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Final
Soil Remedial Investigation Report for IR Site 31 Marina Village Housing, Alameda Point Alameda, California

August 2007

Prepared for:

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:

CDM Federal Programs Corporation
9444 Farnham Street, Suite 210
San Diego, CA 92123

Under Subcontract with:

Barajas & Associates, Inc.
839 W Harbor Drive, Suite 1
San Diego, CA 92101

Prepared under:

Naval Facilities Engineering Command
Contract Number N68711-03-D-5106
Contract Task Order 0032
DCN: BAI.5106.0032.0002

Final

Soil Remedial Investigation Report

for

IR Site 31 Marina Village Housing, Alameda Point
Alameda, California

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Approved by: Michael C. Allen — August 14 2007
Michael Allen — Date
CDM Federal Programs Corporation
Project Manager

Approved by: Larry Davidson — 8/14/07
Larry Davidson, P.E. — Date
CDM Federal Programs Corporation
Program Manager

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August 15, 2007
Doc No. BAI.5106.0032.0002

Ms. Mary E. Parker
Department of the Navy
Base Realignment and Closure
Program Management Office
1455 Frazee Road, Suite 900
San Diego, CA 92108

Subject: Contract No. N68711-03-D-5106, Delivery Order 003
Installation Restoration Site 31, Alameda Point, Alameda, CA
Submittal of Final Remedial Investigation Report for IR Site 31

Dear Ms. Parker:

In accordance with your request, enclosed are three copies with three CDs plus three additional CDs of the Final Remedial Investigation Report for IR Site 31 Marina Village Housing, Alameda Point, Alameda, California dated August 2007. For the Navy's Administrative record we have sent to attention of Diane Silva three copies with 3 CDs. At your request, and with the Navy's cover letter, we have distributed 21 copies and 23 CDs per your address list. This document is submitted in the format of replacement pages and cover to be inserted into the Draft Final Remedial Investigation report.
If you have any questions or require additional information, please call Parveen Kumar (619.338.0798 xt 15) or Mike Allen (858.268.3383).

Sincerely,

for EV

Eli Vedagiri
Program Manager
Barajas and Associates

c: J. Howell-Payne, NAVFAC Southwest (w/o)
M. Allen (w/o) File

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LOCATION: Alameda Point, Alameda, CA

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San Diego, CA 92108

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July 03, 2007

Ms. Mary E. Parker
Department of the Navy
Base Realignment and Closure
Program Management Office
1455 Frazee Road, Suite 900
San Diego, CA 92108

Subject: Contract No. N68711-03-D-5106, Contract Task Order 032
Installation Restoration Site 31, Alameda Point, Alameda, CA
Submittal of Draft Final Remedial Investigation Report for IR Site 31

Dear Ms. Parker:

In accordance with your request, enclosed are three copies and three CDs of the Draft Final Remedial Investigation Report for IR Site 31 Marina Village Housing, Alameda Point, Alameda, California. This document incorporates the responses to agency review comments received 26 April 2007 on the Draft RI Report – Revision I. We have sent three copies and three CDs to the Administrative Record, attention Diane Silva. With the Navy's cover letter, we have distributed to regulatory agencies and others, 21 copies and 22 CDs. Per the document schedule, we anticipate receiving agency review comments by 7 August 2007.

If you have any questions or require additional information, please call me at (619) 270-1247 or Mike Allen at (858) 268-3383.

Sincerely,

V. Saravanan

Saravanan (Eli) Vedagiri, P.E.
Program Manager
Barajas and Associates

c: J. Howell-Payne, NAVFAC Southwest (w/o)
M. Allen (w/o) File

Executive Summary

The Navy conducted a soil remedial investigation (RI) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Title 42 *United States Code*, Sections 9601–9675) at Installation Restoration (IR) Program Site 31 at Alameda Point (formerly Naval Air Station [NAS] Alameda) located in Alameda, California. This Draft Final Soil RI Report has been prepared as part of the remedy selection process described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and meets the specific requirements of Title 40 *Code of Federal Regulations* (CFR) Section 300.430(d). This Draft Final Soil RI Report addresses input received from regulatory agencies in August 2006 and April 2007.

The objective of the soil RI is to collect and evaluate soil data to support a recommendation by the Navy for either no further action or progression to a feasibility study (FS) to evaluate remedial alternatives. The RI analytical results from 126 samples, plus historical data from 648 samples, provide the basis for the human health and Tier 1 screening-level ecological risk assessment conclusions that the current soil conditions at IR Site 31 are protective of human health for residential use and risk to ecological receptors is unlikely. Therefore, this RI report recommends no further action at Site 31.

The purposes achieved by this soil RI are:

- Characterize the nature and extent of contaminants in soil to support human health and ecological risk assessments;
- Conduct a baseline human health risk assessment (HHRA) and a Tier 1, with refined exposure assessment (Step 3a), screening-level ecological risk assessment (ERA) to determine the potential for adverse effects from human exposure to site soil and air and ecological exposure to site soil; and
- Evaluate if groundwater beneath IR Site 31 has characteristics consistent with the known contaminants of the Operable Unit 5 (OU-5)/IR-02 groundwater plume or if the data indicate a site-specific release has occurred and has contributed unique contaminants to groundwater, which are related specifically to previous IR Site 31 activities.

This Draft Final Soil RI Report is not the RI report for IR Site 31 groundwater. A separate groundwater RI and FS report prepared for OU-5 at Alameda Point addressed the groundwater beneath IR Site 31. The OU-5/IR-02 groundwater remedial program is progressing through the remedial decision process separately. The OU-5/IR-02 groundwater preferred remedial alternative is presented in the proposed plan for which the public review period ended in April 2006.

The data evaluated support the conclusion that IR Site 31 is not a source for the benzene and naphthalene contaminants in the OU-5/IR-02 groundwater plume beneath IR Site 31. First, volatile organic compounds (VOCs) were detected infrequently in soils at IR Site 31. When VOCs were detected, they were present at low concentrations in soil, and corresponding groundwater VOC concentrations (i.e., benzene and naphthalene) from the upper portion of the first water bearing zone (FWBZ) were at the lowest concentrations across IR Site 31. Additionally, the organic and inorganic chemicals and the relative chemical concentrations reported in discrete groundwater samples collected at IR Site 31 are consistent with those of the OU-5/IR-02 plume.

Site Background

IR Site 31 is a 25-acre residential use property located within the former NAS Alameda, at the eastern end of Alameda Point. The property now known as IR Site 31 was constructed of fill that was in place by 1927, and fill was added to the surface between 1987 and 1993 during construction of Marina Village Housing. The housing structures were constructed on an approximate 4-foot thick layer of compacted fill with vapor barriers to prevent migration of VOCs from groundwater to indoor air.

IR Site 31 is located in the northwestern corner of the former San Francisco Bay Airdrome (SFBA), an airfield constructed in 1929. The SFBA, which was used primarily by private airplanes and business air fleets, was closed in 1941. In 1947, housing was present across the northwestern corner of IR Site 31. In 1953, two warehouse buildings were within the southwest portion of IR Site 31, and a storage lot was within the eastern half of IR Site 31. The northwestern corner of IR Site 31 was acquired by the Navy in June 1956. Review of aerial photographs shows that the northwestern corner of IR Site 31 was paved in the late 1950s, and the southern portion of IR Site 31 was mostly unpaved at this time. Between 1985 and 1993, warehouse buildings were demolished, and the Marina Village Coast Guard Housing was built on IR Site 31.

IR Site 30, where Island High School (the former George P. Miller Elementary School) and the Woodstock Child Development Center are located, borders IR Site 31 to the north. IR Site 25, where North Village housing structures are located, borders the northeast and northwest perimeter of IR Site 31.

The Navy Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex (FISCA) IR Site 01 warehouse area is located adjacent to IR Site 31 on the south. The FISCA IR Site 01 warehouse area was occupied by four large warehouses that were built in the 1950s. The warehouse area was historically used by the Defense Reutilization and Marketing Office (DRMO) for materials screening and storage and later by the Fleet Support Hospital for packing and shipping operations. FISCA IR Site 01 is no longer Navy-owned property.

FISCA IR Site 02 is located east of IR Site 31 and is no longer Navy-owned property. The western portion of FISCA IR Site 02 was historically used as a screening lot where equipment was temporarily stored prior to sorting for disposal or resale.

Physical Setting

Alameda Point geology is characterized by unconsolidated sedimentary deposits. In the area of IR Site 31, the fill was in place by 1927. A marsh crust layer exists between the fill and the Young Bay Mud portion of the Bay Sediment Unit (BSU). The marsh crust is a soil horizon typically occurring at 5 feet to 18 feet below ground surface (bgs) that is comprised of coal or petroleum-related combustion products (semivolatile organic compounds [SVOCs]), in particular polynuclear aromatic hydrocarbons (PAHs), and trace metals.

The FWBZ is unconfined and extends to depths of at least 20 feet bgs. The dredged fill material is underlain by the Young Bay Mud of the BSU, which forms a semi-permeable aquitard between the FWBZ and the second water-bearing zone (SWBZ). Water level measurements from the wells on IR Site 31 and adjacent sites indicate groundwater is generally at a depth of 7 feet, with a general gradient to the southwest.

Remedial Investigation

The data from the following investigations were used in this soil RI:

- A total of 126 soil samples collected from 50 locations in November 2005 for this IR Site 31 soil RI and analyzed for VOCs, SVOCs (other than PAHs), polychlorinated biphenyls (PCBs), pesticides, and metals;
- A total of 648 soil samples collected from 163 locations in the 2003 PAH assessment;
- Three surface soil samples from the Zone 16 environmental baseline survey (EBS) Parcel 178 Evaluation collected in 2001 and analyzed for pesticides, and PCBs;
- Groundwater analytical results from samples collected in November 2005 for the IR Site 31 RI, consisting of 16 discrete groundwater samples collected from 11 locations and analyzed for VOCs, SVOCs, pesticides, PCBs, and metals;
- Groundwater data from the IR Site 25/IR-02 Groundwater Remedial Investigation/Feasibility Study (RI/FS) report completed in October 2004 to characterize the plume consisting of benzene and naphthalene in shallow groundwater in the vicinity of IR Sites 25, 30, and 31, and the FISCA IR Site 02; and
- Groundwater analytical results from samples collected in the summer of 2002 through summer 2005 and the spring and fall of 2006 from five monitoring wells

within the boundary of IR Site 31 and reported in the spring 2006 annual groundwater sampling report and the fall 2006 quarterly groundwater monitoring data report, which are part of the base-wide groundwater monitoring program ongoing at Alameda Point since 2002.

Soil sampling for the IR Site 31 RI was conducted from 1 November 2005 to 11 November 2005 from 50 soil borings using direct push technology (DPT). A modified grid-based sampling approach was used for characterization of soil, with a bias to past storage areas and adjusted by current access limitations. Soil samples were collected at up to three depths in each boring. The presence of a shallow water table limited the depth of vadose zone soil samples to approximately 7 feet bgs and typically from depth intervals of 0 to 2 feet, 2 to 4 feet, and 4 to 7 feet bgs. All soil samples were analyzed for VOCs, SVOCs (other than PAHs), pesticides, PCBs, and inorganics (Title 22 metals plus iron).

The data quality objectives (DQOs) and laboratory performance criteria met the project-specific quality assurance requirements. There were no rejected analyses. The individual sample quantitation limits were compatible with the specified laboratory reporting limits. The data set generated by the sample analyses met the needs for performing the HHRA and ERA for this soil RI.

Nature and Extent of Potential Contaminants

VOCs (benzene, dichloromethane, and total xylenes), pesticides, two PCBs, and SVOCs (other than PAHs) were detected at concentrations less than the regulatory comparison criteria and infrequently in soil samples at a few locations across the site. Four metals (arsenic, iron, lead, and vanadium) had concentrations exceeding regulatory comparison criteria. The regulatory comparison criteria used were the residential preliminary remediation goals (rPRGs), including California specific values for U.S. Environmental Protection Agency (EPA) Region 9, October 2004. Comparison criteria are used to focus the discussion of nature and extent. The presence of concentrations above comparison criteria does not suggest a health concern, and the health risks are evaluated in the HHRA.

The spatial distribution of PAHs determined in a previous investigation and metals distribution indicated by soil samples from this RI show a difference between the upper 4 feet of fill versus the deeper fill. PAH concentrations are represented as benzo[a]pyrene (B[a]P) equivalent values. The arithmetic mean of the B[a]P equivalent value of 499 micrograms per kilogram (µg/kg) across the entire site is less than 620 µg/kg.

Statistical evaluations were conducted based on the Department of Toxic Substances Control (DTSC) policy for identifying whether metals in soil are related to onsite

activities. Since arsenic, iron, lead, and vanadium were present at concentrations in soils that exceeded screening criteria; the statistical evaluation was conducted to determine whether these metals represent ambient conditions or are a result of onsite activities. Statistical evaluations show that the concentrations of arsenic in soil at IR Site 31 meet criteria for a single population following the methods and criteria in the DTSC policy. The conclusion that arsenic is a single population, is present at ambient concentrations, and unrelated to on-site activity is substantiated by findings that cadmium, chromium, and vanadium also individually represent single populations at ambient concentrations.

Arsenic concentrations are ambient at IR Site 31 means that the arsenic is not the result of releases from onsite activities. Findings from the statistical evaluation of metals are summarized below.

- Evaluation of arsenic at IR Site 31. Application of DTSC criteria to arsenic at IR Site 31 demonstrates that arsenic concentrations in soil represent a single population. Therefore, arsenic concentrations are present at ambient concentrations and do not represent a release.
- Evaluation of other metals at IR Site 31. Cadmium, chromium, and vanadium concentrations at IR Site 31 also meet the DTSC criteria for a single population and ambient concentrations. The probability plots for iron and lead suggest multiple populations. However, this characteristic of iron is also found in the Alameda Point pink background data set, suggesting that it is a common finding with major metals like iron.

Because IR Site 31 was originally included in the area covered by the Alameda Point pink background data set, metal concentrations at IR Site 31 were initially compared to those in the Alameda Point pink background. This result was evaluated and conclusions are supported that the Alameda Point pink background is not applicable at IR Site 31. Similar conclusions were reached for adjacent IR Site 25 in the 2002 Final OU-5 RI Report. Supplemental evaluations of the differences in the soil at IR Site 31 from the soil represented by the Alameda Point pink background data are summarized below.

- Assessment of arsenic concentrations at adjacent locations. IR Sites 31, along with the East Housing Area, and portions of the FISCA Warehouse Area between the East Housing Area and IR Site 31, represent approximately 140 acres of land with similar concentrations of arsenic. This assessment of arsenic concentrations shows that the fill, with concentrations of arsenic that are different than those in the Alameda Point pink background, was used east of Main Street. These arsenic concentrations are similar to arsenic concentrations in the Alameda Point yellow background data.

- Lithological evaluation. The lithology of adjacent areas was evaluated to identify similarities and differences between IR Sites 25, 30, 31, 35, the College of Alameda, and the East Housing Area. The comparison revealed that sites with higher arsenic concentrations tend to be associated with fill events characterized by gravel-laden soil. The physical properties, the grain-size distributions, and the descriptions of soil color indicate that soil at IR Site 31 is different from the soil at IR Site 35, located west of Main Street within the Alameda Point pink background area.
- Alameda Point pink background data set. This data set is not appropriate as a background data set for IR Site 31 based on the original criteria used to group the background data. IR Site 31 has a fill history different from the area sampled for the Alameda Point pink background data set. In addition, none of the background samples representing the Alameda Point pink background area were collected east of Main Street. Therefore, the soil east of Main Street is not represented in the background data set. Iron, considered an indicator of background conditions and used as a criteria in grouping the background data, is statistically higher at IR Site 31 than in the Alameda Point pink background data.

Human Health Risk Assessment

EPA has established a risk management range of 10^{-4} to 10^{-6} for making decisions whether remediation is warranted. Risks less than 10^{-6} are considered negligible. Risks greater than 10^{-4} typically warrant additional investigation or remediation. Risks within the risk management range may be acceptable, depending on decisions made by risk managers. A health risk assessment does not predict actual health effects but is a tool for making risk management decisions.

The noncancer health risk associated with exposure to a chemical is expressed as a hazard quotient (HQ) for individual chemicals or a hazard index (HI) for cumulative noncancer risk. The target risk management level for HQ and HI values is 1.

Cancer risk and noncancer HI values were calculated for three receptor populations potentially exposed to chemicals at IR Site 31:

- **Current Residents** are assumed to be exposed to chemicals in the upper 2 feet of soil to all depths for vapors to indoor air via incidental soil ingestion, dermal contact with soil, inhalation of particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, and ingestion of produce grown in local soil.
- **Future Residents** are assumed to be exposed, via the same pathways as current residents, to chemicals in soil from 0 to 7 foot depth to allow for future

construction. In addition, residential use of groundwater is also considered (ingestion, inhalation, and dermal contact while showering).

- **Construction Workers.** Construction exposure routes are incidental soil ingestion, dermal contact with soil, inhalation of particulates from soil in outdoor air, and inhalation of vapors in outdoor air from the 0 to 7 foot depth.

The risks for the future residential use of groundwater were taken from the final groundwater RI/FS for Site 25/IR-02.

For future residents, the risk estimates assume groundwater is used for drinking water. The total reasonable maximum exposure (RME) and central tendency exposure (CTE) cancer risks (including background) for both EPA and California Environmental Protection Agency (Cal/EPA) are above the risk management range at 2×10^{-2}. Over 99 percent of the risk is associated with residential use of groundwater; however, it is unlikely that groundwater will be used as a source of drinking water. IR Site 31 groundwater will be remediated in accordance with the OU-5/IR-02 groundwater Record of Decision.

For current residents (without groundwater as a drinking water source), the EPA cancer risks (including background inorganics) are within the risk management range with a value of 6×10^{-5}, and the Cal/EPA cancer risk (including background inorganics) is 4×10^{-4}. Approximately 90 percent of this risk is attributable to arsenic in soil. These risks are similar to the risk for the Alameda Point background data sets.

For vapors from soil and groundwater to indoor air, the EPA cancer risk (8×10^{-7}) is below the risk management range, and the Cal/EPA risk (1×10^{-5}) is within the range using the maximum concentration found in any groundwater sample.

EPA and Cal/EPA make risk management decisions considering cancer risk without metals at ambient concentrations, so it is appropriate to present the IR Site 31 cancer risk without ambient metals. Statistical evaluations of arsenic, cadmium, chromium, and vanadium, show that these metal concentrations are ambient and not the result of releases from Navy activities. Therefore, the current and future risks without arsenic and cadmium in soil, and without groundwater as a drinking water source are presented below as residual cancer risk values:

- The current residential residual cancer risk is within the risk management range, with an EPA cancer risk of 7×10^{-6} and a Cal/EPA cancer risk of 3×10^{-5}.
- The future residential residual cancer risk is within the risk management range, with an EPA cancer risk of 1×10^{-5} and a Cal/EPA cancer risk of 4×10^{-5}.

Other chemicals contributing to the residual cancer risk include PCBs, benzo[a]pyrene, and the pesticide dieldrin. Prior to recommending chemicals for inclusion in remedial

decisions, the following factors are considered: the level of risk and the distribution and frequency of detection.

Dieldrin has an EPA and Cal/EPA cancer risk of 1×10^{-6}. The PCBs have an EPA cancer risk of 1×10^{-6} and a Cal/EPA cancer risk greater than 1×10^{-6}. For PCBs and dieldrin, the risk assessment assumes that these chemicals are present at every location when in fact all these chemicals were rarely detected (i.e., detected in 1 to 8 percent of the samples). The few locations where these chemicals were found are dispersed, and there is no specific area of impact.

Benzo[a]pyrene, a PAH, is present, with an estimated cancer risk greater than 10^{-6}. The EPA cancer risk for current residents is 2×10^{-6}. For current residents, the EPA and Cal/EPA cancer risks associated with all PAHs are 3×10^{-6} and 5×10^{-6}, respectively. For future residents, the EPA and Cal/EPA cancer risks associated with all PAHs are 8×10^{-6} and 1×10^{-5}, respectively. The occurrence of PAH is predominately in the northwest portion of the site. The concentrations of PAH contributing to risk are generally at a depth of 4 feet or deeper and appear to be related to the presence of the marsh crust layer. Exposure to the PAH is limited by existing institutional controls that restrict uncontrolled excavations below specified depths and specify a depth of 5 feet as the threshold limit for excavation in the western one-third and specifically the northwest portion of IR Site 31. The institutional controls are administered through the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56.

Noncancer effects are primarily related to direct contact (ingestion) of soil (with Hazard Index HI=4) and primarily associated with vanadium, thallium, and arsenic, with individual HQ values of less than 1, plus iron with an HQ of 2. The noncancer HI value is below 1 without iron and without the ambient metals. Iron noncancer health effects are not considered additive, and there is scientific evidence that increased exposure to iron in soil will not have adverse health effects. The exposure point concentration (EPC) for lead of 40.6 mg/kg is well below the site-specific California residential soil preliminary remediation goals of 150 mg/kg (PRGs).

Benzene, naphthalene, and other VOCs in groundwater that contribute to vapors in indoor air will be remediated as part of the OU-5/IR-02 groundwater plume.

Ecological Risk Assessment

A Tier 1 screening-level ERA was completed with a refined exposure assessment to estimate the potential ecological impacts of chemicals reported at concentrations above detection limits in soil at IR Site 31. The past, current, and expected future use of the site is residential housing; therefore, an urban habitat will be maintained at IR Site 31. Most of IR Site 31 is paved or covered by buildings and is continuously occupied as

residential housing. Therefore, exposure pathways to soil compounds by ecological receptors are not significant and ecological risk to current and expected future terrestrial receptors is unlikely for current or expected future habitat at IR Site 31.

Summary and Conclusions

The NCP Section 300.400(a) requires a remedial response action be evaluated and selected in the CERCLA process when there is a release of a hazardous substance into the environment of any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare. The results of the baseline risk assessment are used to determine whether a release or potential release poses an unacceptable risk to human health or the environment. In accordance with EPA OSWER Directive 9355.0-30, when the cancer risk is greater than 10^{-4} and the noncancer HQ is greater than 1 action is generally warranted.

In conclusion, based upon the HHRA and the ERA results in this RI, no further action is recommended for IR Site 31 for the following reasons:

- There is no evidence of a release of hazardous substance related to a Navy activity.
- Statistical evaluations have concluded that arsenic, cadmium, chromium, and vanadium concentrations individually represent single populations and are presents at ambient concentrations. Therefore, in accordance with EPA guidance and DTSC policy, these ambient metals were removed for residual risk calculations and the risks from ambient metals were not considered in the no further action recommendations of this RI.
- The EPA and Cal/EPA cancer risks for current and reasonable future use are within the risk management range (10^{-4} to 10^{-6}). EPA and Cal/EPA cancer risks, including background metals but without use of groundwater for drinking water, are not greater than 10^{-4}. The EPA and Cal/EPA cancer risks without groundwater as a drinking water source and in accordance with EPA guidance and Navy policy for background inorganics without ambient concentrations of arsenic and cadmium are also in the risk management range. The EPA cancer risk value is 7×10^{-6} and the Cal/EPA cancer risk value is 3×10^{-5}.
- PAH health risks are within the risk management range and are managed by institutional controls in the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56.
- The noncancer HI value is below 1 when the low toxicity of iron is considered and without ambient metals (arsenic, cadmium, chromium, and vanadium).
- Indoor air risks, within the risk management range, will decrease as groundwater remediation for OU-5 proceeds. In the proposed plan for the OU-

5/IR-02 groundwater, the preferred alternative indicates the remedy will take approximately 8 years to achieve the remedial action objectives.

- The screening level ERA concluded that exposure pathways are not significant and ecological risk to current and expected terrestrial receptors is unlikely for current or expected future habitat.

- Groundwater beneath IR Site 31 is consistent with the OU-5/IR-02 groundwater plume, and there is no evidence that IR Site 31 soil has contributed to a release to groundwater. The groundwater remedy selection is specific to OU-5, is unrelated to soil at IR Site 31, and is addressed in the OU-5/IR-02 groundwater remedial program.

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Acronyms and Abbreviation

°F	degrees Fahrenheit
µ	microgram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
95 percent UCL	95 percent upper confidence level
AMSL	above mean sea level
ASTM	American Society for Testing and Materials
B[a]P	benzo(a)pyrene
BAFs	bioaccumulation factors
BCT	BRAC cleanup team
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BRAC	Base Realignment and Closure (Commission)
BSU	Bay Sediment Unit
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethylbenzene, and xylenes
bwt	below the water table
Cal/EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CD	compact disk
CDFG	California Department of Fish and Game
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm^2	square centimeters
COC	chain-of-custody
COPCs	chemicals of potential concern
COPECs	chemicals of potential ecological concern
CSF	cancer slope factor
CSM	conceptual site model
CTE	central tendency exposure
DDD	4,4-dichlorodiphenyldichloroethane
DDE	4,4-dichlorodiphenyldichloroethylene
DDT	4,4-dichlorodiphenyltrichloroethane

Acronyms Abbreviations (continued)

DERP	Defense Environmental Restoration Program
DON	Department of the Navy
DPT	direct push technology
DQOs	data quality objectives
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control
DUAR	data usability and assessment review
EBS	environmental baseline survey
EDC	economic development conveyance
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERA	ecological risk assessments
ERRG	Engineering/Remediation Resources Group, Inc.
ESI	expanded site investigation
EWI	Environmental Work Instruction
FISCA	Fleet and Industrial Supply Center
FS	feasibility study
FWBZ	first water-bearing zone
g/kg-day	grams per kilogram per day
HCI	hydrochloric acid
HERD	Human and Ecological Risk Division
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration
IRIS	Integrated Risk Information System
IT	International Technology Corporation
ITSI	Innovative Technical Solutions, Inc.
K_{oc}	partition coefficient
LBNL	Lawrence Berkeley National Lab
LCS/LCSDs	laboratory control sample/laboratory control sample duplicates
LSA	LSA Associates, Inc.
MCLs	maximum contaminant levels
MDL	method detection limit
mg/kg	milligrams per kilogram

Acronyms Abbreviations (continued)

mg/L	milligrams per liter
mL	millileter
MS/MSDs	matrix spike/matrix spike duplicates
MSL	mean sea level
MTBE	methyl-tertiary-butyl-ether
MWH	Montgomery Watson Harza
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
Neptune	Neptune and Company, Inc.
NFESC	National Facilities Engineering Service Center
NOAEL	no-observed-adverse-effect-level
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and completeness
PCB	polychlorinated biphenyl
PID	photoionization detector
PRC	PRC Environmental Management, Inc.
PRG	preliminary remediation goal
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QC	Quality control
RAO	remedial action objectives
RAP/ROD	remedial action plan/record of decision
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	remedial investigation
RI/FS	remedial investigation and feasibility study
RME	reasonable maximum exposure
RPD	relative percent difference
rPRG	residential preliminary remediation goal
RWQCB	Regional Water Quality Control Board
SAP	sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act

Acronyms Abbreviations (continued)

SFBA	San Francisco Bay Airdrome
SOP	standard operating procedure
SOWs	statements of work
SQL	sample quantitation limit
SSL	soil screening level
SUF	site-use factors
SVOCs	semivolatile organic compounds
SWBZ	second water-bearing zone
TCE	trichloroethene
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TQL	target quantitation limit
TRVs	toxicity reference values
TtEMI	Tetra Tech EM Inc.
TW	temporary well
UCL	upper confidence level
USGS	U.S. Geological Survey
Versar	Versar, Inc.
VOA	volatile organic analyte
VOC	volatile organic compound
WRT	Wallace, Roberts & Todd, LLC

Section 1
Introduction

This report presents the results of the remedial investigation (RI) of Installation Restoration Program Site 31 (IR Site 31), Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California (Figure 1-1). This RI report incorporates elements required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for site characterization. The Draft Final Soil RI report addresses input received from the regulatory agencies in August 2006 on the Draft Soil RI report and comments received April 2007 on Revision 1 of the Draft Soil RI report. Figures and tables for this RI report are presented at the end of the text for each section.

Field activities were performed for this RI in accordance with the final RI work plan for IR Site 31 (CDM Federal Programs [CDM] 2005a), using the following guidance:

- Guidance for the Data Quality Objectives Process (U.S. Environmental Protection Agency [EPA] 2000a);
- Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (EPA 2000b); and
- EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA 2001a).

During a conference call held on 12 October 2005, representatives of EPA, the San Francisco Bay Regional Water Quality Control Board (RWQCB), and the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) verbally concurred with the RI work plan (CDM 2005a).

This RI report was prepared in accordance with the following:

- Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) under CERCLA (EPA 1988);
- Risk Assessment Guidance for Superfund Part A (EPA 1989) and Part B (EPA 1991b);
- Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (Cal/EPA 1996c);
- Ecological Risk Assessment Guidance for Superfund (EPA 1997a);
- Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities Part A (Cal/EPA 1996a) and Part B (Cal/EPA 1996b);

- Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities. Final Policy. Human and Ecological Risk Division (HERD), Cal/EPA February 1997;
- Navy Policy for Conducting Ecological Risk Assessments (Department of the Navy [DON] 1999); and
- Navy Guidance for Conducting Ecological Risk Assessments (ERA) (DON 2001a).

1.1 Purpose

The purpose of this RI is to use analytical results from soil and groundwater samples collected at IR Site 31 during the RI and previous investigations to:

- Characterize the nature and extent of contaminants in soil, if any, that resulted from previous site activities for the purpose of supporting human health and ecological risk assessments;
- Assess human health and ecological risk related to human exposure to site soil and indoor air and ecological exposure to site soil; and
- Evaluate if groundwater beneath IR Site 31 has characteristics consistent with the known contaminants of the Operable Unit (OU)-5/IR-02 groundwater plume, or if the data indicate a site-specific release has occurred and has contributed unique contaminants to groundwater, which are related specifically to previous IR Site 31 activities.

The objective of the RI is to collect and evaluate soil data to support a Navy recommendation of no further action or progression to a feasibility study (FS) to evaluate remedial alternatives. The OU-5/IR-02 groundwater is progressing through the remedial decision process independently from the IR Site 31 Soil RI. Public review for the OU-5/IR-02 groundwater proposed plan, which identifies the preferred remedial alternative, was completed in April 2006 (CDM 2005b). This document focuses on soil contamination and is not the RI report for IR Site 31 groundwater.

The scope of this RI is to collect and conduct chemical analyses on soil samples from 50 direct push borings and perform geotechnical analyses on samples from 10 of these 50 locations. Further descriptions of the scope tasks completed for this soil RI are listed below:

- Characterize the nature and extent of chemicals in soil at IR Site 31 using analytical results of samples collected from 50 direct push sample locations with horizontal and vertical distribution adequate to address the exposure scenarios evaluated in the human health and ecological risk assessments;

- Collect and analyze groundwater samples from two discrete depths at 11 direct push locations;
- Provide useable data for the risk assessments by performing laboratory analyses of soil and groundwater samples using analytical methods adequate to achieve reporting limits that are compatible with the planned statistical evaluations;
- Identify physical properties of the soil based upon samples from 10 (of the 50) direct push soil sample locations;
- Use the analytical results of groundwater samples from direct push and existing onsite monitoring wells to assess the nature of chemicals in groundwater at IR Site 31 to determine whether there has been a chemical release to groundwater that is unique to IR Site 31 and unrelated to the OU-5/IR-02 groundwater plume;
- Use analytical results of volatile organic compounds (VOCs) in shallow groundwater samples to provide input to the Johnson and Ettinger model to estimate the migration of vapors to indoor air in support of the human health risk assessment (HHRA);
- Complete a soil baseline HHRA using analytical results of samples collected in this RI and historic analytical results of polynuclear aromatic hydrocarbons (PAHs) in soil to determine the likelihood that exposure to chemicals in soil or air at IR Site 31 could pose a threat to human health; and
- Complete a screening-level ecological risk assessment to evaluate whether potential chemical releases to soil from past activities at IR Site 31 pose a hazard to potential ecological receptors.

1.2 Report Organization

This RI report is organized into the following sections and appendices:

- Section 1 discusses the purpose and organization of the RI; describes the site, previous operations, and the regulatory framework; and summarizes previous investigations and future use of the site.
- Section 2 describes the physical and environmental setting of Alameda Point and IR Site 31.
- Section 3 discusses the investigation approach and scope, including data quality objectives (DQOs), the RI sampling program, and deviations from the work plan (CDM 2005a).
- Section 4 presents results of the RI sampling and describes the nature and extent of soil contamination at the site and presents a comparative evaluation of groundwater sample results from the RI to the known characteristics of the OU-5/IR-02 VOC plume in groundwater beneath IR Site 31.

- Section 5 discusses the fate and transport of chemicals in soil.
- Section 6 summarizes the results of the human health and ecological risk assessments.
- Section 7 provides conclusions and recommendations.
- Section 8 lists references.
- Appendix A presents historical maps and aerial photographs of IR Site 31 and surrounding areas.
- Appendix B presents historical data tables, including 2002 benzo(a)pyrene (B[a]P) information.
- Appendix C describes the field methods, chain of custody forms, survey coordinate data, and investigation derived waste disposal manifests.
- Appendix D presents boring logs.
- Appendix E presents geotechnical laboratory data (on CD).
- Appendix F presents data quality assessment and validation results (on CD).
- Appendix G presents a tabular summary of analytical results from this RI.
- Appendix H1 summarizes Alameda Point background data sets, including applicability to IR Site 31, and presents the statistical comparisons of concentrations of inorganic analytes in site soil to Alameda Point pink background concentrations.
- Appendix H2 presents an evaluation of arsenic and other metals in soil including statistical evaluations to determine if the metals are present at ambient concentrations.
- Appendix I presents the HHRA; Attachments I1 through I5, and the HHRA data tables are presented on CD.
- Appendix J presents the ERA.
- Appendix K presents the final approved drawings for the housing units, dated March 29, 1990.
- Appendix L presents responses to comments from regulatory agencies on the draft revision 1 version of the RI.
- Appendix M presents a copy of the City of Alameda Marsh Crust Excavation Ordinance number 2824, dated 8 March 2000 and the "threshold depth" map.

1.3 Background

The following subsections provide background information for Alameda Point and IR Site 31 on relevant environmental regulations; the history of NAS Alameda, IR Site 31, and surrounding sites; and previous environmental investigations in the area.

1.3.1 Regulatory Framework

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

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

NAS Alameda (National Priority List Site Identification - CA2170023236), now known as Alameda Point, was added to the EPA National Priorities List in July 1999. Therefore, EPA and Navy RI protocols have been followed in conducting the fieldwork and preparing this RI report for IR Site 31. The RI/FS process involves determining the nature and extent of contamination, estimating risks posed by the contaminants, and evaluating options for their cleanup. The NCP, promulgated in the *Code of Federal Regulations* (CFR) in 40 CFR 300, provides the RI/FS protocols.

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

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

1.3.2 Base Description and History

In 1929, the San Francisco Bay Airdrome (SFBA) was constructed on a 458-acre parcel, and in 1930, the City of Alameda deeded a 100-acre parcel to the Army. The Army established an air base on the airport, now known as Benton Field, and began construction activities in 1931. On June 1, 1936, Alameda deeded another 929-acre parcel of diked and filled reclaimed land to the Navy for the nominal fee of $1. Four months later, the Army abandoned Benton Field and turned over its facilities to the Navy (Alameda Education Foundation 2006). Construction of the rest of the base included several iterations of filling tidelands, marshlands, and sloughs with dredge materials from the San Francisco Bay. In December 1951, the Navy acquired the majority of IR Site 31 for storage purposes. The northwest portion of IR site 31 was acquired in June 1956 (Naval Facilities Engineering Command 1994). NAS Alameda was operated as an active Naval facility from 1940 to 1997.

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

- Construction Battalion Unit 416;
- Commander Naval Air Force, U.S. Pacific Fleet Material Representative;
- Defense Property Disposal Office;
- Navy Disease Vector Ecology Control Center;
- Alameda Detachment, Explosive Ordnance Disposal Group One;
- Marine Air Group 42;
- Naval Air Reserve Unit;
- Naval Regional Dental Center Branch Clinic;
- Naval Regional Medical Center Branch Clinic;
- Pacific Fleet Audio-Visual Facility Component;
- Shore Intermediate Maintenance Activity; and

- Supervisor of Shipbuilding, Conversion, and Repair.

1.3.3 Site Description and Operations

IR Site 31 is a 24.9-acre site located at the eastern end of Alameda Point (Figure 1-2). The site is bounded by IR Site 25 to the north, IR Site 30 to the northeast, and the non-Navy Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex (FISCA) Former Warehouse Area to the east and south. The FISCA Defense Reutilization and Marketing Office (DRMO) Scrapyard and Screening Lot are located east of IR Site 31.

In the late 1800s, the area was intertidal marsh lands and included municipal railroad embankments that connected with the Alameda Point ferry terminals. From the late 1800s until the 1920s, two coal gas plants and an oil refinery (Pacific Coast Oil Works), an asphalt pipe manufacturing plant, a soap company, a carriage factory, and other manufacturing businesses were located near the present-day site (Willard 1988). These facilities may have discharged petroleum products, trace metals, and other wastes, which were deposited along the sides of tidal channels and on the surface of marshlands near the present-day site.

IR Site 31 is located in an area that was created by diking, draining, and then filling tidelands, marshlands, and sloughs, beginning in the early 1900s and continuing until 1927. This is documented by a fill history (Figure 4-2) compiled by Bechtel Environmental, Inc. (Appendix H-2) and confirmed by historical maps of IR Site 31 (Figures A-1 through A-4 in Appendix A), which show that the land was predominantly undeveloped before 1927.

As the marshlands and intertidal areas were filled in, the discharged petroleum products became entrapped in the subsurface, creating what is now referred to as the Marsh Crust. The Marsh Crust layer consists of entrapped organic matter with medium- to heavy-weight petroleum hydrocarbons situated at the original marshland and tidal channel surface across Alameda Point. (Neptune et al. 2002; PRC Environmental Management, Inc. [PRC] and Versar 1996). Subsequent filling actions have buried the Marsh Crust at depths reported to range from 8 feet to 15 feet below ground surface (bgs). The fill material that overlies the Marsh Crust consists mostly of dredged sediment from the Oakland Inner Harbor. The fill used to create the site is believed to contain Oakland Inner Harbor dredge materials (IT 2001), which contained characteristic manufactured coal gas waste (coal ash with abundant trace metals and PAH coal tar) from shoreline plant sites in Oakland and Alameda (Bechtel Environmental, Inc. [BEI] 2004b).

The last documented dredged fill event at Site 31 occurred in 1927. In 1929, construction of the SFBA, an airfield consisting of two runways and a hangar, was

initiated on a rectangular tract consisting of 458 acres of reclaimed marshland that was bounded by Atlantic Avenue to the south, Main Street to the west, the Bethlehem Steel Shipbuilding Company yard to the north, and Webster Street to the east. The SFBA was used primarily by private airplanes and business air fleets. A second hangar was added after 1930 when the SFBA was operated jointly with the Army's Benton Field from 1930 to 1936, where after the Navy took possession. The Navy closed the SFBA in 1941 with the construction of the newer airfield further west on Alameda Point (Freeman 2006). IR Site 31 is located in the northwestern corner of the former SFBA property. Figures A-5 through A-7 show the SFBA property, hangars, and the IR Site 31 boundaries.

An aerial photograph from 1947 (Figure A-6) shows the presence of housing across the northwestern corner of the site. Construction of this housing may have included the addition of construction fill. The southern half of the site had a railway switchyard in the southern perimeter. The railway switchyard remained present until 1953 (Figures A-6 through A-8), at which time the land was graded again. Buildings 369 and 172 (Figure 1-3) were established within the southwest corner of IR Site 31 boundaries, and a storage lot was set up within the eastern half of IR Site 31 boundaries. The storage lot was apparently used for equipment and was not surfaced.

An aerial photograph from 1959 (Figure A-9) shows the former military housing areas on the northwest corner of IR Site 31 and much of IR Site 30 were demolished, paved over, and apparently used as a storage yard. Aerial photographs document that this storage continued on the site until approximately 1985. Aerial photograph review shows that between 1985 and 1993, Buildings 369 and 172 were demolished, and approximately 160 units of the Marina Village Coast Guard Housing were built on IR Site 31.

The Navy completed a Proposed Housing Site Investigation in January 1987 to provide an FS for upgrading the Naval Supply Center Annex for future Navy family housing units (Bissell and Karn, Inc. 1987). It was recommended that the structures be placed on a 4-foot thick layer of engineered fill for adequate support. To achieve this, it was recommended that the upper 2 feet of existing material be reworked and compacted in 12-inch lifts on top of a geotextile fabric. Then an additional 2 feet of imported, non-expansive fill would be placed on top of the reworked fill and compacted in 8-inch lifts. The design drawings (Appendix K) specify the houses be constructed on a total of 4 feet of compacted fill.

The Navy completed an investigation of potential soil and groundwater contamination associated with past activities at the NAS Alameda Supply Annex warehouse area (ERM-West 1987). The study indicated that concentrations of metals were "elevated" in the northern portion of the warehouse area and recommended additional soil samples be collected and analyzed for metals. In 1988, additional soil sampling was conducted, and analytical data indicated high levels of nickel and chromium in the northern

portion of the study area and in the background soil (ERM-West 1988). It was recommended that replacing the top 6 inches to 1 foot of soil in the northern portion of the site would reduce potential risks associated with direct contact with soil at the housing development in the northern portion of the warehouse area.

The ERM study was for the warehouse area, which included areas south of Site 31, and addressed only the southern portion of Site 31. The study made no estimates of human health risk and only reported metals as "elevated" above a median value derived from the results of the 29 sample analyses performed during that study. Construction specifications (Appendix K) specify removal of 6 inches of Site 31 soil prior to importing fill for the housing construction.

The referenced reports (ERM 1987 and 1988) were thoroughly reviewed and discussed with the regulatory agencies during development of the RI work plan and sampling and analysis plan (SAP). Information from these reports was used in developing the investigation and selecting sample locations. The Phase 1 and Phase II ERM reports make repeated mention that the investigation reviewed past use and aerial photos and found no evidence of a spill or release. In addition, the report clearly states that the very limited investigation "was not sufficiently detailed to identify the extent of contamination...." The area sampled extended significantly beyond the southern and eastern boundaries of the current IR Site 31. The Phase II report identified soil analytes of concern as chromium and nickel. For the combined Phase I and II, there were 18 locations sampled and 29 soil samples analyzed. Approximately 10 of the locations were within the current Site 31 area. Only two analyses of chromium were detected at concentrations greater than the current residential preliminary remediation goal (PRG) values (residential preliminary remediation goal [rPRG] - 210 milligrams per kilogram [mg/kg]). The Phase II ERM report shows these two chromium sample results are associated with two soil sample locations (SB-1 north side of Building 369 and SB-3 in the eastern quarter of Site 31) within the area of current Site 31. The reported values for chromium at location SB-1 were 360 mg/kg at a depth of 0 to 0.5 feet bgs; at location SB-3, the sample from 1 to 1.5 feet bgs reported chromium at 250 mg/kg. Chromium data collected during the Site 31 RI did not exceed the current rPRG.

In 1989, the Navy recommended installing a vapor barrier under proposed housing units to mitigate the potential of benzene migrating to indoor air (Woodward-Clyde Consultants 1989). In late 1989, a risk assessment was conducted for the Marina Village Housing Units. Based on the location and distribution of benzene and naphthalene in groundwater, it was determined that these contaminants likely originated in the FISCA screening lot and scrapyard area adjacent to the site and that there was no evidence of an onsite source (PRC 1990).

In 1993, the Navy reported that the Marina Village housing units were completed with an underlying barrier intended to be impermeable to VOC vapors. The final approved

drawings for the housing units, dated 29 March 1990, have been included as Appendix K. The drawings specify the soil removal, addition of fill soil, and details for the foundation base, sand fill, and the planned location for the vapor barriers. The drawings indicate that the following fill activities occurred prior to building the housing units: removal of a 3-inch asphalt layer, removal of 6 inches of soil, reconditioning of existing fill, addition of 2-feet minimum imported construction fill, and compaction of 4 feet of fill, addition of 4 inches of capillary material, placement of a 40-mil vapor barrier, addition of 2 inches (minimum) of sand, and addition of an 8-inch slab.

1.3.4 Operations Adjacent to IR Site 31

IR Site 31 is located near four IR sites: 25 and 30 on Alameda Point and IR-01 and IR-02 on FISCA where many environmental investigations and remediation activities have been conducted. Portions of IR Sites 25, 30, and 31 are underlain by a groundwater plume comprised of dissolved phase benzene and naphthalene that also underlies a portion of FISCA Sites IR-01 and IR-02. The highest concentrations of these chemicals are centered under FISCA Site IR-02 and the southeastern portion of IR Site 25 (see Section 1.3.5.7). The groundwater RI for this plume has already been completed. Descriptions of these four sites and their historical operations are presented below. Like IR Site 31, both of these sites were marshlands until the early 1900s when imported fill material was used to create the land present today.

1.3.4.1 IR Site 25

IR Site 25 is located immediately northwest of IR Site 31 and has been used historically for military housing. The site presently contains the U.S. Coast Guard North Village multi-unit housing structures, a community center, a housing office, and a park containing baseball and soccer fields and a fitness course. There are currently no residents in this housing, which is not planned for future use by the U.S. Coast Guard. The primary contaminants in soil at IR Site 25 are PAHs that are theorized to have originated from the historical emplacement of contaminated fill material (Neptune et al. 2002). The Navy conducted two removal actions at IR Site 25 where approximately 66,763 cubic yards of PAH-contaminated soil was removed across approximately 26 acres.

1.3.4.2 IR Site 30

IR Site 30 is located northeast of IR Site 31 and was also first developed as part of the former SFBA although development was limited to grading and grass cover. The SFBA was constructed in 1929 and used primarily by private airplanes and business air fleets until it was closed in 1941.

An aerial photograph from 1947 (Figure A-6) shows the presence of housing on site; this housing remained until 1953 (Figures A-6 through A-8). The Site 30 property was acquired by the Navy in June 1956 for storage purposes (Naval Facilities Engineering Command 1994). By 1959, the housing area was paved and appears to have been used as a storage area that may have been associated with the FISCA warehouse area located to the south of IR Site 30 (Figure A-9). Construction of the George P. Miller Elementary School began in approximately 1975, and construction began at the Woodstock Child Development Center between 1977 and the mid-1980s (Figures A-10 through A-17). The Woodstock Child Development Center is currently leased to Alameda United School District. The Navy conducted a removal action at IR Site 30 in 2004 in which contaminated soil was removed from one area and pavement or other material to cover the soil was placed over most of the site, including all of the school play area (Shaw 2005b). Island High School moved into the former George P. Miller Elementary School in 2006.

1.3.4.3 FISCA IR Site 02

FISCA IR Site 02 is located east of IR Site 31 (Figure 1-2). FISCA IR Site 02 is one of seven IR sites within FISCA. The western portion of FISCA IR Site 02 was historically used as a screening lot where equipment was temporarily stored prior to sorting for disposal or resale. The eastern portion of FISCA IR Site 02 was used as a scrapyard by DRMO where property declared "excess" by the Department of Defense was temporarily stored. The surplus equipment included autos, equipment, and stockpiled scrap metal, much of which may have contained fuel, oil, coolants, and other automotive liquids that had the potential to leak onto exposed soil (PRC 1993). FISCA IR Site 02 is no longer Navy-owned property and is in the process of being redeveloped into residential housing as part of the land transfer process.

Polychlorinated biphenyl (PCB), lead, and cadmium contamination were discovered in soils during the RI at FISCA IR Site 02. The suspected sources for the PCBs were leaks from PCB-containing electrical equipment that may have been stored on site. The suspected sources of the cadmium and lead are paints and metal bearings that also may have been stored on site. Two removal actions were conducted by the Navy at FISCA IR Site 02 to remove lead and PCB-contaminated soil as a result of findings during the RI at FISCA IR Site 02 (PRC 1993). A third removal action was conducted as part of a subsequent remedial action plan/record of decision to remove cadmium and additional PCB-contaminated soils (Tetra Tech EM Inc. [TtEMI] 2001b).

1.3.4.4 FISCA IR-01 Warehouse Area

The FISCA warehouse area is located adjacent to IR Site 31 on the south. The warehouse area was occupied by five large warehouses (Buildings 361, 368, 369, 370, and 371; Figure 1-3) that were built in the 1950s (ERM-West 1988). With the exception

of Building 369, which was located on IR Site 31, all of these warehouse buildings were located on FISCA IR-01. The warehouse area was historically used by DRMO for materials screening and storage and later by the Fleet Support Hospital for packing and shipping operations.

Historically, the northern portion of the warehouse area was mostly unpaved (present-day location of IR Site 31, U.S. Coast Guard Housing), and the southern portion of the warehouse area (around the warehouses themselves) was paved (ERM-West 1988). FISCA IR Site 01 is no longer Navy-owned property.

Surface soil samples collected during environmental investigations conducted prior to the construction of military housing at the warehouse area were found to contain high concentrations of chromium and nickel. These samples were collected in the northern portion of the former warehouse area (southwest of IR Site 31). Concentrations of benzene and naphthalene were reported above detection limits in groundwater samples, with the highest concentrations occurring on site, immediately downgradient of the DRMO Scrapyard (FISCA IR Site 02). The reports from these investigations concluded that no discrete areas with large amounts of contaminants in soil existed. However, broad areas existed in which concentrations of contaminants in soil were present at concentrations greater than the regulatory criteria.

1.3.5 Previous Investigations at IR Site 31

The former economic development conveyance (EDC) Parcel 21 was designated as IR Site 31 because groundwater beneath the site is impacted by the OU-5/IR-02 groundwater plume. Prior to being designated an IR site, historic investigations took place for adjacent areas and involved some sampling within the boundary of current IR Site 31. This subsection provides information from previous and concurrent investigations conducted at IR Site 31. A summary of data collected during these investigations and a discussion of the usability of the data for purposes of the RI at IR Site 31 are included. Tables 3-2, 3-3, and 3-4 show the number of usable samples (i.e., samples for which data were validated and verified) collected at IR Site 31 presented according to analyses and investigation.

1.3.5.1 1989 Shallow Soil Gas Investigation

A soil gas investigation was conducted in 1989 (PRC 1990) at environmental baseline survey (EBS) Parcels 178, 179, and 180 to evaluate the possibility of locating housing in this area. Parcel 178 is located in IR Site 31. The 1989 investigation included the collection of soil gas samples from shallow soil to evaluate the extent of benzene contamination in groundwater. Five out of 41 soil gas samples collected in these three parcels had detectable concentrations of benzene (PRC 1990). Depth to groundwater at the time the samples were collected is not known (but is now known to be generally

7 feet bgs). Detected soil gas concentrations ranged from 0.3 to 0.04 micrograms per liter (μg/L) for benzene, with the highest concentration near the 3102 location sampled in 2005. Because of the shallow water table, indoor and outdoor air concentrations were modeled using shallow groundwater data collected on site; these soil gas data were not used for the RI at IR Site 31.

1.3.5.2 Environmental Baseline Survey Investigations

In 1993, the EBS program was initiated at Alameda Point to facilitate property transfer. Initially, NAS Alameda was divided into 209 EBS parcels. Figure 1-3 shows the two EBS parcels (Parcels 178 and 184) located within the boundaries of IR Site 31 as well as buildings, structures, open space, and underground utilities.

The EBS investigation was implemented in two phases. Phase 1 provided an assessment of the environmental impacts due to base operations and included site visits, employee interviews, historical research, and an inventory of all property on a parcel by-parcel basis (ERM-West 1994). For the two EBS parcels in IR Site 31, the Phase 1 EBS investigation found no evidence of activities or operations that could have resulted in a release within the two parcels.

Fourteen soil samples were collected from 10 locations in March 1987 and analyzed for pesticides, PCBs, and metals (ERM-West 1987). Groundwater samples were collected from two monitoring wells between March 1987 and January 1988 (ERM-West 1988). The 1987 study indicated that concentrations of metals exceeded criteria in the northern portion of the warehouse area, and the study recommended additional soil samples be collected and analyzed for metals. In 1988, additional soil sampling was conducted, and analytical data indicated high levels of nickel and chromium in the northern portion of the site and in the background soil (ERM-West 1988). It was recommended that replacing the top 6 inches to 1 foot of soil in the northern portion of the site would reduce potential risks associated with direct contact with soil at the housing development in the northern portion of the warehouse area.

1.3.5.3 Zone Evaluation Data Summary, Zone 16: Housing Zone

Three surface soil samples plus two soil gas samples were collected from five locations across IR Site 31 (Zone 16 - EBS Parcel 178; IT 2001). The three soil-sampling locations are identified as 178-Z16-001 through 178- Z16-003 on Figure 4-1. The surface soil samples were analyzed for pesticides and PCBs; the soil gas samples were analyzed for VOCs. The soil sample results were incorporated into this RI for use in the risk assessments. The details are clarified in Section 4 on page 4-2.

1.3.5.4 Residential Risk Evaluation for United States Coast Guard Housing

A risk evaluation was conducted in 2002 (TtEMI 2002a) to evaluate the potential health risks associated with living at the U.S. Coast Guard housing areas located in IR Sites 25 and 31. The risk evaluation included indoor air modeling and the collection of ambient air samples to conduct an indoor air quality assessment.

Analytical data used in the indoor air modeling included samples collected during the OU-5 RI (Neptune et. al 2002) and consisted of groundwater samples collected from monitoring wells and HydroPunch borings, as well as soil vapor samples. Using all VOCs reported above detection limits, a screening-level risk evaluation was conducted. Results of the risk evaluation indicated that the cancer risks and noncancer hazards were below the threshold values (hazard index [HI] of 1 and cancer risk of 1×10^{-5}) for predicted indoor air concentrations based on both soil vapor and HydroPunch groundwater data. Threshold values were exceeded only when predicted indoor air concentrations were based on groundwater data from samples collected at monitoring wells.

Additional indoor and outdoor air samples were collected in IR Sites 25 and 31 to verify the indoor air modeling results. Samples were collected from crawl spaces, indoor locations, and outdoor locations; analyzed for VOCs; and compared to ambient air measurements collected by the California Air Resources Board (CARB).

Findings from statistical analysis showed that the indoor air VOC concentrations in occupied homes were higher than in unoccupied homes, reflecting the use of household VOC products and circulation with outdoor ambient air.

Also the indoor air VOC concentrations (except methyl-tertiary-butyl-ether [MTBE]) for units with vapor barriers (Marina Housing in IR Site 31) were no different than for units without vapor barriers (North Housing and Kollman Circle in IR Site 25). MTBE concentrations were higher during the February sampling of the North Housing than during the April and May sampling of the other units.

The indoor air quality assessment concluded that:

1. VOC concentrations in crawl spaces did not differ from those in indoor air.
2. VOC concentrations in indoor air were consistent with outdoor air concentrations and ambient measurements collected by CARB.
3. "The risks to residents of the U.S. Coast Guard housing areas are not likely any different from those of other individuals residing in the Bay Area" (TtEMI 2002a).

1.3.5.5 2002 Polynuclear Aromatic Hydrocarbon Assessment

An assessment of PAHs was conducted in 2002 (reported in Appendix D to the Final RI Report Transfer Parcel EDC-5, Dated March 2005) to examine the potential presence of PAHs in fill material at eight transfer parcels where no PAH release or disposal had been documented (BEI 2005b). Forty-six soil samples (including four duplicates) were collected from direct push borings at 12 locations in IR Site 31 in June 2002 (BEI 2002). The 12 borings are identified as 32EDC-21-1 through 32EDC-21-12 on Figure 4-1. PAHs reported in the soil samples were expressed as a calculated B[a]P equivalent concentration. Appendix B Figure B2 shows B[a]P equivalents. The maximum concentration was 680 micrograms per kilogram (µg/kg), whereas all other concentrations were below the Alameda Point criteria of 620 µg /kg. The individual PAH values were used in estimating the human health risk for this RI. This sampling effort was largely duplicated and superseded in a 2003 PAH assessment by Bechtel (2004a).

1.3.5.6 2003 Polynuclear Aromatic Hydrocarbon Assessment

A total of 648 normal soil samples collected from 163 borings were analyzed for PAHs during the 2003 PAH assessment. The quality assurance (QA) parameters were not broken out for portions of the data on IR Site 31; however, out of the whole data set, which included 3,401 samples collected from 19 IR Sites and 3 EBS parcels, 66 samples had 15 analytes that were considered unusable. The 2003 PAH assessment data are therefore considered 98 percent usable and have been included in the RI data set for IR Site 31; these data are discussed further in Section 4.

PAHs reported in the soil samples were expressed as a calculated B[a]P equivalent concentration (BEI 2004a) and compared to the Alameda Point-specific screening criterion of 620 µg/kg. The individual PAH values were used in estimating the human health risk for this RI.

1.3.5.7 Remedial Investigations at Operable Unit 5

Two RIs that included discussions of environmental conditions at IR Site 31 were conducted adjacent to the site at IR Site 25: the OU-5 RI completed in July 2002 (Neptune et al. 2002) and the IR Site 25/IR-02 groundwater RI/FS issued as a final report in October 2004 (Engineering Remediation Resources Group, Inc. [ERRG] 2004).

2002 OU-5 Remedial Investigation

Environmental samples of soil gas and groundwater were collected at IR Site 31 in May 2001 in support of the RI for OU-5 (Neptune et al. 2002). The May 2001 soil gas sampling event included the collection of samples at two depths: 2 feet bgs and 5 to 7 feet bgs. Soil gas samples were collected at shallow depths from four locations and

analyzed for VOCs, including naphthalene (using EPA Method TO-15). Saturated soil conditions precluded collection of deeper samples at all IR Site 31 locations. Benzene was reported in one of the four samples at a concentration of 8 micrograms per cubic meter (µg/m^3). Naphthalene was reported in four of the four samples at a maximum concentration of 22 µg/m^3. Other VOCs reported in at least one of the soil gas samples included the chlorinated compounds 1,1,1-trichloroethane, chloroethane, and trichloroethene (TCE) (none of which have been reported in IR Site 31 soil or groundwater samples); fuel related compounds, including ethylbenzene and xylenes, which may be related to the OU-5/IR-02 groundwater plume; and common laboratory contaminants, including 2-butanone, 4-methyl-2-pentanone, 2-hexanone, acetone, methylene chloride, and vinyl acetate. Because the shallow depth to groundwater may have compromised the representativeness of the soil gas data from the OU-5 RI, these data are not included in the data set for IR Site 31. For the IR Site 31 RI, indoor and outdoor air concentrations were modeled using recently collected soil and groundwater data.

As part of the OU-5 RI, six discrete groundwater samples were collected at depths ranging from 6 to 20 feet bgs from five locations at IR Site 31 (Figure 4-1). These groundwater samples were analyzed for VOCs, PAHs, and MTBE. These data are considered usable, have been included in the RI for IR Site 31, and are discussed in Section 4.2. The OU-5 RI report concluded that benzene and naphthalene were the only two contaminants consistently reported at concentrations above drinking water action levels and therefore were the primary risk drivers in the groundwater ingestion exposure pathway. In addition, the OU-5 RI report concluded that the contaminant concentrations appear to be co-located and increase with distance between the top of the water table and the subsurface lithological unit referred to as the marsh crust (Neptune et al. 2002).

2004 Site 25/IR-02 Groundwater Remedial Investigation and Feasibility Study

An RI/FS was conducted to address benzene and PAH (most notably naphthalene) contamination in shallow groundwater in the vicinity of IR Site 25 and the FISCA IR Site 02. Since these sites are near IR Site 31, the report also included an assessment of groundwater underlying portions of IR Sites 30 and 31 (ERRG 2004). The RI/FS report analyzed previously collected data; no additional fieldwork was conducted. The report concluded that the groundwater contamination is no longer migrating laterally and that natural degradation has been occurring; however, the rate of natural degradation has slowed as dissolved oxygen has been consumed and site conditions have become predominantly anaerobic.

Computer-generated contour maps created during the IR Site 25/IR-02 RI/FS show benzene and naphthalene in shallow groundwater within the eastern portions of IR Site 31 at depths of approximately 20 feet bgs. These maps show that the highest

reported concentrations reported in samples collected from monitoring wells are located in three plume centers: immediately east of IR Site 31 (near the Kollman Circle in IR Site 25); directly north of IR Site 31 (near the intersection of Singleton Avenue and the western end of Annapolis Circle); and to the southeast of IR Site 31 (near the former FISCA IR Site 02). Results of HydroPunch sampling indicated that the concentrations of benzene and naphthalene increased with increased depth to approximately 20 feet bgs. The lower limit of the vertical extent of contamination at 20 feet bgs is likely due to the presence of the Young Bay Mud at 25 feet bgs, which limits the downward migration of contaminants.

The RI/FS report identified the following four possible sources for the groundwater contamination (ERRG 2004):

- Previous point-source discharges;
- Contaminated fill material;
- Buried inclusions of high-concentration material trapped near the marsh crust surface; and
- The marsh crust itself.

An HHRA performed during the RI/FS found that the only exposure pathway that posed a risk greater than the EPA's risk management range was the groundwater ingestion pathway. The remedial alternatives recommended in the RI/FS report will apply to all areas of contaminated groundwater in the vicinity of IR Site 25 (including IR Site 31). The RI/FS report concluded that additional sampling was needed to better define the benzene and naphthalene concentrations along the eastern and western edges of the groundwater plume. The OU-5/IR-02 Groundwater Proposed Plan completed public review in April2006. The proposed plan presents the preferred alternative as the Navy's risk management decision to reduce the mass of contaminants in groundwater by facilitating the biodegradation of benzene and naphthalene and preventing potential future unacceptable exposures in the unlikely event that the groundwater may be used for drinking water in the future. The preferred alternative consists of biosparging with soil vapor extraction, nutrient/microorganism enhancement, as required, monitoring, and institutional controls. The preferred alternative applies institutional controls to restrict access to groundwater during the approximate 8 years estimated to achieve remedial goals. Therefore, the IR Site 31 RI does not characterize groundwater for remedial decision purposes.

1.3.5.8 Storm Drain Investigation

A series of reports have documented the extent and layout of the storm drain system at the former NAS Alameda and identified the system as a potential transport pathway for chemicals to reach surface water and sediment in the San Francisco Bay (TtEMI 2000

and 2001a). The storm drain system was constructed between 1930 and the 1960s and was designed to collect basewide surface-water runoff from streets, runways, tarmacs, landscaped areas, and building roof drains (TtEMI 2000).

In addition to surface-water runoff into the storm drains, shallow groundwater and water leaking from underground water lines could also infiltrate into damaged or leaking storm drain line sections. Because of the network of storm drain lines that intersect groundwater contaminant plumes, contaminants can be transported in either the storm drain lines or the bedding material.

Figure 1-3 shows the locations of storm drain segments that are known to exist at IR Site 31 as taken from the Alameda Point base map and verified with information currently used by the City of Alameda. One "low-priority" storm drain segment was identified in IR Site 31 near the lower northeast corner of IR Site 31. This segment was identified because it was damaged, there was potential or actual groundwater infiltration, and it was located in an area where benzene, toluene, ethylbenzene, and xylenes (BTEX), TPH, and/or PAH groundwater contamination were present at concentrations below ecological screening criteria (TtEMI 2000).

1.3.5.9 Historical Releases or Hazardous Waste Handling Facilities

From queries performed on 13 January 2006 to the online Cal/EPA Geotracker database and the online EPA Enviromapper for Envirofacts database, there are no known historical releases or hazardous waste handling facilities within the boundaries of IR Site 31.

The Alameda Naval Air Station East Housing area, registered with DTSC and EPA under identification number CA2170023236, involves Parcels 170 and 171 and is not known to address IR Site 31.

1.3.6 Relevant Offsite Investigations

The following sections present a brief summary of ongoing activity and their relation to Site 31.

1.3.6.1 Basewide Groundwater Monitoring Program

A basewide groundwater-monitoring program was implemented in 2002 and is ongoing at Alameda Point (Shaw 2004a, Innovative Technical Solutions, Inc. [ITSI] 2006, 2007a,b). The monitoring program includes sampling of selected groundwater monitoring wells at IR Site 31, which are within the Basewide Site 25 Group, to monitor the movement and stability of the benzene and naphthalene plume present beneath the site.

Five of the monitoring wells included in this program are within the boundary of IR Site 31. Groundwater samples collected from these wells are analyzed for VOCs, semivolatile organic compounds (SVOCs), dissolved metals, and parameters for monitored natural attenuation. For evaluation in the IR Site 31 RI report, analytical data from the summer 2005 quarterly groundwater monitoring data (ITSI 2006), the spring 2006 annual groundwater monitoring report (ITSI 2007a), the fall 2006 quarterly monitoring report (ITSI 2007b), and the OU-5/IR-02 RI/FS (ERRG 2004) for the existing monitoring wells of the OU-5/IR-02 groundwater plume were used as a baseline to assess consistency with the OU-5/IR-02 groundwater plume.

1.3.6.2 Tidal Influence Studies

Two tidal influence studies (PRC 1993, PRC and Versar 1996) were conducted at the FISCA site located east of IR Site 31. In 1992, a hydrogeologic investigation (PRC 1993) was conducted, which included a tidal influence study to characterize the aquifers beneath the FISCA. The 1992 tidal influence study involved monitoring six shallow wells (screened at depths of 3.5 to 13.5, 5.0 to 15.0, or 6.5 to 16.5 feet bgs in shallow fill material above the Bay Sediment Unit [BSU]) and four deeper wells (screened at depths of 44 to 54, 59 to 69, 95 to 105, or 109 to 119 feet bgs in the lower BSU/Upper San Antonio Formation aquifer). Monitoring was conducted over 24-hour periods to assess baseline groundwater level fluctuations and potential tidal influences. These 10 wells were located between 1,500 and 3,000 feet from the Oakland Inner Harbor. During the study, tidal fluctuations in the Oakland Inner Harbor ranged from 6.1 to 6.9 feet per 24-hour period. Maximum water level fluctuations reported for shallow wells ranged from 0.08 foot to 1.10 feet. The maximum water level fluctuation for deeper wells in the lower BSU/Upper San Antonio Formation aquifer observation wells ranged from 0.03 foot to 0.08 foot (PRC 1993).

Because the first water-bearing zone (FWBZ) is hydraulically connected to the Oakland Inner Harbor, shallow groundwater fluctuations during the daily tidal cycle are expected and reflect a temporary shift in groundwater flow direction and not the mean groundwater flow toward the Oakland Inner Harbor (ERRG 2004). In addition, the tidal influence exhibited by shallow monitoring wells was reported to reflect the hydraulic response based on the changing tide rather than active mixing of the water in the Oakland Inner Harbor with the groundwater underlying FISCA (ERRG 2004).

A second tidal influence study was conducted at FISCA, which confirmed tidal fluctuation at FISCA and concluded that the greatest fluctuations were from wells that were screened in high permeability materials (PRC and Versar 1996).

1.3.7 Future Use

The City of Alameda General Plan Amendment Environmental Impact Report (LSA Associates, Inc. [LSA] 2002) has designated the future use of IR Site 31 as "medium-density residential."

Draft Final Soil Remedial Investigation
for IR Site 31
Figure 1-1
Regional Map

Alameda, California

CDM

Date: 7/3/07
File No.: 060117
Job No.: 6229-003
Rev No.: A

Document: M:\alameda\avquery\RI_Figures\060117_Figure_1-1RegionalMapw_CA.mxd

N00236.002789
ALAMEDA POINT
SSIC NO. 5090.3

PAGE NO. 1-22

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Legend

- IR Site Boundary
- Fisc Annex

N
W E
S

Feet
0 100 200 400
1 inch equals 385 feet

Aerial Photo Source: USGS, High Resolution Orthoimage
0.3 Meter (1 Foot) resolution
San Francisco-Oakland, CA, 2004

Draft Final Soil Remedial Investigation
for IR Site 31
Figure 1-2
Location Map

Alameda, California

CDM

Date: 6/07/07
File No.: 060118
Job No.: 6229-003
Rev No.: A

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PAGE NO. 1-24

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Legend

- SITE 31
- 181 EBS Parcel Boundary with Parcle Number
- Buildings (Removed)
- Communication Lines
- Electric Lines
- Gas Line
- Roads
- Sanitary Sewer Line
- Storm Drain
- Catch Basin
- Manhole

N
W E
S

Feet
0 2550 100 150 200 250
1 inch equals 250 feet

Aerial Photo Source: USGS, High Resolution Orthoimage
0.3 Meter (1 Foot) resolution
San Francisco-Oakland, CA, 2004

Draft Final Soil Remedial Investigation
for IR Site 31
Figure 1-3
Site Features Map

Alameda, California

CDM

Date: 6/07/07
File No.: 060119
Job No.: 6229-003
Rev No.: A

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Section 2
Physical Setting

This section provides an overview of the climate, topography, geology, and hydrogeology of IR Site 31. Discussions of surface water drainage and ecological habitats at Alameda Point and the IR Site 31 vicinity are also presented. The scope of the IR Site 31 RI activities are described in Section 4; however, pertinent information collected during RI activities is presented in this section to provide a more complete description of the physical setting.

2.1 Climate

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

2.2 Topography

Alameda Island lies at the base of a gently westward-sloping plain that extends from the Oakland-Berkeley Hills in the east to the shore of the San Francisco Bay in the west. Alameda Island is characterized by a low topographic profile, with surface elevations varying from mean sea level (MSL) to approximately 30 feet above mean sea level (AMSL). Alameda Point is located on the western portion of Alameda Island and in the northeastern portion of Alameda Point. The topography of IR Site 31 is primarily flat and lies within an enclosed contour level for 10 feet AMSL (U.S. Geological Survey [USGS] Topographic Map 7.5 Minute Quadrangle Oakland West, 1993). Surveyed ground elevations for the onsite monitoring wells range from 10 to 13 feet AMSL.

2.3 Geology

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

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

2.3.1 Alameda Island Geology

Alameda Island sedimentary deposits consist of five stratigraphic units. Figure 2-1 presents the generalized stratigraphic and hydrogeologic units. From oldest to youngest, they are the Alameda Formation, the lower unit of the San Antonio Formation, the upper unit of the San Antonio Formation, the Merritt Sand Formation, and the BSU (upper bay sediment, also referred to as the Young Bay Mud).

These sediments overlie bedrock consisting of metamorphosed sandstone, siltstone, shale, graywacke, and an ophiolite base of Jurassic to Cretaceous age, all of which constitute the Franciscan Formation (Rogers and Figuers 1991, Norfleet Consultants 1998). Table 2-2 presents the sequence and descriptions of sediments beneath Alameda Island.

The stratigraphy beneath the northeastern portion of Alameda Point has been characterized with soil borings advanced to depths ranging from 20 to 105 feet bgs during previous investigations (Neptune et al. 2002, TtEMI 1999a, ERRG 2004, Shaw 2004a). Cross-section locations are shown on Figure 2-2. The derivative cross-sections incorporate shallow lithologic information from this investigation.

The eastern portion of Alameda Point, from surface to a depth of 7 feet to 10 feet, is comprised of imported construction fill and dredged fill material that overlies a marsh crust (2 to 6 inches thick), which typically exists at a depth of 5 feet to 18 feet bgs. This layer of marsh crust overlying the Young Bay Mud portion of the BSU helps to distinguish reworked from undisturbed Young Bay Mud. The marsh crust horizon is underlain by the BSU, which has a reported thickness of up to 110 feet and includes an upper and a lower unit. The upper unit of the BSU is referred to as the Young Bay Mud and consists of an estuarine deposit of stiff, dark, olive-gray clay with discontinuous silty and clayey sand layers. The lower unit consists of estuarine deposits of silty sand with interbedded layers of fine sand (TtEMI 1999a).

The BSU overlies the Merritt Sand Formation, which has a reported thickness of up to 60 feet and is composed of a brown, poorly graded, fine-to-medium-grained sand. The Merritt Sand is laterally continuous across Alameda Point except where it is bisected by a paleochannel. The paleochannel parallels the Inner Oakland Harbor, as mapped for the Oakland Inner Harbor navigation improvement project (Subsurface Consultants, Inc. 1999), and is approximately 1,200 to 1,600 feet wide; its central lowest point is located approximately 1,400 feet south of the present Inner Oakland Harbor and is coincident with the northern margin of IR Site 31.

The Merritt Sand Formation overlies the Upper San Antonio Formation, which consists of interbedded layers of silty sand and green-gray silty clay alluvial deposits and has a reported thickness of up to 35 feet. The upper unit of the San Antonio Formation is continuous over most of Alameda Point but is absent in the area of the paleochannel.

The paleochannel (synchronous with the BSU) underlies IR Site 31 at depths from approximately 60 feet bgs to its central lowest point (95 feet bgs) beneath the northern margin of IR Site 31. The paleochannel marks a prominent erosional unconformity that places the BSU on top of the Yerba Buena Mud due to removal of both the Merritt Sand Formation and the Upper San Antonio Formation. The paleochannel was filled with low-permeability silts and clays with discontinuous layers of poorly graded sands associated with the BSU (TtEMI 1999a).

The Upper San Antonio Formation overlies the lower San Antonio Formation estuarine deposits. The Yerba Buena Mud (or Old Bay Mud) is the uppermost member of the lower San Antonio Formation, with a thickness of up to 90 feet. The Yerba Buena Mud is partially eroded by the paleochannel but is considered to be locally and regionally continuous and a barrier to potential contaminant migration. The San Antonio Formation is underlain by the terrestrial and estuarine deposits of the Alameda Formation. The Quaternary and Tertiary deposits discussed above are underlain by the bedrock of the Franciscan Formation (TtEMI 1999a).

2.3.2 Fill History

The area east of Main Street and north of Atlantic Avenue was created from successive filling of tidal flats between 1859 and 1930 (before Navy occupancy). From 1925 through 1927, the tidal marsh and sloughs that were to become the future site of the SFBA (from 1927 through 1940) were filled with "intermittent dredger fill" (Lee and Praszker 1969). Fill activities that occurred between 1925 and 1930 may also have included use of materials from the excavation of the Posey Tube tunnel beneath Oakland, connecting Alameda Island with Oakland. Fill material associated with the Posey Tube construction may have contained PAHs and metals resulting from waste produced by nearby industries (located within 0.25 mile of the excavation site), including Union Iron Works, Bethlehem Steel, and Associated Oil Company/Phillips (BEI 2005a). Beginning in the 1930s, the Army and then the Navy filled tidelands, marshes, and sloughs between Oakland Inner Harbor and the western tip of Alameda Island (west of Main Street). The fill material consisted largely of dredge spoils from the Oakland Inner Harbor and surrounding San Francisco Bay.

Fill material thickness generally decreases from west to east across Alameda Point. A maximum thickness of 40 feet of fill material is present at the western margin of Alameda Point where offshore areas were filled to create new land. The imported fill material at Alameda Point consists mainly of three types of material:

- The principal type of fill material at Alameda Point is dredged material (also referred to as poorly graded sand dredge spoils or hydraulic fill) from the surrounding San Francisco Bay and Oakland Inner Harbor that is predominantly poorly graded, fine-to-medium-grained gray sand with silt and clay.
- The second most prevalent fill is dredged material from the Young Bay Mud member of the BSU (predominantly clay), also referred to as reworked Young Bay Mud - materials that have been transported or displaced by human activity.
- Occasionally there are materials imported from other areas (i.e., outside of Alameda Island and its surrounding waters such as Oakland Hills), usually distinguishable from poorly graded dredge spoils or reworked Young Bay Mud.

In the eastern portion of Alameda Point, a marsh crust (2 to 6 inches thick) exists between the fill layer and the BSU. This thin layer of marsh crust overlying the Young Bay Mud portion of the BSU helps to distinguish reworked from undisturbed Young Bay Mud. The marsh crust is a soil horizon typically occurring at 5 feet to 18 feet bgs that is comprised of coal or petroleum-related combustion products SVOCs and trace metals. A remedial action plan/record of decision (RAP/ROD) has been written for the marsh crust and has been signed and approved by DON, EPA, and Cal/EPA (DON 2001b). The Marsh Crust RAP/ROD applies institutional controls on property owned by the City of Alameda (Alameda Annex property) and across property leased by the City of Alameda (Alameda Point). The institutional controls prohibit excavations below specified depths without approved work plans. The institutional controls are administered and enforced through the City of Alameda's Marsh Crust Excavation Ordinance number 2824 executed 2 February 2001 (presented in Appendix M).

IR Site 31 fill history (Figure 4-2) shows that the fill was in place by 1927. The most recent construction fill placement was prior to 1993 when construction fill was placed to construct Marina Village Housing. The design drawings (Sheet G-14 Appendix K) show that the housing units were constructed on a minimum 4-foot thick layer of compacted fill. The minimum of 4 feet of compacted fill is comprised of the 2 feet of blanket fill for site grading (reconditioned/compacted) plus 2 feet of foundation fill beneath each house and garage foundation. An evaluation of fill history and lithology is summarized in Section 4.1.5.2, with details and supporting information presented in Appendix H2.

2.3.3 IR Site 31 Geology

The land at IR Site 31 was tidal marshlands until the early 1900s. The marshlands contained numerous tidal channels ranging in width from 10 to 200 feet (PRC and Versar 1993). The history and development of IR Site 31 through multiple fill episodes is traceable through historical maps and aerial photographs presented in Appendix A.

According to these maps and photographs, the IR Site 31 area was completely filled by 1927 (Figures A-1 through A-4 in Appendix A). The fill events include the historical filling of tidal marshlands and the construction fill material emplaced during site development. As identified in the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56, the marsh crust at IR Site 31 is deeper on the east side of the site and shallower to the west. The threshold depth identified in the ordinance changes to 5 feet below the surface in the western portion of IR Site 31.

Data from previous investigations indicate that the BSU is encountered at an average depth of approximately 18 feet bgs at sites contiguous with IR Site 31. A BSU depth of 18 feet bgs is to be expected for locations that were historically tidal channels or offshore. IR Site 31 was historically marshland with tidal channels, and the BSU seemed to be present at 7.5 feet bgs (2.5 feet AMSL) in many boring locations, which would correspond to the upper elevation limit for original tidal marsh topography. The variability of the thickness of the fill material is due to infilling over tidal flats and channels in the original marshland topography (PRC and Versar 1993).

The direct push sample probes completed during the RI at IR Site 31 were advanced to a maximum depth of 8 feet bgs for soil sampling and to 20 feet bgs for the groundwater sample points. The maximum depth of 24 feet bgs was in one groundwater sample probe. The fill material encountered in borings at IR Site 31 included one or more of the following: clay, poorly graded sand, clayey gravel, well-graded gravel with sand, and well-graded sand with gravel. The shallowest fill materials (0 to 4 feet bgs) were dense brown to yellowish-brown clayey sand or gravel that may have been imported from terrestrial fill sources outside of Alameda Island.

The remaining fill materials (soft to medium stiff silty clay or silty sand between approximately 4 and 7.5 feet bgs) appeared to be dredged materials consisting of hydraulic fill from the San Francisco Bay or Oakland Inner Harbor and reworked Young Bay Mud. This mud layer was not fully penetrated in most cases since the borings typically terminated at or just below the water table; hence, a measured thickness is not widely available. Geotechnical analysis of IR Site 31 soils (Appendix E) indicates that the clays have an effective air permeability of 10^{-8} to 10^{-11} square centimeters (cm^2). Figure 2-2 shows the locations of cross-sections, the legend for the cross-sections is on Figure 2-3, and the geologic sections are Figures 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9. These figures represent the shallow subsurface geology at IR Site 31 and were constructed using boring logs from the RI activities (Appendix D).

Figure 2-10 presents a top of clay in the shallow subsurface at IR Site 31. The clay represented by the map includes dark gray or black clays that are first encountered at depths of 4 to 6 feet bgs across the site. The mapped clay is not continuous and includes deep pockets of yellowish-brown gravelly clays that appeared to be part of the imported fill materials. The map (Figure 2-10) and the cross-sections (Figures 2-4

through 2-9) demonstrate that the clay is a recognizable horizon separating older dredged harbor fill from newer, more oxidized, and imported construction fill. The figures show that the elevation of the top of the clay is undulating with inconsistent directional slope.

2.4 Hydrogeology

This subsection discusses regional hydrogeology at Alameda Point and site-specific hydrogeology at IR Site 31.

2.4.1 Regional

Alameda Island is underlain by two primary regional aquifers, the shallow Merritt Sand aquifer that yields brackish-to-very-saline water (20,000 to 35,000 milligrams per liter [mg/L] total dissolved solids) (TtEMI 2000) and the deeper Alameda aquifer that yields freshwater. The generalized hydrogeologic units are shown on Figure 2-1. These aquifers are separated by the regional San Antonio aquitard, which is approximately 55 to 90 feet thick beneath Alameda Point and comprises three parts (TtEMI 1999a):

- Yerba Buena Mud;
- Other estuarine deposits; and
- The upper clay-rich portion of the Alameda Formation.

The Merritt Sand aquifer is a semi-confined aquifer with potentiometric head elevations from 0 foot to 6 feet AMSL at Alameda Island (TtEMI 1999a). Groundwater was observed in November 2005 (Figure 2-11) at elevations ranging from 1 to 4 feet AMSL (depths varying from 5 to 9 feet bgs in 20 feet deep monitoring wells) on IR Site 31. These water levels are consistent with previous regional groundwater mapping for the IR Site 25, 30, and 31 group in base-wide monitoring (ITSI 2007a) in that levels are at 4 feet AMSL or higher on the east side of IR Site 31 and drop to 1 foot AMSL on the west side of IR Site 31. As shown on Figure 2-11, the general groundwater gradient in the FWBZ is from the northeast to southwest across the western half of IR Site 31.

Regionally, groundwater recharge occurs in outcrop areas of the Merritt Sand Formation located in the southeastern portion of Alameda Point, as well as east of Alameda Point. This groundwater recharge is from irrigation, precipitation, and possibly leaking water-supply lines, sewer lines, and storm drains. There is no hydraulic association between the shallow aquifer systems on Alameda Island and the Oakland mainland because of the barrier created by the Oakland Inner Harbor. The Merritt Sand aquifer beneath Alameda Island is hydraulically isolated from mainland aquifers (TtEMI 1999a).

The Alameda aquifer is the principal regional aquifer. Depth to the top of the Alameda aquifer ranges from 180 feet bgs at Alameda Point to 220 feet beneath the surface of the sediment in Oakland Inner Harbor. The thickness of the formation is between 230 and 800 feet. The Alameda aquifer is recharged by rainfall in the Berkeley Hills that seeps through stream channels west of the Hayward Fault and flows through fractures in the bedrock of the Franciscan Formation east of the Hayward Fault (Hickenbottom and Muir 1988).

2.4.2 Alameda Point and IR Site 31

The hydrostratigraphic units at Alameda Point and beneath IR Site 31 have been divided into the following four hydrogeologic units (Figure 2-1):

- FWBZ - imported fill material;
- Semi-permeable aquitard - Young Bay Mud of the BSU;
- Second water-bearing zone (SWBZ) - lower BSU, Merritt Sand Formation, and Upper San Antonio Formation; and
- Regional aquitard - Lower San Antonio Formation, including Yerba Buena Mud.

The FWBZ is typically unconfined and extends to depths of up to 40 feet bgs in the western portion of Alameda Point. This FWBZ in the fill layer is a local feature of Alameda Point and is not present regionally (TtEMI 1999a). Figures 2-4 and 2-5 show the local findings for the shallow subsurface geology at the shallower depths, which is approximately at a vertical extent of 30 feet bgs. In the vicinity of IR Site 31, the imported fill material (dredged fill) appears to extend to depths of 10 to 24 feet bgs where the marsh crust was encountered during previous investigations (Neptune et al. 2002). Previous investigation results indicate that the marsh crust is directly underlain by the Young Bay Mud portion of the upper BSU (PRC and Versar 1993). The Young Bay Mud portion of the upper BSU acts as a semi-permeable aquitard between the FWBZ and the SWBZ, with a thickness at Alameda Point of 25 to 80 feet, as characterized during previous investigations (Neptune et al. 2002).

Throughout Alameda Point, the SWBZ is semi-confined and occurs within the lower BSU, Merritt Sand Formation, and Upper San Antonio Formation (TtEMI 1999a). There is limited hydraulic connection between the FWBZ and the SWBZ where the BSU consists of low permeability clayey layers, such as those reported at IR Site 31. At IR Site 31, the SWBZ is reported to occur within the lower BSU and Upper San Antonio Formation, as generalized on Figure 2-1. The Merritt Sand is absent beneath IR Site 31 due to removal by erosion. The paleochannel underlying the site at depths from 60 to 95 feet bgs marks the erosional unconformity (PRC and Versar 1993; Subsurface Consultants, Inc. 1999). Historically, the paleochannel eroded through the Merritt Sand and the Upper San Antonio Formation and into the top but did not bisect the Yerba

Buena Mud. The paleochannel was filled with low-permeability silts and clays with discontinuous layers of poorly graded sands associated with the BSU (TtEMI 1999a). Previous investigations suggest that the SWBZ in the vicinity of IR Site 31 is 40 to 50 feet thick and would be encountered at a depth of 36 to 55 feet bgs (TtEMI 1999a, PRC and Versar 2003).

Throughout Alameda Point, the SWBZ is subject to saltwater intrusion due to direct hydraulic connection with the Oakland Inner Harbor and the San Francisco Bay (TtEMI 2000). The SWBZ is underlain by the Yerba Buena Mud of the lower San Antonio Formation, which is thick and continuous, forming a regional aquitard (TtEMI 1999a).

Groundwater in the FWBZ at IR Site 31 was typically first encountered at 3.8 to 7 feet bgs in RI soil borings, which correlates to water table elevations between 3.3 feet AMSL (western portion of the site) and 8.6 feet AMSL (eastern portion of the site). In shallow IR Site 25 monitoring wells (generally screened at 10 to 20 feet bgs) located in the area surrounding IR Site 31, water table elevations vary seasonally and range from less than 1 to more than 10 feet AMSL (ITSI 2007a). At IR Site 31, the continuous clay layer separates the upper portion of the FWBZ (above 16 feet bgs) from the lower portion of the FWBZ (16 to 20 feet bgs). Nearby, IR Site 25 monitoring well D-02 is screened in the SWBZ at 95 to 105 feet bgs in the lower BSU. The cross-sections of Figures 2-4 through 2-9 show the differentiation of soil type at the shallower depth, which is approximately at a vertical extent of 30 feet bgs. Water levels for this well range from 4.8 to 6.7 feet MSL (ITSI 2007a). No paired wells are available to interpret potential vertical gradient between the FWBZ and SWBZ.

2.4.3 Surface Water Drainage System

Because there are no natural streams or ponds on Alameda Island, precipitation evaporates into the atmosphere, runs off in the storm drain network, or infiltrates to groundwater. Most of the ground surface at IR Site 31 is covered with buildings, concrete, or asphalt (Figure 1-3). Although ponding may occur in some areas at IR Site 31, precipitation is generally collected in catch basins that connect to main storm drain lines and discharge into the Oakland Inner Harbor at outfalls.

2.5 Ecological Habitats

IR Site 31 is a 25-acre property with approximately 300 residential houses with extensive paved roads and parking areas. Urban and barren habitat occurs at IR Site 31 and on adjacent land at Alameda Point and in the cities of Oakland and Alameda as ornamental shrubs, trees, and landscaped areas. Urban habitat generally supports few wildlife species due to human disturbances and limited vegetation. Urban habitat is the current and expected future habitat condition for IR Site 31. The following ecological habitats are known to occur in the vicinity of Alameda Point.

- Barren habitat occurs as bare soil, buildings, roads, parking areas, and runways.
- Urban habitat occurs as grass lawns, ornamental shrubs, trees, and landscaped areas.
- Annual grassland habitat occurs throughout Alameda Point.
- Saline emergent wetland habitat occurs at the West Beach Landfill wetland and the runway wetlands.
- Coastal scrub habitat occurs between the annual grassland habitat and the saline emergent wetland habitat at the West Beach Landfill and runway wetlands.
- Estuarine habitat occurs at the Oakland Inner Harbor to the north of Alameda Point, Seaplane Lagoon, and the San Francisco Bay to the south of Alameda Point.

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Table 2-1
Monthly Temperature and Rainfall Summary for Alameda Island, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (°F)	57.3	61.6	63.3	66.5	69.0	71.7	72.6	73.6	74.6	72.0	63.9	57.4	66.9
Average Minimum Temperature (°F)	44.5	47.9	49.1	50.6	53.5	55.7	57.0	58.3	58.3	55.3	49.6	44.5	52.0
Average Total Precipitation (inches)	4.85	4.40	3.56	1.35	0.56	0.12	0.07	0.10	0.32	1.31	3.45	3.33	23.43

Source: Oakland Museum data from October 1, 1970 to July 31,2000

°F = degrees Fahrenheit

Jan = January

Feb = February

Mar = March

Apr = April

Jun = June

Jul = July

Aug = August

Sep = September

Oct = October

Nov = November

Dec = December

Table 2-2
Summary of Alameda Island Stratigraphic Units

Period	Geologic Age	Stratigraphic Unit	Estimated Maximum Thickness (feet)	General Lithology
Quaternary	Holocene (unconformity)	Fill Material	40	Dredged materials consisting of olive-brown, fine-to-medium grained sand with lenses of silty sand, gravelly sand, or sandy gravel; generally, thickness increases from east to west.
		Bay Sediment Unit	110	Upper bay sediments consisting of estuarine deposits of moist, stiff, dark olive clay with discontinuous silty and clayey sand layers with shell fragments (also referred to as Young Bay Mud); lower bay sediments consisting of estuarine deposits of silty sand with interbedded layers of fine sand.
	Late Pleistocene to Holocene (unconformity)	Merritt Sand Formation	60	Eolian deposits of yellow-brown clayey sand, silty sand, poorly graded fine-grained sand, thickens toward the southeast.
		Upper San Antonio Formation	35	Alluvial deposits of interbedded layers of silty sand and green-gray silty clay.
	Late Pleistocene (unconformity)	Lower San Antonio Formation	90	Estuarine deposits of firm, gray, silty clay, and clay of Yerba Buena Mud (also referred to as Old Bay Mud; laterally continuous.
Tertiary	Pliocene to Late Pleistocene	Alameda Formation	200 to 400	Terrestrial and estuarine deposits; regional aquifer.

Sources: TtEMI 1999a, Norfleet Consultants 1998, and Shaw 2004a.

TOP OF UNIT (IN FEET BELOW GROUND SURFACE)	STRATIGRAPHIC UNITS			HYDROGEOLOGIC UNITS
0	FILL (UNDERLAIN BY MARSH CRUST AT SOME LOCATIONS)			WATER TABLE AQUIFER - NOT A PRIMARY AQUIFER (FWBZ)
10-35	BAY SEDIMENT UNIT (BSU)			AQUITARD
3-45	MERRITT SAND FORMATION			MERRITT SAND AQUIFER - A PRIMARY AQUIFER (SWBZ)
60-80	SAN ANTONIO FORMATION	UPPER UNIT	ALLUVIAL DEPOSITS	
80-110	SAN ANTONIO FORMATION	LOWER UNIT	YERBA BUENA MUD	AQUITARD
			OTHER ESTUARINE DEPOSITS	
100-200	ALAMEDA FORMATION	UPPER CLAY-RICH PORTION		
180-220	ALAMEDA FORMATION	ALLUVIAL DEPOSITS		ALAMEDA AQUIFER - PRINCIPAL REGIONAL AQUIFER
400-800	FRANCISCAN FORMATION			

NOTES:

FWBZ – FIRST WATER-BEARING ZONE

SWBZ – SECOND WATER-BEARING ZONE

SOURCES:

TETRA TECH EM, INC. 1999. OU-2 RI REPORT DRAFT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. PREPARED FOR THE UNITED STATES DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. JUNE 29.

SHAW ENVIRONMENTAL, INC. 2004. FINAL WORK PLAN BASEWIDE GROUNDWATER MONITORING PROGRAM. ALAMEDA POINT, ALAMEDA, CALIFORNIA. FEBRUARY 6

Draft Final Soil Remedial Investigation Report
for IR Site 31

Figure 2-1

Generalized Stratigraphic and Hydrologic Units at Alameda Point

Alameda, California

CDM

N00236.002789
ALAMEDA POINT
SSIC NO. 5090.3

PAGE NO. 2-14

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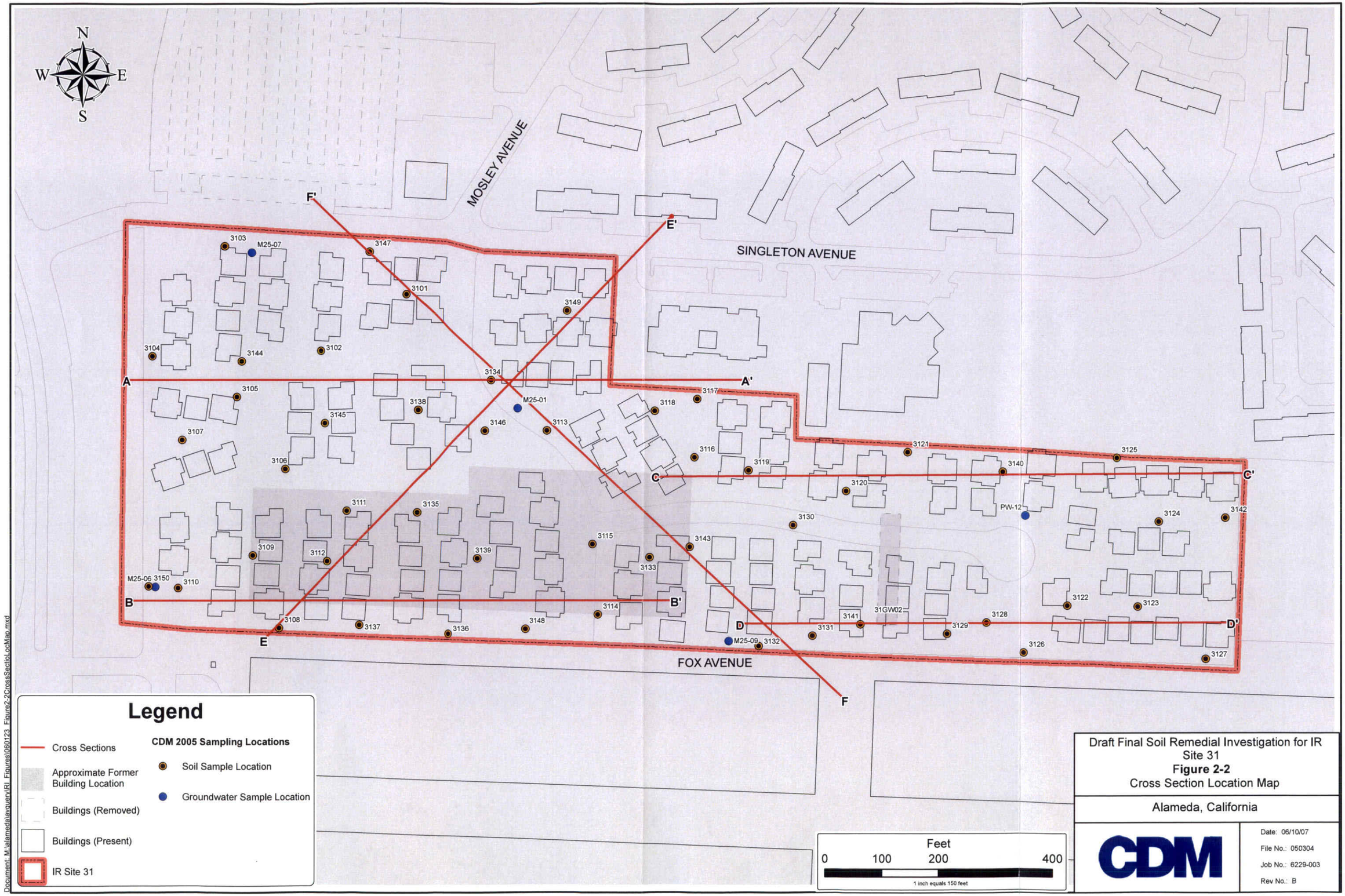

Draft Final Soil Remedial Investigation for IR Site 31

Figure 2-2

Cross Section Location Map

Alameda, California

CDM

Date: 06/10/07

File No.: 050304

Job No.: 6229-003

Rev No.: B

PAGE NO. 2-16

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SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)
- Bulk Sample

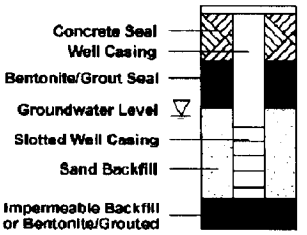
CONTACT BETWEEN UNITS

- Well-defined change in unit
- Gradational change in unit which was clearly noted in the exploration
- Change in unit which was not clearly defined

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing		Structure		General Attitude	
Parting:	less than 1/16 in. (1/6 cm)	Pocket:	Erratic, discontinous deposit of limited extent	Near horizontal:	0 to 10 deg.
Seam:	1/16 to 1/2 in (1/6 to 1 1/4 cm)	Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in (1 1/4 to 30 1/2 cm)	Varved:	Alternating seams of silt and clay	High angle:	45 to 80 deg.
Stratum:	> 12 in (30 1/2 cm)	Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered:	< 1 per ft (30 1/2 cm)	Stratified:	Alternating layers		
Frequent:	> 1 per ft (30 1/2 cm)				

WELL COMPLETIONS



STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water

MODIFIERS

Trace	Particles present at levels estimated < 5%
Slightly (Clayey, Silty, Sandy, Gravelly)	Particles present at levels estimated at 5 to 12%
Clayey, Silty, Sandy, Gravelly	Particles present at levels estimated at 12 to 30%
Very (Clayey, Silty, Sandy, Gravelly)	Percentage of minor constituents estimated > 30%

RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

AL -	Atterberg Limits
FC -	Fines Content
GSD -	Grain Size Distribution
MC -	Moisture Content
MD -	Moisture Content/Dry Density
SG -	Specific Gravity
Perm -	Permeability
TXP -	Triaxial Permeability
Cons -	Consolidation
Chem -	Analytical Chemical Analysis
Corr -	Corrosion
VS -	Vane Shear
DS -	Direct Shear
UC -	Unconfined Compression
TX -	Triaxial Compression
UU -	Unconsolidated, Undrained
CU -	Consolidated, Undrained
CD -	Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines and fine-grained units that plot in the CL-ML area of the plasticity chart.

3. WOR = weight of rod, WOH = weight of hammer

Legend gINT Library
Figure 2-3
Location Map

Alameda, California

CDM

Date: 6/10/07
File No.: 060323
Job No.: 6229-003
Rev No.: A

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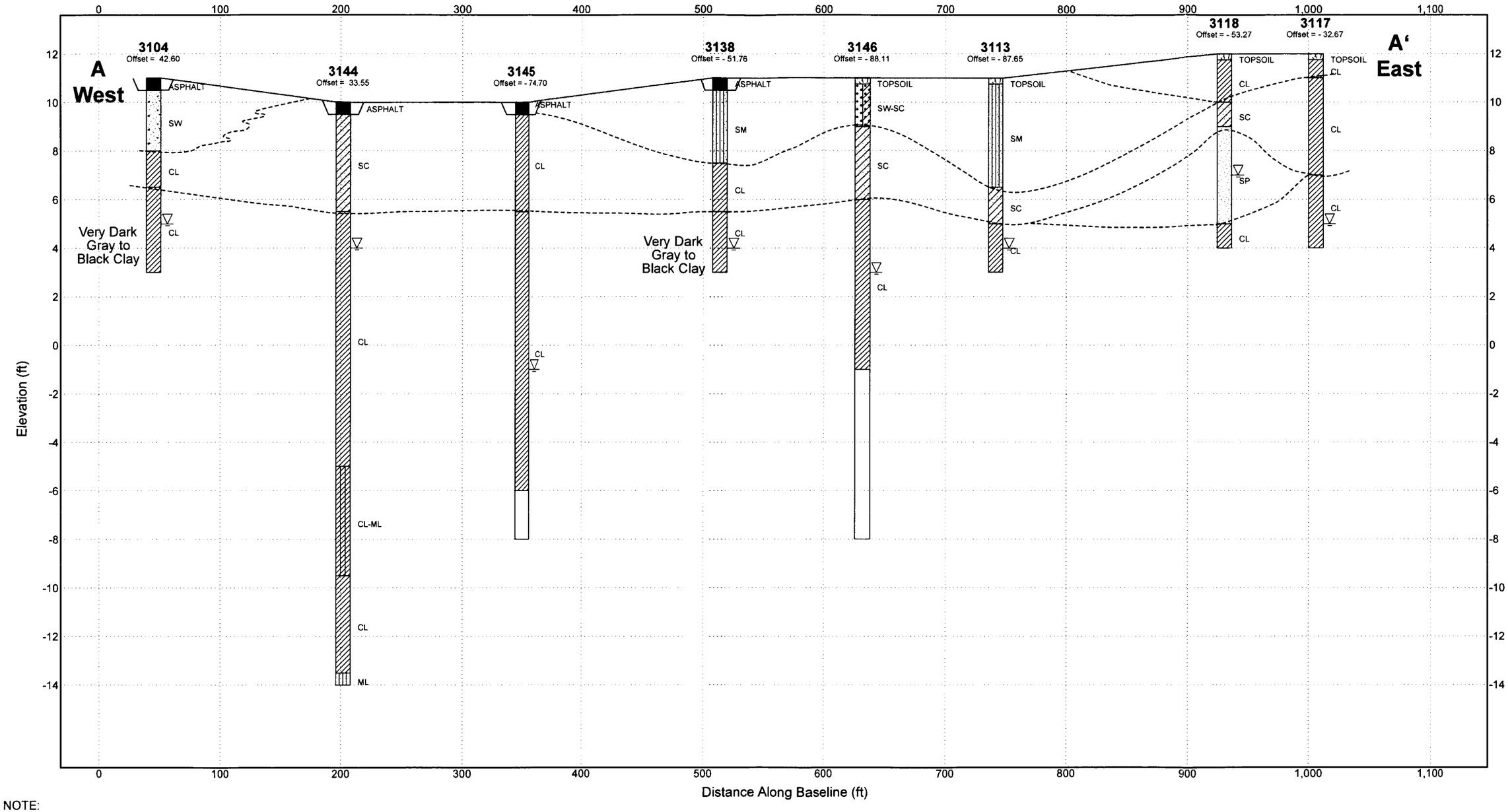

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

CDM

Draft Final Soil Remedial Investigation Report for IR Site 31
July 2007

Figure 2-4
Geologic Cross Section A-A'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/30/06 REV. (W:\Projects\48072\SectionA_Geology.ai 01/31/06 JJT)

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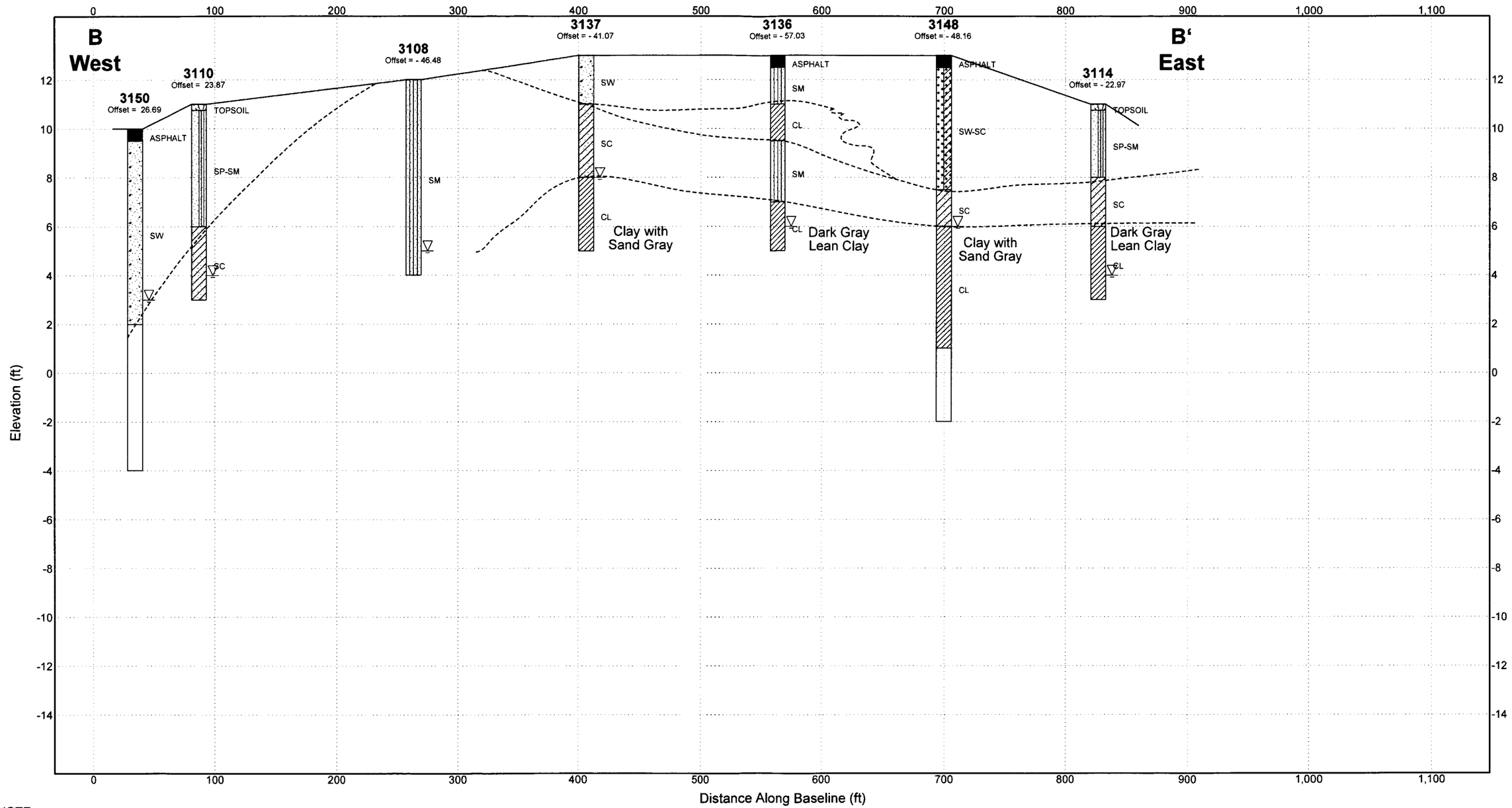

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

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July 2007

Figure 2-5
Geologic Cross Section B-B'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/30/06 REV. (W:\PROJECTS\49072\SectionB_Geology.ai 01/31/06 JJT)

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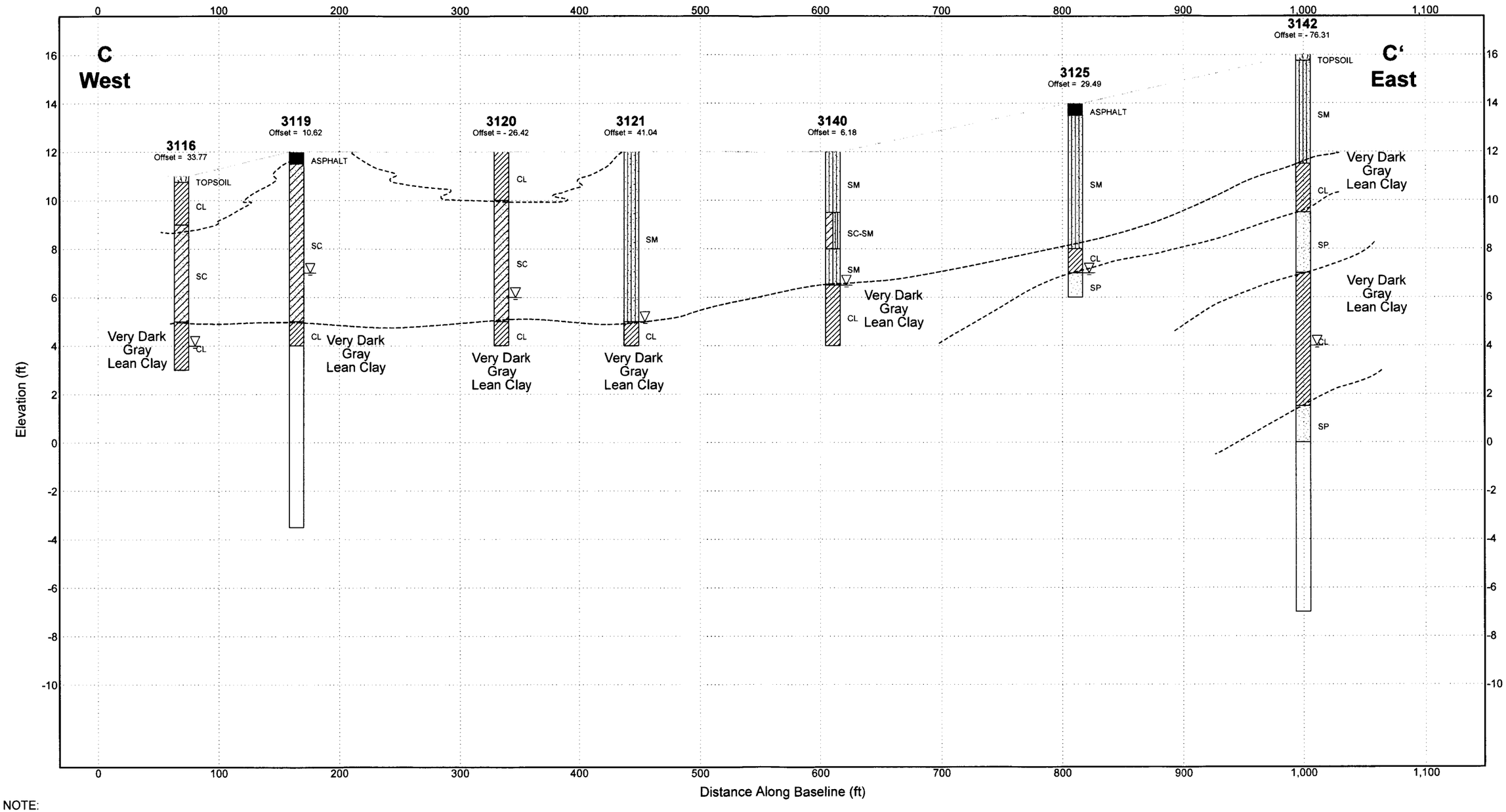

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

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Draft Final Soil Remedial Investigation Report for IR Site 31
July 2007

Figure 2-6
Geologic Cross Section C-C'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/30/06 REV. (W:\PROJECTS\48072\SectionC_Geology.ai 01/31/06 JJT)

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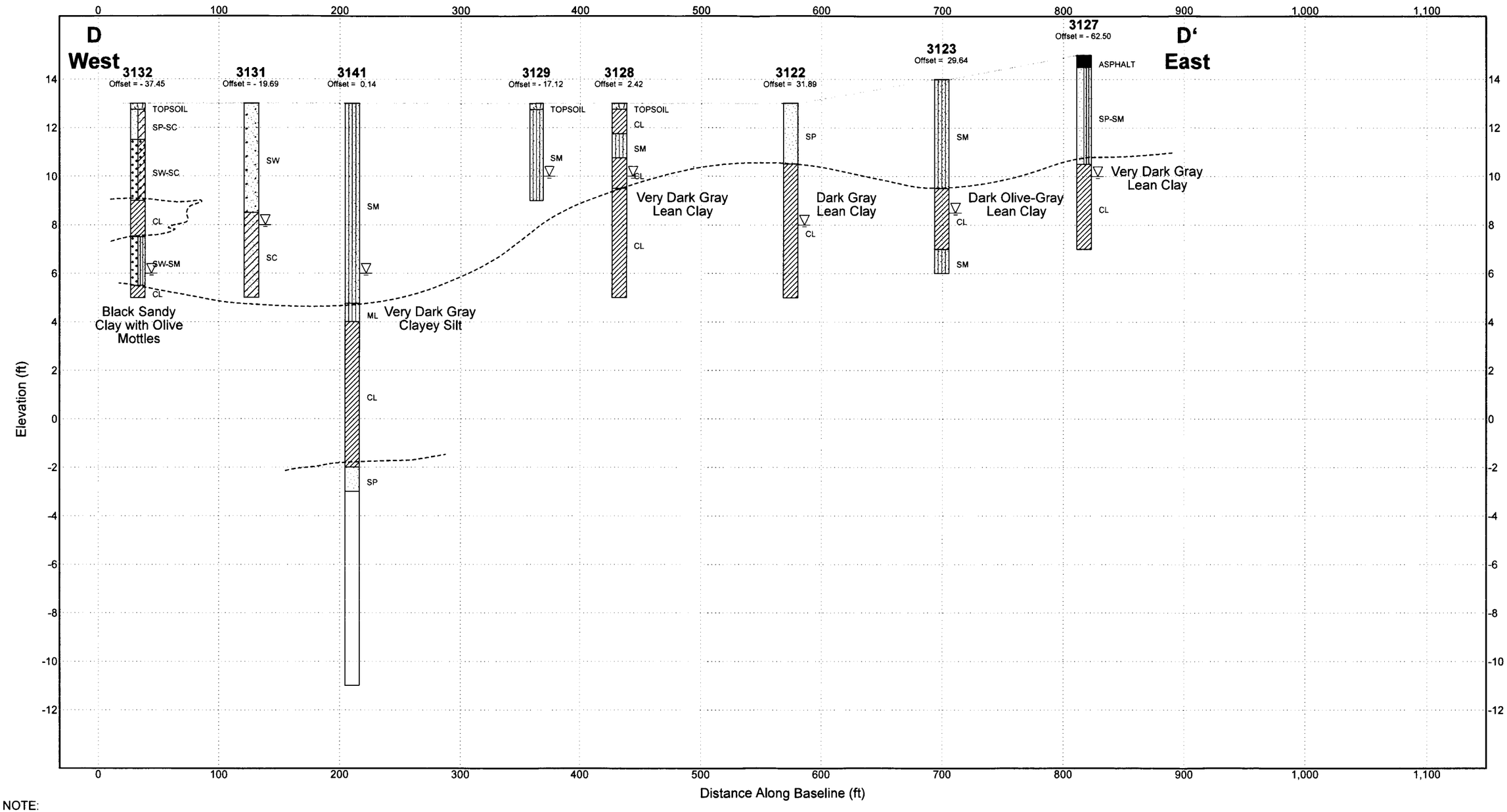

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

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Draft Final Soil Remedial Investigation Report for IR Site 31
July 2007

Figure 2-7
Geologic Cross Section D-D'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/30/06 REV. (W:\PROJECTS\48072\SectionD_Geology.ai 01/31/06 JJT)

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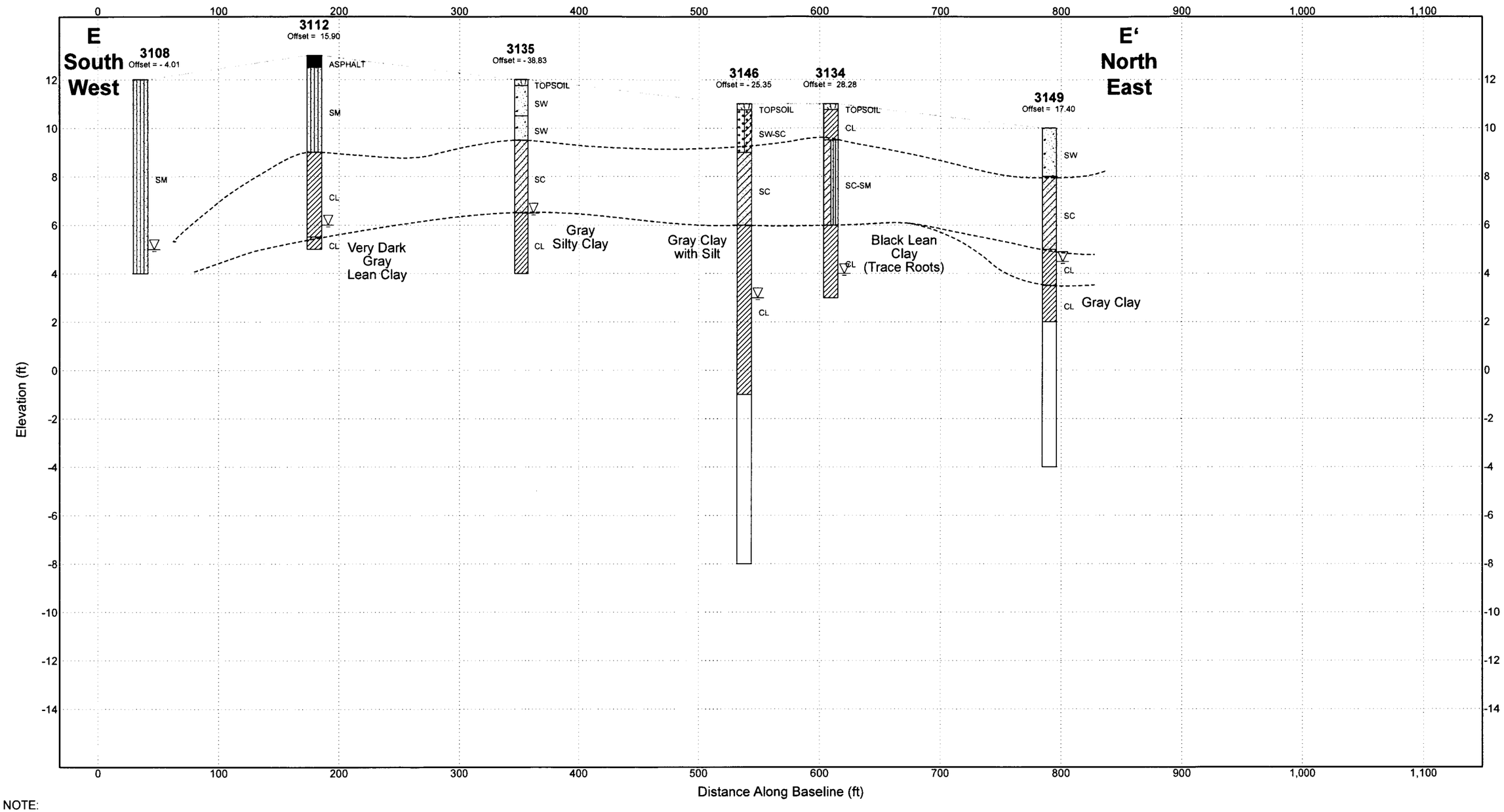

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

CDM

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July 2007

Figure 2-8
Geologic Cross Section E-E'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/30/06 REV. (W:\PROJECTS\48072\SectionE_Geology.ai 01/31/06 JJT)

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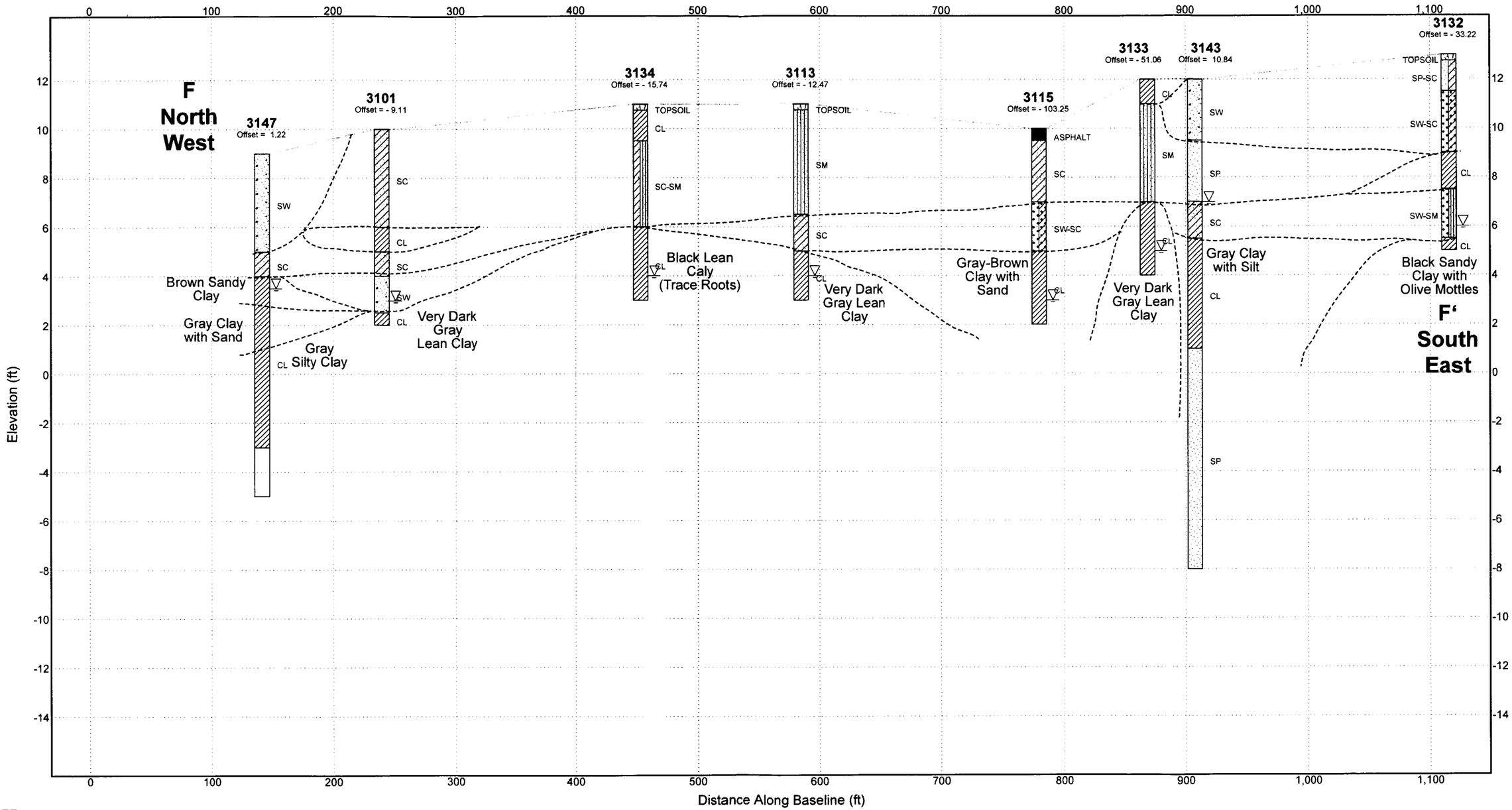

NOTE:
See Figure 2-3 for geological/soil classifications.
Elevations are feet above mean sea level.

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 4'

CDM

Draft Final Soil Remedial Investigation Report for IR Site 31
July 2007

Figure 2-9
Geologic Cross Section F-F'
Alameda, California
6229.003

FENCE 11X17 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/31/06 REV. (W:\PROJECTS\48072\SectionF_Geology.ai 01/31/06 JJT)

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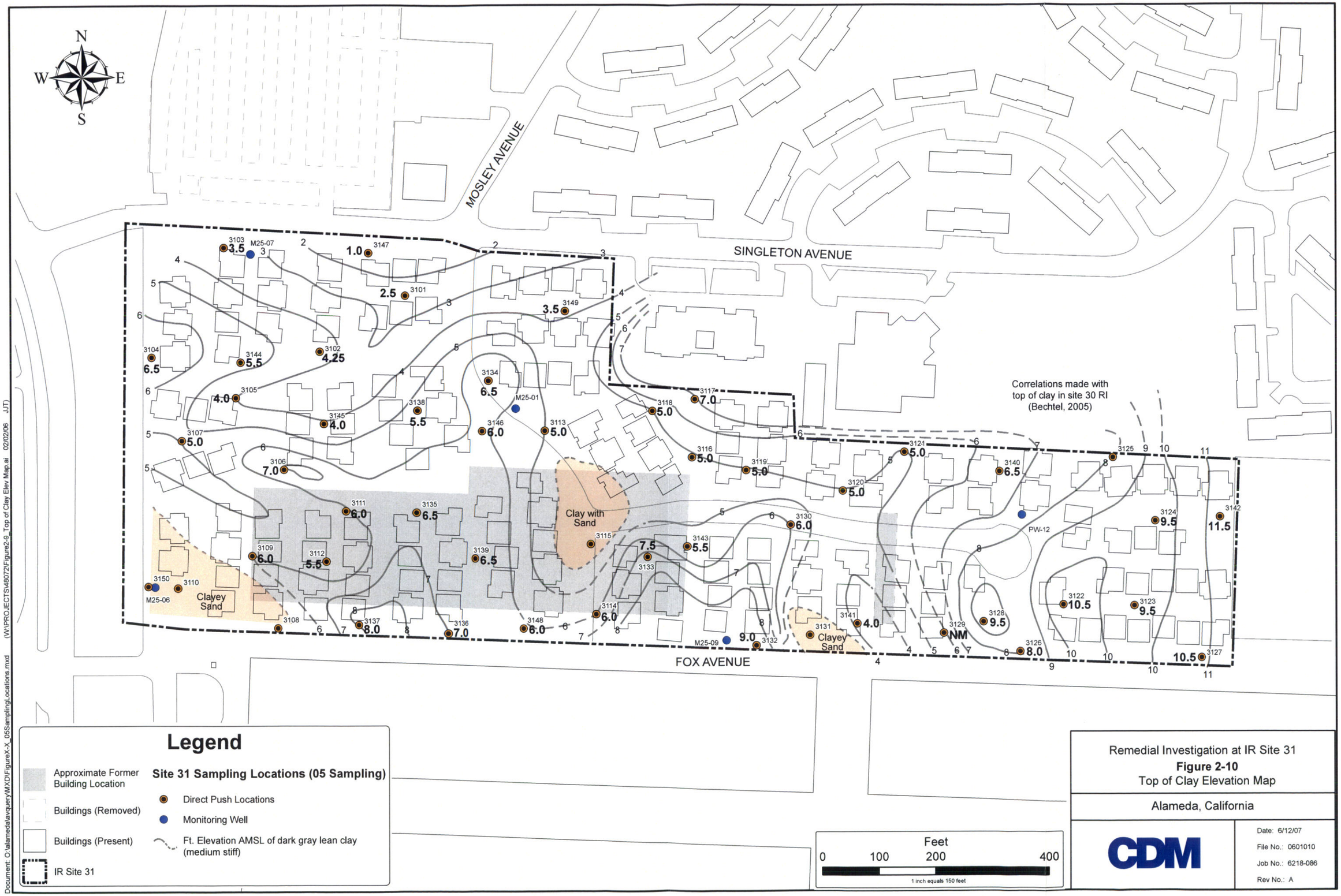

Legend

Approximate Former Building Location

Buildings (Removed)

Buildings (Present)

IR Site 31

Site 31 Sampling Locations (05 Sampling)

Direct Push Locations

Monitoring Well

Ft. Elevation AMSL of dark gray lean clay (medium stiff)

Remedial Investigation at IR Site 31

Figure 2-10

Top of Clay Elevation Map

Alameda, California

CDM

Date: 6/12/07

File No.: 0601010

Job No.: 6218-086

Rev No.: A

Document: O:\alameda\avquery\MXD\FigureX-X_05SamplingLocations.mxd (W:\PROJECTS\48072\Figure2-9_Top of Clay Elev Map.ai 02/02/06 JJT)

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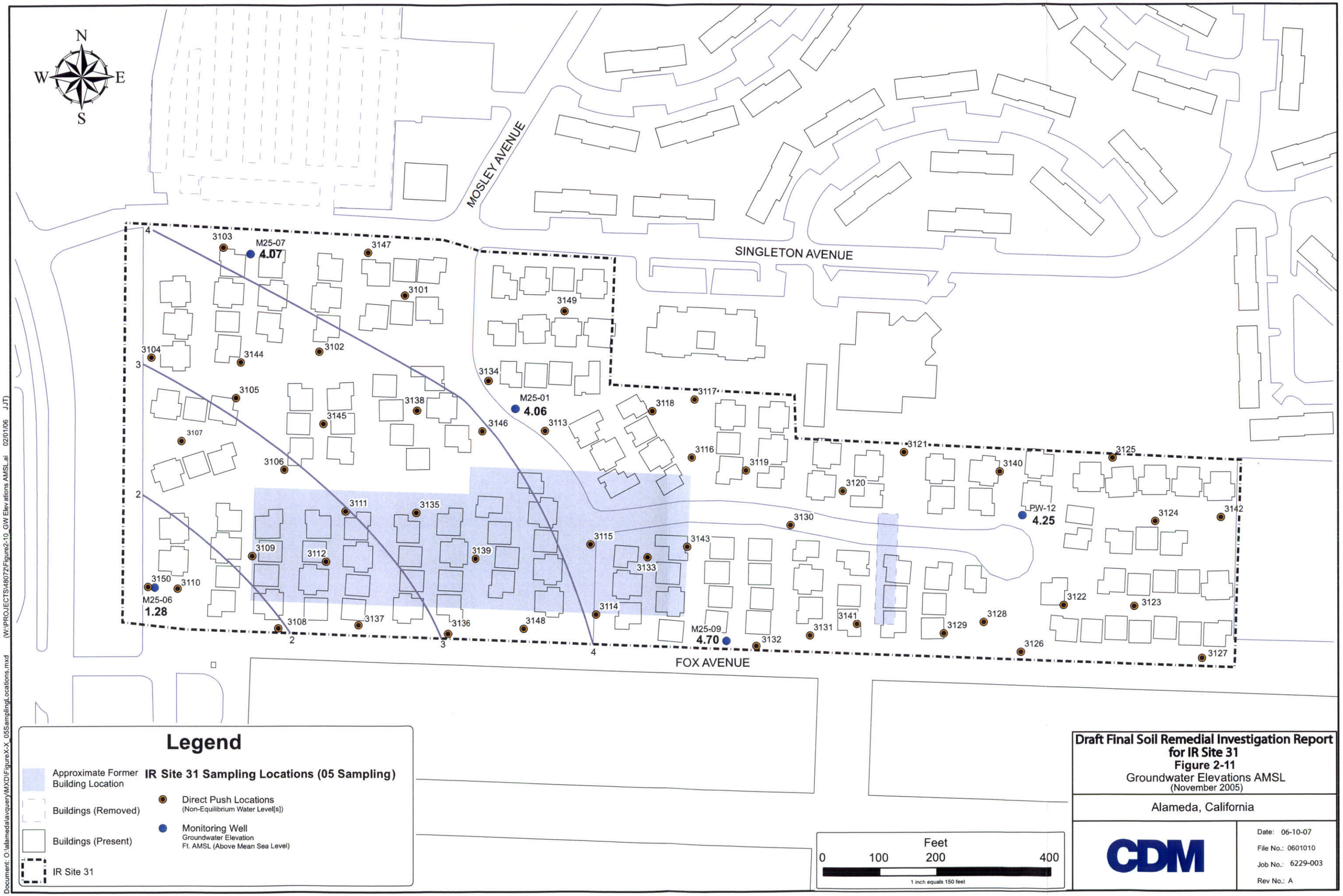

Draft Final Soil Remedial Investigation Report for IR Site 31
Figure 2-11
Groundwater Elevations AMSL
(November 2005)

Alameda, California

Date: 06-10-07
File No.: 0601010
Job No.: 6229-003
Rev No.: A

Document: O:\alameda\avquery\MXD\Figure2-10_GW Elevations AMSL.ai 02/01/06 (W:\PROJECTS\48072\Figure2-10_GW Elevations AMSL.mxd JJT)

Section 3
Investigation Approach and Scope

This section presents a brief description of the DQOs for the RI, the scope and methods of the RI, deviations from the work plan (CDM 2005a), and a summary of data quality and validation methods and results. Comparison criteria used to evaluate the nature and extent of soil contamination at IR Site 31 are also presented.

A review of historical and current activities conducted at IR Site 31 provided no documentation of spills or chemical releases on site. Aerial photographs taken in 1959 and 1985 confirm the continuous presence of a Navy housing area throughout IR Site 31. One former warehouse is shown on the southwest portion and a former open equipment storage area on the east portion of the site. There is no evidence of significant ground staining. On the 1968 photograph, a small dark spot indicates a potential surface stain to the north and west of the former warehouse Building 369. Soil sampling was performed in this area of potential staining.

Data from previous environmental investigations at IR Site 31 have been combined with analytical data collected during the RI to develop a complete description of the IR Site 31 environmental conditions and to evaluate the human health risk and ecological risk. Relevant analytical data collected during previous investigations that are used in the IR Site 31 RI are presented in Appendix B. The analytical data from this IR Site 31 RI are presented in Appendix G. A discussion of the data sets is provided in Section 4.

3.1 Data Quality Objectives

The DQOs for this IR Site 31 RI were developed in accordance with the seven-step process presented in EPA Guidance for the DQO Process, QA/G-4 (EPA 2000a). The DQOs were described in the work plan (CDM 2005a) for IR Site 31 and are reproduced for reference in Table 3-1.

The DQO process was used to describe the problem at IR Site 31 and its temporal, spatial, and resource boundaries; to define the decisions to be made during the project; and to identify data and other inputs required for decision-making. These DQOs prescribed the sampling and analytical methods and the QA procedures that were followed during the RI for IR Site 31.

The principal DQO of this RI was to assure that data collected were of sufficient quantity and quality to support risk-based remedial decision-making. The DQOs outlined procedures for the collection and assessment of data to assure that the data

were within acceptable tolerances for precision, accuracy, and completeness and could provide adequate representativeness and comparability.

3.2 Sampling Locations, Analyses, and Rationale

During the RI field program, soil samples were collected at IR Site 31 to characterize the nature and extent of soil contamination at the site and to provide sufficient data to conduct an HHRA and screening-level ERA. Discrete groundwater samples were also collected at IR Site 31 to evaluate the nature of onsite groundwater contamination, assess whether the concentrations of VOCs in groundwater are consistent with those in the OU-5/IR-02 groundwater plume, and model indoor and outdoor air concentrations for the HHRA. Figure 3-1 provides the RI soil and groundwater sampling locations. Tables 3-2, 3-3, and 3-4 are discussed later in the text. Table 3-5 provides a summary of the sample analyses, methods, and rationale for each medium sampled.

The DTSC guidance on evaluating vapor intrusion recommends soil gas samples as the source term for modeling for indoor air evaluations. The DTSC guidance recommends that the soil gas samples be collected from the vadose zone at a minimum of 5 feet bgs (ideally 10 feet bgs) to be valid for HHRA purposes. The depth to groundwater at the site seasonally varies and can be encountered between 4 and 5 feet bgs and is commonly found at 7 feet bgs. Therefore, in accordance with the project work plans, no soil gas samples were collected during the IR Site 31 RI.

3.2.1 Soil Sampling

A total of 50 soil borings were advanced at IR Site 31 using direct push technology (DPT). The locations of the direct push borings are shown on Figure 3-1. Because there were no known contaminant source areas at IR Site 31, a modified grid-based sampling approach was selected for characterization of soil. Bias was given to past storage areas and adjusted by current access limitations. The locations were distributed to provide adequate site coverage and collect soil data related to human exposure and conducting the HHRA. IR Site 31 had been subject to significant soil disturbance during construction of the Marina Village in the early 1990s, complicating the process of predicting where impacted soil may be present. Soil samples were collected at up to three depths in each boring. Soil boring locations were selected based on borings advanced during previous investigations, site access, locations of previous storage buildings, and utility locations. Due to the complex nature of the subsurface utility layout at IR Site 31, it was necessary to adjust proposed boring locations in response to utilities encountered in the field. A complete description of RI soil sampling methods and procedures is contained in Appendix C, Field Methodology.

Analytical soil samples were planned to be collected from each of the following depth intervals: 0 foot to 2 feet bgs, 2 to 4 feet bgs, and 4 to 8 feet bgs. Owing to the presence

of groundwater, the last sample depth was frequently terminated at 6 or 7 feet bgs. Table 3-2 provides the depth intervals for soil samples at each location. Soil samples were collected in a 4-foot long carbon-steel macro-core sampler fitted with a 4-foot long acetate liner. The DPT sampling system used employed hydraulic and/or vibratory techniques to advance the sampler to the desired sampling depth.

The acetate soil sample liner was cut into approximately 6-inch sections with a hack-saw that was decontaminated with Alconox and deionized water after each depth interval. The ends of the 6-inch sections were inspected for lithologic characterization, and screened with a photoionization detector (PID) immediately after cutting. Laboratory samples for VOC analysis were then collected from the ends using an EnCore sampling device. The remaining 6-inch liners were sealed with Teflon™ lined plastic caps. Immediately after collection, all samples were sealed in zip-top bags and placed in a cooler with ice for shipment to the laboratory. All soil samples were analyzed for the following parameters as shown in Table 3-2:

- VOCs, using EPA Method 5035/8260B;
- Non-PAH SVOCs, using EPA Method 3550B/8270C;
- Pesticides, using EPA Method 3550B/8081A;
- PCBs, using EPA Method 3550B/8082; and
- Inorganics (Title 22 metals plus iron) using EPA Method 3050B/6010B and 7000 series.

In addition to the samples collected for chemical analyses, soil samples were collected for each soil type encountered at six different locations (3102, 3104, 3113, 3122, 3127, and 3132). Each of these soil samples was tested to characterize physical soil properties for use as input parameters for the Johnson and Ettinger model (Johnson and Ettinger 1991), which is used to estimate indoor air quality using subsurface data. As seen on Figure 3-1, the six borings are distributed across the east-west axis of IR Site 31. The following physical properties of soil were characterized for each significant soil type encountered and are summarized in Table 3-3:

- Density and moisture, using American Society for Testing and Materials (ASTM) D2937 and D2216, respectively;
- Grain size, using ASTM C136-96 and D422-63;
- Hydraulic conductivity, using ASTM D5084-90;
- Total organic carbon (TOC), using the Walkley Black method; and
- Air permeability, using the American Petroleum Institute Recommended Practice 40.

Total porosity and air-filled fraction of porosity were calculated from dry bulk density, total sample volume, moisture content, and volumetric water content fraction. The geotechnical parameters were used for comparison to default values used as input into the Johnson and Ettinger model to estimate potential exposure point concentrations in indoor air at the site.

3.2.2 Groundwater Sampling

Groundwater grab samples were collected from up to two depths at 11 DPT locations and used to evaluate if groundwater beneath IR Site 31 has characteristics consistent with the OU-5/IR-02 groundwater plume or if a site-specific release has occurred and has contributed unique contaminants to groundwater and to provide data in support of the HHRA. Low-flow groundwater sampling techniques were employed at each location. Tygon tubing was placed in a ¾-inch polyvinyl chloride (PVC) temporary well (TW) such that the end of the tubing was located at the midpoint of the 5-foot long PVC TW screen. Masterflex tubing was attached to the top of the Tygon tubing and threaded through the peristaltic pump. In addition, a 0.45 microgram (μ) filter was used for collection of total inorganics samples at each depth interval. The groundwater samples collected at each location, depths sampled, and analyses performed are presented in Table 3-4.

At each of the 11 DPT locations, the field geologist determined the TW screen interval depths by extracting and observing a continuous core soil sample to the anticipated depth below the first screened interval. The saturated depth and the soil type were observed and recorded. The target depth of the first screened interval was 0 to 5 feet below the water table (bwt), typically equivalent to 7 to 12 feet bgs. The sample from this first interval was collected from sample tubing placed at the screen interval midpoint. This first sample is for input to the Johnson and Ettinger model for estimating migration of VOCs in groundwater to soil gas and indoor air. The second screened interval targeted from 4 to 9 feet below the water table (typically 11 to 16 feet bgs) correlates with the intervals screened in the IR Site 31 monitoring wells, which are representative of the OU-5/IR-02 groundwater plume. The sample from the second screened interval was collected from tubing placed at the midpoint of the screened interval. All screened intervals were subject to variations based upon field conditions, soil type, observations of saturated soil, and availability of adequate yield from the soil. The paragraphs below briefly summarize the DPT process and selection of screened intervals for each location.

At the first groundwater sampling location, 3141, the first saturated depth interval for groundwater sample collection appeared to be encountered in clay that extended from approximately 8 to 15 feet bgs. The field geologist determined that this interval would provide insufficient groundwater for sample collection and made the field decision to set the first TW screen from 15 to 20 feet bgs in soil classified as fine sand with silt.

Within 24 hours of installation, the water level rose to approximately 9 feet bgs in the first TW. It was determined that the groundwater may have been semi-confined by the overlying clay and was only able to rise to 9 feet bgs after the clay was breached. The second TW screen was set from 19 to 24 feet bgs in silty soil type that had not been observed by the core sample. Within 24 hours of installation, the water level rose to approximately 17 feet bgs in the second TW. This sample interval and water level were considered too deep to meet the sample collection objectives and therefore was not sampled. Thus, location 3141 had one groundwater sample collected from a midpoint depth of 17.5 feet bgs from the 15 to 20 foot bgs screened interval.

At groundwater sampling location 3142, the water table was estimated to be encountered in a clay that extended from approximately 4 to 6 feet bgs. The clay was encountered again from 8 to 14 feet bgs. The geologist determined that the upper aquifer would not yield sufficient groundwater for sampling, so the first TW screen interval was selected and installed from 14 to 19 feet bgs in soil classified as silty sand. Within 24 hours of installation, the water level rose to approximately 12 feet bgs in the first TW. The second TW screen was set from 18 to 23 feet bgs. Within 24 hours of installation, the water level rose to approximately 12 feet bgs in the second TW. Location 3142 had groundwater samples collected from two depths. The first sample is from a depth of 16.5 feet bgs from the midpoint of the screened interval 14 to 19 feet bgs. The second sample was collected from a depth of 20.5 feet bgs from the midpoint of the screened interval from 18 to 23 feet bgs.

At groundwater sampling location 3143, the water table was estimated at approximately 5 feet bgs in clayey sand grading to silty clay to approximately 11 feet bgs. The first TW screen was set from 12 to 17 feet bgs in soil classified as sand to silty sand. Within 24 hours of installation, the water level rose to approximately 7 feet bgs in the first TW. The second TW screen was set from 15 to 20 feet bgs in sandy soil. Within 24 hours of installation, the water level rose to approximately 16 feet bgs in the deeper TW. It was determined that the deeper interval was not representative of the groundwater depth of concern because the depth was significantly deeper than the comparable monitoring well sample depth of 15 feet bgs. Therefore, location 3143 had one groundwater sample collected at a depth of 14.5 feet bgs at the midpoint of the screened interval from 12 to 17 feet bgs. The second sample was not collected at location 3143.

At groundwater sampling location 3144, the water table was estimated at approximately 6 feet bgs in clayey soils. The clayey and silty soil type persisted to the terminal boring depth of 24 feet bgs. The field decision was made to set the first TW screen from 15 to 20 feet bgs in soil classified as silty clay. Within 24 hours of installation, the water level rose to approximately 12 feet bgs in the first TW. The second TW screen was attempted to be set from 19 to 24 feet bgs in silty clay. Upon measurement of water level and total depth within 24 hours of installation, the field

geologist noted that the clay had forced the second TW upward and that both TW screens were at an approximate total depth of 20 feet bgs. Based on the water level of 12 feet bgs, sampling from a deeper interval was determined to be unnecessary, so only the first TW at 15 to 20 foot bgs interval was sampled. Therefore, location 3144 had one groundwater sample collected from a midpoint depth of 17.5 feet bgs from the 15 to 20 foot bgs screened interval.

At groundwater sampling location 3145, the water table was estimated at approximately 8 feet bgs in clay to approximately 16 feet bgs. The field geologist set the first TW screen from 9 to 14 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 8 feet bgs in the first TW. The second TW screen was set from 13 to 18 feet bgs in silty clay. Within 24 hours of installation, the water level rose to approximately 11 feet bgs in the second TW. Location 3145 had groundwater samples collected from two depths. The first sample is from a depth of 11.5 feet bgs from the midpoint of the screened interval 9 to 14 feet bgs. The second sample was collected from a depth of 15.5 feet bgs from the midpoint of the screened interval from 13 to 18 feet bgs.

At groundwater sampling location 3146, the water table was estimated at approximately 8 feet bgs in clay, which extended to at least the terminal boring depth of 12 feet bgs. The first TW screen was set from approximately 10 to 15 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 6 feet bgs in the first TW, which had been pushed upward by clay such that the screened interval was now 9.5 to 14.5 feet bgs. The second TW screen was set from 14 to 19 feet bgs in silty clay. Within 24 hours of installation, no groundwater had moved into the second TW. It was determined that the second interval had limited yield and was not representative of the groundwater depth of interest, and the second interval was not sampled at location 3146. Therefore, location 3146 had one groundwater sample collected from a depth of 12 feet bgs from the screened interval of 9.5 to 14.5 feet bgs. A duplicate sample was collected at this TW.

At groundwater sampling location 3147, the water table was estimated at 5.5 feet bgs in clay, which extended to at least the terminal boring depth of 12 feet bgs. The first TW screen was set from 5 to 10 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 9 feet bgs in the first TW. The second TW screen was set from 9 to 14 feet bgs in silty clay. Within 24 hours of installation, the water level rose to approximately 7 feet bgs in the second TW. The upper TW screen interval did not yield sufficient groundwater for sampling, and the deep TW screened interval met the sampling objectives; therefore, location 3147 had one groundwater sample collected from a depth of 11.5 feet bgs from a screened interval of 9 to 14 feet bgs.

At groundwater sampling location 3148, the water table was estimated at 5 feet bgs in clay, which extended to at least the terminal boring depth of 12 feet bgs. The first TW screen was set from 6 to 11 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 5 feet bgs in the first TW. The second TW screen was set from 10 to 15 feet bgs in silty clay. Within 24 hours of installation, the water level rose to approximately 11 feet bgs in the second TW. Location 3148 had groundwater samples collected from two depths. The first sample is from a depth of 8.5 feet bgs from the midpoint of the screened interval 6 to 11 feet bgs. The second sample was collected from a depth of 12.5 feet bgs from the midpoint of the screened interval from 10 to 15 feet bgs.

At groundwater sampling location 3149, the water table appeared to be encountered at approximately 5.5 feet bgs in clay, which extended to at least the terminal boring depth of 8 feet bgs. The first TW screen was set from 5 to 10 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 8 feet bgs in the first TW. The second TW screen was set from 9 to 14 feet bgs in silty clay. Within 24 hours of installation, the water level rose to approximately 7 feet bgs in the second TW. Location 3149 had groundwater samples collected from two depths. The first sample is from a depth of 7.5 feet bgs from the midpoint of the screened interval 5 to 10 feet bgs. The second sample was collected from a depth of 11.5 feet bgs from the midpoint of the screened interval from 9 to 14 feet bgs.

At groundwater sampling location 3150, the water table was estimated at 7 feet bgs in sand to approximately 8 feet bgs. The first TW screen was set from 5 to 10 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, no water had moved into the first TW. The second TW screen was set from 9 to 14 feet bgs. Within 24 hours of installation, the water level rose to approximately 10 feet bgs in the second TW. The upper TW screen interval yielded insufficient groundwater for sample collection. It was determined in the field that a groundwater sample from 11.5 feet bgs in the lower TW sample interval would meet the sampling objective. Therefore, location 3150 had one groundwater sample collected from a depth of 11.5 feet bgs from a screened interval of 9 to 14 feet bgs.

Upon arrival at the location of monitoring well PW-10A, the field crew noted that upon removing the monitoring well cover, the location was a former soil vapor measuring point and that the monitoring well PW-10A was no longer present. After consulting the Navy contractor that conducts the monitoring program, it was determined that monitoring well PW-10A had recently been decommissioned, but the report had not yet been submitted. To obtain a groundwater sample representing the vicinity of PW-10A, the field decision was made to use soil boring location 3119 as an additional TW location in place of PW-10A. At groundwater sampling location 3119, the water table appeared to be encountered at approximately 7 feet bgs in clayey sand to approximately

8 feet bgs. The first TW screen was set from 7 to 12 feet bgs based on the water table conditions in previous borings. Within 24 hours of installation, the water level rose to approximately 8 feet bgs in the first TW. The second TW screen was set from 11 to 16 feet bgs in silty clay. Within 24 hours of installation, the water level rose to approximately 8 feet bgs in the second TW. Location 3119 had groundwater samples collected from two depths. The first sample is from a depth of 9.5 feet bgs from the midpoint of the screened interval 7 to 12 feet bgs. The second sample was collected from a depth of 13.5 feet bgs from the midpoint of the screened interval from 11 to 16 feet bgs.

Groundwater sample intervals and analyses are summarized in Table 3-4. Due to insufficient yield in the first depth interval at four locations (3119, 3145, 3148, and 3149), the sample volume was adequate for analyses of VOCs only. At three locations (3144, 3148, and 3150), limited yield allowed sufficient volume for collection of VOC and metals, but sample volume was not adequate for either SVOC and/or pesticide/PCB (Table 3-4). Groundwater samples were collected at IR Site 31 and analyzed for each of the following chemical parameters where sufficient sample volume was available:

- VOCs, using EPA Method 5030B/8260B (DPT groundwater locations only);
- SVOCs, using EPA Method 3510C/8270C;
- Pesticides, using EPA Method 3510C/8081A;
- PCBs, using EPA Method 3510C/8082; and
- Total inorganics (Title 22 metals plus iron) using EPA Method 3010A/6010B and 7000 series.

In addition to the 11 TW locations, five onsite monitoring wells were also sampled. The five onsite monitoring wells are sampled quarterly for VOCs as part of a base-wide monitoring program, and the sample results are considered representative of the OU-5/IR-02 groundwater plume. The onsite wells were equipped with dedicated sample tubing set at the mid-point of each screen for use during the base-wide quarterly monitoring. This sample tubing was used with the peristaltic pump to conduct low-flow sample collection during this investigation. Groundwater samples collected from the five monitoring wells during the IR Site 31 RI were analyzed for the following:

- SVOCs, using EPA Method 3510C/8270C;
- Pesticides, using EPA Method 3510C/8081A;
- PCBs, using EPA Method 3510C/8082; and
- Total inorganics (Title 22 metals plus iron) using EPA Method 3010A/6010B and 7000 series.

3.3 Deviations from the Work Plan

Due to conditions encountered in the field, some deviations were made from the final work plan (CDM 2005a) during the fieldwork portion of the soil RI at IR Site 31. Descriptions of deviations are provided in the following subsections.

3.3.1 Soil Sampling

Two deviations were made to the proposed soil sampling design as described in the final work plan (CDM 2005a):

- Proposed: A total of 165 soil samples were to be collected, including 150 normal samples and 15 field duplicate samples. Soil samples were to be collected from each of the following depth intervals: 0 foot to 2 feet bgs, 2 to 4 feet bgs, and 4 to 8 feet bgs (or to groundwater, whichever is encountered first).

  Deviation: Soil samples were collected until visual observation indicated groundwater had been encountered. Soil samples were not collected at some locations and depths, owing to the presence of shallow groundwater. Saturation was encountered above 6 feet bgs in various locations and above 4 feet bgs in some instances. Specific sample depths and analyses per location are shown in Table 3-2. Specific depths of saturation are shown on boring logs in Appendix D. The actual total number of samples collected was 138, comprised of 126 environmental samples and 12 field duplicate samples. All 50 locations had samples collected from the 0 to 2 foot bgs interval. The presence of shallow groundwater prohibited collection of soil samples from the 2 to 4 foot interval at two locations (3128 and 3129) There are 22 locations that did not have samples collected below a depth of 4 feet bgs because of shallow groundwater. Table 3-2 shows the specific locations.

- Proposed: Soil samples were to be collected in 2-foot long carbon-steel split spoon samplers fitted with stainless steel sleeves.

  Deviation: Soil samples were collected in a 4-foot long carbon-steel macro-core sampler fitted with acetate liners. The acetate liners were cut into 6-inch sections, using a decontaminated hack-saw, for submittal to the laboratory.

3.3.2 Groundwater Sampling

Four deviations were made to the proposed groundwater sampling design as described in the final work plan (CDM 2005a):

- Proposed: Discrete groundwater sampling will be performed using DPT equipment by the HydroPunch® (or equivalent) method. If an adequate amount of groundwater could not be collected by the HydroPunch® (or equivalent) method, the sampling rods would be removed from the ground, and 1-inch PVC TW casing with 0.010-inch slotted well screen would be inserted into the boring.

Deviation: Due to the variably high clay content in subsurface soils, it was determined in the field that TW installation would be more efficient for groundwater sampling than using DPT HydroPunch® tooling, based on observed conditions at each location. Groundwater conditions were variable from location to location, but in general recharge was poor due to high clay content in the subsurface soils. Please refer to Section 3.2.2 for further discussion of this deviation.

- Proposed: Depth-discrete samples will be collected from two depths to evaluate if groundwater beneath IR Site 31 has characteristics consistent with the OU-5/IR-02 groundwater plume or if a site-specific release has occurred and has contributed unique contaminants to groundwater and to provide data in support of the HHRA.

  Deviation: Due to the clayey nature of subsurface soils, it was difficult to establish actual water table depths prior to installation of the TWs. Individual sampling locations are described in Section 3.2.2. Of the two depth intervals at each of 11 locations where TWs were installed (total of 22 TWs installed), six depth intervals had insufficient yield or groundwater was too shallow and only one sample was collected. Locations with one groundwater sample are: 3141, 3143, 3144, 3146, 3147, and 3150. Specific sample depths per location are shown in Table 3-4.

- Proposed: Groundwater samples were to be analyzed for the following chemical parameters: VOCs, SVOCs, pesticides, PCBs, and total inorganics.

  Deviation: Due to the clayey nature of subsurface soils, insufficient groundwater yield made it impossible to collect the necessary groundwater volume for all proposed analyses at some locations. It was necessary to select analyses most pertinent to meeting data quality objectives at these locations. All locations have samples analyzed for VOC. In the first depth interval at four locations (3119, 3145, 3148, and 3149), the sample volume was adequate for analysis of VOCs only. At three locations (3144, 3148, and 3150), limited yield allowed sufficient volume for collection of VOC and metals, but sample volume was not adequate for either SVOC and/or pesticide/PCB. As discussed in Section 3.2.2, sample location 3148 had VOCs collected at different depths, 8.5 feet bgs and 12.5 feet bgs. Specific sample depths and analyses collected per location are shown in Table 3-4.

- Proposed: Depth-discrete samples will be collected at 10 DPT locations and six monitoring well locations.

  Deviation: Monitoring well PW-10A was recently decommissioned, but the abandonment report had not yet been submitted. The soil boring location 3119 was sampled as an additional groundwater TW location in place of PW-10A. Therefore, depth-discrete samples were collected at 11 DPT locations and five monitoring well locations.

3.4 Data Quality

QA objectives and details regarding data management, verification, and validation were provided in the quality assurance project plan, Attachment B to the RI work plan (CDM 2005a). Data management and database protocols were described in detail in the data management plan, Attachment C to the RI work plan (CDM 2005a). Data collected by previous contractors were integrated with RI-generated data to compile the data set used to complete the RI for IR Site 31.

This section details the quality assurance/quality control (QA/QC) activities, including data validation results and analysis of the precision, accuracy, representativeness, completeness, and comparability of data that were conducted for the RI. The field QA program was designed in accordance with the CDM Quality Implementation Plan for projects under Contract N68711-00-D-0004, Revision 2, August 16, 2005, *EPA Guidance for the Data Quality Objectives Process* (EPA 2000a), the *Navy Installation Restoration Chemical Data Manual* (National Facilities Engineering Service Center [NFESC] 1999), and *EPA Requirements for Quality Assurance Project Plans* (EPA 2001a).

Measurement data were regularly evaluated and documented to quantitatively assess data quality, monitor consistency with DQOs, and ascertain potential limitations to using the data based upon the data validation results. Data verification included checking that results were transferred correctly from laboratory data printouts to the laboratory report and to the electronic data deliverable (EDD). The following paragraphs describe the methods of review and verification.

3.4.1 Sample QA Methods

Field Decontamination

Decontamination of field equipment occurred in accordance with standard operating procedure (SOP) 4-5, Field Equipment Decontamination at Non-Radioactive Sites provided in the final RI work plan for IR Site 31 SAP.

Field Sampling

The following types of quality control (QC) samples were collected during the sampling events:

- Field duplicates;
- Equipment rinsate blanks;
- Trip blanks;
- Source blanks; and

- Temperature blanks.

The laboratory analyzed all QC samples in accordance with the analytical method at the method-required frequency. All QC samples were analyzed for the same parameters as the primary samples except trip blanks, which were only analyzed for VOCs. The frequency of QC samples collected during this expanded site investigation (ESI) is provided below:

• Field duplicates	1 per 10 samples
• Equipment rinsate blanks	1 per day per sampling event
• Trip blanks	1 per cooler with VOC
• Temperature blanks	1 per cooler
• Source blank	1 sample per water source used

Field Duplicates

Duplicate samples were collected from the same depth interval as the primary sample. Duplicate soil samples were collected in a 4-foot long carbon-steel macro-core sampler fitted with a 4-foot long acetate liner. A total of 13 soil and groundwater field duplicates were collected during November 2005 (12 field duplicates for soil and 1 for groundwater). Only 1 field duplicate was collected for groundwater due to limited water volume.

Equipment Rinsate Blanks

An equipment rinsate blank was prepared and submitted for analysis at a minimum frequency of one per day per sampling event. Equipment rinsate blanks consisted of analyte-free water used to rinse sampling equipment after equipment decontamination. This QC sample serves as a check on reagent (preservative) and residual environmental contamination remaining after decontamination.

A total of five equipment rinsate blank samples were collected during November 2005. The equipment rinsate blanks were collected from unlined, decontaminated, split-spoon samplers and analyzed for the same analytes as the samples collected at the site.

Trip Blanks

The trip blank is a sealed volatile organic analyte (VOA) vial filled with target analyte-free water provided by the laboratory that accompanies the samples from collection through shipment. This QC sample serves as a check for cross-contamination of VOCs.

A total of 21 trip blank samples, provided by the analytical laboratory in sealed, 40-millileter (mL) vials with Teflon™ septa, were analyzed during November 2005 to

determine whether potential cross-contamination had occurred during sample shipping to the analytical laboratory. The vials were filled with ASTM Type II water and preserved with a 1:1 solution of hydrochloric acid (HCl). Trip blanks were included in the coolers shipped to the laboratory along with the groundwater samples to be analyzed for VOCs. The trip blanks were analyzed for VOCs only.

Source Blank

A source blank consists of target analyte-free water used by sampling personnel for equipment decontamination. The source blank is transferred from one vessel to another at the sampling site and is preserved as appropriate. This QC sample serves as a check on environmental contamination of the water used for decontamination of field equipment.

One source blank sample was collected during November 2005 to assess the quality of site-supplied water used for equipment decontamination.

Temperature Blanks

A temperature blank consists of a sealed VOC vial filled with water provided by the laboratory. The temperature blank is a sealed container that accompanies the samples from packaging through shipment. This QC sample served as a check of adequate cooling of coolers containing samples to be analyzed for organic compounds. Temperature blanks were submitted to the laboratory at a frequency of one per cooler per shipment.

Sampling Handling and Custody

After a sample was collected, it was prepared for shipment. Chain-of-custody (COC) procedures and sample shipment followed the requirements in SOP 1-2, Sample Custody and SOP 2-1, Packaging and Shipping of Environmental Samples provided in the final RI work plan for IR Site 31 SAP.

Holding times are the maximum storage times allowed between sample collection and sample analysis (or extraction) during which the designated preservation and storage techniques are employed. The method of shipment was chosen to meet required holding times (i.e., hexavalent chromium samples were sent via courier to a local laboratory for analysis due to the minimal holding time). Required holding times for each analytical method are provided in the final RI work plan for IR Site 31 SAP.

Laboratory Quality Control Samples

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interference by and/or contamination of glassware and reagents. QC

samples are laboratory duplicates, laboratory blanks, matrix spike/matrix spike duplicates (MS/MSDs), laboratory control sample/laboratory control sample duplicates (LCS/LCSDs), as applicable, and other method-required QC samples. Each type of laboratory-based QC sample was analyzed at a rate of 5 percent or one per batch (a batch is a group of up to 20 samples analyzed together), whichever was more frequent. Results were included in the laboratory QC package.

Blank samples were analyzed to assess possible contamination so that corrective measures may be taken, if necessary. Duplicate samples are aliquots of a single sample that are split on arrival at the laboratory or upon analysis. Results obtained for two replicates that are split in a controlled laboratory environment were used to assess laboratory precision of the analyses. MS/MSD and LCS/LCSD analyses were used to determine both precision and accuracy.

The number of calibration standards is prescribed by each analytical method procedure. The following table provides a summary of the frequency of collection/analysis of the quality control samples described above:

- Laboratory duplicates — 1 per sample batch
- Laboratory blanks — 1 per sample batch
- MS/MSD — 1 per 20 samples or 5 percent per matrix sampled
- LCS/LCSD — 1 per 20 samples or 5 percent per matrix sampled
- Surrogates — All samples for organic analysis

3.4.2 Validation and Verification Methods

Validation was conducted in accordance with Southwest Environmental Work Instruction (EWI) No. 1, Data Validation Guidelines for Chemical analysis of Environmental Samples. EWI No. 1 is compiled from EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 2004c), and/or EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 1999b).

The data validation strategy employed during the IR Site 31 RI is "20 percent Level IV and 80 percent Level III." Under this strategy, 10 percent of the data was subjected to a Level IV validation, and the remaining 90 percent of the data was validated as per Level III procedures. The 10 percent portion of the data set for Level IV validation included both routine and QC samples. All data that are not subjected to Level IV validation as described in EWI No. 1 were subject to Level III validation procedures.

A copy of EWI No. 1 was provided to the independent laboratory validation contractor selected for this project.

3.4.3 Data Usability and Assessment Review

The purpose of the data usability and assessment review (DUAR) is to evaluate the data collected and determine whether they meet the quality objectives outlined in the project work plans. QA objectives for measuring data are expressed in terms of precision, accuracy, representativeness, comparability, and completeness (PARCC). The QA objectives provide a mechanism for ongoing control and evaluating and measuring data quality throughout the project. The complete DUAR is included as Appendix F.

Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\text{RPD} = \text{absolute value } [(C1-C2)/\{(C1+C2)/2)\}] \times 100\%$$

Where: C1 = Concentration of split sample #1
C2 = Concentration of split sample #2

Some analytical RPDs were outside criteria. Associated sample results were qualified as estimated (J). Specific details are documented in Appendix F.

Accuracy

Accuracy is a measurement of agreement for a given measurement against an accepted reference value. It is typically assessed through the analysis of matrix spike and calibration check samples and expressed as a percent recovery. Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure;
- Field contamination;
- Sample preservation and handling;
- Sample matrix;
- Sample preparation; and
- Analytical techniques.

By adhering to the approved field and analytical SOPs, the data generated are believed to be accurate. CDM's subcontract validators reviewed the laboratories' data for accuracy; that is, the reported surrogate, internal standards, calibration, and MS and MSD results. Select laboratory spike recoveries, surrogate recoveries, internal standards, and calibrations were outside criteria. The data validator qualified the data as required by the validation guidance. Specific details are documented in Appendix F.

Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and depth interval of sample collection. Requirements and procedures for sample collection are designed to maximize sample representativeness.

Representativeness also can be monitored by reviewing field documentation and by performing field audits. Appropriate laboratory QA/QC requirements were described in the final RI work plan for IR Site 31 SAP and laboratory statements of work (SOWs) to ensure that the laboratory analytical results were representative of true field conditions.

Representativeness, as defined above, has met the applicable requirements for the fieldwork as well as laboratory analyses.

Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods assures that data from like samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures are determined to have been followed, or defined to show that variations did not affect the values reported.

Comparability has been met for this sampling event for IR Site 31.

Completeness

Completeness of the field program is defined as the percentage of samples planned for collection as listed in the final RI work plan for IR Site 31 SAP versus the actual samples collected during the field program (See equation A below).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (See equation B

below). Acceptable data include both data that pass all the QC criteria (unqualified data) and data that may not pass all of the QC criteria but had appropriate corrective actions taken (qualified but useable data).

A. $$\%\text{Completeness} = C \times \frac{100}{n}$$

Where: C = actual number of samples collected
n = total number of samples planned

B. $$\%\text{Completeness} = V \times \frac{100}{n'}$$

Where: V = number of measurements judged valid
n' = total number of measurements made

No sample results were rejected. Therefore, the completeness of acceptable data based upon sample analyses is 100 percent. However, seven groundwater samples from six locations had insufficient volume for complete analysis of all analytical parameters. The completeness goal was to generate a complete data set for at least 90 percent of the samples planned to be collected and 90 percent valid data of the samples analyzed.

It was estimated that three samples could be collected from the vadose zone of 50 locations. During sample collection, it was discovered that the vadose layer was not of sufficient depth to obtain three samples at all locations. Therefore even though only 126 of the 150 planned samples were collected, a completeness of 100 percent for sample collection was achieved as relates to the sampling objectives.

For groundwater samples, it was planned to collect two samples from 10 locations for a total of 20 samples. As stated previously, due to the clayey nature of subsurface soils, insufficient groundwater yield made it impossible to collect the necessary groundwater volume for all proposed analyses at some locations. All samples though were analyzed for VOCs, which is the analysis most pertinent to meeting data quality objectives at these locations. A completeness goal of 100 percent was met for the collection and analysis of VOCs. A completeness goal of 85 percent was met for the remaining analyses. Since the most pertinent analysis was completed, data quality objectives have been met.

Project Assessment

The data reported are suitable for their intended use as stated in the IR Site 31 Work Plan Attachment A SAP. The achievement of the completeness goal for usable data provides sufficient data for project decisions. The detection limits reported do not exceed the expected limits as documented in the SAP.

3.4.4 Detection Limits

Each analytical method used during the RI was chosen because it has a method detection limit (MDL) at or below the level of concern. For each analyte, the IR Site 31 work plan (CDM 2005a) provided a target quantitation limit (TQL) that the laboratory was to achieve to provide analytical results at or below regulatory comparison criteria.

The TQL is generally equal to or greater than the MDL. The TQLs are set above MDLs to simplify comparisons between results from individual samples by minimizing influences from matrix effects (e.g., water content, high-level analytes).

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

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

Quantitation limits are a compromise between analytical sensitivity and precision. Setting low TQLs can lead to poorly defensible data due to false positive (Type I) and/or false negative (Type II) errors, whereas elevated TQLs can hamper site characterization. Laboratory determinations of MDL are performed on non-typical samples (e.g., distilled water) leading to idealized limits. Confidence in detection limits increases with instrument signal level above the MDL, and higher limits mean better precision.

Although the TQL of some analyte groups (i.e., SVOCs, pesticides, and PCBs) are set high to avoid Type I and Type II errors, these limits provide a conservative picture of the nature and extent of contamination and the associated risk. Accordingly, risk is assessed at the TQL or SQL for analytes reported as not present rather than at the MDL.

Table 3-6 presents a summary of analytes with one or more SQLs exceeding TQLs or either EPA or Cal/EPA PRGs for residential soil. This table provides information on the number of samples in which a given analyte was reported as not present at concentrations exceeding TQLs or regulatory comparison criteria. Table 3-6 also provides the range of SQLs at which a given analyte was reported as not present.

Additional details for SQLs and TQLs for each analyte group are presented in Section 4.1.2.

3.5 Comparison Criteria

Comparison criteria are used in the following nature-and-extent discussion to assess the magnitude and extent of contamination at IR Site 31 and to define a list of chemicals of interest at the site. The identification of chemicals of potential concern (COPCs) for the risk assessments is performed independently and described in Section 6.

The following comparison criteria were used for soil samples:

- Federal (EPA) Residential PRG - EPA Region 9 PRGs for Residential Soil Direct Contact Updated October 2004 (EPA 2004b);
- California Modified (Cal/EPA) Residential Preliminary Remediation Goal - EPA Region 9 PRGs for Residential Soil Direct Contact Updated October 2004 (EPA 2004b);
- Base-wide background metals concentrations in soil at Alameda Point (PRC 1997a, TtEMI 2001a);
- RWQCB Soil Screening Levels for Evaluation of Potential Vapor Intrusion Concerns (Residential; February 2005);
- EPA Ecological Soil Screening Levels Benchmark; and
- Oak Ridge National Lab Benchmark - Efroymson, R., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. Preliminary remediation goals for ecological endpoints.

The methods and results of the statistical comparison of metals concentrations in soil at IR Site 31 to Alameda Point pink background concentrations are described in Appendix H1. These statistical comparisons detailed in Appendix H1 include use of the Wilcoxon rank sum test to compare the background concentration distributions of metals in soil with the IR Site 31 distributions. When the background or site data sets were not suitable for the Wilcoxon rank sum test, box plots or dot plots were used to visually compare background and site data. This approach is consistent with Navy and EPA guidance (DON 1999, 2002). Tables and figures in Appendix H1 summarize the results of these comparisons. Comparisons between background and metals concentrations reported in soil at IR Site 31 showed the following 16 metals to have concentrations

statistically different from background for both the 0-to-2-foot and the 0-to-7-foot depth ranges:

- Arsenic;
- Barium;
- Cadmium;
- Chromium;
- Cobalt;
- Copper;
- Iron;
- Lead;
- Mercury;
- Molybdenum;
- Nickel;
- Selenium;
- Thallium;
- Vanadium; and
- Zinc.

The metals concentrations reported for soil samples at IR Site 31 are compared in this RI to background concentrations, in order to distinguish between a release and naturally occurring concentrations. Following the project work plan, analytical results of soil samples are to support the human health risk assessment and were analyzed for the 17 Title 22 inorganics plus iron. Aluminum and manganese are not included in the Title 22 metals and therefore were not reported by the laboratory; thus, they were not included in the background analysis presented in Appendix H1. The concentrations for aluminum, magnesium, and manganese were determined at a later date though through an examination of the raw data and a percent moisture correction. Because these concentrations are estimated and not certified by the laboratory, the health risks are calculated separately and presented in the Uncertainty Analysis of Section 6 and Appendix K. Also, the data were used in the evaluation of ambient concentrations discussed in Section 4.1.4. Figure H-1 in Appendix H1 shows the locations of the three background areas at Alameda Point. The background data set does not include any samples collected east of Main Street (the western boundary of IR Site 31). Further discussion and evaluation of background comparisons in Section 4 indicate that the Alameda Point pink background data set is not appropriate for comparison with IR Site 31 data. The discussion of analytes exceeding background is presented in Section 4.

Step 1 State the Problem	Step 2 Identify the Decisions	Step 3 Identify the Decision Inputs	Step 4 Define the Study Boundaries	Step 5 Develop the Decision Rules	Step 6 Specify Tolerable Limits on Decision Errors	Step 7 Optimize the Sampling Design
IR Site 31 was previously used for storage of excess equipment. An aerial photographic review indicates that the site was used for storage starting from between 1953 and 1959 and ending between 1985 and 1993. The types of materials stored are unknown. IR Site 31 overlies an benzene and naphthalene groundwater plume. Unknown site-specific spills or leaks may have impacted soil and/or groundwater. PAHs, the primary COPCs in soil at the site, have been sufficiently characterized. Limited soil data exist for VOCs, SVOCs, pesticides, PCBs, and metals, which leaves a data gap for soil. Soil data for non-PAH organic compounds and metals are needed to complete characterization of the soil and fill the data gap. Limited non-VOC groundwater data exist. In accordance with EPA and RWQCB guidance, soil gas samples must be collected from the vadose zone and at a minimum depth of 5 feet bgs to be valid for HHRA purposes. Groundwater at the site is typically encountered between 6 and 8 feet bgs; therefore, soil gas data are considered an unreliable data source for estimating indoor air concentrations in support of the HHRA.	Decisions will be based on data gathered during previous investigations and the field investigation for the IR Site 31 RI. These data will be used to answer the following questions: • Can data from non-PAH organic chemicals and metals in soil be used to support decisions for risk assessment and potential remedial action? • Can data from the proposed VOC groundwater sampling be used for the indoor air modeling for the HHRA? • Can data from the proposed and previous groundwater sampling be used to evaluate if groundwater beneath IR Site 31 has characteristics consistent with a site-specific release or the IR Site 25 groundwater plume? If the groundwater data determine that a site-specific release has occurred, then what further actions should be conducted? If the groundwater data determine that a site-specific release has not occurred, then what further actions should be conducted? A baseline HHRA and a screening-level ERA were conducted to answer the following question. • Do COPCs at the site pose a risk to human health and ecological habitats under current and future use scenarios for the site?	Inputs include analytical results for soil and groundwater from previous investigations and analytical results for soil and groundwater from the IR Site 31 RI field investigation. Laboratory methods were selected to minimize the occurrence of elevated laboratory detection limits.	The boundaries of the study area are as follows. • Lateral boundaries for soil encompass IR Site 31. • Lateral boundaries for groundwater encompass the groundwater plume and groundwater beneath IR Site 31. • Vertical boundaries: for soil encompass vadose zone soil from ground surface (excluding concrete, asphalt, gravel subbase, and the sod root zone) to approximately 6 to 8 feet bgs (the top of groundwater). For groundwater, the vertical limit is approximately 24 feet bgs, correlating with the bottom of existing monitoring well screen interval. • The temporal boundary for the investigation is 2002 through 2006. Assuming use of soil data from 2002 and completing the final RI report in 2006.	If soil data are usable per Section 4.2, **then** the data will be used to conduct the risk assessment. **If** soil data are not usable per Section 4.2, **then** the data will not be used to conduct the risk assessment and recommendations will be made to the BRAC Cleanup Team (BCT) for supplemental investigation efforts. **If** VOC groundwater data are usable per Section 4.2, **then** the data will be used to perform the indoor air model. **If** VOC groundwater data are not usable per Section 4.2, **then** the data will not be used to perform the indoor air model and recommendations will be made to the BCT for supplemental investigation efforts. **If** sufficient groundwater data are available to determine whether a site-specific release to groundwater has occurred, **then** it will be determined whether a site-specific release has occurred. **If** sufficient groundwater data are not available to determine whether a site-specific release to groundwater has occurred, **then** recommendations will be made to the BCT for supplemental investigation efforts (not part of this scope of work).. **If** soil and/or groundwater data identify COPCs unique to IR Site 31 or if the results are statistically different from the base-wide groundwater plume results, **then** it will be assumed that a site-specific release has occurred. **If** soil and/or groundwater data do not identify COPCs unique to IR Site 31 or if the results are not statistically different from the base-wide groundwater plume results, **then** it will be assumed that a site-specific release has not occurred. **If** the groundwater data determine that a site-specific release to groundwater has occurred, **then** conduct a groundwater risk assessment (not part of this scope of work). **If** the groundwater data determine that a site-specific release to groundwater has not occurred, **then** assume the groundwater under IR Site 31 is related to the VOC plume (OU-5) and use groundwater risk assessment values and groundwater remedial actions associated with OU-5 (ERRG 2004). **If** the risk assessments indicate that COPCs pose a risk to current or future human receptors and/or ecological habitat, **then** risk management decisions may be recommended. **If** the risk assessments indicate that COPCs do not pose a risk to current or future human receptors and/or ecological habitat, **then** no further action recommendations will be made.	Site-specific sampling objectives and the presence of residential housing, utilities, and previous sample locations limit the use of statistical methods for selecting sampling locations for the IR Site 31 RI. Available geologic and chemical concentration data will be evaluated conservatively. The limits for data usability are those described in Section 4.2 and per the data usability for risk assessment guidance (EPA 1992). The most severe error would be to conclude that action (further investigation) is not required when an unacceptable level of human health or ecological risk actually exists at IR Site 31. To minimize the potential error of underestimating risk, the investigation will make use of QC samples, careful sample collection, handling, preparation, and analysis of all media in accordance with applicable standard operating procedures. Optimal sampling design will assure that the sample locations are evenly distributed to include areas with no historic uses or biased to areas where past activities indicate potential release. Also, the risk assessment will include all chemicals detected in at least one sample, regardless of frequency of detection, and the exposure assumptions will be designed to not underestimate risk.	To meet the objectives of this RI, soil samples will be collected at 50 locations across IR Site 31 in a modified grid spacing approach with bias toward past storage areas and adjusted by current access limitations. The locations are distributed to provide adequate site coverage and collect soil data related to human exposure and conducting the HHRA. Sample locations will be adjusted to occur in unpaved and play areas where possible. Soil samples will be collected from three depth intervals: 0 to 2 feet bgs, 2 to 4 feet bgs, and 4 to 8 feet bgs (or groundwater, whichever is encountered first). Soil samples will be analyzed for the following chemicals at IR Site 31: • VOCs (120 samples), using EPA Method 5035/8260B • SVOCs (120 samples), using EPA Method 3550B/8270C • Pesticides and PCBs (120 samples), using EPA Method 3550B/8081A/8082 • Title 22 metals and iron (120 samples), using EPA Method 3050B/6010B/7000 series Groundwater samples will be collected at five existing monitoring wells and from 10 DPT locations that are biased to correlate with the margins of the plume based upon the 2004 sampling results and to address the areas where benzene and naphthalene are reported at the greatest concentration values. Groundwater samples will be analyzed for the following parameters: • VOCs (17 samples - DPT only), using EPA Method 5030B/8260B • SVOCs (16 samples), using EPA Method 3510C/8270C • Pesticides and PCBs (16 samples), using EPA Method 3510C/8081A/8082 • Title 22 dissolved metals and iron (18 samples), using EPA Method 3010A/6010B/7000 series

bgs - below ground surface
COPCs - contaminants of potential concern
DPT - direct push technology (with tempora
EPA - U.S. Environmental Protection Age:
FS- feasibility study
RI - remedial investigation
RWQCB - Regional Water Quality Control Board
SVOC - semivolatile organic compound
TOC - total organic carbon
HHRA - human health risk assessment
IR - Installation Restoration (Program)
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenylP
QC - quality control
VOC - volatile organic compound
BCT - BRAC Cleanup Team
ERA - ecological risk assessment

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Table 3-2
Analytical Soil Samples Collected
IR Site 31 Alameda Point, Alameda, California

Sample Location ID	VOCs			Title 22 Metals and Iron			SVOCs (non-PAHs)			PCBs			Pesticides		
	Sample Depth Interval (feet bgs)														
	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6
3101	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3102	X	X		X	X		X	X		X	X		X	X	
3103	X	X	X[1]	X	X	X[1]	X	X	X[1]	X	X	X[1]	X	X	X[1]
3104	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3105	X	X	XX	X	X	XX	X	X	XX	X	X	XX	X	X	XX
3106	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3107	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3108	XX	X	**X[2]**	XX	X	**X[2]**	XX	X	**X[2]**	XX	X	**X[2]**	XX	X	**X[2]**
3109	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3110	X	X[3]	X[1]	X	X[3]	X[1]	X	X[3]	X[1]	X	X[3]	X[1]	X	X[3]	X[1]
3111	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3112	X	X	XX[1]	X	X	XX[1]	X	X	XX[1]	X	X	XX[1]	X	X	XX[1]
3113	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3114	X	X	**X[2]**	X	X	**X[2]**	X	X	**X[2]**	X	X	**X[2]**	X	X	**X[2]**
3115	X	X	XX	X	X	XX	X	X	XX	X	X	XX	X	X	XX
3116	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3117	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3118	XX	X		XX	X		XX	X		XX	X		XX	X	
3119	X	X		X	X		X	X		X	X		X	X	

Table 3-2 (continued)
Analytical Soil Samples Collected
IR Site 31 Alameda Point, Alameda, California

Sample Location ID	VOCs			Title 22 Metals and Iron			SVOCs (non-PAHs)			PCBs			Pesticides		
	Sample Depth Interval (feet bgs)														
	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6
3120	X	X	X[4]	X	X	X[4]	X	X	X[4]	X	X	X[4]	X	X	X[4]
3121	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3122	X	XX		X	XX		X	XX		X	XX		X	XX	
3123	X	X		X	X		X	X		X	X		X	X	
3124	X	X		X	X		X	X		X	X		X	X	
3125	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3126	XX	X		XX	X		XX	X		XX	X		XX	X	
3127	X	X		X	X		X	X		X	X		X	X	
3128	X			X			X			X			X		
3129	X			X			X			X			X		
3130	X	X		X	X		X	X		X	X		X	X	
3131	X	X		X	X		X	X		X	X		X	X	
3132	X	XX	X[5]	X	XX	X[5]	X	XX	X[5]	X	XX	X[5]	X	XX	X[5]
3133	X	X	X[5]	X	X	X[5]	X	X	X[5]	X	X	X[5]	X	X	X[5]
3134	X	X	X[1]	X	X	X[1]	X	X	X[1]	X	X	X[1]	X	X	X[1]
3135	X	X		X	X		X	X		X	X		X	X	
3136	X	X	XX	X	X	XX	X	X	XX	X	X	XX	X	X	XX
3137	X	X		X	X		X	X		X	X		X	X	
3138	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 3-2 (continued)
Analytical Soil Samples Collected
IR Site 31 Alameda Point, Alameda, California

Sample Location ID	VOCs			Title 22 Metals and Iron			SVOCs (non-PAHs)			PCBs			Pesticides		
	Sample Depth Interval (feet bgs)														
	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6
3139	X	X		X	X		X	X		X	X		X	X	
3140	X	X		X	X		X	X		X	X		X	X	
3141	X	X	XX	X	X	XX	X	X	XX	X	X	XX	X	X	XX
3142	X	X		X	X		X	X		X	X		X	X	
3143	X	X		X	X		X	X		X	X		X	X	
3144	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3145	X	**X**	XX	X	**X**	XX	X	**X**	XX	X	**X**	XX	X	**X**	XX
3146	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3147	X	X		X	X		X	X		X	X		X	X	
3148	X	X		X	X		X	X		X	X		X	X	
3149	X	X		X	X		X	X		X	X		X	X	
3150	X	XX		X	XX		X	XX		X	XX		X	XX	
	50	**48**	**28**	**50**	**48**	**28**	**50**	**48**	**28**	**50**	**48**	**28**	**50**	**48**	**28**

Notes:
XX - Field duplicate taken
Bold **X** - MS/MSD sample taken
1- Sample depth 4.5 to 6.5 feet bgs
2- Sample depth 4 to 7 feet bgs
3- Sample depth 3 to 4 feet bgs
4- Sample depth 4 to 6.5 feet bgs
5- Sample depth 5 to 7 feet bgs

ID= Identification
VOCs= Volatile Organic Compounds
SVOCs= Semivolatile Organic Compounds
PAHs= Polychlorinated Aromatic Hydrocarbons
PCBs= Polychlorinated Biphenyls
bgs= below ground surface

Table 3-3
Analytical Geotechnical Soil Samples Collected
IR Site 31 Alameda Point, Alameda, California

Sample Location ID	Sample ID	Total Organic Carbon			Density and Moisture			Grain Size			Hydraulic Conductivity			Air Permeability		
		Sample Depth Interval (feet below ground surface)														
		0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6	0-2	2-4	4-6
3102	31144	X			X			X			X			X		
3102	31145		X			X			X			X			X	
3104	31007	X			X			X			X			X		
3104	31008		X			X			X			X			X	
3104	31009			X			X			X			X			X
3113	31037	X			X			X			X			X		
3113	31038		X			X			X			X			X	
3113	31039			X			X			X			X			X
3122	31066	X			X			X			X			X		
3122	31068		X			X			X			X			X	
3127	31081	X			X			X			X			X		
3127	31082		X			X			X			X			X	
3132	31087	X			X			X			X			X		
3132	31088		X			X			X			X			X	
3132	31090			X[1]			X[1]			X[1]			X[1]			X[1]
	TOTALS	6	6	3	6	6	3	6	6	3	6	6	3	6	6	3

1- Sample depth 5 to 7 feet bgs
ID= Identification

Table 3-4
Groundwater Samples and Analyses by Location
IR Site 31 Alameda Point, Alameda, California

Sample Location ID	Sample ID	SDG	Matrix	Screened Interval (Feet bgs)	Sample Depth (Feet bgs)	VOCs	Title 22 Metals and Iron	SVOCs (PAHs)	PCBs	Pesticides
Discrete Groundwater Samples Collected from Temporary Wells										
3119	31171	4742	WG	7 - 12	9.5	X	NA	NA	NA	NA
3119	31172	4742	WG	11 - 16	13.5	X	X	X	X	X
3141	31123	4702	WG	15 - 20	17.5	X	X	X	X	X
3142	31125	4702	WG	14 - 19	16.5	X	X	X	X	X
3142	31126	4702	WG	18 - 23	20.5	X	X	X	X	X
3143	31127	4724	WG	12 - 17	14.5	X	X	X	X	X
3144	31167	4743	WG	15 - 20	17.5	X	X	X	NA	NA
3145	31165	4743	WG	13 - 18	15.5	X	X	X	X	X
3145	31166	4743	WG	9 - 14	11.5	X	NA	NA	NA	NA
3147	31164	4743	WG	9 - 14	11.5	X	X	X	X	X
3148	31162	4743	WG	6 - 11	8.5	X	NA	NA	NA	NA
3148	31163	4743	WG	10 - 15	12.5	X	X	NA	X	X
3149	31169	4742	WG	9 - 14	11.5	X	X	X	X	X
3149	31170	4742	WG	5 - 10	7.5	X	NA	NA	NA	NA
3150	31173	4743	WG	9 - 14	11.5	X	X	NA	NA	NA
3146*	31148	4724	WG	9.5 - 14.5	12.0	X	X	X	X	X
Groundwater Monitoring Wells										
M25-01	31129	4702	WG	9.95 - 19.95	14.95	np	X	X	X	X
M25-06	31146	4724	WG	10 - 19.5	14.75	np	X	X	X	X
M25-07	31147	4724	WG	10 - 19.5	14.75	np	X	X	X	X
M25-09	31131	4702	WG	10 - 19.5	14.75	np	X	X	X	X
PW-12	31130	4702	WG	12 -17	14.5	np	X	X	X	X
				Totals:		**16**	**17**	**15**	**15**	**15**

* - Field duplicate collected at location 3146, duplicate not included in total sample analyses count
np = not planned for analyses, see section 3.2.2
NA = no analyses owing to field conditions, see Section 3.2.2 and 3.3.2
ID = Identification
SDG = Sample Delivery Group
bgs = below ground surface
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
PCBs = Polychlorinated Biphenyls

Table 3-5
Sample Analyses and Rationales for IR Site 31

Medium Investigated	Analysis and Method(s)	Rationale
Soil	VOCs (with TICs) (EPA Method 5035/8260B)	Assess the concentration of VOCs in soil that may have been derived from site activities (e.g., storage). Characterize VOCs in soil to assist in delineating the extent of possible VOCs in soil and identifying any potential onsite source of VOCs.
	SVOCs (with TICs) (EPA Method 3550B/8270C)	Assess the concentration SVOCs (other than PAHs) in soil that may have been derived from site activities (e.g., storage). Characterize SVOCs in soil to assist in delineating the extent of possible SVOCs in soil and identifying any potential onsite source of SVOCs.
	Pesticides (EPA Method 3550B/8081A)	Assess the concentration of pesticides in soil that are potentially derived from site activities (e.g., storage). Characterize pesticides in soil to assist in delineating the extent of possible pesticides in soil and identifying any potential onsite source of pesticides.
	PCBs (EPA Method 3550B/8082)	Assess the concentration of PCBs in soil that are potentially derived from site activities (e.g., storage). Characterize PCBs in soil to assist in delineating the extent of possible PCBs in soil and identifying any potential onsite source of PCBs.
	Title 22 Metals Plus Iron (EPA Method 3050B/6010 and 7000 series)	Assess the concentration of metals in soil that may have been derived from site activities. Characterize metals in soil to assist in delineating the extent of possible metals in soil and identifying any potential onsite source of metals.
Groundwater	SVOCs (with TICs) (EPA Method 3510C/8270C)	Assess the concentrations of SVOCs in groundwater in order to assess whether an onsite release has impacted groundwater in comparison to the IR Site 25 plume.
	Pesticides (EPA Method 3510C/8081A)	Assess the concentrations of pesticides in groundwater in order to assess whether an onsite release has impacted groundwater in comparison to the IR Site 25 plume.
	PCBs (EPA Method 3510C/8082)	Assess the concentrations of PCBs in groundwater in order to assess whether an onsite release has impacted groundwater in comparison to the IR Site 25 plume.
	Title 22 Metals (dissolved) Plus Iron (EPA Method 3010A/6010 and 7000 series)	Assess the concentrations of metals in groundwater in order to assess whether an onsite release has impacted groundwater in comparison to the IR Site 25 plume.
	VOCs (with TICs) (EPA Method 5030B/8260B)	Assess the concentrations of VOCs in groundwater in order to evaluate whether an onsite release has impacted groundwater in comparison to the IR Site 25 plume. Use in Johnson and Ettinger model.

IR - Installation Restoration (Program)
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenyl
SVOC - semivolatile organic compound
TIC - tentatively identified compound
EPA - United States Environmental Protection Agency
VOC - volatile organic compound

Table 3-6
Comparison of Sample Quantitation Limits to Regulatory
Comparison Criteria for Non - Detects in Soil Samples
IR Site 31 Alameda Point

cas Number	ANALYTE (1)	Number of Samples Analyzed	Number of Non-Detects	Minimum SQL for Non-Detects (2)	Maximum SQL for Non-Detects (2)	Location of Maximum SQL for Non-Detects	Sample of Maximum SQL for Non-Detects	TQL (3)	Number of SQLs Exceeding TQL	Residential Soil Direct Contact (4)	Number of SQLs Exceeding Residential Soil Direct Contact	Residential SSL for Vapor Intrusion (5)	Number of SQLs Exceeding Residential SSL for Vapor Intrusion	EPA ECO-SSL Benchmark (6)	Number of SQLs Exceeding EPA ECO-SSL Benchmark	ORNL Benchmark (7)	Number of SQLs Exceeding ORNL Benchmark
				mg/kg	mg/kg			mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
VOLATILE ORGANIC COMPOUNDS																	
630-20-6	1,1,1,2-Tetrachloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	3.2	0	NA	0	NA	0	NA	0
71-55-6	1,1,1-Trichloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	1200	0	98	0	NA	0	NA	0
79-34-5	1,1,2,2-Tetrachloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.41	0	0.0091	0	NA	0	NA	0
79-00-5	1,1,2-Trichloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.73	0	0.032	0	NA	0	NA	0
75-34-3	1,1-Dichloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	2.8	0	0.32	0	NA	0	NA	0
75-35-4	1,1-Dichloroethene	126	126	0.0041	0.0086	3122	31068	0.0050	74	124	0	8.9	0	NA	0	NA	0
96-18-4	1,2,3-Trichloropropane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.034	0	NA	0	NA	0	NA	0
120-82-1	1,2,4-Trichlorobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	62	0	0.38	0	NA	0	20	0
95-63-6	1,2,4-Trimethylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	52	0	NA	0	NA	0	NA	0
96-12-8	1,2-Dibromo-3-chloropropane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.030	0	NA	0	NA	0	NA	0
106-93-4	1,2-Dibromoethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.032	0	0.0073	2	NA	0	NA	0
95-50-1	1,2-Dichlorobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	600	0	8.9	0	NA	0	NA	0
107-06-2	1,2-Dichloroethane (EDC)	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.28	0	0.025	0	NA	0	NA	0
156-59-2	1,2-Dichloroethene (cis)	126	126	0.0041	0.0086	3122	31068	0.0050	74	43	0	1.6	0	NA	0	NA	0
156-60-5	1,2-Dichloroethene (trans)	126	126	0.0041	0.0086	3122	31068	0.0050	74	69	0	3.1	0	NA	0	NA	0
78-87-5	1,2-Dichloropropane	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.34	0	0.051	0	NA	0	700	0
108-67-8	1,3,5-Trimethylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	21	0	NA	0	NA	0	NA	0
541-73-1	1,3-Dichlorobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	531	0	NA	0	NA	0	NA	0
142-28-9	1,3-Dichloropropane	126	126	0.0041	0.0086	3122	31068	0.0050	74	105	0	NA	0	NA	0	NA	0
106-46-7	1,4-Dichlorobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	9.11	0	0.046	0	NA	0	20	0
135-98-8	2-Phenylbutane	126	126	0.0041	0.0086	3122	31068	0.0050	74	NA	0	NA	0	NA	0	NA	0
67-64-1	Acetone	126	126	0.041	0.086	3122	31068	0.050	74	14,127	0	1400	0	NA	0	NA	0
71-43-2	Benzene	126	124	0.0041	0.0086	3122	31068	0.0050	72	0.64	0	0.18	0	NA	0	NA	0
108-86-1	Bromobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	28	0	NA	0	NA	0	NA	0
108-90-7	Chlorobenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	151	0	2.7	0	NA	0	40	0
75-00-3	Chloroethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	3.0	0	0.63	0	NA	0	NA	0
67-66-3	Chloroform	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.22	0	140	0	NA	0	NA	0
74-87-3	Chloromethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	47	0	0.070	0	NA	0	NA	0
124-48-1	Dibromochloromethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	1.1	0	0.019	0	NA	0	NA	0
75-71-8	Dichlorodifluoromethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	94	0	NA	0	NA	0	NA	0
100-41-4	Ethylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	395	0	390	0	NA	0	NA	0
75-09-2	Methylene chloride	126	120	0.0041	0.0086	3122	31068	0.0050	69	9.1	0	0.52	0	NA	0	NA	0
104-51-8	n-Butylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	240	0	NA	0	NA	0	NA	0
103-65-1	n-Propylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	240	0	NA	0	NA	0	NA	0
100-42-5	Styrene	126	126	0.0041	0.0086	3122	31068	0.0050	74	1700	0	450	0	NA	0	300	0
98-06-6	tert-Butylbenzene	126	126	0.0041	0.0086	3122	31068	0.0050	74	390	0	NA	0	NA	0	NA	0

cas Number	ANALYTE (1)	Number of Samples Analyzed	Number of Non-Detects	Minimum SQL for Non-Detects (2)	Maximum SQL for Non-Detects (2)	Location of Maximum SQL for Non-Detects	Sample of Maximum SQL for Non-Detects	TQL (3)	Number of SQLs Exceeding TQL	Residential Soil Direct Contact (4)	Number of SQLs Exceeding Residential Soil Direct Contact	Residential SSL for Vapor Intrusion (5)	Number of SQLs Exceeding Residential SSL for Vapor Intrusion	EPA ECO-SSL Benchmark (6)	Number of SQLs Exceeding EPA ECO-SSL Benchmark	ORNL Benchmark (7)	Number of SQLs Exceeding ORNL Benchmark
				mg/kg	mg/kg			mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
127-18-4	Tetrachloroethene	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.484	0	0.087	0	NA	0	NA	0
108-88-3	Toluene	126	126	0.0041	0.0086	3122	31068	0.0050	74	520	0	130	0	NA	0	200	0
79-01-6	Trichloroethylene	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.053	0	0.26	0	NA	0	NA	0
75-69-4	Trichlorofluoromethane	126	126	0.0041	0.0086	3122	31068	0.0050	74	386	0	NA	0	NA	0	NA	0
75-01-4	Vinyl chloride	126	126	0.0041	0.0086	3122	31068	0.0050	74	0.079	0	0.0067	6	NA	0	NA	0
1330-20-7	Xylenes	126	123	0.0082	0.017	3122	31067	0.010	53	271	0	310	0	NA	0	NA	0
SEMIVOLATILE ORGANIC COMPOUNDS (NO PAHs)																	
95-95-4	2,4,5-Trichlorophenol	126	126	0.52	540	3115	31043	0.50	126	6,110	0	23	41	NA	0	4	85
88-06-2	2,4,6-Trichlorophenol	126	126	0.52	540	3115	31043	0.50	126	6	55	NA	0	NA	0	4	85
120-83-2	2,4-Dichlorophenol	126	126	0.52	540	3115	31043	0.50	126	183	2	NA	0	NA	0	NA	0
105-67-9	2,4-Dimethylphenol	126	126	0.52	540	3115	31043	0.50	126	1,222	0	110	2	NA	0	NA	0
51-28-5	2,4-Dinitrophenol	126	126	2.6	2700	3115	31043	2.5	126	122	41	NA	0	NA	0	20	85
121-14-2	2,4-Dinitrotoluene (see DNT mixture for "ca")	126	126	0.52	540	3115	31043	0.50	126	122	2	NA	0	NA	0	NA	0
606-20-2	2,6-Dinitrotoluene (see DNT mixture for "ca")	126	126	0.52	540	3115	31043	0.50	126	61	3	NA	0	NA	0	NA	0
95-57-8	2-Chlorophenol	126	126	0.52	540	3115	31043	0.50	126	63	3	0.78	88	NA	0	NA	0
95-48-7	2-Methylphenol	126	126	0.52	540	3115	31043	0.50	126	3,055	0	NA	0	NA	0	NA	0
88-74-4	2-Nitroaniline	126	126	2.6	2700	3115	31043	2.5	126	183	29	NA	0	NA	0	NA	0
91-94-1	3,3-Dichlorobenzidine	126	126	1	1100	3115	31043	1.0	123	1.1	123	NA	0	NA	0	NA	0
108-39-4	3-Methylphenol	126	126	0.52	540	3115	31043	0.50	126	3,055	0	NA	0	NA	0	NA	0
99-09-2	3-Nitroaniline	126	126	2.6	2700	3115	31043	2.5	126	18	85	NA	0	NA	0	NA	0
106-44-5	4-Methylphenol	126	126	0.52	540	3115	31043	0.50	126	306	2	NA	0	NA	0	NA	0
100-01-6	4-Nitroaniline	126	126	2.6	2700	3115	31043	2.5	126	23	85	NA	0	NA	0	NA	0
62-53-3	Aniline	126	126	0.52	540	3115	31043	0.50	126	85	2	NA	0	NA	0	NA	0
65-85-0	Benzoic acid	126	126	2.6	2700	3115	31043	2.5	126	100,000	0	NA	0	NA	0	NA	0
100-51-6	Benzyl alcohol	126	126	1	1100	3115	31043	1.0	123	18,331	0	NA	0	NA	0	NA	0
111-44-4	Bis(2-chloroethyl)ether	126	126	0.52	540	3115	31043	0.50	126	0.22	126	0.0037	126	NA	0	NA	0
117-81-7	Bis(2-ethylhexyl)phthalate (BEHP)	126	126	0.52	540	3115	31043	0.50	126	35	29	NA	0	NA	0	NA	0
85-68-7	Butyl benzyl phthalate	126	126	0.52	540	3115	31043	0.50	126	12,221	0	NA	0	NA	0	NA	0
86-74-8	Carbazole	126	126	0.52	540	3115	31043	0.50	126	24	41	NA	0	NA	0	NA	0
132-64-9	Dibenzofuran	126	126	0.52	540	3115	31043	0.50	126	145	2	NA	0	NA	0	NA	0
84-66-2	Diethyl phthalate	126	126	0.52	540	3115	31043	0.50	126	48,882	0	NA	0	NA	0	100	2
131-11-3	Dimethyl phthalate	126	126	0.52	540	3115	31043	0.50	126	100,000	0	NA	0	NA	0	200	2
117-84-0	di-n-Octyl phthalate	126	126	0.52	540	3115	31043	0.50	126	2,444	0	NA	0	NA	0	NA	0
118-74-1	Hexachlorobenzene	126	126	0.52	540	3115	31043	0.50	126	0.30	126	NA	0	NA	0	1000	0

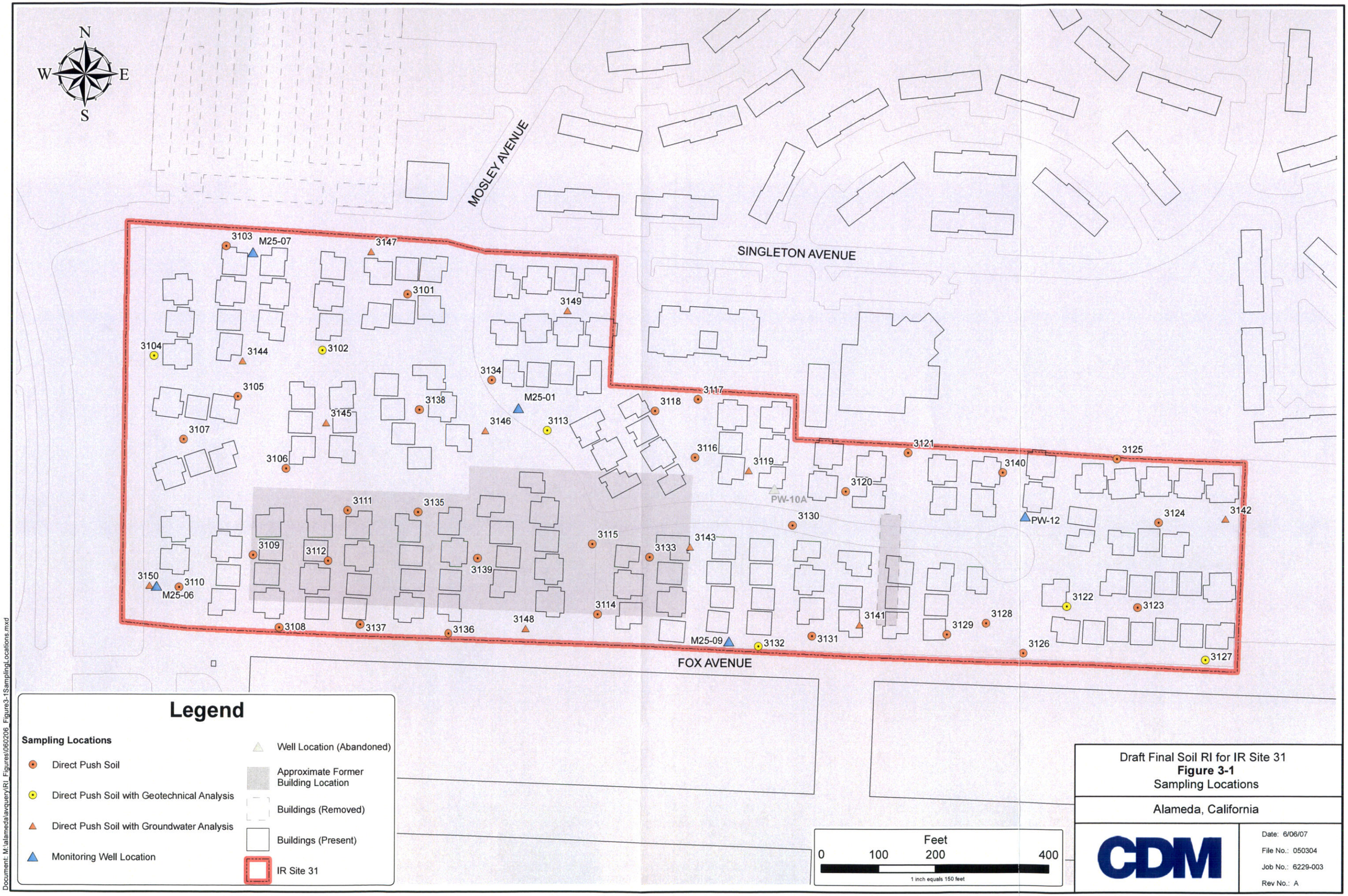
Table 3-6 (continued)
Comparison of Sample Quantitation Limits to Regulatory
Comparison Criteria for Non - Detects in Soil Samples
IR Site 31 Alameda Point

cas Number	ANALYTE (1)	Number of Samples Analyzed	Number of Non-Detects	Minimum SQL for Non-Detects (2)	Maximum SQL for Non-Detects (2)	Location of Maximum SQL for Non-Detects	Sample of Maximum SQL for Non-Detects	TQL (3)	Number of SQLs Exceeding TQL	Residential Soil Direct Contact (4)	Number of SQLs Exceeding Residential Soil Direct Contact	Residential SSL for Vapor Intrusion (5)	Number of SQLs Exceeding Residential SSL for Vapor Intrusion	EPA ECO-SSL Benchmark (6)	Number of SQLs Exceeding EPA ECO-SSL Benchmark	ORNL Benchmark (7)	Number of SQLs Exceeding ORNL Benchmark
				mg/kg	mg/kg			mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
87-68-3	Hexachlorobutadiene	126	126	0.52	540	3115	31043	0.50	126	6.2	55	NA	0	NA	0	NA	0
67-72-1	Hexachloroethane	126	126	0.52	540	3115	31043	0.50	126	35	29	NA	0	NA	0	NA	0
78-59-1	Isophorone	126	126	0.52	540	3115	31043	0.50	126	512	2	NA	0	NA	0	NA	0
1321-94-4	Methylnaphthalene (total 1- & 2-)	126	126	0.52	540	3115	31043	NA	0	NA	0	110	2	NA	0	NA	0
98-95-3	Nitrobenzene	126	126	0.52	540	3115	31043	0.50	126	20	44	NA	0	NA	0	40	29
621-64-7	N-Nitroso di-n-propylamine	126	126	0.52	540	3115	31043	0.50	126	0.069	126	NA	0	NA	0	NA	0
62-75-9	N-Nitrosodimethylamine	126	126	0.52	540	3115	31043	0.50	126	0.010	126	NA	0	NA	0	NA	0
86-30-6	N-Nitrosodiphenylamine	126	126	2.6	2700	3115	31043	2.50	126	99	44	NA	0	NA	0	20	85
87-86-5	Pentachlorophenol	126	126	2.6	2700	3115	31043	2.50	126	3.0	95	NA	0	0.0018	126	3	93
108-95-2	Phenol	126	124	0.52	540	3115	31043	0.50	124	18,331	0	NA	0	NA	0	30	29
110-86-1	Pyridine	126	126	0.52	540	3115	31043	0.50	126	61	3	NA	0	NA	0	NA	0
PESTICIDES																	
309-00-2	Aldrin	126	126	0.0018	0.029	3109	31024	0.0017	126	0.029	1	NA	0	NA	0	NA	0
319-84-6	BHC (alpha)	126	126	0.0018	0.029	3109	31024	0.0017	126	0.090	0	NA	0	NA	0	NA	0
319-85-7	BHC (beta)	126	126	0.0018	0.029	3109	31024	0.0017	126	0.32	0	NA	0	NA	0	NA	0
58-89-9	BHC (gamma) Lindane	126	126	0.0018	0.029	3109	31024	0.0017	126	0.44	0	NA	0	NA	0	NA	0
57-74-9	Chlordane	126	126	0.052	0.84	3109	31024	0.050	126	1.6	0	NA	0	NA	0	NA	0
72-54-8	DDD	126	123	0.0031	0.051	3109	31024	0.0030	123	2.4	0	NA	0	NA	0	NA	0
72-55-9	DDE	126	118	0.0031	0.051	3109	31024	0.0030	118	1.7	0	NA	0	NA	0	NA	0
50-29-3	DDT	126	122	0.0031	0.051	3109	31024	0.0030	122	1.7	0	NA	0	NA	0	NA	0
60-57-1	Dieldrin	126	125	0.0031	0.051	3109	31024	0.0030	125	0.030	61	NA	0	0.000032	125	NA	0
115-29-7	Endosulfan	126	126	0.0018	0.029	3109	31024	0.0017	126	367	0	NA	0	NA	0	NA	0
1031-07-8	Endosulfan Sulfate	126	126	0.0052	0.084	3109	31024	0.0050	126	NA	0	NA	0	NA	0	NA	0
72-20-8	Endrin	126	126	0.0031	0.051	3109	31024	0.0030	126	18	0	NA	0	NA	0	NA	0
7421-93-4	Endrin Aldehyde	126	126	0.0031	0.051	3109	31024	0.0030	126	NA	0	NA	0	NA	0	NA	0
76-44-8	Heptachlor	126	125	0.0018	0.029	3109	31024	0.0017	125	0.11	0	NA	0	NA	0	NA	0
1024-57-3	Heptachlor epoxide	126	126	0.0018	0.029	3109	31024	0.0017	126	0.053	0	NA	0	NA	0	NA	0
8001-35-2	Toxaphene	126	126	0.1	1.7	3109	31024	0.10	121	0.44	61	NA	0	NA	0	NA	0
PCBs																	
12674-11-2	Aroclor 1016	126	125	0.034	0.056	3122	31067	0.033	125	3.9	0	NA	0	NA	0	0.371	0
11104-28-2	Aroclor 1221	126	126	0.068	0.11	3122	31067	0.066	126	0.22	0	NA	0	NA	0	0.371	0
11141-16-5	Aroclor 1232	126	126	0.034	0.056	3122	31067	0.033	126	0.22	0	NA	0	NA	0	0.371	0
53469-21-9	Aroclor 1242	126	126	0.034	0.056	3122	31067	0.033	126	0.22	0	NA	0	NA	0	0.371	0
12672-29-6	Aroclor 1248	126	126	0.034	0.056	3122	31067	0.033	126	0.22	0	NA	0	NA	0	0.371	0
11097-69-1	Aroclor 1254	126	126	0.034	0.056	3122	31067	0.033	126	0.22	0	NA	0	NA	0	0.371	0
11096-82-5	Aroclor 1260	126	117	0.034	0.056	3122	31067	0.033	117	0.22	0	NA	0	NA	0	0.371	0

cas Number	ANALYTE (1)	Number of Samples Analyzed	Number of Non-Detects	Minimum SQL for Non-Detects (2)	Maximum SQL for Non-Detects (2)	Location of Maximum SQL for Non-Detects	Sample of Maximum SQL for Non-Detects	TQL (3)	Number of SQLs Exceeding TQL	Residential Soil Direct Contact (4)	Number of SQLs Exceeding Residential Soil Direct Contact	Residential SSL for Vapor Intrusion (5)	Number of SQLs Exceeding Residential SSL for Vapor Intrusion	EPA ECO-SSL Benchmark (6)	Number of SQLs Exceeding EPA ECO-SSL Benchmark	ORNL Benchmark (7)	Number of SQLs Exceeding ORNL Benchmark
				mg/kg	mg/kg			mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
INORGANICS																	
7440-36-0	Antimony	126	109	5.1	8.5	3122	31067	5.0	109	31	0	NA	0	0.27	109	5	109
7440-38-2	Arsenic	126	0	--	--	--	--	0.30	0	0.062	0	NA	0	18	0	9.9	0
7440-39-3	Barium	126	0	--	--	--	--	1.0	0	5,375	0	NA	0	330	0	283	0
7440-41-7	Beryllium	126	48	0.21	0.34	3122	31067	0.20	48	154	0	NA	0	21	0	10	0
7440-43-9	Cadmium	126	22	0.21	0.3	3122	31068	0.20	22	37	0	NA	0	0.36	0	4	0
7440-47-3	Chromium	126	0	--	--	--	--	0.50	0	30	0	NA	0	26	0	0.4	0
7440-48-4	Cobalt	126	0	--	--	--	--	0.50	0	903	0	NA	0	13	0	20	0
7440-50-8	Copper	126	0	--	--	--	--	0.50	0	3,129	0	NA	0	NA	0	50	0
7439-89-6	Iron	126	0	--	--	--	--	3.0	0	23,463	0	NA	0	NA	0	200	0
7439-92-1	Lead+++	126	0	--	--	--	--	0.30	0	150	0	NA	0	11	0	40.5	0
7439-97-6	Mercury	126	25	0.21	0.65	3130	31086	0.20	25	NA	0	NA	0	NA	0	0.00051	25
7439-98-7	Molybdenum	126	122	0.21	0.34	3122	31067	0.20	122	391	0	NA	0	NA	0	2	0
7440-02-0	Nickel	126	0	--	--	--	--	0.30	0	1,564	0	NA	0	NA	0	30	0
7782-49-2	Selenium	126	113	0.52	0.85	3122	31067	0.50	113	391	0	NA	0	NA	0	0.21	113
7440-22-4	Silver	126	126	0.51	0.85	3122	31067	0.50	126	391	0	NA	0	NA	0	2	0
7440-28-0	Thallium+++	126	81	0.52	0.76	3120	31062	0.50	81	5.2	0	NA	0	NA	0	1	0
7440-62-2	Vanadium	126	0	--	--	--	--	0.50	0	78	0	NA	0	7.8	0	2	0
7440-66-6	Zinc	126	0	--	--	--	--	0.50	0	23,463	0	NA	0	NA	0	8.5	0

1 List of compounds analyzed for IR Site 31 RI. VOC by Method 8260B; SVOC by Method 8270C; Pesticides by Method 8081A; PCBs by Method 8082; Inorganics by Method 6010B and Mercury by Method 7471A.
2 Sample quantitation limit is the sample-specific laboratory detection limit with adjustments for sample parameters such as % moisture.
3 Target quantitation limit is the laboratory reporting limit specified in the laboratory subcontract.
4 EPA Region 9 PRGs for Residential Soil Direct Contact and Tap Water (Human Health) Updated October 2004.
5 California Regional Water Quality Control Board. San Francisco Bay Region. 2005. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Volume 2: Table E-1b, Soil Screening Levels for Evaluation of Potential Vapor Intrusion Concerns. Interim Final . February 2005.
6 EPA. Retrieved August 17, 2005, from http://www.epa.gov/ecotox/ecossl/
7 Efroymson, R., M. Will, G. Suter II, and A. Wooten. 1997. Toxicological benchmarks for screening contaminants of potential; concern for effects on terrestrial plants: 1997 Revision. ES/ER/TM-85/R3. Prepared for U.S. Department of Energy by Environmental Sciences Division, Oak Ridge National Laboratory. Oak Ridge, TN.
Efroymson, R.A., M. Will, and G. Suter. 1997d. Ecological benchmarks for screening contaminants of potential concern for effects on soil and litter invertebrates and heterotrophic process: 1997 Revision. ES/ER/TM-126-R2. Prepared for U.S. Department of Energy by Environmental Sciences Division, Oak Ridge National Laboratory. Oak Ridge, TN.
Efroymson, R., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. Preliminary remediation goals for ecological endpoints. ES/ER/TM-162/R2. Prepared for U.S. Department of Energy by Environmental Sciences Division, Oak Ridge National Laboratory. Oak Ridge, TN.

--	Compound detected in all samples; no non-detects
NA	Not available or not applicable
+++	Special analytical methods required.
SQL	Sample quantitation limit (sample-specific)
TQL	Target quantitation limit (laboratory reporting limit)
Eco-SSL	Ecological soil screening level
ORNL	Oak Ridge National Laboratory
SSL	soil screening level
mg/kg	milligram per kilogram
PAHs	polynuclear aromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
cas	Chemical Abstracts Service



Draft Final Soil RI for IR Site 31
Figure 3-1
Sampling Locations

Alameda, California

Date: 6/06/07
File No.: 050304
Job No.: 6229-003
Rev No.: A

Document: M:\alameda\avquery\RI_Figures\060206_Figure3-1SamplingLocations.mxd

Section 4
Nature and Extent of Contamination

The objective of this soil RI is to characterize the nature and extent of chemicals in soil at the site to provide data in support of an HHRA and screening-level ERA. The risk evaluations are performed to support recommendations for either no response action or progression to an FS to evaluate remedial alternatives. Potential human health risk related to soil is derived from exposure via direct contact with contaminants in the soil, transport by particulate dispersion, and volatilization of chemicals from soil. Hence, the nature and extent of soil contamination is evaluated in terms of exposure to VOCs, SVOCs (including PAHs), PCBs, pesticides, and metals. The nature and extent evaluation found that chemicals at concentrations greater than regulatory comparison criteria in soil at IR Site 31 are arsenic, iron, lead, and vanadium based upon the IR Site 31 RI sample results and PAHs based upon analytical results from previous investigations.

The RI objectives for groundwater are to evaluate the nature of onsite groundwater to assess whether the concentrations of VOCs in groundwater are consistent with those in the OU-5/IR-02 groundwater plume and to model indoor and outdoor air concentrations for the HHRA. Groundwater has been investigated and reported in the OU-5 RI (Neptune et al. 2002) and the Site 25/IR-02 RI/FS (ERRG 2004) and in reports for the ongoing base-wide monitoring program (ITSI 2006, 2007a,b). The remedial decision for groundwater is proposed in the OU-5/IR-02 groundwater proposed plan which identifies the preferred remedial alternative. The proposed plan was final after the public meeting and following the public review period in April 2006 (CDM 2005b).

The nature and extent of soil contamination will be addressed by the following data sets:

- The 126 soil samples collected in the IR Site 31 RI, which have been tabulated (Appendix G), mapped, and discussed separately. These samples were analyzed for VOCs, SVOCs (other than PAHs), PCBs, pesticides, and metals. Tables 3-2 and F1 (in Appendix F) identify 12 field duplicates (see Section 3 for discussion of data quality) that are not included in the sample count. If the field duplicate result is greater than the parent sample result, the duplicate results were used instead of the parent.
- The 648 normal soil samples collected from 163 locations during the PAH assessment (BEI 2004a) performed in 2003. These samples provide a comprehensive characterization of PAH in soil at IR Site 31. For this reason, the IR Site 31 RI soil sampling did not include analysis for PAHs in soil samples. A

statistical summary of the 2003 PAH assessment soil data is presented in Table B-1 of Appendix B. The distribution of PAH in soil, as B[a]P equivalents, is discussed in Section 4.1.3 separately from the RI soil data. The analytical results for individual PAHs are used in the HHRA (Section 6).

- Three surface soil samples from the Zone 16 - EBS Parcel 178 Evaluation (IT 2001). These three soil sampling locations are identified as 178-Z16-001 through 178- Z16-003 on Figure 4-1. The surface soil samples were analyzed for pesticides and PCBs.

The historic data reference above is summarized in Table B-1 of Appendix B. Also in Appendix B is a map of the B[a]P equivalent values for samples collected during the 2002 PAH assessment. The 2002 PAH data consists of 46 soil samples, including 4 duplicates that were collected in June 2002 from direct push borings at 12 locations within IR Site 31. The 2002 PAH investigation is reported in Appendix D to the Final RI Report Transfer Parcel EDC-5, dated March 2005 (BEI 2005b). This sampling effort was superseded by the 2003 PAH assessment (BEI 2004a), which collected 648 normal soil samples from 163 locations and was representative of IR Site 31 so did not restate the 2002 PAH assessment results. Therefore, the 2002 data are not summarized in this soil nature and extent evaluation. However, both the 2002 and the 2003 PAH analytical results were used to estimate human health risk for this RI.

Surface soil samples during the EBS program were collected in two phases (ERM-West 1994). For the first phase, 14 soil samples were collected from 10 locations distributed across portions of what is now IR Site 31 to depths of less than 5 feet bgs and analyzed for pesticides, PCBs, and metals (ERM-West 1988). Arsenic was detected above the EPA Region 9 residential soil PRG levels (EPA 2004b) in all samples, and chromium was detected above the EPA Region 9 residential soil PRG (EPA 2004b) in two samples (SB-1 and SB-3) located close to IR Site 31 RI sample locations 3145 and 3123, respectively. These EBS soil samples were collected prior to housing construction, which involved removal of 6 inches of surface soil, reconditioning of a 2-foot thick layer of existing soil, addition of imported fill, and compaction of 4 feet of fill (Spectrum Land Planning 1993; Appendix K). Because the soil represented by the EBS samples has since been partly removed by construction activity, redistributed by site grading, and buried beneath imported fill, the analytical results are not considered representative of site surface soils, and the data are not used in the nature and extent evaluations for the IR Site 31 RI.

For evaluating the nature of groundwater contamination and comparing with the OU-5/IR-02 groundwater plume, the IR Site 31 RI groundwater data have been tabulated and mapped with recent data from the following investigations:

- The OU-5 RI groundwater data (Neptune et al. 2002) from five onsite HydroPunch® samples (used for showing contaminant source characteristics);

- The summer 2006 quarterly groundwater monitoring data (ITSI 2006) of five onsite monitoring;
- The 2006 annual groundwater monitoring report for the IR Site 31 and 25 monitoring wells (ITSI 2007a,b); and
- The OU-5/IR-02 RI/FS groundwater data from the OU-5 monitoring wells (ERRG 2004).

The locations of all soil samples and discrete groundwater samples used for evaluation of the nature and extent of contamination at IR Site 31 are presented on Figure 4-1. The following sections discuss the soil data (Section 4.1) and the groundwater data (Section 4.2) in terms of sampling, results, and nature/extent of contamination.

4.1 Soil

The following discussion describes the soil data collected during the IR Site 31 RI, the data from the 2003 PAH assessment (BEI 2004a), and the Zone 16 Parcel Evaluation (IT 2001) that are used to present a description of the nature and extent of soil contamination at IR Site 31. As described in Section 1, data from the previous PAH investigations confirmed that PAHs were present in soil at IR Site 31; however, the data representing potential presence of pesticides, PCBs, VOCs, and metals in soil were not as extensive as the PAH samples and, therefore, required further investigation in the IR Site 31 RI. To discuss the nature and extent of soil contamination at IR Site 31, the following subsections describe the collection and results of soil samples during the IR Site 31 RI and results of soil analyses from the previous Zone 16 Parcel Evaluation and the 2003 PAH assessment:

- Sections 4.1.1 through 4.1.1.3 discuss the samples collected and analyzed.
- Sections 4.1.2 through 4.1.2.5 discuss the extent of detected chemicals by identifying the distribution of detections by number of locations and comparing analytical results to regulatory criteria.
- Sections 4.1.3 to 4.1.3.3 discuss the nature and extent of chemicals detected by reporting concentration ranges and evaluates inorganics relative to background concentrations.
- Section 4.1.4 summarizes the statistical evaluations of arsenic and other metals in soil that is presented in Appendix H2.

In discussions of the IR Site 31 RI data, quality control samples, with the exception of field duplicates, were excluded from the assessment of nature and extent of contamination. The 126 samples include the resolution of the 12 field duplicate results by selecting the result with the greater value between the parent and the duplicate. If the greater sample concentration was qualified as estimated "J", the data validation

report was reviewed to determine the rationale for the "J" qualifier. The reports reveled that the "J" qualifier was assigned because the duplicate sample result exceeded the RPD criteria. Therefore, these "J" qualified values were used as the maximum value. In the cases of previously collected data, all quality control samples were excluded from the assessment of nature and extent.

4.1.1 Soil Investigations

This subsection describes the sampling and analysis of soil at IR Site 31 performed during the RI and summarizes sampling and analyses of previous investigations at IR Site 31. Table 3-5 summarizes the analyses performed during each study.

4.1.1.1 Remedial Investigation

The IR Site 31 RI soil samples were collected from 1 November through 11 November 2005 from borings at 50 locations (location 3101 through location 3150) as specified in the RI work plan (CDM 2005a). At each location, samples were collected from three depth ranges (0 to 2 feet bgs, 2 to 4 feet bgs, and 4 to 6 feet bgs or to groundwater, whichever was encountered first) and analyzed for one or more of the following parameters:

- VOCs using EPA Method 8260B;
- SVOCs (other than PAHs) using Method 8270C;
- Pesticides using EPA Method 8081A;
- PCBs using EPA Method 8082; and
- Title 22 Metals (17 analytes plus iron) using EPA Method 6010B/7000 series.

The analyses conducted for soil samples from each depth interval are shown in Table 3-2. Specific depths are also footnoted in Tables 3-2 and 3-3. PAHs were not included in SVOC analyses by EPA Method 8270C since they had been comprehensively characterized at IR Site 31 in the 2003 PAH assessment (BEI 2004a). The inorganic analytes, aluminum, magnesium, and manganese were not included in the work plan to be analyzed for during the remedial investigation. Hence, the laboratory did not identify these analyte concentrations in the main portion of the laboratory data package. The quantitative health risks associated with exposure to aluminum and manganese are discussed in the Uncertainty Analysis in Section 6 and Appendix I. The data for all three metals were included in the statistical analyses summarized in Section 4.1.4.

A total of 126 soil samples were collected from up to three depth intervals per location. All of the soil samples were analyzed for VOCs, SVOCs (other than PAHs), pesticides, PCBs, and metals (see Table 3-2). The rationale for this coverage was to:

- Provide sufficient data to define the nature and extent of these potential contaminants in soil and to support an HHRA for the present residential use of the area;
- Complement those of the PAH study performed in 2003 (BEI 2004a); and
- Evaluate other chemical compounds in the context of historical usage as a surplus equipment storage area.

4.1.1.2 Parcel Evaluation Data Summary, Zone 16: Housing Zone

Three surface soil samples were collected as part of a Zone 16 - EBS Parcel 178 investigation (IT 2001). These three soil sampling locations are identified as 178-Z16-001 through 178- Z16-003 on Figure 4-1. The surface soil samples were analyzed for pesticides, and PCBs. The results for pesticides and PCBs were incorporated into the historical data set used for the HHRA.

4.1.1.3 2003 Polynuclear Aromatic Hydrocarbon Assessment

The 2003 PAH (BEI 2004a) assessment sampling at IR sites throughout Alameda Point had 171 planned boring locations for IR Site 31 in August 2003. The planned borings were identified as C3S031B001 through C3S031B171 (Figure 4-1). Soil samples were planned for collection at four depths: 0 to 6 inches, 6 to 24 inches, 24 to 48 inches, and 48 to 96 inches below the base of pavement, if any.

The following breakdown explains the distribution of a total of 719 collected samples of which 648 samples were normal and 71 were field duplicates, (BEI 2004a). Normal samples analyzed by depth are summarized below:

- 163 normal samples from 0 to 0.5 feet bgs;
- 163 normal samples from 0.5 to 2 feet bgs;
- 161 normal samples from 2 to 4 feet bgs; and
- 161 normal samples from 4 to 8 feet bgs.

Duplicate samples were not included in the statistical summary (Table B-1 Appendix B), but the duplicate sample result was compared to the normal sample result, and the highest detected value was used for the statistical analyses and in the human health risk assessment. Hence, out of the field duplicate pairs only one set of results was used. A statistical summary of the PAH analysis is included in Appendix B along with Figure B-1 representing the B[a]P equivalent values broken into three areas for the IR Site 31 as well as Figure B-2 presenting the 2002 B[a]P equivalent values. The 648 sample results as B[a]P equivalents from the 2004 PAH report are used for discussion of PAHs in soils for the IR Site 31 RI, whereas PAH analytical results from the 2002 and 2003 report are used in the HHRA.

Eight borings had incomplete sample collection due to refusal at the surface (C3S031B-006, -012, -027, -047, -066, -095, -098, and -128), one boring had incomplete recovery by refusal at 2 feet bgs (C3S031B030), one boring had incomplete recovery by refusal at 4 feet bgs (C3S031B171), and one boring had incomplete recovery from the 2 to 4 feet bgs interval (C3S031B063). The individual locations are included in the map of historic locations shown on Figure 4-1.

The samples listed above were analyzed for PAHs using EPA Method 8270C SIM. The 2003 PAH assessment (BEI 2004a) did not break out QA parameters for IR Site 31 beyond the level of detail discussed above; however, out of 3,401 samples collected from 19 IR sites and 3 EBS parcels, 66 samples had 15 analytes that were considered unusable. The 2003 PAH assessment data are therefore considered 98 percent usable.

4.1.2 Soil Analytical Results

IR Site 31 RI results for analytes detected above sample quantitation limits at least once in soil samples are summarized in Table 4-1. Per Section 4.1, the quality control sample results were not used, and the parent/duplicate sample results were resolved before preparing the summary in Appendix G. Table 3-6 of Section 3 provides a discussion of sample quantitation limits in soil compared to regulatory criteria. The full IR Site 31 RI data set for all analytes reported in each soil sample is presented in Appendix G, Table G-1. Table 4-2 provides a summary of analytes detected in soil and presents regulatory comparison criteria. The criteria were selected on the basis of project objectives: human health exposure to soil and indoor air and ecological exposure to soil. Those criteria are:

- Federal (EPA) Residential Preliminary Remediation Goal - EPA Region 9 PRGs for Residential Soil Direct Contact Updated October 2004 (EPA 2004b);
- California Modified (Cal/EPA) Residential Preliminary Remediation Goal - EPA Region 9 PRGs for Residential Soil Direct Contact Updated October 2004 (EPA 2004b);
- Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater (February 2005) California Regional Water Quality Board, San Francisco Bay Region;
- U.S. EPA Ecological Soil Screening Levels. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Washington, D.C. March. (EPA 2007) http://www.epa.gov/ecotox/ecossl/; and
- Oak Ridge National Lab Benchmark - Efroymson, R., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. PRGs for ecological endpoints.

The above comparison criteria were used to define the chemicals for mapping.

PAHs are not shown in Tables 4-1 and 4-2 since PAHs were not analyzed in soil samples collected during the IR Site 31 RI. The 2003 PAH assessment (BEI 2004a) results are summarized in Appendix B and are sufficient to characterize the onsite distribution of PAHs in soil.

4.1.2.1 Volatile Organic Compounds

In IR Site 31 RI fieldwork, three VOCs (analyzed by EPA Method 8260B) were detected in soil samples collected on site (Table 4-1). No VOC concentrations in these samples exceeded the regulatory comparison criteria (Table 4-2). The analytes reported at concentrations greater than the SQL were:

- Benzene in 2 of 126 samples at 2 of 50 locations;
- Dichloromethane in 6 of 126 samples at 5 of 50 locations; and
- Total xylenes in 3 of 126 samples at 3 of 50 locations.

4.1.2.2 Polynuclear Aromatic Hydrocarbons

PAHs in soil were characterized by the analytical results of 648 normal samples collected in the 2003 PAH investigation. Appendix B provides the summary of PAH data (BEI 2004a). PAH concentrations are represented, for nature and extent discussions and comparisons to criteria, by B[a]P equivalency values (BEI 2004a). For every sample, the detected concentrations of seven carcinogenic PAHs were multiplied by unique toxicity factors to form products that were summated to a B[a]P equivalency value. The conversion to B[a]P equivalency was completed as part of the 2003 PAH assessment report, and the B[a]P equivalent values from that report are used in this IR Site 31 RI report.

The Navy, regulatory agencies, and the City of Alameda, during a PAH technical meeting on 31 May 2001, identified an Alameda Point-specific screening level concentration of 620 µg/kg B[a]P equivalents (DON 2001c). This screening level is used in Section 4 as one perspective for discussing the nature and extent of PAH compounds. For another perspective of the PAH compounds, a baseline risk assessment was conducted as part of the RI to assess the potential health aspects of exposure to the PAH, and the results are presented in Section 6.

4.1.2.3 Other Semi-Volatile Organic Compounds

In IR Site 31 RI fieldwork, phenol (analyzed by EPA method 8270C) was detected in 2 of 126 soil samples at 2 of 50 locations (Table 4-1). Detected phenol did not exceed the regulatory comparison criteria.

The IR Site 31 RI addressed data gaps for soil by analyzing for SVOCs other than PAHs. SVOCs, other than PAHs, are not generally present in soils at IR Site 31 in concentrations that exceed the regulatory comparison criteria.

4.1.2.4 Pesticides and Polychlorinated Biphenyls

Pesticide analyses were performed using EPA Method 8081A on 126 soil samples collected during the RI field activities. Five pesticides and two PCBs were detected (Table 4-1); none of the pesticide or PCB concentrations exceeded the regulatory comparison criteria (Table 4-2). The analytes reported at concentrations greater than the SQL were:

- 4,4-dichlorodiphenyldichloroethane (DDD) in 3 of 126 samples and 3 of 50 locations;
- 4,4-dichlorodiphenyldichloroethylene (DDE) in 8 of 126 samples and 7 of 50 locations;
- 4,4-dichlorodiphenyltrichloroethane (DDT) in 4 of 126 samples and 3 of 50 locations;
- Dieldrin in 1 of 126 samples and 1 of 50 locations; and
- Heptachlor in 1 of 126 samples and 1 of 50 locations.

In the Zone 16 Parcel Evaluation (IT 2001), a surface soil sample from 178-Z16-001 contained 4 µg/kg of endosulfan sulfate; all other analytes were not detected above SQLs. The chemical compound 4,4-DDT was reported as "J" qualified, being an estimated concentration.

The PCB analyses were performed using EPA Method 8082. The analytes reported at concentrations greater than the SQL were:

- Aroclor 1016 in 1 of 126 samples and 1 of 50 locations; and
- Aroclor 1260 in 10 of 126 samples and 8 of 50 locations.

The combined RI and historical analytical results support the conclusion that pesticides and PCBs are not present in soils at IR Site 31 at concentrations that exceed the regulatory comparison criteria.

4.1.2.5 Metals

The IR Site 31 RI analyses for inorganics were for the California Title 22 list of 17 metals plus iron. Seventeen of the 18 analyzed metals were detected (non-detected results are presented in Table 3-6) in the soil samples analyzed (Table 4-1). Silver was the analyte not detected. Four of the 18 metals analyzed were reported at concentrations above

regulatory comparison criteria (Table 4-2). Metals with concentrations exceeding EPA or California modified residential soil PRGs are arsenic, iron, lead, and vanadium. The following points summarize the results:

- Arsenic concentrations in all 126 samples exceeded the California modified EPA (EPA 2004b) residential soil PRG (0.062 mg/kg).
- Lead was also detected in all 126 samples, of which 2 samples (from two separate locations) had concentrations exceeding California modified EPA residential soil PRG (150 mg/kg).
- Iron was detected in all 126 samples, of which 97 samples (at all 50 locations) exceeded the EPA residential soil PRG (23,000 mg/kg.
- Vanadium was detected in all 126 samples, of which 7 samples (at 6 of 50 locations) exceeded the EPA residential soil PRG 78 mg/kg.

4.1.3 Nature and Extent of Soil Contamination

The evaluation of the nature and extent of soil contamination at IR Site 31 uses a combination of data gathered during the IR Site 31 RI and the 2003 PAH assessment. The locations of the historical sampling points used in the evaluation are illustrated on Figure 4-1. The following subsections of Section 4.1.3 discuss the nature and extent of all chemicals reported in soil and groundwater at IR Site 31 grouped as PAHs, metals, and non-PAH organic chemicals, with additional detail on the chemicals which were found at concentrations above regulatory criteria. Cross-section locations are shown on Figure 2-2.

As stated in Section 4.1.1.2, the analytical results for pesticide and PCB for the three samples collected during the Zone 16 parcel evaluation study are used in the HHRA. However, the very limited detections in these three samples are not carried through in the nature and extent discussions and associated mapping. Instead, the results from the IR Site 31 samples are used to fill the data gap for pesticides and PCB.

4.1.3.1 Non-PAH Organic Chemicals

VOCs, pesticides, PCBs, and SVOCs other than PAHs were detected infrequently and at concentrations that were lower than regulatory comparison criteria. Of the three VOCs detected in soil (benzene, dichloromethane, and total xylenes), benzene was detected in 2 of 126 samples (4 to 6 feet bgs at location 3107 and 4.5 to 6.5 feet bgs at location 3145) and neither concentration exceeded federal residential soil PRGs or the RWQCB 2005 screening criteria for evaluation of potential vapor intrusion concerns (in a high permeability vadose zone; 0.18 mg/kg). The maximum detected concentration of benzene was 0.003 mg/kg although the maximum SQL was 0.0068 mg/kg. Clustering of samples with detected benzene at 4-foot to 7-foot depth indicates a relationship to

groundwater or dredged harbor fill. Benzene is a principal constituent of the OU-5/IR-02 groundwater plume.

The following other non-PAH organic chemicals were reported at concentrations greater than their SQLs but less than regulatory criteria (Tables 4-1 and 4-2):

- Dichloromethane and total xylenes were found in samples at location 3116 and location 3117, respectively, and both at 0 to 2 feet bgs.
- Phenol was reported in two soil samples, at depths below 2 feet bgs.
- Four pesticides and two Aroclors (PCBs) were reported in four boring locations at 0 to 2 feet bgs.

4.1.3.2 Polynuclear Aromatic Hydrocarbons

The PAHs reported in soil samples at IR Site 31 are historical analytical results from the 2003 PAH Assessment (BEI 2004a) and represented by B[a]P equivalent values. Although PAH data collected in 2002 and 2003 are available and both are used in the risk assessment, only the 2003 data are used for the nature and extent discussion because these 2003 data were collected to be representative of IR Site 31. The 2002 PAH (BEI 2005b) B[a]P equivalents for samples from the 12 locations are mapped in Appendix B, Figure B-2.

For the 648 samples analyzed, B[a]P equivalents concentrations ranged for the 0- to 4-foot depth from 1.4 to 4,100 µg/kg, and for the 4- to 8-foot depth the B[a]P equivalent values ranged from 3.9 µg/kg to 71,000 µg/kg. The individual PAH values are summarized in Appendix B. The arithmetic mean of the B[a]P equivalent value of 499 µg/kg across the entire site is less than 620 µg/kg and is less than 620 µg/kg for each depth interval from 0 to 4 ft bgs. The mean values for each depth interval are listed below.

- Depth interval 0 to 0.5 feet bgs, mean B[a]P equivalent value is 186 µg/kg;
- Depth interval 0.5 to 2.0 feet bgs, mean B[a]P equivalent value is 120 µg/kg;
- Depth interval 2 to 4 feet bgs, mean B[a]P equivalent value is 226 µg/kg; and
- Depth interval 4 to 8 feet bgs, mean B[a]P equivalent value is 1,472 µg/kg.

At various locations across IR Site 31, the B[a]P equivalent values are greater than the Alameda Point comparison value of 620 µg/kg B[a]P equivalents (DON 2001c) but primarily in the western portion of the site where the march crust is shallower, with a threshold depth of 5 feet bgs. At each depth interval, the maximum concentrations were reported for locations in the northwestern portion of the site. The highest concentrations and the greatest percentage of locations with B[a]P equivalents exceeding 620 µg/kg (DON 2001c) were reported for samples collected at 4 to 8 feet bgs

in the western portion of the site. For samples collected in the 0 to 2 foot depth, the three greatest B[a]P equivalent values are from locations where samples were collected directly beneath or immediately adjacent to asphalt paving. These results are considered biased by the presence of asphalt and not representative of soil conditions as documented in the field and shown on boring logs of 2003 PAH Assessment report (BEI 2004a). These three locations with the greatest B[a]P equivalent values are listed below and the locations are shown on Figure 4-1.

- 3,800 µg/kg at 0 to 0.5 foot bgs in C3S031B036;
- 2,400 µg/kg at 0.5 to 2.0 feet bgs in C3S031B017; and
- 1,700 µg/kg at 0.5 to 2.0 feet bgs in C3S031B028.

The overall distribution of PAHs in IR Site 31 soil shows concentrations increase broadly westward and with depth. This suggests a distributed non-point source for the PAHs and a relatively stronger association of PAHs with older dredged fill than with the newer imported construction fills although some mixing would have been inevitable during placement of the imported construction fill. The PAH distribution is also supported by the interpreted depths to the marsh crust layer, which can be inferred by the threshold limits for excavation depths depicted in the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56. The map of threshold depths indicates that the marsh crust layer at IR Site 31 is deeper on the east side of the site and shallower to the west. The threshold depth identified in the ordinance changes to 5 feet below the surface in the western portion of IR Site 31.

Naphthalene, a contaminant of interest in the OU-5/IR-02 groundwater plume (ITSI 2007a), was detected in 83 percent of all soil sample analyses in the 2003 PAH assessment of IR Site 31 (BEI 2004a). However, none of the soil results exceeded the California modified EPA residential soil PRG of 1.7 mg/kg or the RWQCB 2005 screening criteria for evaluation of potential vapor intrusion concerns (in a high permeability vadose zone; 0.18 mg/kg). The wide distribution and low concentrations, increasing at 4 feet bgs, indicate that naphthalene is predominantly associated with the deeper (greater than 4 feet bgs) dredged fill. Results of the baseline risk assessment indicate that PAHs do not drive the risk (Section 6).

4.1.3.3 Metals

Analytical results for metals are described in the following sections based on a comparison to regulatory criteria. As shown in Table 4-2, four of the 18 metal analytes (arsenic, iron, lead, and vanadium) had concentrations exceeding regulatory comparison criteria. The nature and extent of metals exceeding regulatory criteria (i.e., arsenic, iron, lead, and vanadium) are discussed further in the following text.

Statistical evaluations (probability plots) of arsenic, cadmium, chromium, and vanadium in IR Site 31 soil show that these metals are a single population and are present at ambient concentrations. Further discussions and supporting evaluations are provided in Section 4.1.4.1, 4.1.4.2, with detailed evaluations in Appendix H2. Probability plots of iron and lead suggest multiple populations, which is consistent with the Alameda Point pink background data.

Past use for storage at the IR Site 31 could have resulted in limited releases of selected metals to the soil beneath the unpaved storage areas. The analytical results of the associated soil samples and a review of historic aerial photographs, shows no evidence of such a release. Historical photographs indicate that the site was within the boundaries of the former San Francisco Bay Airdrome, which was constructed in 1929 and closed in 1941 (Freeman 2006). However, the site is not located near the former hangers or other industrial activities associated with the airdrome. The northwestern part of the site was used for housing from the 1940s through the mid-1950s (Figures A-6 through A-9; Appendix A). Aerial photographs show that the site was paved in 1959 and used as a storage area until the early 1990s when construction of the Marina Village Coast Guard Housing began.

Nature and Extent of Arsenic

Arsenic concentrations in all 126 samples ranged between 2 and 42.4 mg/kg and exceeded the California modified EPA (EPA 2004b) residential soil PRG of 0.062 mg/kg as shown in Table 4-2. Figures 4-10 and 4-14 show the distribution of arsenic in soil at IR Site 31 at depths of 0 to 2 feet bgs and greater than 2 feet bgs, respectively. The three highest arsenic concentrations by depth and boring location are:

- 32.6 mg/kg at 0 to 2 feet bgs at location 3144 (northwest corner of IR Site 31);
- 42.4 mg/kg at 2 to 4 feet bgs at location 3106 (west end of IR Site 31); and
- 36.5 mg/kg at 4 to 7 feet bgs at location 3115 (south central portion of IR Site 31).

As indicated in Section 3, second paragraph of this report, a 1968 photograph of IR Site 31 depicted a small dark spot indicating a potential surface stain to the north and west of the former warehouse Building 369. Soil sampling was performed in this area of potential staining. During discussion of the work plan/SAP with the regulatory agencies, it was acknowledged that the potential stained soil has since been subjected to at least two periods of grading and fill, and hence, the soil is likely not present at the location of the area noted in the 1968 aerial photo.

During development of the project work plans, two sampling locations were selected to represent the west end and northwest corner of former Building 369. Sample location 3109 is adjacent to the building's west end and closest to the potential stained area

adjacent to the north end of former Building 369. Low concentrations of arsenic are reported in analyses of samples from location 3109. The highest arsenic sample result (42.4mg/kg) is in the sample collected at 2 to 4 feet bgs from location 3106, which is about 50 feet west of the west side of Building 369. An aerial photo from 1963 shows a potential stain adjacent to the northwest corner of the building.

However, similarly high concentrations of arsenic were found directly under the footprint of the former Building 369 (Locations 3135 and 3115). There is no pattern of arsenic having the greatest concentrations related to the footprint of the former Building 369 as shown on Figures 4-10A and 4-10B for arsenic from 0 to 2 feet and 2 to 7 feet, respectively. There is no pattern in the western portion related to the concentrations of arsenic along the margins of the former Building 369 footprint. There are six samples that can be most clearly assigned as inside the Building 369 footprint. Some of the highest concentrations of arsenic are located beneath the building footprint.

Nature and Extent of Iron

Iron was reported at concentrations greater than the SQL in all 126 soil samples; these concentrations ranged from 8,000 to 67,000 mg/kg. Iron concentrations in soil exceeded the EPA residential PRG in 97 of 126 soil samples. The EPA residential PRG is 23,000 mg/kg; Table 4-2).

Figures 4-11 and 4-15 show the distribution of iron in soil at IR Site 31 at depths of 0 to 2 feet bgs and greater than 2 feet bgs, respectively. The three greatest iron concentrations by depth and boring location are:

- 67,000 mg/kg at 0 to 2 feet bgs at location 3140 (northeast corner of the site);
- 56,600 mg/kg at 2 to 4 feet bgs at location 3133 (center of the site); and
- 52,000 mg/kg at 4 to 7 feet bgs at location 3145 (west side of the site).

The distribution of iron concentrations shows no pattern related to the footprint of the former Building 369 as shown on Figures 4-11A and 4-11B for iron from 0 to 2 feet and 2 to 7 feet, respectively. There is no pattern in the western portion related to the footprint of the former Building 369. There are six samples that can be most clearly assigned as inside the Building 369 footprint. Some of the highest concentrations of iron are located beneath the building footprint.

Nature and Extent of Lead

Lead was reported at concentrations greater than the SQL in all 126 soil samples; these concentrations ranged from 1.9 to 168 mg/kg (the California modified EPA residential PRG is 150 mg/kg; Table 4-2). Lead concentrations in soil exceeded the California residential PRG in one sample.

Figure 4-12 shows the distribution of lead in soil at IR Site 31 at depths of 0 to 2 feet bgs. No lead was detected above the California modified EPA residential soil PRG of 150 mg/kg in soil at depths greater than 2 feet bgs.

The three highest concentrations by depth and boring location are:

- 168 mg/kg at 0 to 2 feet bgs at location 3115 (center of the site);
- 96.7 mg/kg at 2 to 4 feet bgs at location 3105 (west side of the site); and
- 60.2 mg/kg at 4 to 7 feet bgs at location 3103 (NW corner of the site).

Nature and Extent of Vanadium

Vanadium was reported at concentrations greater than the SQL in all 126 soil samples; these concentrations ranged from 19.3 to 104 mg/kg (the EPA residential PRG is 78 mg/kg; Table 4-2). For the 0 to 2 foot depth interval, there were five values that ranged between 82 mg/kg to 104 mg/kg. Vanadium concentrations in soil exceeded the modified EPA residential PRG in seven of 126 soil samples. Figures 4-13 and 4-16 show the distribution of vanadium in soil at depths of 0 to 2 feet bgs and greater than 2 feet bgs, respectively.

The three highest vanadium concentrations by depth and boring location are:

- 104 mg/kg at 0 to 2 feet bgs at location 3140 (NE corner of the site);
- 102 mg/kg at 2 to 4 feet bgs at location 3131 (center of the site); and
- 79.8 mg/kg at 4 to 7 feet bgs at location 3146 (west side of the site).

4.1.4 Statistical Evaluation of Metals

This section summarizes statistical evaluations conducted for IR Site 31 soil. Statistical evaluations were conducted based on the DTSC policy (Cal/EPA 1997) for identifying inorganic chemicals in soil for use in risk assessments (Appendix H2). Statistical methods are provided by DTSC for use in identifying metals as a single population and at ambient concentrations to determine whether metals are related to on-site activities. Since arsenic, iron, lead, and vanadium were present at concentrations in soils that exceeded screening criteria; the statistical evaluation was conducted to determine whether these metals represent ambient conditions or are a result of onsite activities. Arsenic is a primary risk driver at IR Site 31. Because cadmium has a contribution to human health risk, it also was evaluated. Chromium was evaluated because chromium in soil was potentially related to the localized concentrations of chromium in groundwater as measured in the IR Site 31 RI groundwater samples (see Section 4.2).

The findings show that arsenic, cadmium, chromium, and vanadium, and possibly iron, represent ambient populations. The identification of these metals as ambient is sufficient to conclude that the metals are not associated with a release from Navy activities without further background analysis. Sections 4.1.4.1 and 4.1.4.2 summarize this statistical evaluation which is presented in Appendix H2.

In accordance with the typical process at Alameda Point and because IR Site 31 was originally included in the area covered by the Alameda Point pink background data set (TtEMI, 2001), metal concentrations in soil at IR Site 31 were statistically compared to those in the Alameda Point pink background data set. This statistical evaluation is presented in Appendix H1. A total of 15 of 17 metals were found to exceed Alameda Point pink background population concentrations. This result is evaluated in Appendix H2 and summarized in Section 4.1.4.3. Appendix H2 provides technical evaluations and presents supporting technical rationale that the Alameda Point pink background is not applicable at IR Site 31. Similar conclusions were reached for adjacent IR Site 25 in the 2002 Final OU-5 RI Report (Neptune et. al 2002). Evaluation of arsenic concentrations at locations adjacent to IR Site 31 provides supporting evidence that the fill at IR Site 31 is different from the soils represented by the Alameda Point pink background data set. Arsenic concentrations are similar in soil over a 140-acre contiguous area which encompasses IR Site 31 and are similar to those in the Alameda Point yellow background.

4.1.4.1 Arsenic at IR Site 31

Analytical data from a site can be used to determine whether or not a release has occurred, without using a background data set for comparison. The DTSC policy for selecting inorganic constituents as chemicals of potential concern describes a methodology for using site data to determine whether chemical concentrations represent single populations (and ambient concentrations), or possibly represent multiple populations indicating potential contamination by onsite activity (Cal/EPA 1997). The results of an evaluation using the methods outlined in the DTSC policy demonstrate that arsenic concentrations meet the following DTSC criteria for a single population.

- The data set fits a lognormal distribution. DTSC guidance states that trace metals, such as arsenic, typically fit a lognormal distribution. The Shapiro-Wilks test confirmed that the arsenic data from IR Site 31 are lognormally distributed. A probability plot for arsenic depicting this data is presented as Figure 4-3.
- The coefficient of variation is less than 1. The coefficient of variation for arsenic at IR Site 31 is 0.69. This value shows that the data are not highly variable.

- The range between minimum and maximum values is less than two orders of magnitude. Arsenic data at IR Site 31 range from 2.3 to 42.4 mg/kg, a factor of 18. The range shows lower variability than the DTSC criterion of a factor of 100.
- The cumulative probability plot is a straight line (Figure 4-3). The data set for IR Site 31 plotted in this manner form a straight line without gaps or inflection points. As is common with these plots, the tails of the lines depart slightly from the line. However, the values in the tail with the higher concentrations are not outliers.
- There are no outliers. The Rosner's test for outliers (not required by the DTSC policy) also shows that neither data set includes outliers that could be associated with a release.

The statistical evaluation showing that arsenic concentrations are a single population and represent ambient concentrations in soil at IR Site 31 means that arsenic is not the result of releases from onsite activities. Other published papers on the use of probability plots for identification of ambient populations include Cook (1998), Fleischhauer and Korte (1990), Sinclair (1976), and Singh et al. (1994).

4.1.4.2 Other Metals at IR Site 31

In addition to arsenic, five metals (cadmium, chromium, iron, lead, and vanadium) in soil at IR Site 31 were evaluated using the methods outlined in the DTSC policy to determine whether the concentrations meet the criteria for a single population. An evaluation of these metals was conducted because the metals are found at concentrations above a risk-based screening level, had significant contributions to human health risk, or were present in groundwater samples at concentrations above historical levels.

The concentrations of cadmium, chromium, and vanadium in soil at IR Site 31 meet all DTSC criteria for occurring at ambient concentrations (i.e., the range of detections is less than two orders of magnitude, the coefficient of variation is less than 1, and the data represent one population on a probability plot). Distributional analysis and outlier testing were conducted on cadmium, chromium, and vanadium to substantiate the above results. No outliers were identified at high concentrations. After removal of one chromium outlier at the lowest concentration, all three data sets were lognormally distributed at a significance level of 5 percent.

The probability plots for iron and lead indicate the presence of more than one population. However, this finding is not unexpected for iron, a common rock-forming metal. The Alameda Point pink background data probability plot for iron also indicates multiple populations. The finding for lead is consistent with the multiple sources of lead in the environment.

4.1.4.3 Supplemental Evaluations

A possible rationale for the differences between metals in the soil at IR Site 31 and the Alameda Point pink background data set is provided in Appendix H2 which evaluates the chemical composition of soil and the fill history. This information was not used in evaluating whether IR Site 31 metals concentrations are related to on site activity. The evaluations in Appendix H2 show that based on the original criteria for grouping background data, the Alameda Point pink background is not applicable to soil at IR Site 31. Original groupings of areas for background data were based upon similarity in fill history and similarity in iron concentrations. Soil at IR Site 31 has significantly higher concentrations of iron than the Alameda Point pink background data set. The evaluations also show that IR Site 31 has a fill history different from the Alameda Point pink background area which is located west of Main Street where the background samples were collected. The lithological evaluation for IR Sites 25, 30, 31, 35, the College of Alameda, FISCA, and East Housing Area reveals differences in soil composition between some of the sites that could reflect differences in sources of fill. Soil at IR Sites 30 and 31, FISCA Warehouse Area, and East Housing Area have higher gravel content than soil in other nearby areas.

4.2 Groundwater

The following discussion describes the results of the groundwater sampling conducted during the RI at IR Site 31. Data collected during the RI have been used to determine if the nature of groundwater chemicals in groundwater beneath IR Site 31 is consistent with the groundwater associated with the adjacent IR Site 25 and FISCA IR Site 02 (OU-5/IR-02 groundwater) and whether a site-specific release related to past activities at IR Site 31 has contributed to unique chemicals in groundwater at IR Site 31 and was also used for modeling indoor/outdoor air for the HHRA.

Groundwater data are available from the IR Site 31 Soil RI, and the following reports as described below:

- *Soil Remedial Investigation Report for IR Site 31 Marina Village Housing, Alameda Point, Alameda, California,* which includes groundwater monitoring well and direct push data collected in November of 2005 at IR Site 31 for VOCs, SVOCs, and total metals.
- *Final Operable Unit 5 Remedial Investigation Report, Alameda Point, Alameda* (Neptune et al. 2002), which includes groundwater monitoring well and direct push data collected in June 2001 at OU-5 for VOCs, MTBE, and PAHs.
- *Summer 2005 Quarterly Monitoring Data Report* (ITSI 2006) - groundwater monitoring wells data collected in summer 2002 to summer 2005 at IR Site 25 group for VOCs, PAHs, and dissolved metals.

- *Final Spring 2006 Alameda Basewide Annual Groundwater Monitoring Report* (ITSI 2007a) - groundwater monitoring wells data collected from summer 2002 to spring 2006 at IR Site 25 group for VOCs, PAHs, and dissolved metals.
- *Fall 2006 Alameda Basewide Annual Groundwater Monitoring Data Report* (ITSI 2007b) - groundwater monitoring well data collected at IR Site 25 Group in October 2006 for VOCs, PAHs, and dissolved metals.
- *Final Groundwater Remedial Investigation/Feasibility Study, Alameda Point, Site 25 and Alameda Annex IR-02, Alameda, California* (ERRG 2004) - groundwater monitoring well data collected at IR Site 25 group prior to 2002 for VOCs, SVOCs, and dissolved metals.

The OU-5 RI report (Neptune et al. 2002) defines the chemicals of interest within the VOC plume as benzene and naphthalene. Benzene and naphthalene were also mapped as the chemicals of interest in the base-wide monitoring reports (ITSI 2006, 2007a,b). The OU-5/IR-02 groundwater is the subject of a separate remedial program that is independent of the soil at IR Site 31. The OU-5/IR-02 groundwater proposed plan was final after the public meeting and following the public review period in that was completed April 2006 (CDM 2005b).

Results for analytes detected at least once in groundwater samples collected during the IR Site 31 Soil RI are summarized in Table 4-3. Table 4-4 provides a summary of detected VOCs and SVOCs for groundwater samples from the 11 TW locations and the 5 monitoring wells at IR Site 31 compared with vapor intrusion criteria (RWQCB 2005). Table 4-5 provides a comparison of detected analytes in groundwater from the IR Site 31 RI with analytical data from the OU-5/IR-02 Groundwater RI/FS (ERRG 2004) and the base-wide groundwater monitoring (ITSI 2007a, b). Only analytical results of groundwater samples from IR Site 31 TWs collected between 13.5 feet bgs to 17.5 feet bgs (see sample depths in Table 3-4) and the 5 monitoring wells were used for comparisons. These data were selected because the shallower and the deeper groundwater samples were deemed not rigorously comparable to samples from the onsite monitoring wells all having sample depths of 14.5 to 14.95 feet bgs.

4.2.1 Remedial Investigation Groundwater Sampling

The IR Site 31 RI groundwater sampling activities included discrete groundwater sampling conducted in November 2005. To provide site-specific groundwater data, 16 discrete groundwater samples and 1 duplicate sample were collected from 11 TW locations at IR Site 31 (Figure 4-1). As outlined in the work plan, samples collected from the TW locations were analyzed for VOCs, SVOCs, pesticides, PCBs, and total metals (analyses was not for dissolved metals). To provide site-specific data comparable to the base-wide groundwater monitoring program, five monitoring wells were sampled. These monitoring wells were already in a quarterly monitoring program for the OU-

5/IR-02 groundwater plume; however, the base-wide program did not collect samples from these wells in the winter of 2005 or the spring of 2006. Samples collected from the monitoring wells during the IR Site 31 RI were analyzed for SVOCs, pesticides, PCBs, and total metals.

For comparison purposes and to support the indoor air portion of the risk assessment, TW and monitoring well samples were identified as originating from a shallow depth interval or a deep interval. As mentioned in Section 3, collecting more than one depth-differentiated water sample per location from TWs was compromised by poor and unpredictable water recoveries from silt/clay-affected lithologies below the water table. To support vapor intrusion evaluation in the HHRA, groundwater sample depths for TWs are discussed as shallow for sample collection depths less than 14 feet bgs. For the purpose of comparison of IR Site 31 groundwater to the OU-5/IR-02 groundwater plume, groundwater samples collected from a depth of 13.5 feet bgs to 17.5 feet bgs were selected and designated as deep samples because they correspond to monitoring well screen intervals for the area-wide OU-5/IR-02 monitoring well network (ITSI 2007a,b). The 14-foot depth separation was chosen because minimal water was recovered from screen midpoint depths around 14 feet bgs, and that depth corresponds with sea level, or possibly the depth of the original tidal marshland surface. The sample collection depth for TWs is based upon the sample being collected using low-flow methods from the sample tube placed at the midpoint of the 5-foot screened interval (See Section 3.2.2). During the IR Site 31 RI investigation, groundwater samples were collected from the five existing monitoring wells which are considered the deep interval and correspond to the deep interval of the TWs. The specific locations and their sample point depths are provided in Table 3-4.

The analytical results from samples collected at a depth of 13.5 to 17.5 feet bgs were used in comparison to existing monitoring well data from the spring 2006 annual groundwater sampling report (ITSI 2007a), the fall 2006 quarterly monitoring data (ITSI 2007b), and the OU-5/IR-02 RI/FS (ERRG 2004) to assess consistency with the OU-5/IR-02 groundwater plume. In Table 4-5, the analytical results of samples from the IR Site 31 RI (current sampling) are from six TWs and five monitoring wells. The deeper groundwater sample (i.e., from location 3142 at 20.5 feet bgs) was deemed not rigorously comparable to groundwater of the monitoring wells on IR Site 31.

To graphically present and compare groundwater results from this RI with the OU-5/IR-02 groundwater plume beneath IR Site 31, the groundwater sample results for benzene and naphthalene from this RI were plotted on a base map of the benzene plume from the summer 2005 quarterly monitoring data (ITSI 2006). Because the summer 2005 data were collected in June 2005, it is the most current data corresponding to the collection time of the RI data (November 2005). The comparative presentation is shown on Figure 4-17 and includes the depth of the sample collection point for all sample locations (11 TW and 5 monitoring wells). Therefore, the data presented on

Figure 4-17 include benzene and naphthalene results for both the shallow and deep sample intervals. As noted in the legend of Figure 4-17, the map also includes the results from the five groundwater samples collected at HydroPunch® locations in June 2001 on the eastern portion of the site (Neptune et al. 2002). Since the graphic plume from the ITSI monitoring report includes deeper groundwater data from off IR Site 31, the deep TW boring location 3142 sample results from 20.5 feet bgs were included. The analytical results presented for monitoring wells have the June 2005 results presented on the first line; the second line are analytical results from the IR Site 31 RI as collected in November 2005.

4.2.2 Operable Unit 5 Remedial Investigation Groundwater Sampling

Historically, groundwater samples have been collected in June 2001 at five HydroPunch® locations in IR Site 31 as part of the OU-5 RI at IR Site 25 (Neptune et al. 2002). The borings were located within the IR Site 31 boundaries and are identified on Figure 4-1 as OS-HP-03, OS-HP-05 and OS-HP-20, OS-HP-21, and OS-HP-22. The samples were collected at depths ranging from 6 to 20 feet bgs and analyzed for VOCs and MTBE using EPA Method 8260B and for PAHs using EPA Method 8310. The analytical results from these samples all underwent data validation and verification resulting in 100 percent validated and verified analytical results. Although these historic groundwater results do not represent current site conditions, the data were incorporated into this RI to enhance shallow groundwater data density for the HHRA (Section 6). These data do not represent the current plume but are mapped on Figure 4-17.

4.2.3 Remedial Investigation Analytical Results for Groundwater

This subsection describes the results of the analyses of chemicals reported in groundwater at IR Site 31, including VOCs, SVOCs, pesticides, and total metals. Results for analytes detected at least once in groundwater samples collected during the RI are summarized in Table 4-3. Table 4-4 provides a summary of VOCs and SVOC results reported in groundwater samples from the 11 TW locations and the 5 monitoring wells, compared with vapor intrusion criteria (RWQCB 2005). Table 4-5 provides a summary of the analytical results of samples collected at TW locations having sample depths between 13.5 feet bgs and 17.5 feet bgs and from the 5 monitoring wells, compared with analytical results available from the base-wide monitoring program (ITSI 2007a,b) and the Site 25/IR-02 RI/FS (ERRG 2004). The analytical results for groundwater samples collected during RI field activities are presented in Appendix G.

4.2.3.1 Organic Compounds

The sections below discuss the occurrence of organic chemical compounds in groundwater based upon results form TW and monitoring well samples as summarized in Tables 4-4 and 4-5.

Volatile Organic Compounds

VOCs detected in groundwater samples include fuel-related VOCs and possible laboratory contaminants (e.g., acetone). Per Table 4-3, nine VOCs were detected in the discrete groundwater samples collected during the RI at IR Site 31. The maximum concentrations of seven of the nine analytes were reported in the groundwater sample from location 3142 collected at a depth of 20.5 feet bgs. This sample location is on the east side of IR Site 31, near a documented plume center (ERRG 2004). The sample was collected at this depth because the shallower zone would not yield sufficient water for adequate sample volume. This depth interval is below that monitored by the five onsite monitoring wells.

As shown in Table 4-4, none of the shallow groundwater samples had concentrations of VOCs greater than vapor intrusion screening criteria. The inclusion of analytical results from samples collected at depths greater than those sampled in the monitoring wells also found no exceedances of vapor intrusion criteria.

Semi-Volatile Organic Compounds

SVOCs detected in groundwater samples include both PAHs and other SVOCs. Per Table 4-4, 20 SVOCs were reported at concentrations above the SQL in the discrete groundwater samples collected during the RI.

The maximum concentrations of nine of the 20 SVOC analytes were reported in the groundwater sample from location 3145 collected at a depth of 15.5 feet bgs. The location 3145 is within the central part of the west side of IR Site 31 near a documented plume center (ITSI 2007a). Another five analytes had maximum concentrations in the groundwater sample from location 3142 collected at a depth of 20.5 feet bgs, near the east side of IR Site 31 and also near a documented plume center (ERRG 2004).

As shown in Table 4-4, none of the shallow groundwater samples exceeded vapor intrusion screening criteria. The inclusion of deeper groundwater data found one exceedance of vapor intrusion screening criteria. Naphthalene was detected (4,910 µg/L) at the 20.5 foot bgs screen midpoint depth of location 3142 (east boundary of the site). Boring location 3142 is within the existing OU-5/IR-02 groundwater plume. The closest offsite regional monitoring well was P181-M47, which reported naphthalene at 2,700 µg/L in the summer of 2005 (ITSI 2006).

PCBs/Pesticides

No PCBs or pesticides were detected in groundwater sampled on the site.

4.2.3.2 Inorganic Analytes

Table 4-5 shows 14 metals that were detected in at least one groundwater sample. The maximum concentrations of 6 of the 14 analytes were found in TWs.

4.2.4 Nature and Extent of Groundwater Contamination

The nature and extent of groundwater contamination have been assessed in terms of potential vapor intrusion concerns from VOCs, SVOCs (including PAHs), and to a lesser extent, PCBs and pesticides. Inorganic chemicals were not identified as chemicals of interest in the Groundwater RI/FS (ERRG 2004). Of the analytical results discussed in Section 4.2.3, VOCs and SVOCs have vapor intrusion potential. PCBs and pesticides were not detected in groundwater samples. With reference to Table 4-4, naphthalene exceeded vapor intrusion screening criteria. Since benzene is a target analyte in the OU-5/IR-02 groundwater plume, it is also assessed. The documented groundwater contamination is from benzene and naphthalene and is addressed by a separate remedial program. The remedial decision for groundwater is proposed in the OU-5/IR-02 groundwater proposed plan, which identifies the preferred remedial alternative. The proposed plan was final after completing the public review and the public meeting in early April 2006 (CDM 2005b). A discussion of benzene and naphthalene and inorganic chemicals in groundwater is provided below.

4.2.4.1 Benzene

As shown in Table 4-4 benzene did not exceed vapor intrusion criteria at any sampled depth or location. In 10 shallow groundwater samples (sample collection depth less than 14 feet bgs), benzene was reported at concentrations from 0.7 to 137 µg/L, with the maximum concentration reported at location 3146. All locations at which benzene was reported in shallow groundwater samples were in the western part of IR Site 31. Shallow groundwater sampling in the eastern part of IR Site 31 was compromised by poor water recoveries. In six deeper groundwater samples, benzene was reported at concentrations from 0.7 to 480 µg/L, with the maximum concentration reported for the groundwater sample from location 3142 collected at a screen midpoint depth of 20.5 feet bgs. The 3142 location also had a reported concentration for benzene of 92 µg/L from a sample collected at 16.5 feet bgs. Benzene concentrations in groundwater samples from TWs decreased toward the western side of the site (Figure 4-17).

To compare sampled groundwater from this RI with the OU-5/IR-02 groundwater plume graphically, all of the groundwater results from this RI were plotted on a base map from the summer 2005 (collected in June 2005) quarterly monitoring data (ITSI

2006) on Figure 4-17. These data were collected nearest in time to the November 2005 RI sampling event. The data are tabulated and mapped showing screen interval midpoints from all wells involved because the base map included data from deep and shallow offsite wells. Monitoring wells samples as part of the IR Site 31 RI are also part of the quarterly monitoring program. As depicted on Figure 4-17, the maximum benzene concentration (480 µg/L) was detected at location 3142 for the November 2005 IR Site 31 RI samples. The maximum benzene concentration reported for monitoring wells as part of the quarterly monitoring program was 440 µg/L at location M25-01. Location 3142 corresponds to the groundwater benzene plume as detailed in the *Summer 2005 Quarterly Monitoring Data* (ITSI 2006) and on Figure 4-17.

4.2.4.2 Naphthalene

As shown on Table 4-4 and Figure 4-17, the 15 groundwater samples, analyzed for SVOC consist of 10 samples (4 shallow and 6 deep) from 9 TW locations and 5 samples from the 5 monitoring wells. Naphthalene exceeded vapor intrusion criteria at 20.5 feet bgs in the sample collected at a depth of 20.5 feet bgs from TW location 3142. For comparison with the OU-5/IR-02 groundwater plume, Figure 4-17 shows naphthalene results from TWs and the five onsite monitoring wells.

In four shallow groundwater samples (sample collection depths less than 14 feet bgs), naphthalene was detected at concentrations from 3 to 2,500 µg/L, with the maximum concentration reported for the field duplicate sample collected at 12 feet bgs at location 3146 (Figure 4-17). The lowest concentration was below the SQL of 10 µg/L. Groundwater sample results in the eastern part of IR Site 31 were compromised by the limited yield of the fine-grained matrix that significantly limited sample volume. In the 11 deep groundwater samples (6 from TW locations and 5 from monitoring wells), naphthalene was reported at concentrations from 2 to 4,910 µg/L, with the maximum concentration in the groundwater sample from location 3142 collected at a depth of 20.5 feet bgs in an area where P181-M47 had reported 3,200 µg/L in the 4th quarter of monitoring in 2004 (ITSI 2007a). Additionally, analytical results from M25-01, located in the same area, had a naphthalene concentration of 2,490 µg/L for the IR Site 31 RI and a concentration of 6,200 µg/L in the 4th quarter of monitoring in 2004 (ITSI 2007a). The three lowest concentrations were below the SQL of 10 µg/L. Naphthalene concentrations decreased toward the western side of the site.

4.2.4.3 Comparison of IR Site 31 Groundwater Data to Plume

As outlined in the work plan for IR Site 31, depth-discrete groundwater samples were collected during RI field activities to compare the nature of site-specific groundwater data with similar data from the VOC groundwater plume. This comparison was performed to assess whether the contaminants in groundwater at IR Site 31 are consistent with those in the plume or whether a potential site-specific release may have

occurred. The OU-5/IR-02 plume is characterized by the principal analytes, benzene and naphthalene, which are the target analytes for the OU-5/IR-02 groundwater remedy.

Summary Information for the OU-5/IR-02 Groundwater Plume

In October 2004, the final IR Site 25/IR-02 Groundwater RI/FS Report (ERRG 2004) was completed. This report summarized the nature and extent of shallow groundwater (shallow and deeper FWBZ) contamination beneath portions of IR Site 25 and FISCA (near the eastern edge of IR Site 31). Benzene and naphthalene were identified as chemicals of concern in groundwater.

As reported in the final IR Site 25/IR-02 Groundwater RI/FS, in the shallow zone (12 to 16 feet bgs HydroPunch® data), the highest concentrations reported in samples were localized in three plume centers:

- Northeast of IR Site 31 (up to 500 µg/L near Kollman Circle in IR Site 25).
- Directly north of IR Site 31 (up to 375 µg/L near the intersection of Singleton Avenue and the western end of Annapolis Circle).
- To the east of IR Site 31 (up to 742 µg/L near the former FISCA). The source of the contamination 006Day be previous point-source discharges and contaminated fill material used in the area. PAH contamination from the marsh crust was also identified as a potential source.

The IR Site 25/IR-02 Groundwater RI/FS Report (ERRG 2004) reported that the highest concentrations of benzene and naphthalene were reported in samples collected at 16 to 20 feet bgs. The maximum reported concentration of benzene (6,000 µg/L) was in a sample collected at Kollman Circle (the plume center northeast of IR Site 31).

Comparison of Data

Table 4-5 compares analytical results of groundwater samples from the 11 TWs and 5 monitoring wells sampled for this IR Site 31 RI with groundwater samples from the monitoring wells sampled for the base-wide monitoring program (ITSI 2007a, b) and the OU-5/IR-02 RI/FS (ERRG 2004).

Six of the seven VOCs detected in samples from TW locations were represented in historical monitoring well data (ITSI 2007a,b). Of the seven VOCs detected in TW water samples, all but 1,2-DCE were higher in the base-wide monitoring well data. Benzene was detected at a maximum concentration of 92 µg /L, whereas base-wide data reported that historical maximum benzene concentrations for the OU-5/IR-02 groundwater plume ranged from 650 µg/L in IR Site 25 wells in 2004 (ITSI 2007a,b) to 6,000 µg/L based on the OU-5/IR-02 RI/FS direct push samples collected prior to 2002

(ERRG 2004). The maximum concentration of all the VOCs for IR Site 31 RI samples were detected in water from location 3142, which is near a documented plume center (ERRG 2004, ITSI 2007a).

As detailed in Table 4-5, the 19 SVOCs detected in groundwater at IR Site 31 in TWs and monitoring wells included those reported in the plume although four samples were not target analytes for base-wide monitoring. Naphthalene was detected at a maximum concentration of 2,490 µg/L in M25-01 collected as part of the IR Site 31 RI in November 2005. The naphthalene concentration decreased from the historical maximum of 6,300 µg/L in M25-01 collected in June 2005 as part of the base-wide monitoring (ITSI 2007a,b).

Table 4-5 shows 15 metals that were detected in at least one groundwater sample. To evaluate whether the groundwater collected during the Site 31 RI at IR Site 31 was representative of site conditions and was consistent with inorganic chemicals in the groundwater plume of OU-5/IR-02, the maximum concentrations of the metals for the Site 31 RI TWs and Site 31 monitoring wells was compared to base-wide groundwater monitoring data (all IR Site 25 data and IR Site 31 data only) (ITSI 2007a,b) and the OU-5/IR-02 RI/FS data (ERRG 2004).

Data collected from TW locations were compared to monitoring well data collected during the IR Site 31 RI to determine if they were similar. Groundwater samples from TW locations had high turbidity (15 - 221 NTU) compared to monitoring well samples (3.5-19.8 NTU), which may bias total metal concentrations high in sample results from the TW locations (EPA 2005). The high turbidity is likely related to the poor recoveries and silt/clay-affected lithology as detailed in Section 4.2.1. Concentrations were comparable for 12 of the15 metals detected, with the exception of cadmium, chromium, and lead, which were 16-, 3-, and 9-fold greater, respectively, in TW than the IR Site 31 monitoring wells collected during the same time period. However, cadmium and lead were infrequently detected. Iron concentrations were 10-fold less in samples from the TW than in samples from the monitoring wells.

Although the IR Site 31 RI data reported total metals and the base-wide monitoring reports and OU-5/IR-02 RI/FS reported dissolved metals, the maximum concentrations from these sources were loosely compared to determine if groundwater at IR Site 31 is similar to groundwater in the OU-5/IR-02 groundwater plume. Inorganic analyte concentrations were generally less in groundwater samples collected during the IR Site 31 RI compared to the base-wide data and OU-5/IR-02 data (Table 4-5). Antimony and lead were the only analytes that were more than 1-fold greater than the base-wide and OU-5/IR-02 data.

Although the concentrations of inorganics in the IR Site 31 TWs are greater than those detected in monitoring wells used to characterize the OU-5/IR-02 groundwater plume,

the differences are attributable to high turbidity from colloidal clays present in TWs and are correlated with naturally occurring concentration of inorganics in soils.

The following similarities were observed:

- The highest concentrations of benzene were reported in the deeper intervals.
- Concentrations of benzene and naphthalene generally decrease to the west.
- Benzene and naphthalene concentrations reported in samples collected during the IR Site 31 RI generally fell within values represented by the plume contours. The highest concentrations of VOCs and PAHs were reported at location 3142 near a documented plume center. The second highest center of benzene and naphthalene in groundwater was located at locations 3145 and 3146, also near a documented plume center. Figure 4-17 shows the comparisons of the June 2005 (ITSI 2006) values to those collected for this IR Site 31 RI in November 2005 and includes 2002 HydroPunch® data (Neptune et al. 2002).
- Groundwater beneath IR Site 31 is characterized by the five monitoring wells and is consistent with the OU-5/IR-02 groundwater plume.
- Inorganics in TWs are caused by to the high turbidity and related to naturally occurring concentration of inorganics in IR Site 31 soils.
- Data from TWs at Site 31 had greater concentrations of cadmium, chromium, and lead than monitoring wells or OU-5/IR-02 plume data. Therefore, TW data are not rigorously comparable to data collect from monitoring wells at Site 31, most likely due to the high turbidity of the TW samples. Inorganics are monitored regularly in the IR Site 25 group of the basewide groundwater monitoring program and are not mapped as a chemical of interest.

Table 4-1
Concentration Ranges for Organic and Inorganic
Analytes Reported in Soil
IR Site 31 Alameda Point, Alameda, California

Compound Name	Frequency (Detects/Number Analyzed)	Method (a)	Minimum		Maximum						
			Minimum Detect (mg/kg) (b)	Validation Qualifier	Maximum Detect (mg/kg) (b)	Validation Qualifier	Maximum Location	Maximum Sample Code	Date of Maximum Sample	Depth of Maximum Concentration	CRDL
4,4-DDD	3/126	8081A	0.0004	J	0.005	J	3117	31054	11/4/2005	4-6	0.035
4,4-DDE	8/126	8081A	0.0001	J	0.03	J	3117	31054	11/4/2005	4-6	0.035
4,4-DDT	4/126	8081A	0.0002	J	0.002	J	3110 (3114)	31029 (31040)	11/3/2005	4.5-6.5 (0-2)	0.0034
Antimony	17/126	6010B	0.14	J	3.2	J	3101	31001	11/1/2005	0-2	
Aroclor 1016	1/126	8082	0.047		0.047		3138	31101	11/7/2005	0-2	0.035
Aroclor 1260	10/126	8082	0.005	J	0.02	J	3105	31010	11/2/2005	0-2	0.034
Arsenic	126/126	6010B	2		42.4		3106	31015	11/3/2005	2-4	0.34
Barium	126/126	6010B	30.9		479		3115	31046	11/3/2005	4-6	1.1
Benzene	2/126	8260B	0.001	J	0.003	J	3145	31121	11/8/2005	4-6	0.0068
Beryllium	78/126	6010B	0.0065	J	0.66		3125	31075	11/5/2005	4-6	0.22
Cadmium	104/126	6010B	0.017	J	1.5		3125	31074	11/5/2005	2-4	0.23
Chromium	126/126	6010B	3		197	J	3134	31095	11/6/2005	2-4	0.62
Cobalt	126/126	6010B	4.6		28.6		3131	31157	11/10/2005	2-4	0.56
Copper	126/126	6010B	3.6		118	J	3131	31156	11/10/2005	0-2	0.55
Dichloromethane	6/126	8260B	0.0008	J	0.002	J	3134	31094	11/6/2005	0-2	0.0055
Dieldrin	1/126	8081A	0.0005	J	0.0005	J	3114	31040	11/3/2005	0-2	0.0035
Heptachlor	1/126	8081A	0.0005	J	0.0005	J	3114	31041	11/3/2005	2-4	0.0019
Iron	126/126	6010B	8000		67000		3140	31106	11/7/2005	0-2	34
Lead	126/126	6010B	1.9		168		3115	31043	11/3/2005	0-2	0.33
Mercury	101/126	7471A	0.041	J	2.4		3146	31133	11/8/2005	2-4	0.67
Molybdenum	4/126	6010B	0.47	J	2.5		3101	31003	11/1/2005	4-6	
Nickel	126/126	6010B	2.4		474	J	3134	31095	11/6/2005	2-4	0.37
Phenol	2/126	8270C	0.2	J	0.3	J	3134	31096	11/6/2005	4.5-6.5	0.56
Selenium	13/126	6010B	0.71	J	3.1	J	3101	31002	11/1/2005	2-4	
Thallium	45/126	6010B	0.48	J	3.7		3103	31005	11/2/2005	2-4	0.52
Vanadium (fume or dust)	126/126	6010B	19.3		104		3140	31106	11/7/2005	0-2	0.56
Xylenes (total)	3/126	8260B	0.0005	J	0.003	J	3137	31160	11/10/2005	0-2	0.013
Zinc	126/126	6010B	15.6		901		3125	31074	11/5/2005	2-4	0.58

a RI samples: analysis by EPA Method 8270C for SVOCs; EPA Method 8081A for pesticides and 8082 for PCBs; EPA Method 6010B for metals; EPA Method 7471A for mercury.
b Individual analytical results presented in Appendix B and Appendix G.
mg/kg - milligram per kilogram
TQL - Target Quantitation Limit = requested reporting limit specified in the laboratory subcontract

Table 4-2
Detections and Criteria for Organic and Inorganic Analytes Reported in Soil[a,b]
IR Site 31 Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Samples Above Detection Limit (b)	Detections > Federal Residential PRG[c]	Federal Residential PRG[c] (mg/kg)	Detections > California Residential PRGc	California Residential PRG[c] (mg/kg)	Detections > Residential SSL for Vapor Intrusion	Residential SSL for Vapor Intrusion[e] (mg/kg)	Detections > EPA ECO-SSL Benchmark[f]	EPA ECO-SSL Benchmark[f] (mg/kg)	Detections > ORNL Benchmark[g]	ORNL Benchmark[g] (mg/kg)
VOLATILE ORGANIC COMPOUNDS												
Benzene	126	2	0	0.64	0	–[d]	0	0.18	NA	NA	NA	NA
Dichloromethane	126	6	0	9	0	–	0	0.52	NA	NA	NA	NA
Xylenes (total)	126	3	0	270	0	–	0	310	NA	NA	NA	NA
SEMIVOLATILE ORGANIC COMPOUNDS												
Phenol	126	2	0	18,000	0	–	NA	NA	NA	NA	0	30
PESTICIDES												
4,4'-DDD	126	3	0	2	0	–	NA	NA	NA	NA	NA	NA
4,4'-DDE	126	8	0	2	0	–	NA	NA	NA	NA	NA	NA
4,4'-DDT	126	4	0	2	0	–	NA	NA	NA	NA	NA	NA
Dieldrin	126	1	0	0.03	0	–	NA	NA	1	0.000032	NA	NA
Heptachlor	126	1	0	0.11	0	–	NA	NA	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS												
Aroclor 1016	126	1	0	4	0	–	NA	NA	NA	NA	0	0.371
Aroclor 1260	126	10	0	0	0	–	NA	NA	NA	NA	0	0.371
METALS												
Antimony	126	17	0	31	0	–	NA	NA	17	0.27	0	5
Arsenic	126	126	126	0.39	126	0.062	NA	NA	13	18	54	9.9
Barium	126	126	0	5,400	0	–	NA	NA	12	330	19	283
Beryllium	126	78	0	150	0	–	NA	NA	0	21	0	10
Cadmium	126	104	0	37	0	–	NA	NA	33	0.36	0	4
Chromium	126	126	0	210	0	–	NA	NA	103	26	126	0.4
Cobalt	126	126	0	900	0	–	NA	NA	76	13	22	20
Copper	126	126	0	3,100	0	–	NA	NA	NA	NA	25	50
Iron	126	126	97	23,000	0	–	NA	NA	NA	NA	126	200
Lead	126	126	0	400	2	150	NA	NA	100	11	21	40.5
Mercury	126	101	0	23	0	–	NA	NA	NA	NA	101	0.00051
Molybdenum	126	4	0	390	0	–	NA	NA	NA	NA	1	2
Nickel	126	126	0	1,600	0	–	NA	NA	NA	NA	103	30
Selenium	126	13	0	390	0	–	NA	NA	NA	NA	13	0.21

Table 4-2 (continued)
Detections and Criteria for Organic and Inorganic Analytes Reported in Soil[a,b]
IR Site 31 Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Samples Above Detection Limit (b)	Detections > Federal Residential PRG[c]	Federal Residential PRG[c] (mg/kg)	Detections > California Residential PRGc	California Residential PRG[c] (mg/kg)	Detections > Residential SSL for Vapor Intrusion	Residential SSL for Vapor Intrusion[e] (mg/kg)	Detections > EPA ECO-SSL Benchmark[f]	EPA ECO-SSL Benchmark[f] (mg/kg)	Detections > ORNL Benchmark[g]	ORNL Benchmark[g] (mg/kg)
Thallium	126	45	0	5.2	0	–	NA	NA	NA	NA	42	1
Vanadium	126	126	7	78	0	–	NA	NA	126	7.8	126	2
Zinc	126	126	0	23,000	0	–	NA	NA	NA	NA	126	8.5

a RI samples: Analysis by EPA Method 8260B for VOCs; EPA Method 8270C for SVOCs; EPA Method 8081A for pesticides and 8082 for PCBs; EPA Method 6010B for metals; EPA Method 7471A for mercury.
b. Individual analytical results presented in Appendix B and Appendix G.
c. EPA Region 9 PRGs for Residential Soil Direct Contact and Tap Water (Human Health) Updated October 2004.
d. Dash indicates a lower California PRG has not been developed for the analyte.
e. California Regional Water Quality Control Board. San Francisco Bay Region. 2005. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Volume 2: Table E-1b, Soil Screening Levels for Evaluation of Potential Vapor Intrusion Concerns. Interim Final . February 2005.
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Efroymson, R., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. Preliminary remediation goals for ecological endpoints. ES/ER/TM-162/R2. Prepared for U.S. Department of Energy by Environmental Sciences Division, Oak Ridge National Laboratory. Oak Ridge, TN.

Acronyms/Abbreviations:

µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenyl
PRG - preliminary remediation goal
SVOC - semivolatile organic compound
EPA - U.S. Environmental Protection Agency
VOC - volatile organic compound
NA - not applicable

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Table 4-3
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater[a,b]
IR Site 31 Alameda Point, Alameda, California

Compound Name	Frequency (Detects/Number Analyzed)	Method	Minimum		Maximum						
			Minimum Detect (µg/L)	Validation Qualifier	Maximum Detect (µg/L)	Validation Qualifier	Maximum Location	Maximum Sample Code	Date of Maximum Sample	Depth of Maximum Concentration (feet bgs)	CRDL
1,2,4-Trimethylbenzene	4/16	8260B	0.4	J	22	J	3142	31126	11/8/2005	18-23	25
1,2-Benzphenanthracene	4/15	8270C	2	J	8	J	3145	31165	11/10/2005	13-18	10
1,2-Dichloroethane	1/16	8260B	3	J	3	J	3142	31125	11/8/2005	14-19	5
1,3,5-Trimethylbenzene	2/16	8260B	4	J	5	J	3146	31149	11/9/2005	9.5-14.5	5
Acenaphthene	11/15	8270C	3	J	130	J	3146	31149	11/9/2005	9.5-14.5	500
Acenaphthylene	9/15	8270C	2	J	217	J	3142	31126	11/8/2005	18-23	1000
Acetone	3/16	8260B	3	J	16	J	3148	31163	11/10/2005	10-15	50
Anthracene	9/15	8270C	2	J	12		3146	31148	11/9/2005	9.5-14.5	10
Antimony	15/17	6010B	6.8	J	14.5		3142	31125	11/8/2005	14-19	10
Arsenic	1/17	6010B	14.8		14.8		3142	31126	11/8/2005	18-23	5
Barium	17/17	6010B	136		1540		PW-12	31130	11/8/2005	14.5-14.5	10
Benzene	15/16	8260B	0.7		480		3142	31126	11/8/2005	18-23	25
Benzo(a)anthracene	4/15	8270C	2	J	8	J	3145	31165	11/10/2005	13-18	10
Benzo(a)pyrene	6/15	8270C	1	J	12		3145	31165	11/10/2005	13-18	10
Benzo[b]fluoranthene	3/15	8270C	2	J	11		3145	31165	11/10/2005	13-18	10
Benzo[g,h,i]perylene	4/15	8270C	1	J	14		3145	31165	11/10/2005	13-18	10
Benzo[k]fluoranthene	2/15	8270C	2	J	4	J	3145	31165	11/10/2005	13-18	10
Beryllium	8/17	6010B	0.067	J	0.12	J	M25-01	31129	11/8/2005	14.95-14.95	2
Bis(2-ethylhexyl)phthalate	6/15	8270C	2	J	7	J	M25-06	31146	11/9/2005	14.75-14.75	10
Cadmium	3/17	6010B	0.51	J	18.5		3147	31164	11/9/2005	9-14	2
Carbazole	4/15	8270C	15		150		3142	31126	11/8/2005	18-23	10
Chromium	15/17	6010B	4.1	J	50.5		3142	31125	11/8/2005	14-19	5
Cobalt	12/17	6010B	0.99	J	3.7	J	M25-09	31131	11/8/2005	14.75-14.75	5
Copper	1/17	6010B	0.99	J	10.3		M25-09	31131	11/8/2005	14.75-14.75	10
Dibenzofuran	3/15	8270C	5	J	6	J	3146 (3146, 3142)	31149 (31148, 31126)	11/9/2005 (11/9/2005, 11/8/2005)	9.5-14.5 (9.5-14.5, 18-23)	10

Table 4-3 (continued)
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater[a,b]
IR Site 31 Alameda Point, Alameda, California

Compound Name	Frequency (Detects/Number Analyzed)	Method	Minimum		Maximum						
			Minimum Detect (µg/L)	Validation Qualifier	Maximum Detect (µg/L)	Validation Qualifier	Maximum Location	Maximum Sample Code	Date of Maximum Sample	Depth of Maximum Concentration (feet bgs)	CRDL
Ethylbenzene	13/16	8260B	0.3	J	60		3142	31126	11/8/2005	18-23	25
Fluoranthene	12/15	8270C	2	J	41		3145	31165	11/10/2005	13-18	10
Fluorene	8/15	8270C	2	J	44		3142	31126	11/8/2005	18-23	10
Indeno[1,2,3-cd]pyrene	2/15	8270C	3	J	8	J	3145	31165	11/10/2005	13-18	10
Iron	17/17	6010B	49.4	J	132000		M25-09	31131	11/8/2005	14.75-14.75	50
Lead	3/17	6010B	5.6		98.5		3147	31164	11/9/2005	9-14	5
Mercury	2/17	7470A	0.34	J	0.37	J	M25-09	31131	11/8/2005	14.75-14.75	0.5
Methylnaphthalene	11/15	8270C	4	J	218	J	3142	31126	11/8/2005	18-23	1000
Molybdenum	7/17	6010B	8.5		24.5		3150	31173	11/10/2005	9-14	5
Naphthalene	15/15	8270C	2	J	4910		3142	31126	11/8/2005	18-23	1000
Nickel	12/17	6010B	0.67	J	24.4		3142	31125	11/8/2005	14-19	5
Phenanthrene	13/15	8270C	3	J	92		3146	31148	11/9/2005	9.5-14.5	10
Pyrene	13/15	8270C	2	J	42		3145	31165	11/10/2005	13-18	10
Styrene (monomer)	2/16	8260B	4	J	130		3142	31126	11/8/2005	18-23	25
Toluene	6/16	8260B	0.3	J	110		3142	31126	11/8/2005	18-23	25
Vanadium (fume or dust)	12/17	6010B	1.4	J	22.9		M25-06	31146	11/9/2005	14.75-14.75	10
Xylenes (total)	7/16	8260B	0.5		240		3142	31126	11/8/2005	18-23	25
Zinc	1/17	6010B	10.1		10.1		M25-09	31131	11/8/2005	14.75-14.75	10

a. RI samples: Analysis by EPA Method 8260B for VOCs; EPA Method 8270C for SVOCs; EPA Method 8081A for pesticides and 8082 for PCBs; EPA Method 6010B for metals; EPA Method 7471A for mercury.
b. Individual analytical results presented in Appendix B and Appendix G.

Table 4-4
Detections and Criteria for Organic Analytes Reported in Groundwater[a,b]
IR Site 31 Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Results Above Detection Limit	Detections > Residential SSL for Vapor Intrusion[c] (µg/L)	Residential SSL for Vapor Intrusion[c] (µg/L)
VOLATILE ORGANIC COMPOUNDS				
Acetone	16	3	0	53,000,000
Benzene	16	15	0	540
Ethylbenzene	16	13	0	170,000
Toluene	16	6	0	380,000
Xylenes (Total)	16	7	0	160,000
1,2-Dichloroethane	16	1	0	200
1,2,4-Trimethylbenzene	16	4		NA
1,3,5-Trimethylbenzene	16	2		NA
SEMIVOLATILE ORGANIC COMPOUNDS/ POLYNUCLEAR AROMATIC HYDROCARBONS				
Acenaphthene	15	11	0	4,200
Acenaphthylene	15	9		NA
Anthracene	15	9	0	43
Benzo(a)anthracene	15	4		NA
Benzo(b)fluoranthene	15	3		NA
Benzo(k)fluoranthene	15	2		NA
Benzo(g,h,i)perylene	15	4		NA
Benzo(a)pyrene	15	6		NA
Carbazole	15	4		NA
Fluoranthene	15	12		NA
Fluorene	15	8	0	1,900
Indeno(1,2,3-cd)pyrene	15	2		NA
Methylnaphthalene	15	11	0	26,000
Naphthalene	15	15	1	3,200
Phenanthrene	15	13		NA
Pyrene	15	13	0	135
Styrene (monomer)	16	2	0	310,000
1,2-Benzophenanthracene	15	4		NA
OTHER SEMIVOLATILE ORGANIC COMPOUNDS				
Bis(2-ethylhexyl)phthalate	15	6		NA
dibenzofuran	15	3		NA

a RI samples: Analysis by EPA Method 8260B for VOCs; EPA Method 8270C for SVOCs; EPA Method 8081A for pesticides and 8082 for PCBs; EPA Method 6010B for metals; EPA Method 7471A for mercury.
b Individual analytical results presented in Appendix B and Appendix G.
c Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns. Interim Final. February 2005.

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Analytes Detected During Site 31 RI	Analytical Method	Site 31 RI Data[1]							Site 31 RI Data[1]						
		Direct Push Data							Groundwater Monitoring Well Data						
		Detects/ Number Analyzed	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Sample code	Detects/ Number Analyzed	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Sample code
VOCs															
1,2,4-Trimethylbenzene	8260B	1/6	9		16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
1,2-Dichloroethane	8260B	1/6	3	J	16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
1,3,5-trimethylbenzene	8260B	1/6	4	J	16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
Benzene	8260B	6/6	92		16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
Ethylbenzene	8260B	6/6	35		16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
Styrene	8260B	0/6	ND		-	-	-	-	NA	-		-	-	-	-
Toluene	8260B	2/6	23		16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
Xylenes (total)	8260B	2/6	70		16.5	11/8/2005	3142	31125	NA	-		-	-	-	-
PAHs															
1,2-Benzphenanthracene	8270C	3/6	8	J	15.5	11/10/2005	3145	31165	0/5	ND (10U)					
Acenaphthene	8270C	3/6	16		15.5	11/10/2005	3145	31165	4/5	76	J	14.95	11/8/2005	M25-01	31129
Acenaphthylene	8270C	2/6	5	J	17.5	11/8/2005	3141	31123	3/5	64	J	14.95	11/8/2005	M25-01	31129
Anthracene	8270C	4/6	6	J	15.5	(11/8/2005)	3145	31165 (31129)	1/5	6	J	14.95	(11/8/2005)	M25-01	31165 (31129)
Benzo(a)anthracene	8270C	3/6	8	J	15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Benzo(a)pyrene	8270C	3/6	12		15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Benzo(b)fluoranthene	8270C	2/6	11		15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Benzo[g,h,i]perylene	8270C	3/6	14		15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Benzo[k]floranthene	8270C	2/6	4	J	15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Bis(2-ethylhexyl)phthalate	8270C	3/6	4	J	17.5	11/9/2005	3144	31167	1/5	7	J	14.75	11/9/2005	M25-06	31146
Carbazole	8270C	0/6	ND (10U)		-	-	-	-	1/5	60		14.95	11/8/2005	M25-01	31129
Dibenz(a,h)anthracene	8270C	0/6	ND (500U)		16.5	11/8/2005	3142	31125	0/5	ND (10U)		-	-	-	-
Dibenzofuran	8270C	0/6	ND (500U)		16.5	11/8/2005	3142	31125	1/5	5	J	14.95	11/8/2005	M25-01	31129
Fluoranthene	8270C	4/6	41		15.5	11/10/2005	3145	31165	4/5	6	J	14.95	11/8/2005	M25-01	31129
Fluorene	8270C	3/6	4	J	15.5	11/10/2005	3145	31165	2/5	31		14.95	11/8/2005	M25-01	31129
Indeno[1,2,3-cd]pyrene	8270C	2/6	8	J	15.5	11/10/2005	3145	31165	0/5	ND (10U)		-	-	-	-
Methylnaphthalene	8270C	5/6	110	J	16.5	11/8/2005	3142	31125	3/5	170		14.95	11/8/2005	M25-01	31129
Naphthalene	8270C	6/6	1,700		16.5	11/8/2005	3142	31125	5/5	2,490		14.95	11/8/2005	M25-01	31129
Phenanthrene	8270C	5/6	74	J	16.5	11/8/2005	3142	31125	4/5	64		14.95	11/8/2005	M25-01	31129
Pyrene	8270C	5/6	42		15.5	11/10/2005	3145	31165	4/5	5	J	14.95	11/8/2005	M25-01	31129

Analytes Detected During Site 31 RI	Analytical Method	Site 31 RI Data[1]							Site 31 RI Data[1]						
		Direct Push Data							Groundwater Monitoring Well Data						
		Detects/ Number Analyzed	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Sample code	Detects/ Number Analyzed	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Sample code
INORGANICS[5]															
Antimony	6010B	5/6	14.5		16.5	11/8/2005	3142	31125	5/5	13.8		14.5	11/8/2005	PW-12	31130
Arsenic	6010B	0/6	ND (11.8U)		15.5	11/10/2005	3145	31165	0/5	ND (14U)		14.75	11/9/2005	M25-06	31146
Barium	6010B	6/6	1,260		17.5	11/8/2005	3141	31123	5/5	1,540		14.5	11/8/2005	PW-12	31130
Beryllium	6010B	3/6	0.095	J	17.5	11/8/2005	3148	31163	2/5	0.12	J	14.95	11/8/2005	M25-01	31129
Cadmium	6010B	1/6	8.1		17.5	11/9/2005	3144	31167	1/5	0.51	J	14.5	11/8/2005	PW-12	31130
Chromium	6010B	5/6	50.5		16.5	11/8/2005	3142	31125	5/5	14.7		14.75	11/9/2005	M25-06	31146
Cobalt	6010B	5/6	2.2	J	14.75	11/10/2005	3145	31165	3/5	3.7	J	14.75	11/8/2005	M25-09	31131
Copper	6010B	0/6	ND (10U)		-	-	-	-	1/5	10.3		14.75	11/8/2005	M25-09	31131
Iron	6010B	6/6	12,700		13.5	11/10/2005	3119	31172	5/5	132,000		14.75	11/8/2005	M25-09	31131
Lead	6010B	1/6	50.6		17.5	11/9/2005	3144	31167	1/5	5.6		14.75	11/8/2005	M25-09	31131
Mercury	7470A	2/6	0.37	J	14.75	11/8/2005	M25-09	31131	2/5	0.37	J	14.75	11/8/2005	M25-09	31131
Molybdenum															
Nickel															
Vanadium															

Acronyms:

Conc. - concentration
ft - feet
J - estimated value
Max - Maximum
ND - nondetect
PAH - polyaromatic hydrocarbon
RI- Remedial Investigation
U - not detected above reporting limits
µg/L - micrograms per liter
VOC - volatile organic compounds

Notes:

1 - Data collected during the RI soil investigation in November 2005.
2 - Data collected during quarterly basewide groundwater monitoring events from Summer 2002- Summer 2005 and biannual monitoring events for spring and fall 2006 (ITSI 2007 a,b)
3 - Maximum detected concentration or maximum reporting limit for analytes not detected. The location of the maximum nondetect is given if unique for a single sample.
4 - Data collected prior to 2002 and reported in the Site 5/IR-02 RI/FS (EERG 2004)
5 - Inorganics samples were anlayzed for total metals for the IR Site 31 Soil RI and for dissovled metals for the Basewide Groundwater Monitoring Data (ITSI 2007 a,b) and the Site 25/IR-02 RI/FS (EERG 2004) .

Analytes Detected During Site 31 RI	Basewide Groundwater Monitoring Data IR Site 31 Well Only[2]					Basewide Groundwater Monitoring Data All Site 25 Group Wells[2]					Site 25/IR-02 RI/FS[4]
	Groundwater Monitoring Well Data					Groundwater Monitoring Well Data					Groundwater Monitoring Well and Direct Push Data
	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Max. Detected Conc. (µg/L)[3]
VOCs											
1,2,4-Trimethylbenzene	28	J	14.95	2004 (Spring)	M25-01	28	J	14.95	2004 (Spring)	M25-01	52
1,2-Dichloroethane	ND (50U)		14.95	2005 (Summer)	M25-01	ND (50U)		14.95	2005 (Summer)	M25-01	39
1,3,5-trimethylbenzene	10	J	14.95	2003 (Spring)	M25-01	10	J	14.95	2003 (Spring)	M25-01	29
Benzene	650	J	14.95	2004	M25-01	720		16	2004 (Winter)	P181-MW47	6,000
Ethylbenzene	170		14.95	2005 (Summer)	M25-01	220		14	2002 (Winter)	M181-MW46	800
Styrene	19	J	14.95	3/17/2005	M25-01	29	J	14.95	2004 (Spring)	M25-01	130
Toluene	200	J	14.95	2004 (Spring)	M25-01	200	J	14.95	2004 (Spring)	M25-01	620
Xylenes (total)	211		14.95	2003 (Winter)	M25-01	211		14.95	2003 (Winter)	M25-01	227
PAHs											
1,2-Benzphenanthracene	4.1		14.95	6/25/2004	M25-01	4.1		14.95	6/25/2004	M25-01	-
Acenaphthene	300	J	14.95	2006 (Spring)	M25-01	300	J	14.95	2006 (Spring)	M25-01	120
Acenaphthylene	570		14.95	6/25/2004	M25-01	570		14.95	2004 (Summer)	M25-01	660
Anthracene	16		14.95	2002 (Fall)	M25-01	16		14.95	2002 (Fall)	M25-01	59
Benzo(a)anthracene	2.5		14.95	2002 (Fall)	M25-01	2.5		14.95	2002 (Fall)	M25-01	8.8
Benzo(a)pyrene	5.2		14.95	2003 (Winter)	M25-01	5.2		14.95	2003 (Winter)	M25-01	60
Benzo(b)fluoranthene	2.5		14.95	2003 (Winter)	M25-01	2.5		14.95	2003 (Winter)	M25-01	8
Benzo[g,h,i]perylene	3.9		14.95	2003 (Winter)	M25-01	3.9		14.95	2003 (Winter)	M25-01	11
Benzo[k]floranthene	1.4		14.95	2003 (Winter)	M25-01	1.4		14.95	2003 (Winter)	M25-01	3.6
Bis(2-ethylhexyl)phthalate			-	-	-	-		-	-	-	-
Carbazole			-	-	-	-		-	-	-	-
Dibenz(a,h)anthracene	14		14.95	6/25/2004	M25-01	14		14.95	6/25/2004	M25-01	-
Dibenzofuran			-	-	-	-		-	-	-	-
Fluoranthene	29		14.95	2003 (Summer)	M25-01	29		14.95	2003 (Summer)	M25-01	280
Fluorene	86		14.95	11/19/2004	M25-01	86		14.95	11/19/2004	M25-01	70
Indeno[1,2,3-cd]pyrene	4.2		14.95	2002 (Fall)	M25-01	4.2		14.95	2002 (Fall)	M25-01	-
Methylnaphthalene			-	-	-	-		-	-	-	-
Naphthalene	6,300		14.95	2005 (Summer)	M25-01	6,300		14.95	2005 (Summer)	M25-01	19,000
Phenanthrene	110		14.95	11/19/2004	M25-01	110		14.95	11/19/2004	M25-01	250
Pyrene	25		14.95	2002 (Fall)	M25-01	25		14.95	2002 (Fall)	M25-01	200

Analytes Detected During Site 31 RI	Basewide Groundwater Monitoring Data IR Site 31 Well Only[2]					Basewide Groundwater Monitoring Data All Site 25 Group Wells[2]					Site 25/IR-02 RI/FS[4]
	Groundwater Monitoring Well Data					Groundwater Monitoring Well Data					Groundwater Monitoring Well and Direct Push Data
	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Max. Detected Conc. (µg/L)[3]	Qualifier	Sample Depth (ft)	Date of Max Detected Concentration	Location of Max Detected Concentration	Max. Detected Conc. (µg/L)[3]
INORGANICS[5]											
Antimony	1.3		14.5	2005 (Summer)	PW-12	2.7		14	2004 (Spring)	M25-05	2.67
Arsenic	150		14.5	2005 (Summer)	PW-12	150		14.5	2005 (Summer)	PW-12	71.8
Barium	1,830		14.5	2003 (Summer)	PW-12	1,960	J	17.25	2003 (Summer)	P181-MW45	2,460
Beryllium	1.8	J	14.95	2003 (Summer)	M25-01	22	J	14	5/3/2006	S-16R	1.83
Cadmium	4.2	J	14.95	2005 (Summer)	M25-01	4.2	J	14.75	9/14/2005	M25-09	3.24
Chromium	18		14.5	2002 (Summer)	PW-12	19		17.25	2002 (Summer)	P181-MW45	22
Cobalt	5.3	J	14.95	2003 (Summer)	M25-01	7.5	J	14	2003 (Winter)	M25-05	7.46
Copper	11		14.5	11/19/2004	PW-12	17		14	2004 (Summer)	S16-2	11
Iron	180,000		14.75	11/19/2004	M25-09	180,000		14.75	11/19/2004	M25-09	39,700
Lead	0.59	J	14.95	2004 (Summer)	M25-01	0.94	J	14.75	2004 (Summer)	S-35	2.45
Mercury	0.28		14.5	2004 (Summer)	PW-12	0.28		14.5	2004 (Summer)	PW-12	0.222
Molybdenum	12.4	J		2003 (Winter)	M25-01	25.2	J		2004 (Spring)	M25-05	37.4
Nickel	15	J		11/19/2004	PW-12	23			2004 (Winter)	S-16R	16
Vanadium	17			2004 (Summer)	PW-12	20	J		2002 (Winter)	M25-03	20
											11

Acronyms:

Conc. - concentration
ft - feet
J - estimated value
Max - Maximum
ND - nondetect
PAH - polyaromatic hydrocarbon
RI- Remedial Investigation
U - not detected above reporting limits
µg/L - micrograms per liter
VOC - volatile organic compounds

Notes:

1 - Data collected during the RI soil investigation in November 2005.
2 - Data collected during quarterly basewide groundwater monitoring events from Summer 2002- Summer 2005 and biannual monitoring events for spring and fall 2006 (ITSI 2007 a,b)
3 - Maximum detected concentration or maximum reporting limit for analytes not detected. The location of the maximum nondetect is given if unique for a single sample.
4 - Data collected prior to 2002 and reported in the Site 5/IR-02 RI/FS (EERG 2004)
5 - Inorganics samples were anlayzed for total metals for the IR Site 31 Soil RI and for dissovled metals for the Basewide Groundwater Monitoring Data (ITSI 2007 a,b) and the Site 25/IR-02 RI/FS (EERG 2004) .

Legend

Historical Sampling Locations

- Surface Soil
- Soil Boring
- HydroPunch

- IR Site 31
- Approximate Former Building Location
- PavedSurfaces
- Buildings (Removed)
- Buildings (Present)

Sampling Locations (November 2005)

- Direct Push Soil
- Direct Push Soil with Geotechnical Analysis
- Direct Push Soil with Groundwater Analysis
- Monitoring Well Location

Feet
0 100 200 400
1 inch equals 150 feet

Draft Final Soil RI for IR Site 31
Figure 4-1
Sample Locations for IR Site 31
and
Previous Investigations

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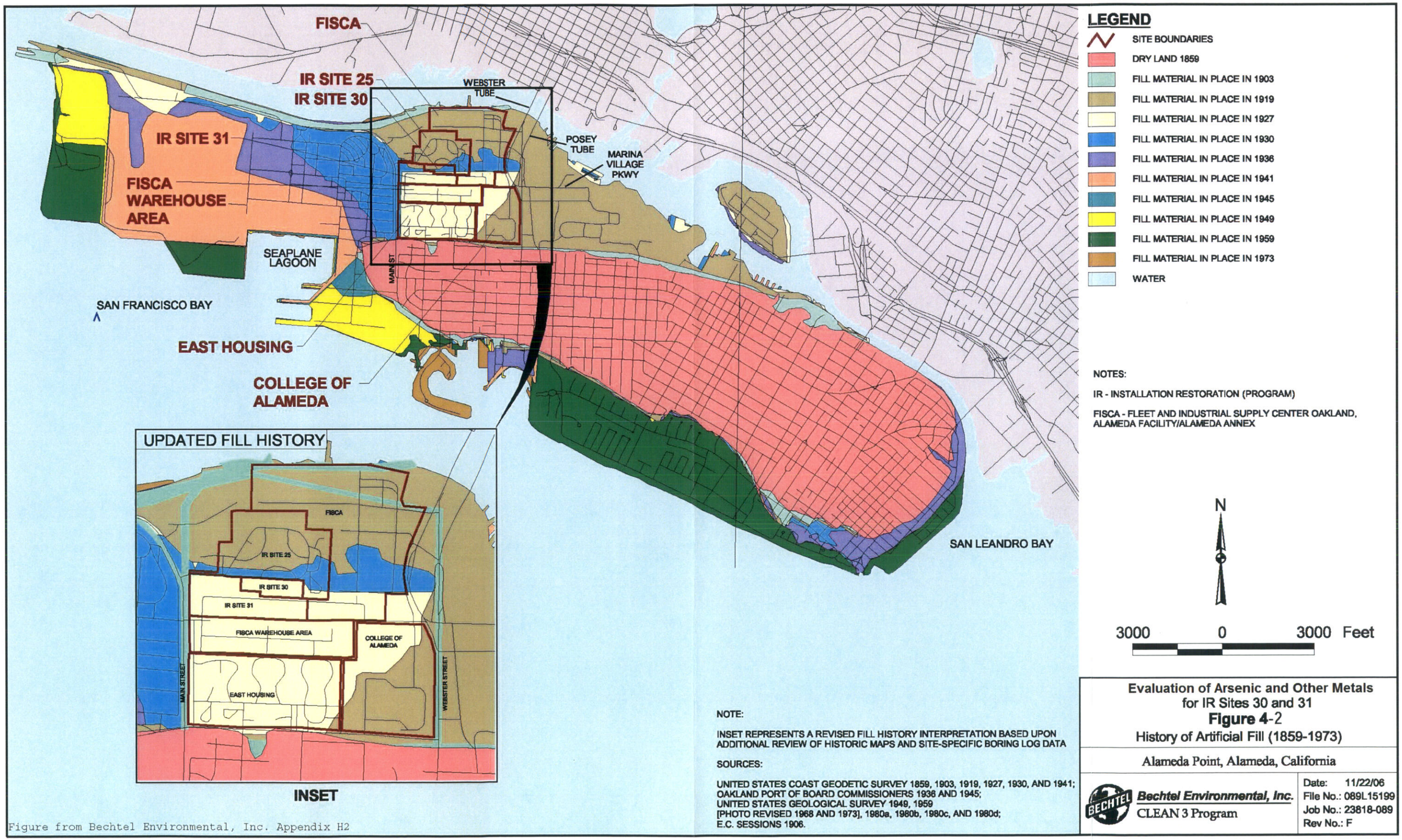

Figure from Bechtel Environmental, Inc. Appendix H2

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SSIC NO. 5090.3

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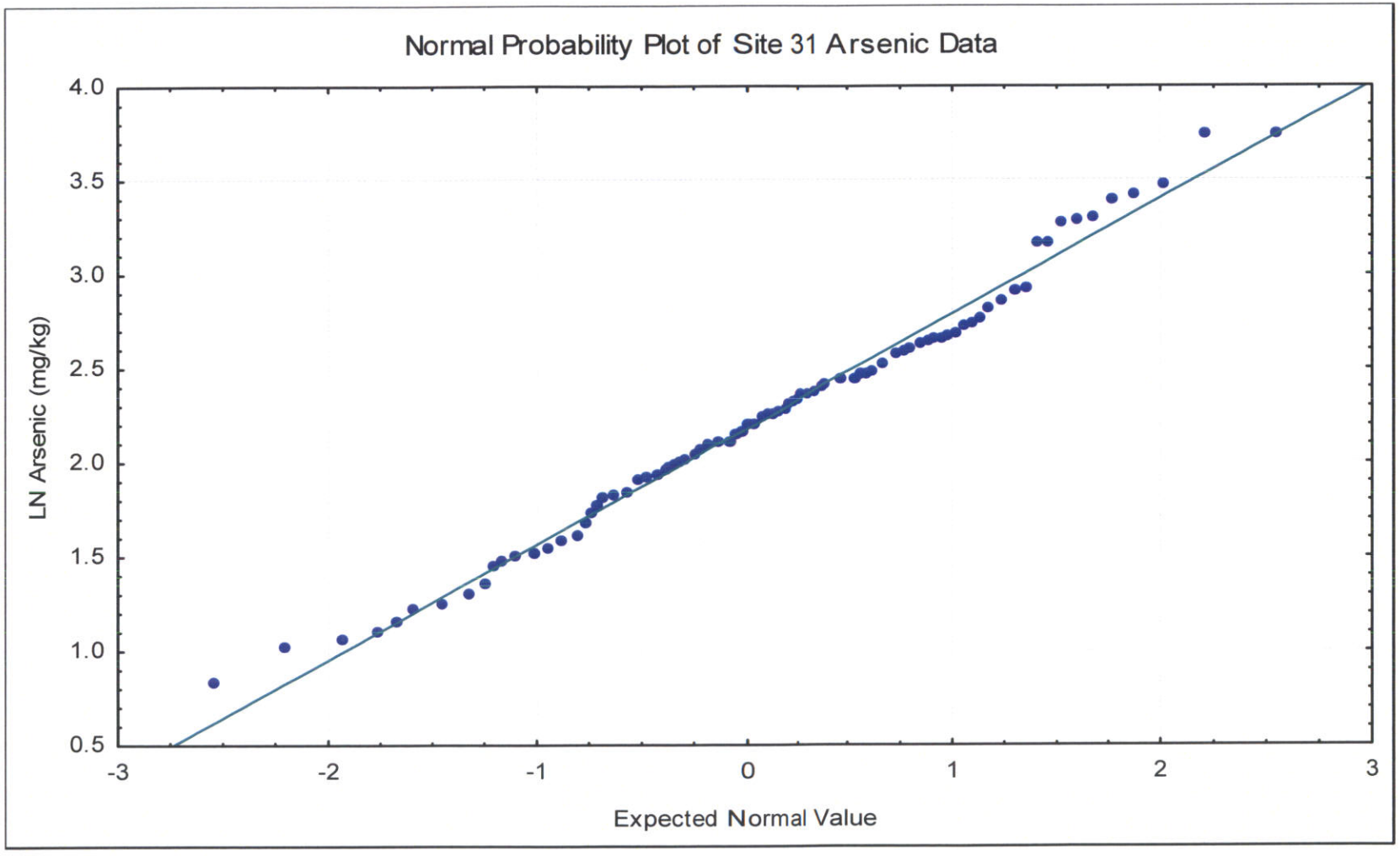
Figure 4-3
Arsenic Probability Plot for Soils at IR Site 31



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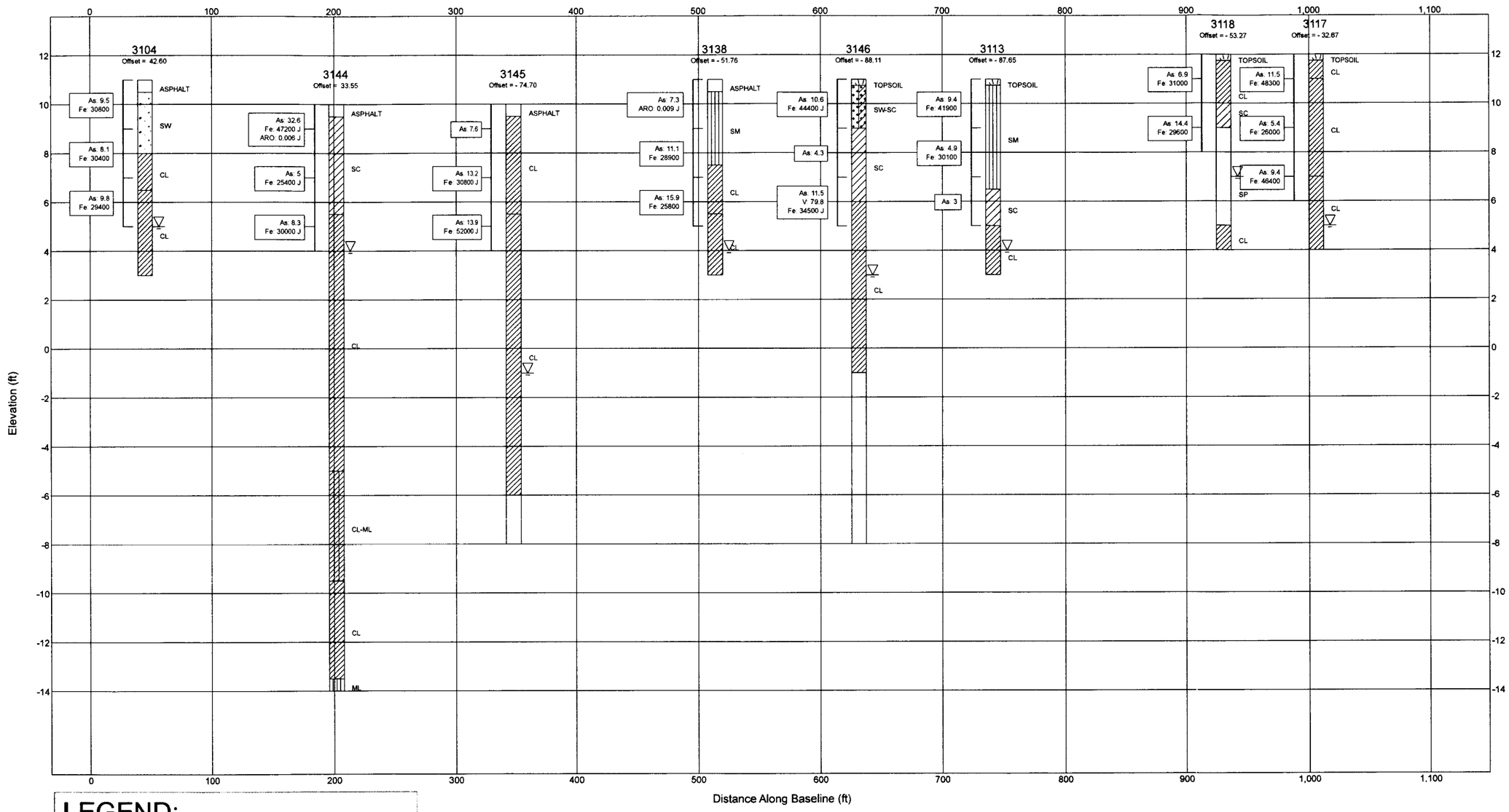

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-4
Geochemical Cross Section A - A'

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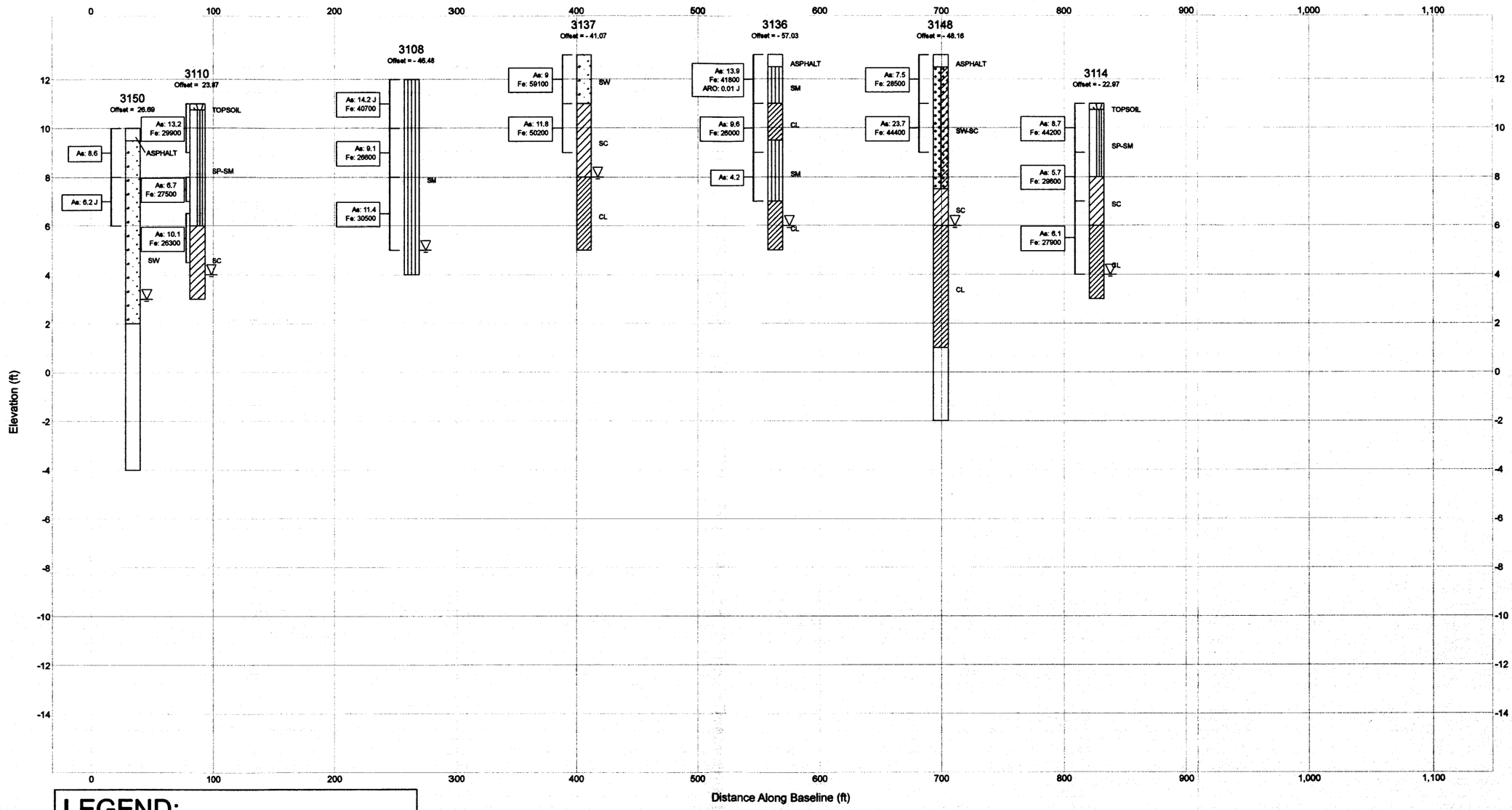

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-5
Geochemical Cross Section B - B'

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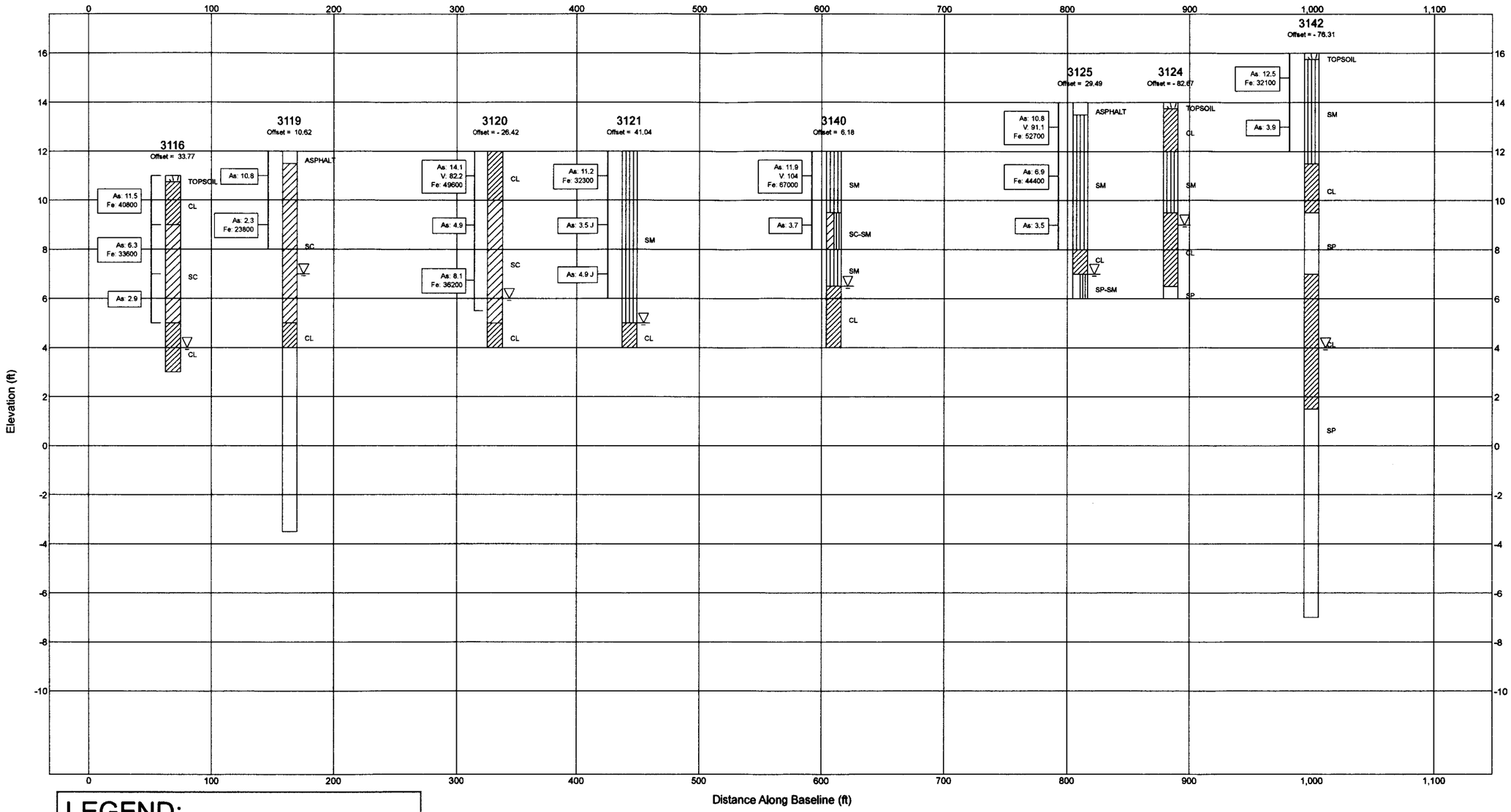

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-6
Geochemical Cross Section C - C'

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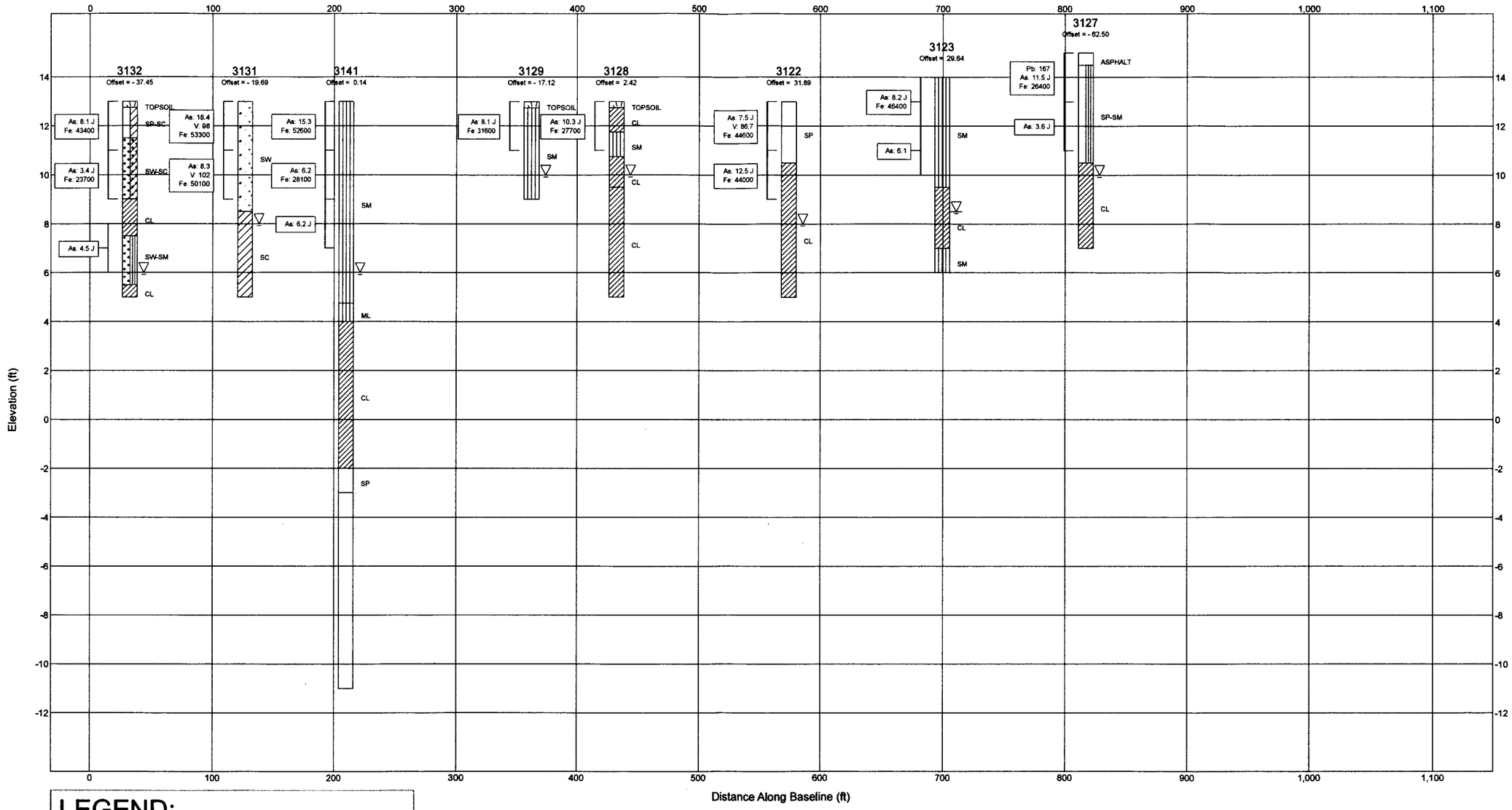

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-7
Geochemical Cross Section D - D'

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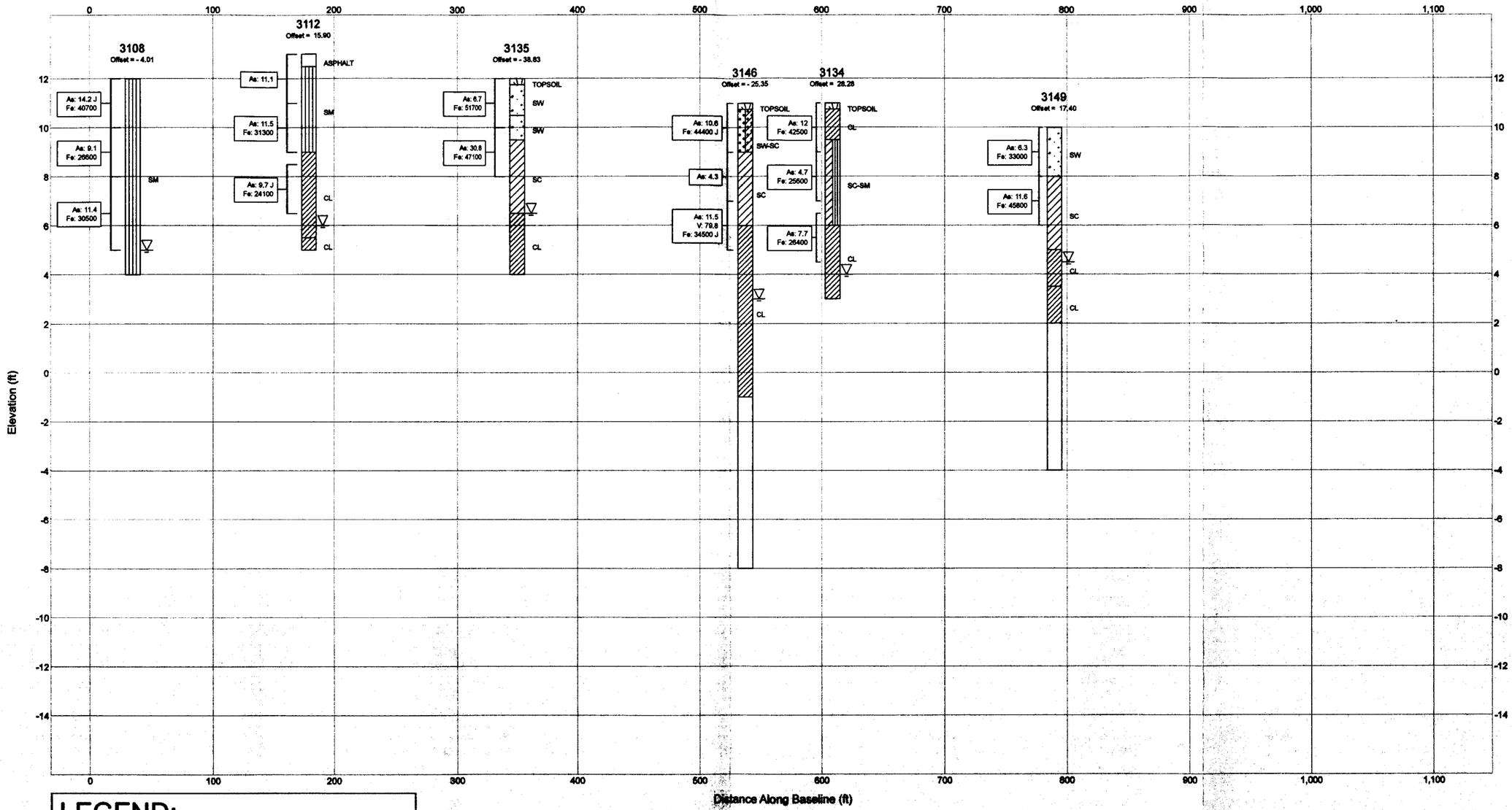

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-8
Geochemical Cross Section E - E'

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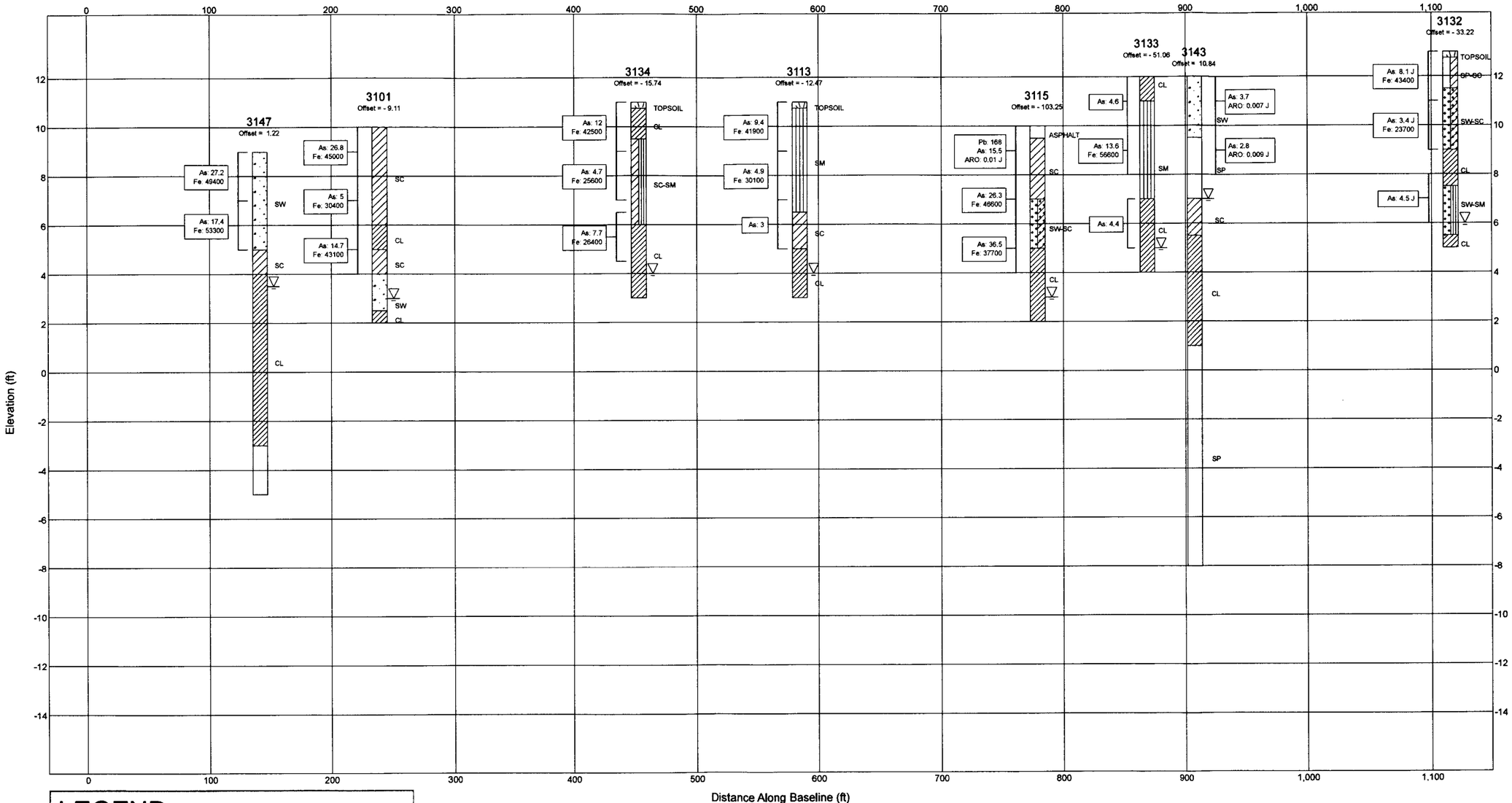

LEGEND:

Pb: 0.36 J

Lab Qualifier

Analyte Concentration (mg/kg)

Analyte

Pb = Lead
As = Arsenic
V = Vanadium
Fe = Iron
ARO = Aroclor 1260

Draft Final Soil RI for IR Site 31
Figure 4-9
Geochemical Cross Section F - F'

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Legend

Approximate Former Building Location

Buildings (Removed)

Buildings (Present)

IR Site 31

Soil Sample Locations (Arsenic Detects)

3105 Soil Sample Location with Concentration in mg/kg
0.02J

Sampling Locations (Non-detects)

Note:
Alameda point background 95% quantile for Arsenic 9.1 mg/kg (Tetra Tech-EMI 2003)

Feet
0 100 200 400
1 inch equals 150 feet

Draft Final Soil RI for IR Site 31
Figure 4-10
Arsenic in 0 - 2 Ft Soils

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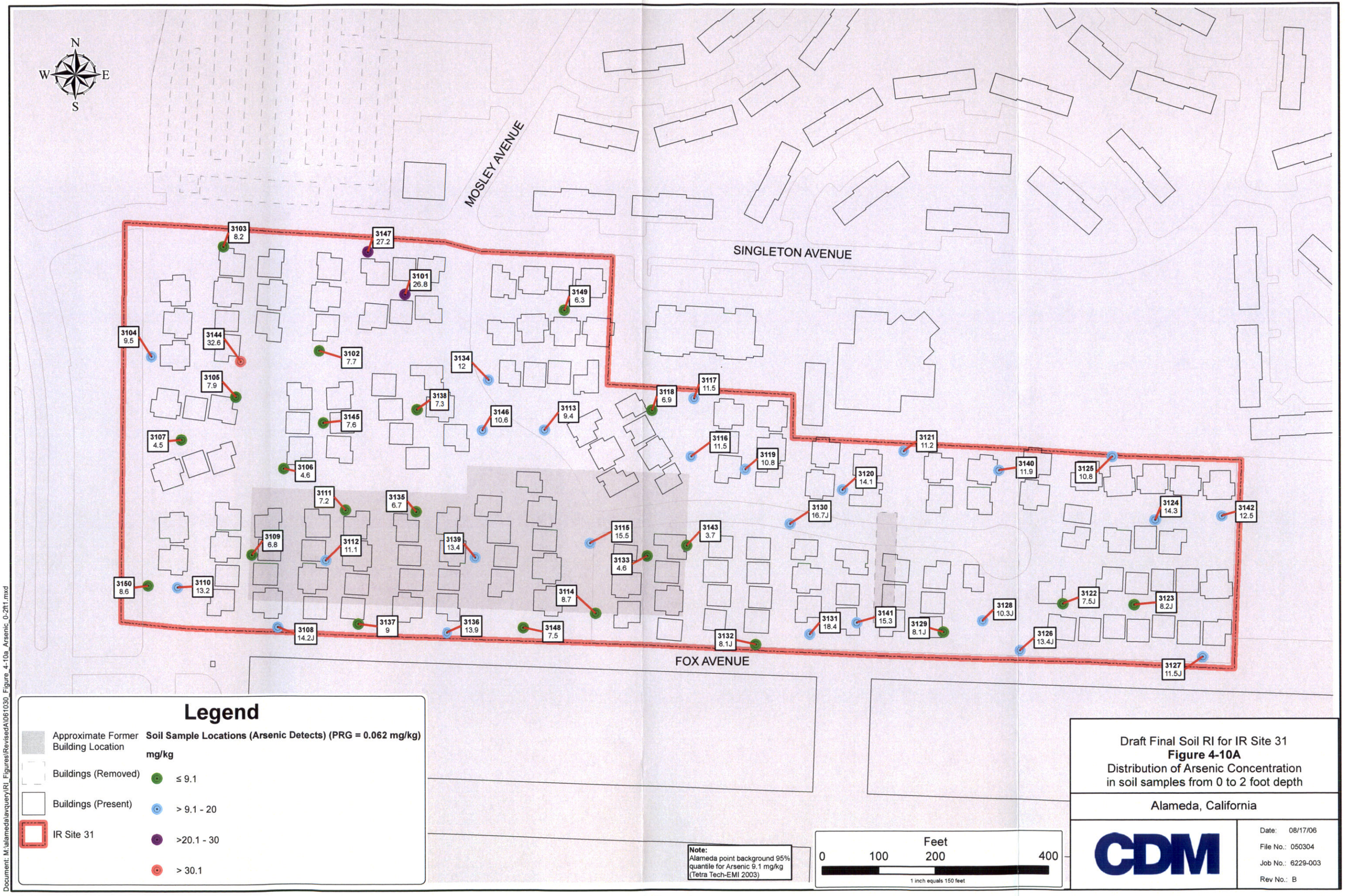

Draft Final Soil RI for IR Site 31
Figure 4-10A
Distribution of Arsenic Concentration in soil samples from 0 to 2 foot depth

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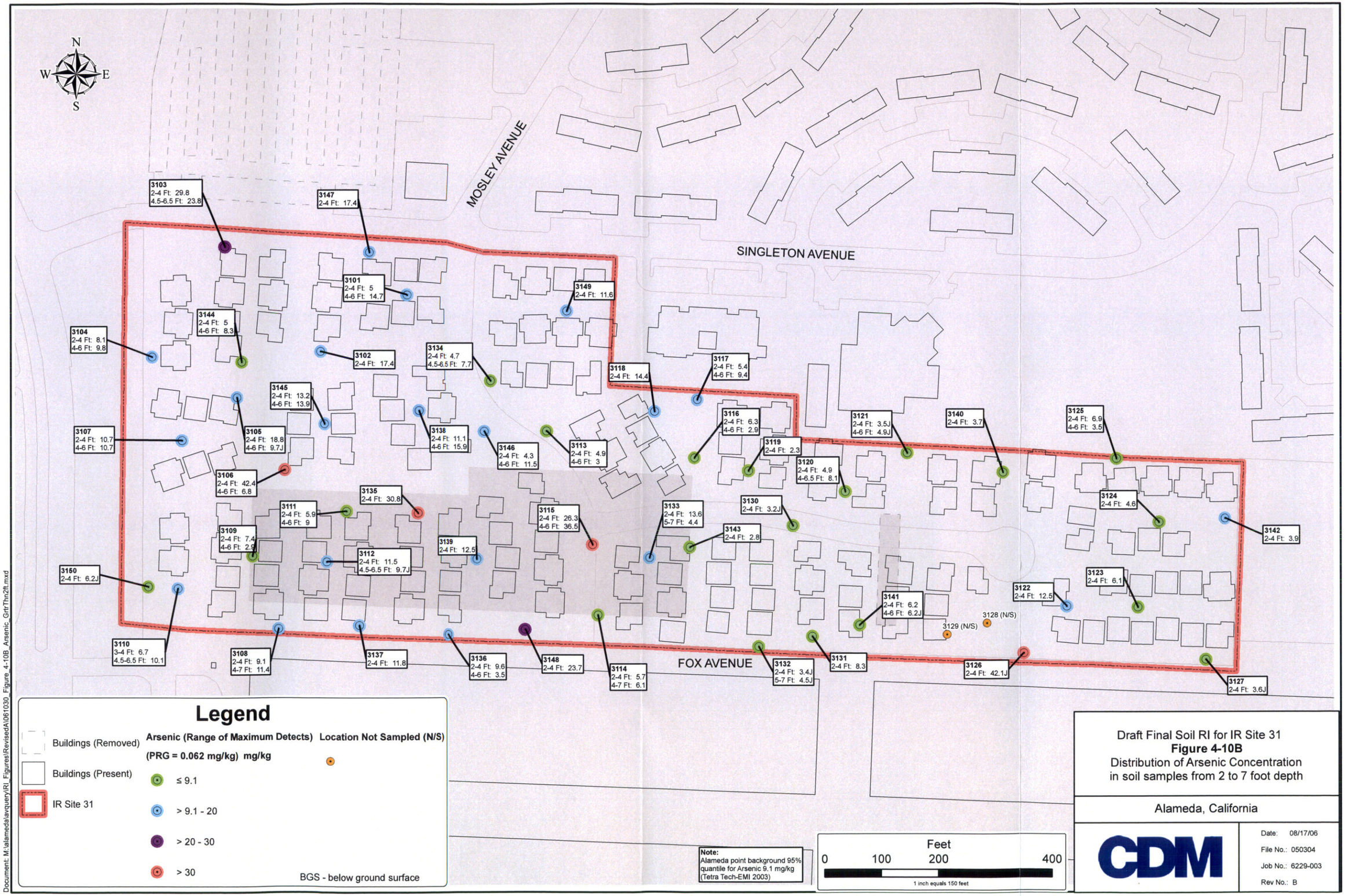
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S
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MOSLEY AVENUE
SINGLETON AVENUE
FOX AVENUE
3103 2-4 Ft: 29.8 4.5-6.5 Ft: 23.8
3147 2-4 Ft: 17.4
3101 2-4 Ft: 5 4-6 Ft: 14.7
3149 2-4 Ft: 11.6
3144 2-4 Ft: 5 4-6 Ft: 8.3
3104 2-4 Ft: 8.1 4-6 Ft: 9.8
3102 2-4 Ft: 17.4
3134 2-4 Ft: 4.7 4.5-6.5 Ft: 7.7
3118 2-4 Ft: 14.4
3117 2-4 Ft: 5.4 4-6 Ft: 9.4
3145 2-4 Ft: 13.2 4-6 Ft: 13.9
3107 2-4 Ft: 10.7 4-6 Ft: 10.7
3105 2-4 Ft: 18.8 4-6 Ft: 9.7J
3138 2-4 Ft: 11.1 4-6 Ft: 15.9
3146 2-4 Ft: 4.3 4-6 Ft: 11.5
3113 2-4 Ft: 4.9 4-6 Ft: 3
3116 2-4 Ft: 6.3 4-6 Ft: 2.9
3119 2-4 Ft: 2.3
3120 2-4 Ft: 4.9 4-6.5 Ft: 8.1
3121 2-4 Ft: 3.5J 4-6 Ft: 4.9J
3140 2-4 Ft: 3.7
3125 2-4 Ft: 6.9 4-6 Ft: 3.5
3106 2-4 Ft: 42.4 4-6 Ft: 6.8
3135 2-4 Ft: 30.8
3111 2-4 Ft: 5.9 4-6 Ft: 9
3115 2-4 Ft: 26.3 4-6 Ft: 36.5
3133 2-4 Ft: 13.6 5-7 Ft: 4.4
3130 2-4 Ft: 3.2J
3124 2-4 Ft: 4.6
3109 2-4 Ft: 7.4 4-6 Ft: 2.9
3139 2-4 Ft: 12.5
3143 2-4 Ft: 2.8
3142 2-4 Ft: 3.9
3112 2-4 Ft: 11.5 4.5-6.5 Ft: 9.7J
3150 2-4 Ft: 6.2J
3123 2-4 Ft: 6.1
3122 2-4 Ft: 12.5
3141 2-4 Ft: 6.2 4-6 Ft: 6.2J
3128 (N/S)
3129 (N/S)
3110 3-4 Ft: 6.7 4.5-6.5 Ft: 10.1
3108 2-4 Ft: 9.1 4-7 Ft: 11.4
3137 2-4 Ft: 11.8
3136 2-4 Ft: 9.6 4-6 Ft: 3.5
3148 2-4 Ft: 23.7
3114 2-4 Ft: 5.7 4-7 Ft: 6.1
3132 2-4 Ft: 3.4J 5-7 Ft: 4.5J
3131 2-4 Ft: 8.3
3126 2-4 Ft: 42.1J
3127 2-4 Ft: 3.6J
Legend
Buildings (Removed)
Buildings (Present)
IR Site 31
Arsenic (Range of Maximum Detects) (PRG = 0.062 mg/kg) mg/kg
≤ 9.1
> 9.1 - 20
> 20 - 30
> 30
Location Not Sampled (N/S)
BGS - below ground surface
Note: Alameda point background 95% quantile for Arsenic 9.1 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-10B
Distribution of Arsenic Concentration in soil samples from 2 to 7 foot depth
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Job No.: 6229-003
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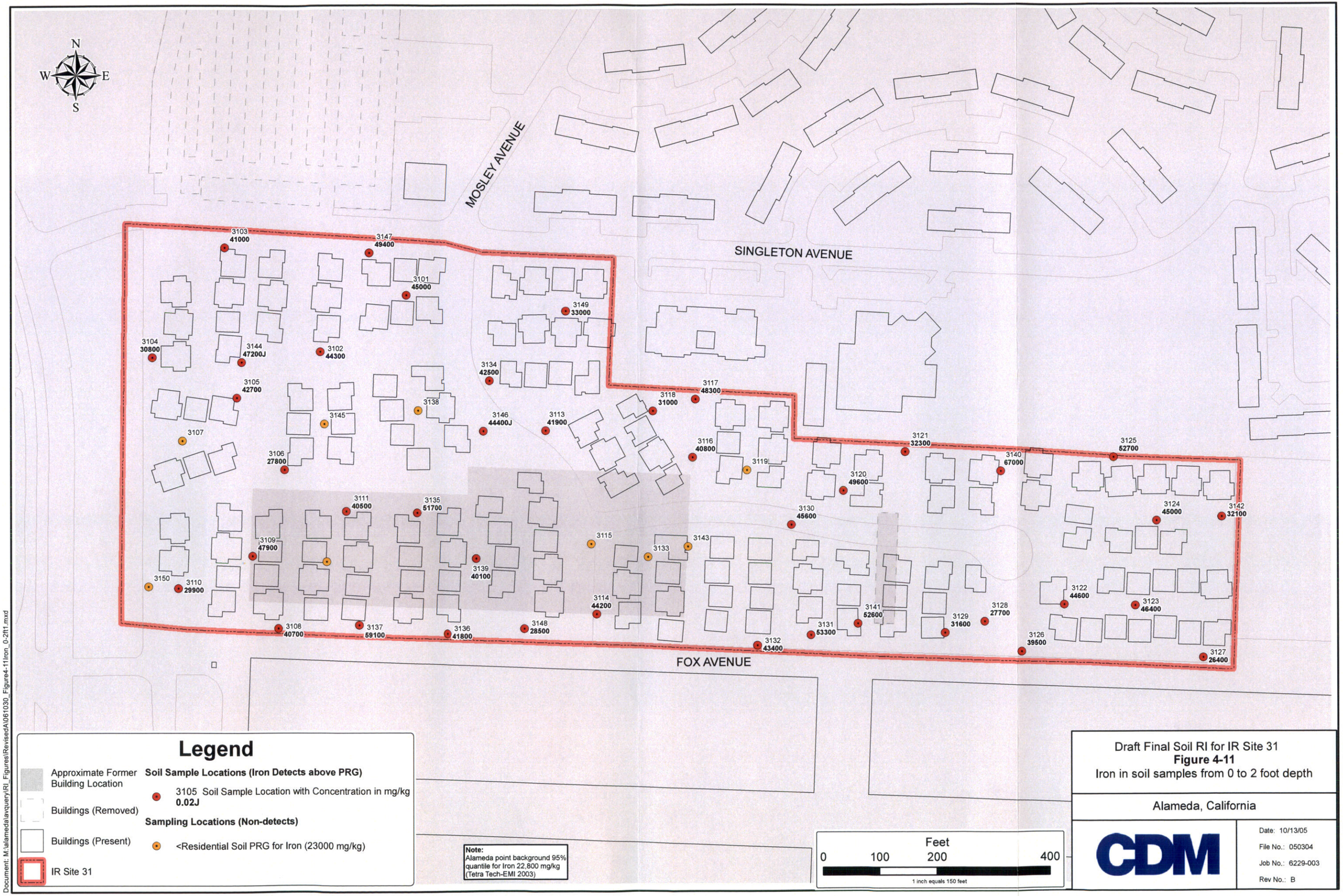
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SINGLETON AVENUE
FOX AVENUE
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3101 45000
3149 33000
3104 30800
3144 47200J
3102 44300
3134 42500
3105 42700
3138
3145
3146 44400J
3113 41900
3117 48300
3118 31000
3107
3106 27800
3116 40800
3119
3121 32300
3125 52700
3140 67000
3120 49600
3111 40500
3135 51700
3130 45600
3124 45000
3142 32100
3109 47900
3115
3133
3143
3150
3110 29900
3139 40100
3114 44200
3122 44600
3123 46400
3141 52600
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3132 43400
3126 39500
3127 26400
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Legend
Approximate Former Building Location
Buildings (Removed)
Buildings (Present)
IR Site 31
Soil Sample Locations (Iron Detects above PRG)
3105 Soil Sample Location with Concentration in mg/kg
0.02J
Sampling Locations (Non-detects)
<Residential Soil PRG for Iron (23000 mg/kg)
Note:
Alameda point background 95% quantile for Iron 22,800 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-11
Iron in soil samples from 0 to 2 foot depth
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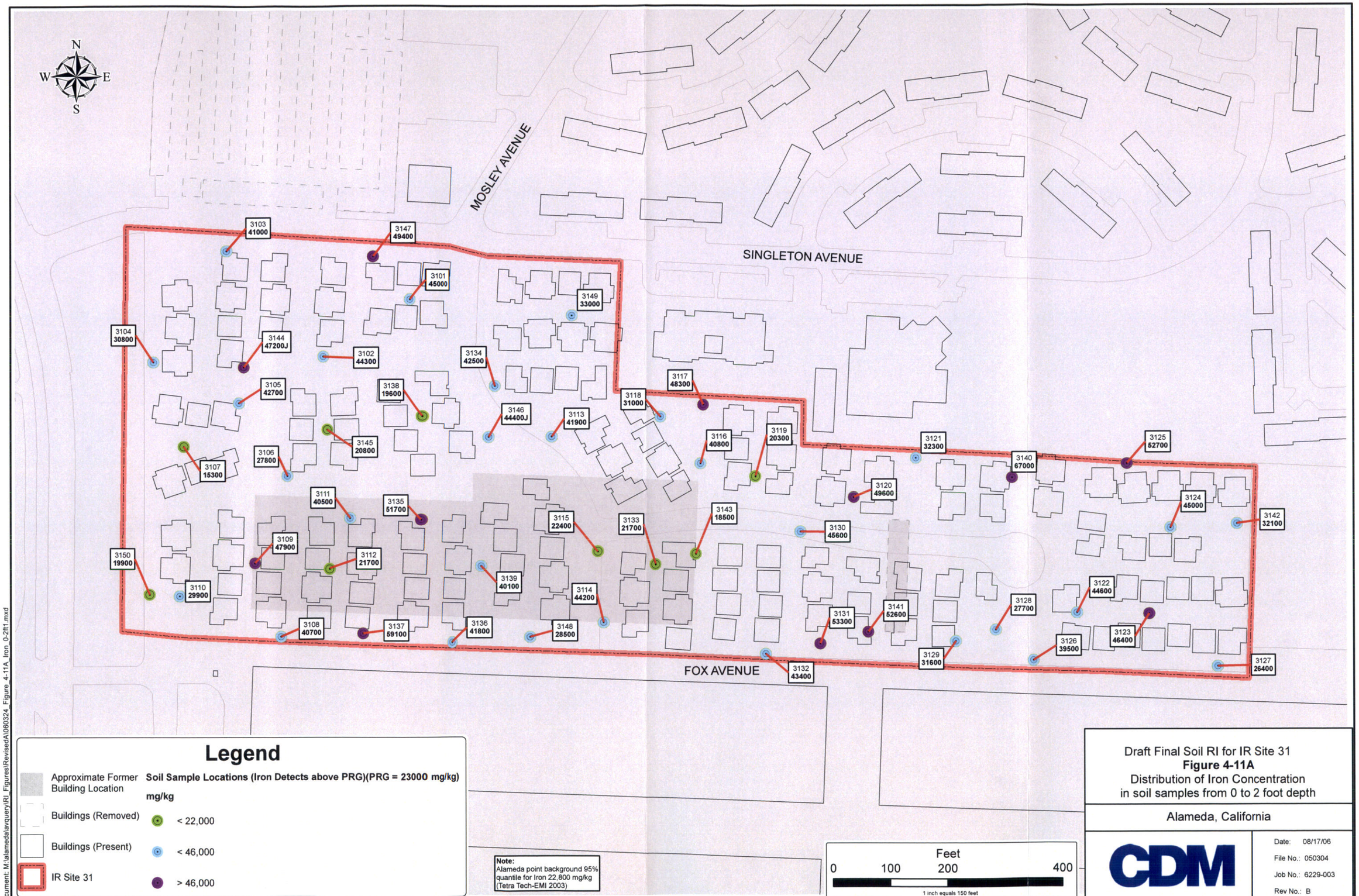
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MOSLEY AVENUE
SINGLETON AVENUE
FOX AVENUE
3103 41000
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3144 47200J
3102 44300
3134 42500
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3111 40500
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3115 22400
3133 21700
3143 18500
3130 45600
3142 32100
3109 47900
3150 19900
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3139 40100
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3110 29900
3128 27700
3131 53300
3141 52600
3123 46400
3108 40700
3137 59100
3136 41800
3148 28500
3126 39500
3129 31600
3132 43400
3127 26400
Legend
Approximate Former Building Location
Buildings (Removed)
Buildings (Present)
IR Site 31
Soil Sample Locations (Iron Detects above PRG)(PRG = 23000 mg/kg)
mg/kg
< 22,000
< 46,000
> 46,000
Note:
Alameda point background 95% quantile for Iron 22,800 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-11A
Distribution of Iron Concentration in soil samples from 0 to 2 foot depth
Alameda, California
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File No.: 050304
Job No.: 6229-003
Rev No.: B
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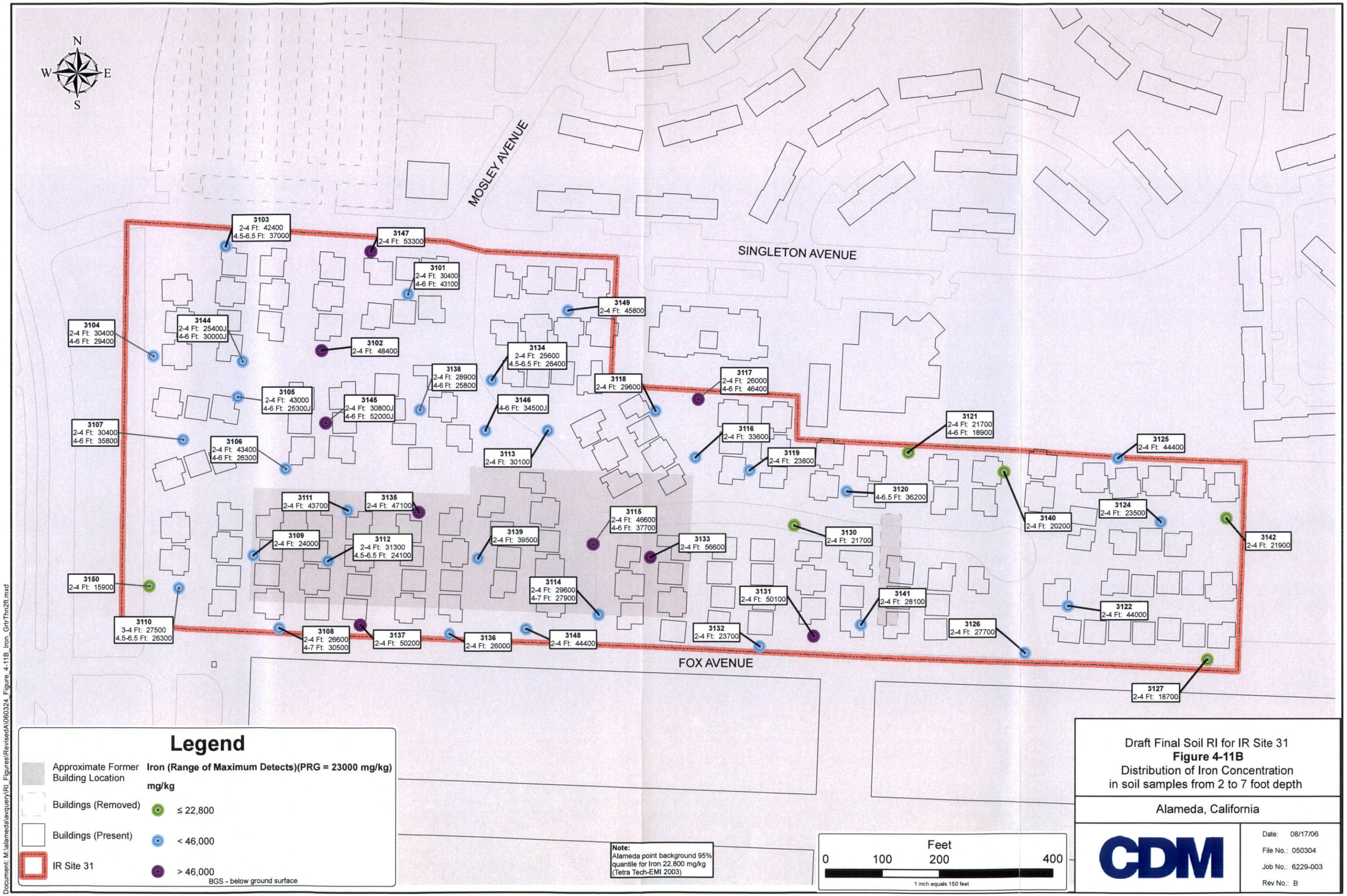
N
W
E
S
MOSLEY AVENUE
SINGLETON AVENUE
FOX AVENUE
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3149 2-4 Ft: 45800
3104 2-4 Ft: 30400 4-6 Ft: 29400
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3105 2-4 Ft: 43000 4-6 Ft: 25300J
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3120 4-6.5 Ft: 36200
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3140 2-4 Ft: 20200
3109 2-4 Ft: 24000
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3142 2-4 Ft: 21900
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3131 2-4 Ft: 50100
3141 2-4 Ft: 28100
3122 2-4 Ft: 44000
3110 3-4 Ft: 27500 4.5-6.5 Ft: 26300
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3136 2-4 Ft: 26000
3148 2-4 Ft: 44400
3132 2-4 Ft: 23700
3126 2-4 Ft: 27700
3127 2-4 Ft: 18700
Legend
Approximate Former Building Location
Buildings (Removed)
Buildings (Present)
IR Site 31
Iron (Range of Maximum Detects)(PRG = 23000 mg/kg)
mg/kg
≤ 22,800
< 46,000
> 46,000
BGS - below ground surface
Note:
Alameda point background 95% quantile for Iron 22,800 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-11B
Distribution of Iron Concentration in soil samples from 2 to 7 foot depth
Alameda, California
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Job No.: 6229-003
Rev No.: B
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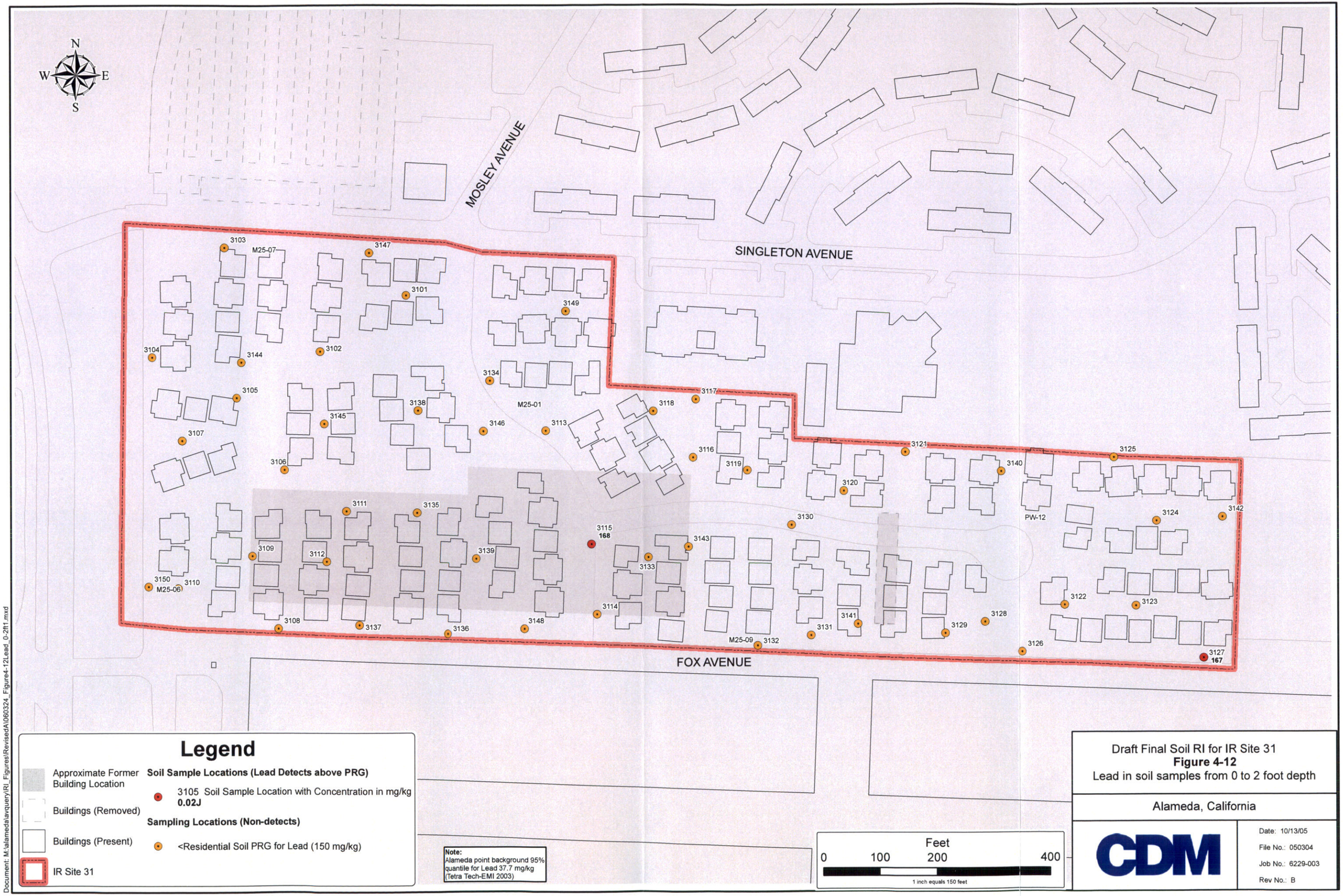

Legend

Approximate Former Building Location

Buildings (Removed)

Buildings (Present)

IR Site 31

Soil Sample Locations (Lead Detects above PRG)

3105 Soil Sample Location with Concentration in mg/kg
0.02J

Sampling Locations (Non-detects)

<Residential Soil PRG for Lead (150 mg/kg)

Note:
Alameda point background 95% quantile for Lead 37.7 mg/kg (Tetra Tech-EMI 2003)

Feet
0 100 200 400
1 inch equals 150 feet

Draft Final Soil RI for IR Site 31
Figure 4-12
Lead in soil samples from 0 to 2 foot depth

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Job No.: 6229-003
Rev No.: B

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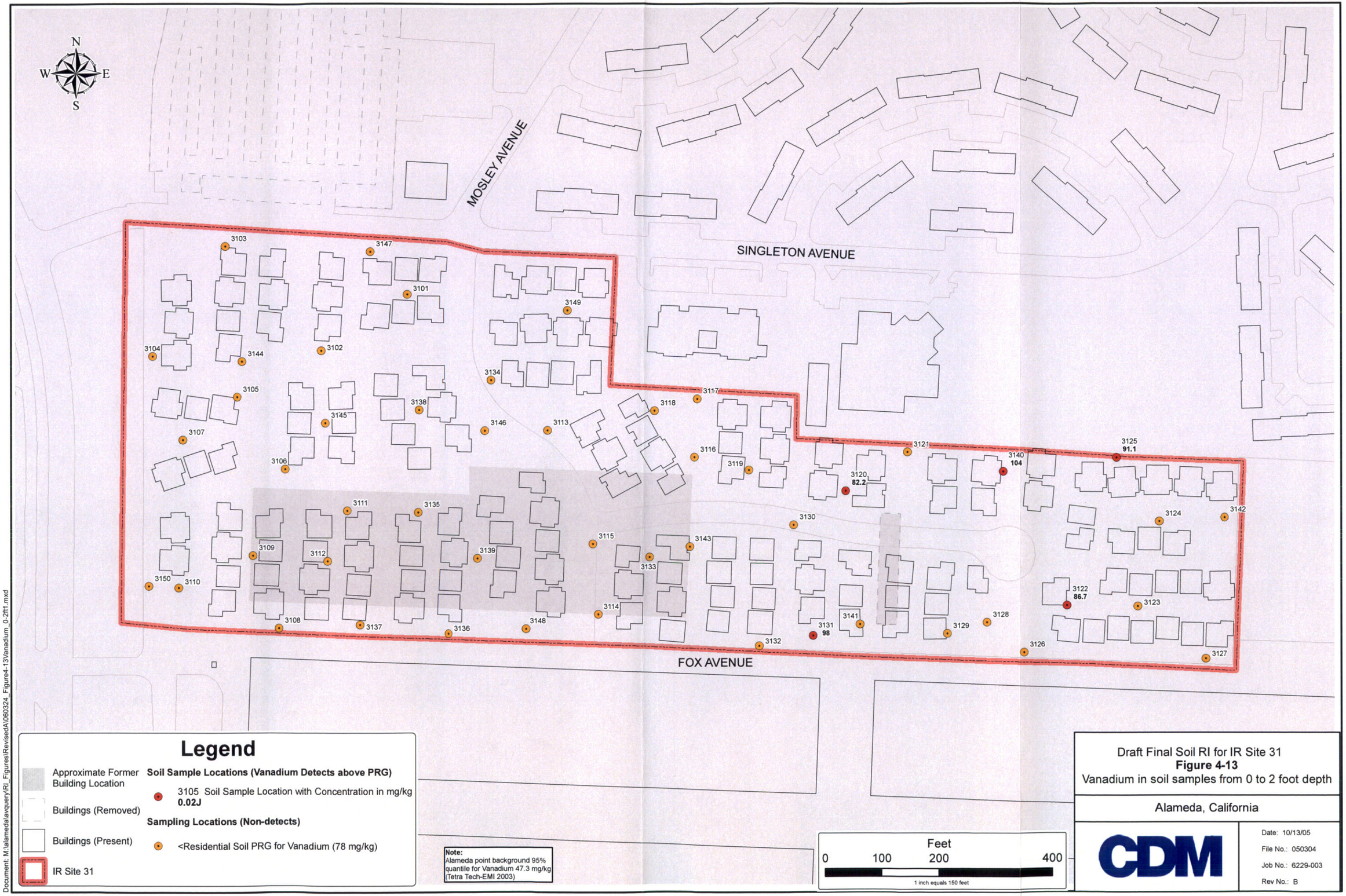

Draft Final Soil RI for IR Site 31
Figure 4-13
Vanadium in soil samples from 0 to 2 foot depth

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Job No.: 6229-003
Rev No.: B

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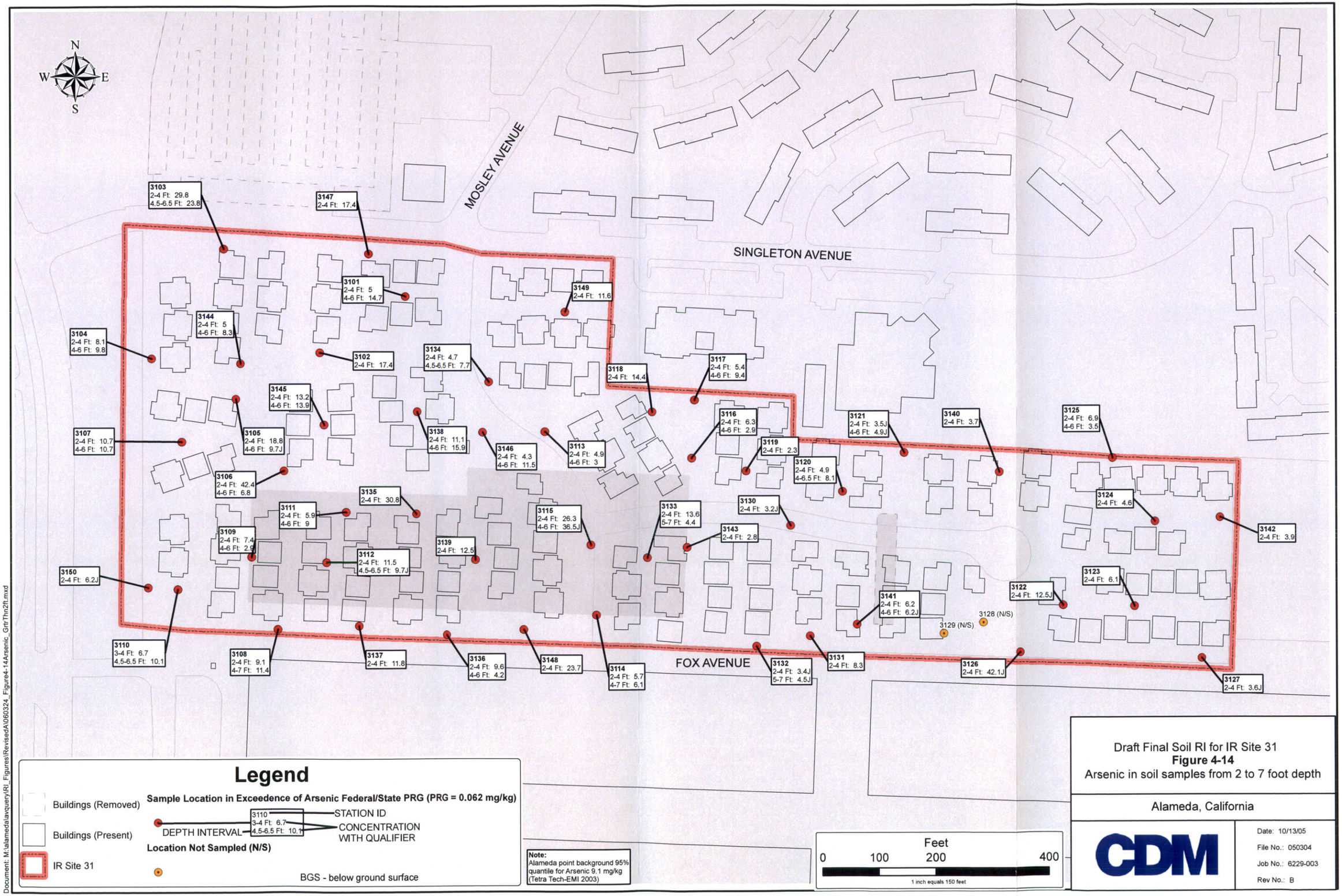
N
S
E
W
MOSLEY AVENUE
SINGLETON AVENUE
FOX AVENUE
3103 2-4 Ft: 29.8 4.5-6.5 Ft: 23.8
3147 2-4 Ft: 17.4
3101 2-4 Ft: 5 4-6 Ft: 14.7
3149 2-4 Ft: 11.6
3144 2-4 Ft: 5 4-6 Ft: 8.3
3104 2-4 Ft: 8.1 4-6 Ft: 9.8
3102 2-4 Ft: 17.4
3134 2-4 Ft: 4.7 4.5-6.5 Ft: 7.7
3118 2-4 Ft: 14.4
3117 2-4 Ft: 5.4 4-6 Ft: 9.4
3145 2-4 Ft: 13.2 4-6 Ft: 13.9
3116 2-4 Ft: 6.3 4-6 Ft: 2.9
3121 2-4 Ft: 3.5J 4-6 Ft: 4.9J
3140 2-4 Ft: 3.7
3125 2-4 Ft: 6.9 4-6 Ft: 3.5
3107 2-4 Ft: 10.7 4-6 Ft: 10.7
3105 2-4 Ft: 18.8 4-6 Ft: 9.7J
3138 2-4 Ft: 11.1 4-6 Ft: 15.9
3146 2-4 Ft: 4.3 4-6 Ft: 11.5
3113 2-4 Ft: 4.9 4-6 Ft: 3
3119 2-4 Ft: 2.3
3120 2-4 Ft: 4.9 4-6.5 Ft: 8.1
3106 2-4 Ft: 42.4 4-6 Ft: 6.8
3135 2-4 Ft: 30.8
3130 2-4 Ft: 3.2J
3124 2-4 Ft: 4.6
3111 2-4 Ft: 5.9 4-6 Ft: 9
3115 2-4 Ft: 26.3 4-6 Ft: 36.5J
3133 2-4 Ft: 13.6 5-7 Ft: 4.4
3142 2-4 Ft: 3.9
3109 2-4 Ft: 7.4 4-6 Ft: 2.9
3139 2-4 Ft: 12.5
3143 2-4 Ft: 2.8
3112 2-4 Ft: 11.5 4.5-6.5 Ft: 9.7J
3150 2-4 Ft: 6.2J
3123 2-4 Ft: 6.1
3122 2-4 Ft: 12.5J
3141 2-4 Ft: 6.2 4-6 Ft: 6.2J
3128 (N/S)
3129 (N/S)
3110 3-4 Ft: 6.7 4.5-6.5 Ft: 10.1
3108 2-4 Ft: 9.1 4-7 Ft: 11.4
3137 2-4 Ft: 11.8
3136 2-4 Ft: 9.6 4-6 Ft: 4.2
3148 2-4 Ft: 23.7
3114 2-4 Ft: 5.7 4-7 Ft: 6.1
3132 2-4 Ft: 3.4J 5-7 Ft: 4.5J
3131 2-4 Ft: 8.3
3126 2-4 Ft: 42.1J
3127 2-4 Ft: 3.6J
Legend
Buildings (Removed)
Buildings (Present)
IR Site 31
Sample Location in Exceedence of Arsenic Federal/State PRG (PRG = 0.062 mg/kg)
3110
3-4 Ft: 6.7
4.5-6.5 Ft: 10.1
STATION ID
DEPTH INTERVAL
CONCENTRATION WITH QUALIFIER
Location Not Sampled (N/S)
BGS - below ground surface
Note:
Alameda point background 95% quantile for Arsenic 9.1 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-14
Arsenic in soil samples from 2 to 7 foot depth
Alameda, California
CDM
Date: 10/13/05
File No.: 050304
Job No.: 6229-003
Rev No.: B
Document: M:\alamedaavquery\RI_Figures\Revised\AI060324_Figure4-14Arsenic_GrtrThn2ft.mxd

PAGE NO. 4-74

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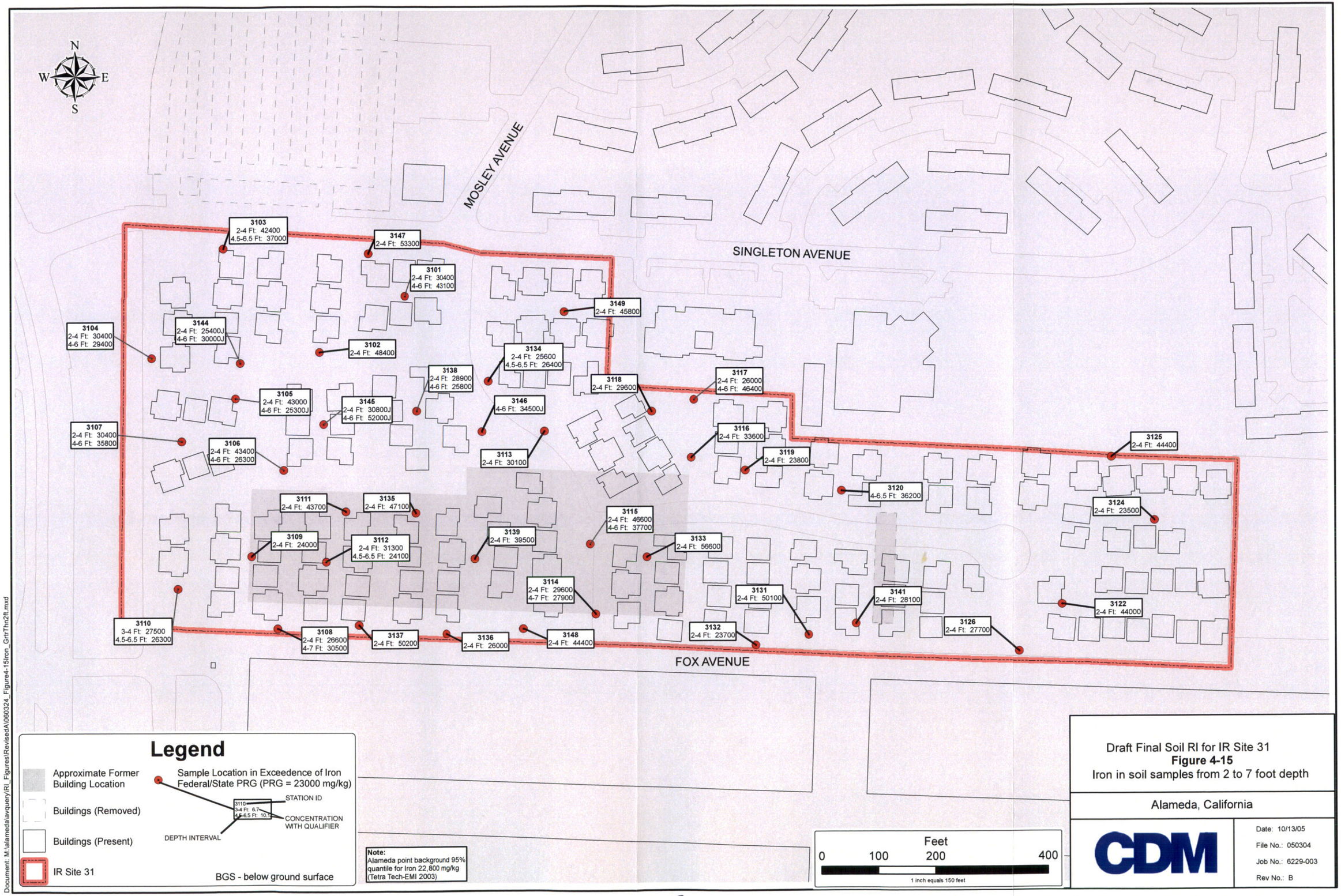
N
W
E
S
MOSLEY AVENUE
SINGLETON AVENUE
FOX AVENUE
3103 2-4 Ft: 42400 4.5-6.5 Ft: 37000
3147 2-4 Ft: 53300
3101 2-4 Ft: 30400 4-6 Ft: 43100
3149 2-4 Ft: 45800
3104 2-4 Ft: 30400 4-6 Ft: 29400
3144 2-4 Ft: 25400J 4-6 Ft: 30000J
3102 2-4 Ft: 48400
3134 2-4 Ft: 25600 4.5-6.5 Ft: 26400
3138 2-4 Ft: 28900 4-6 Ft: 25800
3118 2-4 Ft: 29600
3117 2-4 Ft: 26000 4-6 Ft: 46400
3105 2-4 Ft: 43000 4-6 Ft: 25300J
3145 2-4 Ft: 30800J 4-6 Ft: 52000J
3146 4-6 Ft: 34500J
3107 2-4 Ft: 30400 4-6 Ft: 35800
3106 2-4 Ft: 43400 4-6 Ft: 26300
3113 2-4 Ft: 30100
3116 2-4 Ft: 33600
3119 2-4 Ft: 23800
3125 2-4 Ft: 44400
3120 4-6.5 Ft: 36200
3124 2-4 Ft: 23500
3111 2-4 Ft: 43700
3135 2-4 Ft: 47100
3115 2-4 Ft: 46600 4-6 Ft: 37700
3109 2-4 Ft: 24000
3112 2-4 Ft: 31300 4.5-6.5 Ft: 24100
3139 2-4 Ft: 39500
3133 2-4 Ft: 56600
3114 2-4 Ft: 29600 4-7 Ft: 27900
3131 2-4 Ft: 50100
3141 2-4 Ft: 28100
3122 2-4 Ft: 44000
3110 3-4 Ft: 27500 4.5-6.5 Ft: 26300
3108 2-4 Ft: 26600 4-7 Ft: 30500
3137 2-4 Ft: 50200
3136 2-4 Ft: 26000
3148 2-4 Ft: 44400
3132 2-4 Ft: 23700
3126 2-4 Ft: 27700
Legend
Approximate Former Building Location
Buildings (Removed)
Buildings (Present)
IR Site 31
Sample Location in Exceedence of Iron Federal/State PRG (PRG = 23000 mg/kg)
STATION ID
CONCENTRATION WITH QUALIFIER
DEPTH INTERVAL
BGS - below ground surface
Note:
Alameda point background 95% quantile for Iron 22,800 mg/kg (Tetra Tech-EMI 2003)
Feet
0 100 200 400
1 inch equals 150 feet
Draft Final Soil RI for IR Site 31
Figure 4-15
Iron in soil samples from 2 to 7 foot depth
Alameda, California
CDM
Date: 10/13/05
File No.: 050304
Job No.: 6229-003
Rev No.: B
Document: M:\alameda\avquery\RI_Figures\RevisedA\060324_Figure4-15Iron_GrtrThn2ft.mxd

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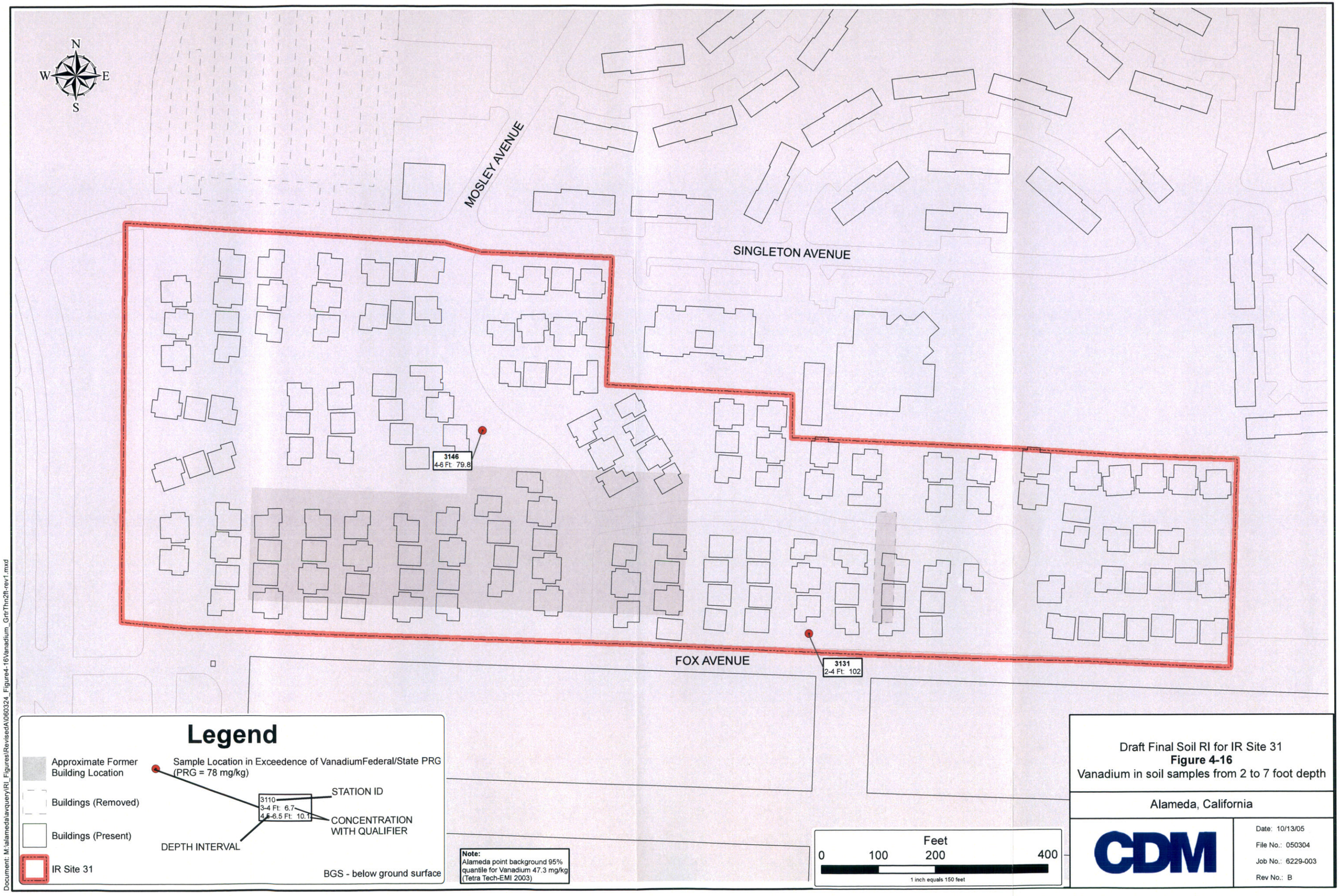

Draft Final Soil RI for IR Site 31
Figure 4-16
Vanadium in soil samples from 2 to 7 foot depth

Alameda, California

CDM

Date: 10/13/05
File No.: 050304
Job No.: 6229-003
Rev No.: B

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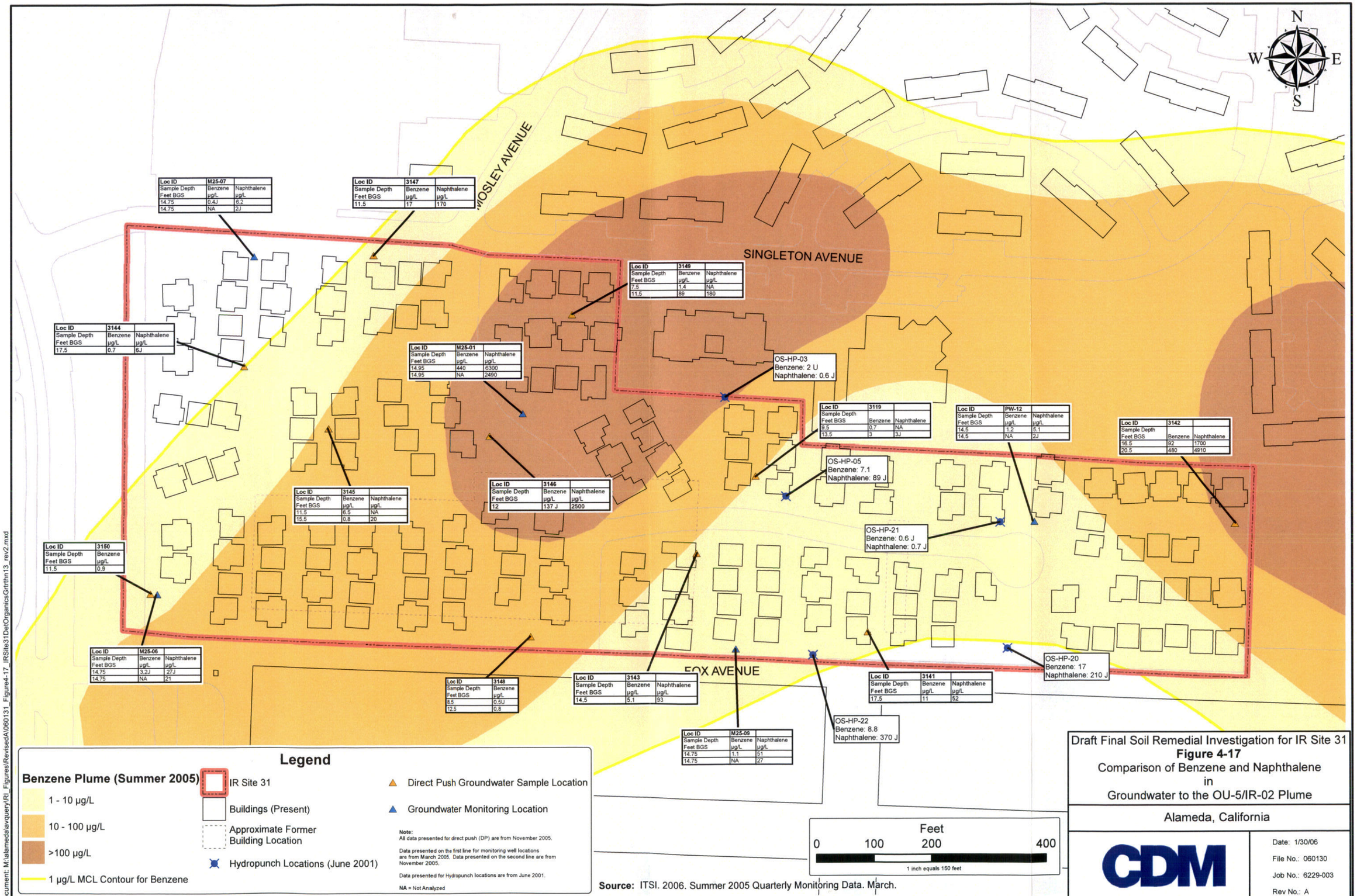

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Section 5
Fate and Transport Mechanisms

This section describes the fate and transport mechanisms for the chemicals of interest in soil and groundwater at IR Site 31. It includes a discussion of the conceptual site model (CSM), the potential pathways for transport of chemicals between environmental media, and contaminant fate and mobility in the environment.

The discussion is focused on the chemicals of interest reported in soil samples that were presented in Section 4. This section also describes fate and transport mechanisms associated with the VOCs in groundwater that are present in the OU-5/IR-02 groundwater plume addressed by the IR Site 25/IR-02 Groundwater RI/FS Report (ERRG 2004).

The fate and transport evaluations are provided to support the nature and extent discussions presented in Section 4. Potential migration pathways and contaminant fate/mobility are considered when developing the risk assessments, which are presented in Section 6.

5.1 Conceptual Site Model

The CSM is used to identify and prioritize transport pathways that pose the greatest potential impact to human health and the environment. These exposure pathways are considered further in the human health and ecological risk assessments presented in Section 6. This subsection summarizes the site physical characteristics (e.g., geology, hydrogeology, and surface drainage systems) that influence the fate and transport of the chemicals of interest and the distribution of these chemicals at IR Site 31.

5.1.1 Physical Characteristics of the Site

The physical characteristics of IR Site 31 were detailed in Section 2. The following discussion highlights those factors that have a significant impact on the fate and transport of chemicals of interest in soil at IR Site 31.

The land at IR Site 31 is composed of imported fill material that was placed during multiple fill events with fill material in place by 1927. In addition, fill was imported during the construction of the Marina Village Housing development. Prior to the fill events, the area was a tidal flat subject to inundation. The FWBZ, or imported fill material layer, is shallow at IR Site 31 and is encountered at depths of approximately 4 to 7 feet bgs. Groundwater in the FWBZ at IR Site 31 was typically first encountered at approximately 5 to 9 feet bgs in RI soil borings. Groundwater elevations are deeper at

the western portion of IR Site 31, resulting in a west by southwest groundwater flow gradient.

The fill material is underlain by the BSU, which is present at an average depth of approximately 10 to 20 feet bgs at IR Site 31. The BSU is a semi-permeable aquitard that inhibits downward movement of chemicals in the upper fill soils to deeper native material and the SWBZ.

5.1.2 Distribution of Contaminants

The predominant chemicals of interest at IR Site 31 were identified in Section 4 and consist of PAHs and metals in soil and benzene and naphthalene in groundwater.

Soil

The data from the 2003 PAH investigation (648 normal samples) are sufficient to characterize the distribution of PAHs in soil at IR Site 31 (BEI 2004a). Based on these data, PAHs at concentrations exceeding residential soil PRGs were reported in soil throughout IR Site 31. The highest PAH concentrations were reported in the western portion of the site. Maximum concentrations were reported at depths of 4 to 7 feet bgs. Anthropogenic PAHs are present in the dredged fill material throughout Alameda Point (BEI 2002). Bay sediments impacted with PAHs from the region's historical industrial facilities were dredged and deposited as fill material. At IR Site 31, observed soil lithology, including color and texture of materials, at depths approximately 4 feet bgs and greater are consistent with finer-grained dredged fill materials and correspond to the highest concentrations of PAHs reported in soil samples. The color and texture (yellowish-brown, clayey gravel) of the fill materials at depths of approximately 0 to 2.5 feet bgs differ from typical dredged fill materials, which suggests that these fill materials were imported from other areas (outside of Alameda Island and its surrounding waters). Specific comparisons of soil grain size and general lithology are made in Appendix H2.

To supplement the previous PAH investigations, the RI included soil sampling to evaluate other potential contaminants in soil, including VOCs, SVOCs, pesticides, PCBs, and metals. The RI soil sample results indicated detections for three VOCs (benzene, xylenes, methylene chloride), one SVOC (phenol), five pesticides (DDD, DDT, DDE, heptachlor, and dieldrin), and two PCBs (Aroclor-1016, Aroclor-1260), as well as several metals. However, none of the VOCs, SVOCs, pesticides, or PCBs exceeded the applicable federal or California PRGs for direct contact of soils, as shown on Table 4-2. While metals were frequently detected throughout IR Site 31 soils, only arsenic, iron, vanadium, and lead were detected at concentrations greater than federal or California PRGs.

Arsenic was reported in soil samples at concentrations greater than the federal and California residential PRG in all IR Site 31 RI soil samples. As discussed in Section 4, evaluation of arsenic indicates ambient arsenic concentrations that are associated with the soil composition (Appendix H2). The color and texture (yellowish-brown, clayey gravel) of the surface fill materials differ from typical dredged fill materials, which suggest that the fill materials with the higher arsenic concentrations were imported from other areas. The area-specific background evaluation in Appendix H2 summarized in Section 4.1.4 provides details. The vertical and horizontal distribution of metals is relatively homogenous. It is unlikely that a release would result in increasing the concentration of 15 metals over 25 acres from the surface to the groundwater. The statistical evaluation of arsenic, cadmium, chromium, iron, lead, and vanadium by DTSC methods indicates that these inorganics are a single population and are present at ambient concentrations as discussed in Section 4.1.4, with supporting details in Appendix H2.

Iron was reported in soil at concentrations exceeding the federal residential PRG in 97 of 126 sample locations throughout the site and at various depths. As discussed in Section 4, the distribution of iron suggests that the imported fill material in the top 2.5 feet of fill may be a source of some iron enrichment at IR Site 31. The maximum concentration was 67,000 mg/kg observed at 0 to 2 feet bgs in location 3140 in the northeast corner of the site.

Vanadium was detected in all 126 RI soil samples at IR Site 31 but only exceeded the federal residential PRG of 78 mg/kg in seven locations, of which five were within the top 2 feet of fill. The distribution of vanadium indicates that the imported construction fill material has greater vanadium concentrations than the underlying dredged fill material. The maximum concentration of vanadium was 104 mg/kg observed at the 0 to 2 feet bgs sample in location 3140. This location coincides with the maximum concentration of iron.

Lead was detected in all 126 RI soil samples at IR Site 31 but only exceeded the California residential PRG of 150 mg/kg at two locations (3115 and 3127), both in the top 2 feet of fill. These concentrations of 168 and 167 mg/kg are both below the federal residential PRG value of 400 mg/kg.

Groundwater

Groundwater data were collected during the RI to determine if the nature of groundwater contamination at IR Site 31 is consistent with the OU-5/IR-02 groundwater plume. The IR Site 25/IR-02 Groundwater RI/FS (ERRG 2004) and the spring 2006 annual groundwater sampling report (ITSI 2007a) define the principal COPCs of the OU-5/IR-02 plume as benzene and naphthalene.

RI groundwater samples were analyzed for VOCs and SVOCs, including PAHs, pesticides, PCBs, and metals. Groundwater samples were typically collected from two depth intervals, when possible, to represent the shallow (7 to 13 feet bgs) and deep (13 to 20 feet bgs) intervals.

As expected, benzene and naphthalene were among the detected VOCs and were found throughout IR Site 31. Benzene was detected in 15 of 16 samples, with concentrations ranging from 0.7 to 480 µg/L. None of the benzene results exceeded the residential soil screening levels (SSLs) for Evaluation of Potential Vapor Intrusion Concerns for volatilization to indoor air value for benzene of 540 µg/L. Naphthalene was detected in 15 of 15 samples, with concentrations ranging from 2 to 4,910 µg/L. Only one of the naphthalene results exceeded the residential SSL for volatilization to indoor air value for naphthalene of 3,200 µg/L, which was at the deeper sample at location 3142 within the existing OU-5/IR-02 groundwater plume. This sample was from the 18 to 23 feet deep interval and that the shallow sample at 3142, and all shallow samples across the site, did not exceed the volatilization to indoor air regulatory comparison criteria.

The presence of these contaminants, their concentrations, and their distribution are consistent with the OU-5/IR-02 VOC plume. As summarized in Section 4.2, the results of the RI data indicate that no site-specific release has occurred because the groundwater beneath IR Site 31 is consistent with characteristics predicted by mapping of VOC in the OU-5/IR-02 plume.

5.2 Potential Migration Mechanisms

As part of the IR Site 31 soil and groundwater characterization, potential transport and migration mechanisms have been evaluated to address potential exposure pathways for human and ecological risk evaluations discussed in Section 6. Contaminants may migrate from impacted media at IR Site 31 by several potential routes or pathways. The current potential transport mechanisms are summarized below and correlate to the pathways presented on Figure 6-1.

- Chemicals in soil can migrate by particulate dispersion from unpaved surfaces via airborne dust, surface water runoff, direct human contact, and other mechanisms.
- VOCs and low-molecular-weight PAHs in soil and groundwater can migrate by volatilization into the air.
- Chemicals in soil can migrate to groundwater by infiltration of surface water and/or precipitation.
- Chemicals in soil can migrate to groundwater by means of a fluctuating groundwater table.

- Chemicals in groundwater can migrate to the Oakland Inner Harbor, San Francisco Bay, or deeper aquifers by groundwater flow.
- Chemicals in groundwater can migrate to the Oakland Inner Harbor or San Francisco Bay along or through preferential pathways, such as buried utilities or buried estuarine channels of the former tidal flats.

These transport mechanisms and the significance of each to the movement of chemicals at IR Site 31 are discussed in the following subsections.

5.2.1 Particulate Dispersion

Particulate dispersion is the process by which solids (either adsorbed to soil particles or as residual product) undergo transport as airborne or waterborne particulates, either by mechanical processes or through human or other biological activities. The amount of contaminated material released to the atmosphere or transported by water or other mechanisms depends on the extent and magnitude of contamination and the proximity of chemicals to the surface. Due to the presence of some unpaved surfaces at IR Site 31, soil erosion (as wind drift, sediment transport, and surface runoff) is a possible transport pathway; however, it likely represents a minor source of contaminant migration due to significant surface cover at the site. Soil erosion could present a more significant transport pathway if the buildings and/or paved surfaces were to be disturbed or removed.

5.2.2 Volatilization to Ambient Air

Volatilization is the process by which liquids and solids vaporize and escape to the atmosphere. VOCs in soil (either adsorbed to soil particles or as residual product) can volatilize and migrate into the vadose zone as soil gas contaminants and then into the atmosphere. VOCs in groundwater can also migrate and volatilize at the soil-water interface to soil gas in the vadose zone. The amount of material released to the atmosphere depends on the extent and magnitude of contamination, the proximity of chemicals to the surface, the barometric pressure, and the vapor pressure of the VOC.

Previous investigations reported minimal concentrations of VOCs in soil gas. The RI soil sampling confirmed that concentrations of VOCs in soil are below the residential volatilization to indoor air regulatory comparison criteria, as summarized on Table 4-2.

The RI sampling also confirmed that VOCs and SVOCs reported in the groundwater plume are present in the groundwater beneath IR Site 31 but are generally at concentrations below the residential volatilization to indoor air regulatory comparison criteria, as summarized on Table 4-4. The single exception was the maximum detected naphthalene concentration at location 3142 (18 to 23 feet bgs). The shallow sample at

that location, and all shallow samples across the site, did not exceed the regulatory comparison criteria.

Because of the low concentrations of VOCs reported in soil and groundwater and the significantly lower VOC concentrations in shallow groundwater versus deeper groundwater, there is currently limited potential for migration of volatile chemicals in soil or groundwater to the atmosphere. In addition, the housing units at IR Site 31 have been built with underlying vapor barriers designed to be impermeable to VOC vapors, minimizing or preventing the migration of vapor phase VOCs to indoor air.

However, contaminant volatilization to ambient air could also occur along shallow preferential pathways that might serve as conduits for vapors to reach IR Site 31 from soil and groundwater in more highly contaminated areas outside IR Site 31 (e.g., the center of the groundwater plume east of the site). As IR Site 31 is a highly developed area, there are numerous subsurface utility conduits that could potentially transport vapors, including utility trenches for water and gas lines and sanitary and storm sewer lines, manholes, and catch basins.

The potential for vapor migration and vapor intrusion to indoor air has been evaluated using the Johnson and Ettinger model, as part of the human health risk evaluation in Section 6. The groundwater at IR Site 31 is being addressed separately as part of the OU-5 remediation.

5.2.3 Infiltrating Surface Water

Transport of chemicals from vadose zone soil to groundwater can result from precipitation or landscape lawn and garden irrigation water percolating downward through contaminated soil to the underlying saturated zone.

At IR Site 31, a possible transport pathway from soil to groundwater is by leaching of chemicals in soil caused by infiltrating surface water. The chemical concentrations in groundwater depend on the solubility of the chemicals in soil, the soil texture, the net volume and rate of chemicals in soil infiltration, and the concentration of chemicals at the point of release. Because a significant portion of IR Site 31 is developed and/or paved, the migration of chemicals caused by infiltrating surface water is considered a possible transport pathway but is expected to be limited.

5.2.4 Fluctuating Groundwater Table

Transport of chemicals from soil to groundwater can also occur when fluctuations of the groundwater table result in chemical-impacted soil coming into contact with groundwater, thus, allowing chemicals to dissolve into groundwater. Leaching of residual chemicals from soil to groundwater as a result of fluctuation of the groundwater table is considered a possible transport mechanism at IR Site 31.

As discussed in Section 1.3.6.2, results of tidal influence investigations at surrounding sites indicate that there are tidal influences on the groundwater elevations at this site. Therefore, both seasonal and tidal fluctuations of the groundwater table may be mechanisms to promote transport of contaminants from the soil to groundwater.

Groundwater on Alameda Island generally flows outward from inland areas toward the Oakland Inner Harbor on the north or San Francisco Bay on the south. Based on the RI monitoring data collected in November 2005 (Figure 2-11), groundwater elevations were recorded between 1 and 4 feet AMSL (depths varying from 5 to 9 feet bgs in the 20-foot deep monitoring wells). These water levels are consistent with previous regional groundwater mapping for the IR Site 25, 30, and 31 group in the annual base-wide monitoring report (ITSI 2007a) in that levels are at 4 feet AMSL or higher on the east side of IR Site 31 and drop to 1 foot AMSL on the west side of IR Site 31. While the groundwater elevation data from the November 2005 monitoring indicates a west by southwest gradient, it is believed that general groundwater flow in the portion of Alameda Island containing IR Site 31 is northward toward the Oakland Inner Harbor (Subsurface Consultants, Inc. 1999). Based on previous measurements and evaluations for surrounding sites, groundwater flow direction in the FWBZ is highly variable in the immediate vicinity of IR Site 31.

5.2.5 Migration by Groundwater Flow

The vertical or horizontal migration of contaminants that have migrated from soil into groundwater is controlled by the concentration of contaminants, flow velocity, dispersion, diffusion, retardation, and natural attenuation mechanisms. Groundwater is present in unconfined conditions at depths ranging from approximately 5 to 9 feet bgs at IR Site 31. Vertical migration of groundwater to deeper aquifers is not considered a significant transport pathway at IR Site 31 because of the BSU aquitard underlying the fill layer. Horizontal migration due to groundwater flow and tidal fluctuation is considered an active transport pathway for the site. Fate and transport of contaminants in groundwater beneath and surrounding IR Site 31 is discussed in detail in the Alameda Point IR Site 25/Annex IR-02 Groundwater RI/FS (ERRG 2004).

5.2.6 Groundwater Migration Via Preferential Pathways

Pipes and pipe bedding can act as conduits that facilitate migration of contaminated fluids (water and/or soil vapor) through the subsurface environment. Within the saturated zone, areas with greater hydraulic conductivity, including interbedded estuarine channels containing sands within the former tidal flats, will allow more rapid groundwater flow and, therefore, represent a preferential pathway.

This pathway is considered complete but relatively insignificant at IR Site 31 since the majority of the subsurface utilities and trenches would typically be shallower than the groundwater depth (5 to 9 feet bgs).

5.3 Fate and Mobility of Chemical Classes of Interest

Chemical fate is the tendency of a chemical to undergo transformation or degradation. Chemical mobility is the tendency of a chemical to move along a pathway in response to a driving force. A chemical that is immobile and persistent in the environment tends to remain in place; the tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the chemicals. These properties include solubility, the tendency to transform or degrade (usually described as half-life or environmental half-life in a given medium), and chemical affinity for solids or organic matter (usually described by a partitioning coefficient).

The following chemical classes are of interest at IR Site 31 because of reported concentrations of chemicals in soil or groundwater above federal or California residential direct contact soil PRGs or residential vapor intrusion to indoor air screening levels:

- PAHs in soil;
- Metals (primarily arsenic, iron, lead, and vanadium) in soil; and
- VOCs/SVOCs in groundwater.

The following subsections present the specific physical and chemical properties for these chemicals of interest. As described below, the compounds in each chemical group have similar physicochemical properties that influence chemical mobility or persistence in the environment.

5.3.1 Properties, Fate, and Transport of Organic Compounds

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

5.3.1.1 Polynuclear Aromatic Hydrocarbons

PAHs are a group of organic chemicals produced during incomplete combustion of organic materials. There are more than 100 PAHs; they vary in the number of fused aromatic rings and in their connectivity. The pure forms of these compounds are colorless, white, or pale yellow-green solids, with a faint, pleasant odor. Currently, a few PAHs are used in medicines and the manufacture of dyes, plastics, and pesticides (Research Triangle Institute 1995).

PAHs are hydrophobic compounds with low water solubility and high affinity for sorption to organic particles. High-molecular-weight, multi-ringed PAHs that do not contain polar functional groups (e.g., B[a]P) are the most resistant to biodegradation

and generally remain in soil longer than low-molecular-weight PAHs with fewer aromatic rings (e.g., naphthalene) (Research Triangle Institute 1995).

PAHs can be introduced into air, water, and soil through direct emission into the atmosphere. Volcanic eruption, forest fires, natural oil seeps, and tar pits are examples of major natural sources of PAHs in the environment. Major anthropogenic sources that can release PAHs to air include emission from residential wood/coal burning, exhaust from automobiles and trucks and waste incineration. Localized loading of PAHs into the environment can also occur through petroleum-refining processes, industrial effluents from coal gasification and liquefaction processes, accidental spillage of raw refinery petroleum, irrigation with coke-oven effluent, leachate from bituminous coal storage sites, and use of soil compost and fertilizers. In addition, PAHs are present in asphalt used in road construction, crude oil, coal tar pitch, creosote, and roofing tar (Research Triangle Institute 1995).

The composition of PAHs released into the atmosphere varies with the source. Atmospheric emissions from residential wood burning are primarily composed of acenaphthylene. Auto emissions contain more benzo(g,h,i)perylene and pyrene. Diesel emissions vary by phase; PAHs emitted in diesel exhaust as particulates are primarily three- and four-ringed compounds, such as fluoranthene, phenanthrene, and pyrene while diesel vapor emissions primarily contain phenanthrene and anthracene (Research Triangle Institute 1995). PAHs with a higher molecular weight have a lower vapor pressure and are more likely to be found adsorbed to airborne particles than found as vapor.

PAHs can be removed from the atmosphere by wet and dry deposition onto soil, water, and vegetation. Due to their low vapor pressure, PAHs in the atmosphere generally condense and adsorb onto particles with a diameter of less than 2.5 microns, but gaseous phase PAHs are also reported. Most PAHs are believed to enter surface waters through deposition of airborne PAHs; secondary sources include discharges from industrial plants and wastewater treatment plants, runoff from stormwater and coal storage areas, oil spills, and petroleum processing.

In surface water, PAHs can photolyze, oxidize, biodegrade, bind to suspended particles or sediment, or bioaccumulate in aquatic organisms. In sediment, PAHs can biodegrade or bioaccumulate in aquatic organisms. PAHs in soil can undergo abiotic degradation (photolysis and oxidation), accumulate in plants, or biodegrade. PAHs in soil can also enter groundwater although their low solubility in water and high affinity for soil greatly retard this process (Research Triangle Institute 1995). At IR Site 31, PAHs are not expected to migrate to groundwater. PAHs reported in soil at IR Site 31 are primarily high-molecular-weight, low-solubility compounds that are resistant to transport, as described above.

5.3.1.2 Volatile Organic Compounds

VOCs, including benzene and naphthalene (also identified as an SVOC), were reported in groundwater at concentrations consistent with the surrounding groundwater plume originating outside the boundaries of IR Site 31. Low levels of a few VOCs were reported in soil, but concentrations were below residential soil PRGs.

The relevant physical and chemical parameters for VOCs include water solubility, vapor pressure, Henry's law constant, and organic-carbon-normalized partition coefficient (K_{oc}). The solubility of a chemical in water is a critical property because transport is often by water. Highly soluble substances can be readily leached from soil and are generally mobile in groundwater.

Volatilization of a constituent is dependent on its vapor pressure, water solubility (if present in water), and molecular weight. Vapor pressure is the tendency of the substance to evaporate and can be thought of as the solubility of a chemical in the gas phase at a given temperature. Higher vapor pressure indicates a greater tendency to volatilize.

Henry's law constant is based on the equilibrium relationship between the solubility of a gas in water and the partial pressure of the gas in the atmosphere above the water. Henry's law constant represents the tendency of a dissolved gas to transfer from liquid to the atmosphere. It differs from volatilization in which the chemical changes phase from liquid to gas. Henry's law constant is important if the chemical exists as a gas in groundwater or surface water. The greater the value of Henry's law constant, the greater the tendency of the gas to be released into the air and transported into the atmosphere. The lower the constant, the greater the tendency of the gas to remain dissolved in the liquid phase and to be influenced by the transport of groundwater.

The K_{oc} reflects the propensity of a compound to adsorb to the naturally occurring organic matter in the soil. Higher K_{oc} values indicate greater sorption potential and less mobility in the saturated zone. Compounds with a K_{oc} of less than 100 are considered moderately to highly mobile.

Retardation coefficient values for organic compounds in soils are normalized to the organic carbon content. While numerous soil properties affect adsorption (e.g., particle size, clay mineral composition, pH, cation-exchange capacity), organic carbon content is one of the most important for organic chemicals (Barbee 1994). Although many phenomena contribute to the distribution coefficient (e.g., ion exchange, adsorption, precipitation, or complexation), sorption is the predominant contributor to the immobilization of organic compounds in soil.

Due to low concentrations and low frequency of detection, VOCs in soil are not chemicals of interest at IR Site 31. Additionally, low concentrations in soil do not indicate a potential soil source for the VOCs reported in groundwater beneath the site.

Conversely, while high concentrations of benzene and naphthalene in groundwater could be a potential source of volatilization of these chemicals from groundwater to soil gas, the detected concentrations at IR Site 31 are low and appear to not pose a volatilization threat.

5.3.1.3 Transformation Mechanisms

The major transformation mechanisms of organic chemicals occurring in the natural subsurface environment include biodegradation, hydrolysis, and oxidation-reduction (redox) reactions.

Biodegradation involves the conversion of organic compounds to lower energy forms as microorganisms use the compound for energy. Biodegradation can occur either aerobically (with oxygen as the electron acceptor) or anaerobically (with an element or compound other than oxygen as the electron acceptor). Biodegradation can be influenced by availability of electron acceptors, pH, redox potential, temperature, water content, organic carbon concentration, and biological factors. In the natural environment, biodegradation is usually much more rapid than non-biological processes.

Biodegradation of benzene and naphthalene can occur under proper environmental conditions, including both aerobic and anaerobic environments (EPA 1999a). However, benzene has been shown to degrade at a very slow rate under anaerobic conditions (Alvarez et al. 1998).

Fate and transport of chemicals in groundwater beneath and surrounding IR Site 31 are discussed in detail in the Alameda Point IR Site 25/Annex IR-02 Groundwater RI/FS (ERRG 2004). The groundwater RI/FS report identified biodegradation as a likely primary transformation mechanism for organic chemicals in the OU-5/IR-02 groundwater plume beneath IR Site 31.

Hydrolysis reactions occur either biologically or chemically. Chemical hydrolysis reactions are a function of parameters, such as pH, dissolved organic matter, and dissolved metal ions. These reactions generally occur at a much slower rate than biological hydrolysis reactions. This transformation mechanism may contribute to destruction of organic compounds at IR Site 31.

Redox reactions involve the transfer of an electron from an electron donor to an electron acceptor. This naturally occurring transformation mechanism may contribute to destruction of organic compounds at IR Site 31.

5.3.2 Properties of Metals

Metals are inorganic chemicals and not subject to many of the degradation reactions that affect organic compounds because they are chemical elements rather than chemical compounds, making them naturally persistent in the environment. However, metals are vulnerable to redox reactions that can change their valence, species, and net ionic charge. This redox vulnerability of each metal species strongly influences the transport behavior of the metal in the environment and determines whether the metal will be present as an immobile phase in soil or as a mobile phase dissolved in groundwater.

5.4 Summary of Fate and Transport

The predominant chemicals of interest in soil at IR Site 31 are PAHs and metals. All of these chemicals tend to persist in soil over time. It is likely that natural processes will not result in significant reduction of PAHs in soil in less than tens or hundreds of years. Metals in soil are not subject to degradation and will persist unless removed by physical or chemical transport mechanisms.

A summary of the possible transport mechanisms affecting soil contamination at IR Site 31 are as follows:

- Migration of chemicals in soil caused by particulate dispersion (e.g., wind drift, sediment transport, and surface runoff) is limited; much of IR Site 31 is paved or covered by buildings or landscaping. If the surface cover at the site were disturbed or removed, soil erosion and particulate dispersion could present a more significant transport mechanism. However, particulate dispersion is a factor affecting the dermal contact, ingestion, and inhalation of particulates exposure pathways evaluated in the Section 6 risk assessment.
- Volatilization of VOCs in soil and groundwater to air is a possible transport mechanism; however, the potential is considered limited due to the low concentrations detected and the fact that the housing units throughout IR Site 31 are equipped with underlying vapor barriers. The potential for vapor migration and vapor intrusion to indoor air is being evaluated in the Johnson and Ettinger model as part of the human health risk evaluation in Section 6.

These contaminant transport mechanisms are used to evaluate potential exposure scenarios for the site contaminants of interest in the subsequent risk evaluations discussed in Section 6.

For groundwater contamination, the following is a summary of possible transport mechanisms and their significance:

- Migration of chemicals in the subsurface caused by infiltration of surface water (e.g., rainfall or landscape irrigation) is limited; much of IR Site 31 is paved or covered by buildings, which reduces the amount of surface water that can reach the subsurface. If the surface cover at the site were disturbed or removed, infiltration of surface water could present a more significant transport mechanism.
- Tidal and seasonal fluctuations of the groundwater table may be possible mechanisms to transport chemicals from soil to groundwater.
- Migration of chemicals in groundwater due to groundwater flow is a potential transport mechanism.
- Migration of chemicals in groundwater along or through preferential pathways is a potential transport mechanism; IR Site 31 contains numerous subsurface utility trenches for water and gas lines and sanitary and storm sewers.

However, as summarized in Section 4.2, the groundwater contamination at IR Site 31 is consistent with the OU-5/IR-02 VOC plume, and no site-specific release is known to have occurred. Therefore, the groundwater contamination is addressed by the Alameda Point IR Site 25/Annex IR-02 Groundwater RI/FS (ERRG 2004) and is subject to the preferred alternative in the draft final proposed plan for OU-5 (biosparging, soil vapor extraction, nutrient/microorganism enhancement, monitoring natural attenuation, and institutional controls).

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Section 6
Human Health and Ecological Risk Assessments

A baseline HHRA and a Tier 1 screening-level ERA (consisting of Steps 1 and 2 of the Navy policy for conducting ERAs) were performed to assess potential impacts on human health and environmental receptors from exposure to chemicals at IR Site 31 in the absence of any remedial actions. For this RI, refined exposure assessments per Step 3a of Navy policy were also included in the ERA. The HHRA and Tier 1 screening-level ERA methodologies and results are presented in Appendices I and J, respectively.

Both the HHRA and the ERA evaluate current and future potential human health risks and ecological impacts, respectively, with the assumption that concentrations of chemicals in soil and groundwater remain unchanged from current conditions. The results of the risk assessments provide information for making decisions concerning the necessity for action to reduce exposure.

6.1 Human Health Risk Assessment

The baseline HHRA was conducted in accordance with guidelines published by EPA in the Risk Assessment Guidance for Superfund Part A (EPA 1989), Part B (EPA 1991b) and Part E (EPA 2004a) and supporting documents and guidelines published by Cal/EPA. Tables summarizing the results of the HHRA are presented in this section, and the details and supporting calculations are presented in Appendix I.

6.1.1 Conceptual Site Model

The CSM summarizes the physical characteristics, distribution of chemicals, and migration pathways at IR Site 31. The most frequently identified chemicals are metals and PAHs. VOCs, SVOCs (other than PAHs), pesticides, and PCBs were reported in 10 percent or fewer of the soil samples (Figure 6-1).

As reported in Section 4 and Appendix H2, statistical analysis using DTSC policy for arsenic, cadmium, chromium, and vanadium shows that these metals, and likely iron, represent ambient populations. IR Site 31 was originally included in the area covered by the Alameda Point pink background (TtEMI 2001). Therefore, in accordance with the typical process at Alameda Point, metal concentrations at IR Site 31 were also compared to those in the pink background. A total of 15 of 17 metals were found to exceed Alameda Point pink background population concentrations (Appendix H1). The evaluation in this report indicates that the Alameda Point pink background is not applicable at IR Site 31 as was also concluded for adjacent IR Site 25 in the 2002 final OU5 RI report (Neptune 2002).

The finding that the metals are ambient is consistent with the absence of a pattern in the distribution of metals in soil related to former Navy activities as discussed in Section 4. There are elevated metals beneath the footprint of the former warehouse as well as outside this footprint. The upper 2 to 4 feet is fill soil imported in the early 1990s for construction of the Marina's Village Housing. The placement and thickness of fill is described in the final construction design drawings in Appendix K.

Using the B[a]P equivalent value, the concentrations greater than the comparison level of 620 μg/kg (see Section 4.1.3.2) are mainly found in the 4- to 8-foot depth interval with a few exceptions (BEI 2004a). Also, the locations with B[a]P equivalent concentrations greater than 620 μg/kg are much more prevalent in the western half of IR Site 31. The distribution of PAH concentrations as represented by the B[a]P equivalent values, and supporting discussions are presented in Section 4.1.3.2.

The groundwater in the vicinity, and directly beneath IR Site 31, is impacted by benzene and naphthalene. The nature of VOCs and naphthalene in groundwater beneath IR Site 31 is similar to the OU-5/IR-02 groundwater plume. There is no evidence in soil or groundwater sample results of an impact specifically related to past activity at IR Site 31. As discussed in Section 4.2, the concentrations of benzene and naphthalene in shallow groundwater are substantially less than the concentrations in deeper water, probably due to natural degradation processes in shallow groundwater.

The chemical migration pathways for IR Site 31 include the migration of vapors from soil and groundwater into indoor and outdoor air. In addition, particles of soil could become airborne and be inhaled in outdoor air although there is a limited amount of exposed soil at IR Site 31.

6.1.2 Data Evaluation

This section presents the data evaluation process used to select data for inclusion in the risk assessment and for identification of COPCs. In addition to the data collected for this RI, the data from the following investigations were also included in this risk assessment:

- VOCs, non-PAH SVOCs, PCBs, and pesticides from soil sample data at 50 soil sample locations for this RI (November 2005);
- VOCs from groundwater sample results from 11 temporary well locations for this RI (November 2005);
- PAH soil data from the 2002 PAH assessment (BEI 2004a);
- PAH soil data from the 2003 PAH assessment (BEI 2004b);
- PAH soil data from the OU-5 RI (Neptune et al. 2002);

- Surface soil sample data, from the 2001 parcel assessment (IT 2001) (3 locations); and
- VOC groundwater data from 5 HydroPunch® locations sampled during the 2001 Parcel 178 assessment (IT 2001).

All validated and verified data from these investigations were used. Manganese was not included in the work plan but was extrapolated by CDM from the raw data packages. The results are unverified by the laboratory and are estimated. The health risks associated with manganese are presented in Section 6.1.6.5.

In previous investigation data, there are 648 soil samples analyzed for PAHs from over 160 locations. From this RI, there are 120 samples analyzed for metals, VOCs, non-PAH SVOCs, PCBs, and pesticides from 50 locations (see Section 3 for sample analyses summaries). There are three additional analyses of pesticides and PCBs from three surface soil samples collected as part of a Zone 16 - EBS Parcel 178 investigation (IT 2001). These three soil sampling locations are identified as 178-Z16-001 through 178-Z16-003 on Figure 4-1. There are 16 shallow groundwater samples from 16 locations with analyses for VOCs that are used in the risk assessment. Table 3-4 has the details of samples and analyses by location. Attachment I1 presents the samples used for the risk assessment.

All chemicals reported in at least one sample at concentrations greater than the sample quantitation limit were included as COPCs (Table 6-1). No chemicals were excluded based on comparison to background concentrations. Screening criteria were not applied to eliminate or screen out analytes from the risk assessment.

For estimating the migration of vapors from groundwater, the data from shallow groundwater collected in this RI and the OU-5 RI (Neptune et al. 2002) investigation are used. COPCs identified in groundwater are presented in Table 6-1. For estimating the risks for future residential use of groundwater, completed risk calculations from the Final Groundwater RI/FS for IR Site 25/IR-02 were used (ERRG 2004).

6.1.3 Exposure Assessment

IR Site 31 is currently used for Coast Guard housing, and this use is likely to continue for the foreseeable future. The homes were constructed in the early 1990s and vapor barriers were included to address any potential concerns with VOCs in the OU-5/IR-02 groundwater plume.

Currently residents are drinking water supplied by the East Bay Municipal Utility District. It is unlikely that residents would drink groundwater in the future; however, in accordance with input from the regulatory agencies, groundwater use for drinking water is included in the evaluation of future residential use of IR Site 31.

Several exposure pathways (routes) for current and future residential and construction scenarios at IR Site 31 are considered complete for this risk assessment. The exposure pathways, scenarios, and receptors are shown on the Conceptual Site Exposure Model of Figure 6-1 and summarized below:

- **Current Residential.** Residential exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, and ingestion of produce grown in local soil. Current exposure is assumed to occur to COPCs in the upper 2 feet of soil except for vapors to indoor air where all soil samples are included.
- **Future Residential.** Residential exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, ingestion of groundwater, inhalation while showering with groundwater, and ingestion of produce grown in local soil. Future exposure is assumed to occur to COPCs in soil from 0- to 7-foot depth because future construction could bring deeper soil to the surface.
- **Construction.** Construction exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates from soil in outdoor air, and inhalation of vapors in outdoor air. Construction worker exposure is assumed to occur to COPCs in soil from 0- to 7-foot depth.

The risks for residential use of groundwater were taken from the Final Groundwater RI/FS for IR Site 25/IR-02 (ERRG 2004). Dermal contact with groundwater by construction or utility workers is considered to be an incomplete or insignificant pathway and details of the rationale are included in Appendix I.

In soil, the exposure point concentration (EPC) was the lower of the 95 percent UCL of the average chemical concentration or the maximum detected concentration. The Student's t-test was used to calculate the EPC for normal data, the Land equation for lognormal data, and the gamma value for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data. The distributions were determined with EPA software, ProUCL. Tables I4-2 and I4-3 in Appendix I summarize the soil EPCs used for the risk assessment for 0- to 2-foot depth and 0- to 7-foot depth, respectively.

In shallow groundwater, the EPC for vapor migration modeling is the maximum concentration found in any sample. One hypothetical sample was created that consisted of the maximum concentrations for the volatile COPCs and was assumed to be representative of all groundwater. Table I4-4 in Appendix I summarizes the groundwater EPCs used for the risk assessment.

6.1.4 Toxicity Assessment

Toxicological effects fall into two categories: (1) those that could potentially cause cancer (carcinogens) and (2) those that cause other types of adverse health effects (non carcinogens). The toxicity value for carcinogenic effects is called a cancer slope factor (CSF), and the toxicity value for noncarcinogenic effects is called a reference dose (RfD).

Lead is evaluated with a site-specific DTSC value for lead in soil of 184 mg/kg with a scenario including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce calculated using local concentrations for lead in outdoor air and drinking water supply (Cal/EPA 1999b).

The toxicity values were obtained from the table of PRGs published by EPA Region 9 (EPA 2004b) and confirmed by a review of the EPA Integrated Risk Information System (IRIS) database (EPA 2004a). PRGs based on provisional toxicity values cannot be confirmed as these data are not available to the public.

Total chromium analytical results were evaluated with a slope factor modified in accordance with the EPA Region 9 PRGs to account for the presence of hexavalent chromium. The health effects of iron are not considered additive with those for other metals. Iron has a provisional toxicity value that has not been accepted by EPA or Cal/EPA. Iron is thought to be a concern for blood overload, which is a unique target organ compared to the other non-carcinogens. Also, there is evidence that increased exposure to iron may not result in adverse health effects.

Toxicity values developed by Cal/EPA were also used in the risk assessment. The Navy agrees at this time to evaluate Cal/EPA toxicity values but clearly and expressly reserves the right to evaluate the legal and technical justification for these values and accept or reject them before or at the time of the Navy cleanup decisions.

6.1.5 Risk Characterization

The risk characterization combines the amount of exposure with the toxicity value into a numerical risk estimate. EPA and Cal/EPA risk estimates do not predict actual health effects but are a tool for risk managers in these agencies to help them make decisions on whether action should be taken to reduce exposure. Risk assessment calculations are intentionally designed so that the actual risk will be less than the risk calculated in the risk assessment, and could be zero.

6.1.5.1 Overview of Interpreting Risk Characterization Results

The risk estimate for potential carcinogenic effects is an individual excess cancer risk. This represents the probability that an individual could have an increased risk of cancer above his/her background risk. A risk of 1×10^{-6} means that each individual has a 1 in

1,000,000 probability that his/her risk of incurring cancer will increase above the baseline cancer risk.

In accordance with EPA OSWER Directive 9355.0-30, the risk management range is between 10^{-6} and 10^{-4}.

- Cancer risks below 10^{-6} are considered insignificant.
- Cancer risks within the risk management range (10^{-6} to 10^{-4}) are evaluated based on site-specific factors to determine if steps are needed to reduce exposure. The site-specific information that could be considered by risk managers is discussed in Section I7, Uncertainty Analysis.
- Cancer risks above 10^{-4} could require action to prevent unacceptable exposure from occurring now or in the future.

Noncancer adverse health effects for individual chemicals are expressed as hazard quotients (HQs) or hazard index (HI) values when HQ values are added together. HI values above 1 are evaluated closely and could warrant action to reduce exposure.

The cancer risks are total cumulative estimates and include metals present at concentrations below background. However, EPA and Cal/EPA do not require remediation of metals at concentrations below background and make risk management decisions considering cancer risk without metals at ambient concentrations. Arsenic and cadmium are removed from risk estimates based upon being ambient concentrations per the DTSC policy and are not associated with a release from Navy activities (Section 4.1.1 and Appendix H2).

The following tables are referenced in this section:

- Table 6-2 – Total EPA and Cal/EPA, plus site-specific cancer risk and noncancer hazard by receptor;
- Table 6-3 – Total EPA and Cal/EPA cancer risk and noncancer hazard by receptor and exposure pathway;
- Tables 6-4 to 6-6 – Current Resident: EPA and Cal/EPA cancer risk and noncancer hazard risk drivers;
- Tables 6-7 to 6-9 – Future Resident: EPA and Cal/EPA cancer risk and noncancer hazard risk drivers; and
- Tables 6-10 and 6-11 – Future Construction Worker: EPA and Cal/EPA cancer risk drivers.

6.1.5.1.1 Cancer Risks - Current Residential Scenario

The total reasonable maximum exposure (RME) cancer risks (including ambient metals) for EPA and Cal/EPA are 6×10^{-5} and 4×10^{-4}, respectively (see current residential scenario in Table 6-2). The total RME cancer risks rank-ordered by exposure pathway (Table 6-3) for EPA and Cal/EPA, respectively, are as follows:

- Ingestion of soil (3×10^{-5} and 2×10^{-4});
- Ingestion of homegrown produce (2×10^{-5} and 1×10^{-4});
- Dermal contact with soil (4×10^{-6} and 2×10^{-5});
- Inhalation of vapors in indoor air (8×10^{-7} and 1×10^{-5}); and
- Inhalation of particulates/vapors in outdoor air (3×10^{-7} and 5×10^{-7}).

The majority of the cancer risk (about 90 percent) for EPA and Cal/EPA is associated with arsenic in soil. The total cancer risk for arsenic is 5×10^{-5} for EPA (Table 6-4) and 3×10^{-4} for Cal/EPA (Table 6-5). Cadmium has a Cal/EPA cancer risk of 2×10^{-6}. These metals are present at ambient concentrations (Appendix H2).

Chemicals contributing to the residual cancer risk include PCBs, the pesticide dieldrin, and benzo[a]pyrene. These chemicals were rarely detected. The risk assessment assumes that these chemicals are present at every location when in fact all these chemicals were rarely detected (i.e., 1 to 8 percent of the samples). The few locations where these chemicals were found are dispersed, and there is no specific area of impact.

- A PCB (Aroclor 1016 for Cal/EPA only) was reported in 1 of 123 samples and does not represent a widespread concern (EPA 1989).
- A PCB (Aroclor 1260) was reported in 9 of 123 samples and does not represent a widespread concern (EPA 1989).
- Dieldrin was reported in 1 of 123 samples and does not represent a widespread concern (EPA 1989).
- Benzo[a]pyrene, a PAH, was associated with a cancer risk of 1×10^{-5}, which is in the risk management range.

Most of the risk for organic chemicals is associated with the homegrown produce. There are no community gardens in the Marina Village Housing now, and it is unlikely that there will be in the future because open land is limited to recreational uses.

In indoor air, the EPA risk (8×10^{-7}) is below the risk management range, and Cal/EPA risk (1×10^{-5}) is within the range. The majority (90 percent) of the Cal/EPA risk is due to naphthalene in shallow groundwater at the maximum concentration found in any sample. However, independent of any decisions made for IR Site 31, the concentrations

of benzene and naphthalene in groundwater will be reduced as part of the preferred alternative presented in the Final Proposed Plan for OU 5/IR-02 Groundwater (CDM 2005b). When the remedial goals for groundwater are met, within 8 to 10 years, the indoor air risks for EPA and Cal/EPA will be well below 1×10^{-6}. Also, the cancer risk is based on 30 years of exposure, adding to the level of confidence that the current and future cancer risks via inhalation of vapors from groundwater in the indoor air are well below the risk management range.

The total EPA and Cal/EPA central tendency exposure (CTE) cancer risks (including background risks) for the current residential scenario are 1×10^{-5} and 8×10^{-5}, respectively. The respective CTE risks are shown on Table 6-2.

6.1.5.1.2 Cancer Risks – Future Residential Scenario

The total RME and CTE cancer risks (including ambient metals) for both EPA and Cal/EPA are 2×10^{-2} (Table 6-2). Exposure pathways with cancer risks above the risk management range include residential use of groundwater (ingestion and inhalation while showering), ingestion of homegrown produce (Cal/EPA only), and ingestion of soil (Cal/EPA only) (Table 6-3). Most of the total cumulative risk (99 percent) is associated with benzene in groundwater. The risks for residential use of groundwater were taken from the Final Groundwater RI/FS for Site 25/IR-02 (ERRG 2004). Therefore, the risks are not shown on the calculation of percents by risk driving chemicals in Tables 6-7 and 6-8. However, independent of any decisions made for IR Site 31, the concentrations of benzene and naphthalene in groundwater will be reduced as part of the preferred alternative agreed and presented in the Draft Final Proposed Plan for OU 5/IR-02 Groundwater (CDM 2005b).

The remaining cancer risks are generally identical to those for the current resident, with the minor exceptions of slight increases in EPA risks for dermal contact with soil and inhalation of outdoor air from dust for COPCs in the 0 to 7 foot depth interval.

6.1.5.1.3 Cancer Risks – Construction Worker Scenario

The RME EPA and Cal/EPA cancer risks are 2×10^{-6} and 6×10^{-6}, respectively (Table 6-2). For EPA, chromium has the highest individual cancer risk at 1×10^{-6} (Table 6-10). The Cal/EPA risk drivers are arsenic (4×10^{-6}) and chromium (2×10^{-6}) (Table 6-11).

6.1.5.1.4 Cancer Risks - Without Ambient Metals

The statistical evaluation of metals data (Appendix H2) shows that the arsenic and cadmium concentrations at IR Site 31 are ambient and not the result of a release by Navy activities. Arsenic and cadmium are the only two risk driver ambient metals

included in the cancer risk calculations. Therefore, it is appropriate to consider the cancer risk without these metals.

- The current residential cancer risk, without arsenic and cadmium in soil, is within the risk management range, with an EPA cancer risk of 7×10^{-6} and a Cal/EPA cancer risk of 3×10^{-5} (Table 6-2).
- The future residential cancer risk, without residential use of groundwater and without arsenic and cadmium in soil, is within the risk management range, with an EPA cancer risk of 1×10^{-5} and a Cal/EPA cancer risk of 4×10^{-5} (Table 6-2).

The Navy agrees at this time to evaluate Cal/EPA toxicity values but expressly reserves the right to evaluate the legal and technical justification for these values and accept or reject them before or at the time of the Navy cleanup decisions.

Risks from exposure to PAHs are within the acceptable risk management range.

6.1.5.1.5 Noncancer Hazards and Lead Results

This section presents the noncancer hazard and lead results for current and future residential and construction scenarios at IR Site 31.

The RME HI values for current and future residential scenarios are 5 and 149 (Table 6-2), respectively. The noncancer hazard values are based on the most sensitive receptor, a child from 0 to 6 years of age. Noncancer hazard values are the same for EPA and Cal/EPA. The RME HI values including metals at ambient concentrations for the current and future residential scenario are as follows:

- Residential use of groundwater (145 for future residents only);
- Ingestion of soil (4 for both current and future residents);
- Inhalation of vapors indoor air (0.4 for both current and future residents);
- Homegrown produce (0.3 for both current and future residents);
- Dermal contact with soil (0.1 for both current and future residents); and
- Inhalation of particulates and vapors in outdoor air (0.02 for both current and future residents).

The hazard value for ingestion of soil is 4, associated with several metals with individual HQ values of less than 1 except iron with an HI of 2. However, iron toxicity is not considered additive with the other non-carcinogens, and there is evidence that there may not be any adverse health effects from increased exposure to iron in soil or food. Also, statistical evaluation using DTSC policy for arsenic, cadmium , chromium, and vanadium indicates that these metals, and likely iron, are ambient and not the

result of a release from Navy activities (Appendix H2). Without these metals, the HI is below 1.

The EPC for lead is well below the site-specific DTSC residential value.

The RME and CTE HI values for construction scenarios are 0.2 and well below the risk management level of 1.

The lead EPCs of 61.5 and 40.6 mg/kg for the 0 to 2 foot and 0 to 7 foot depth intervals, respectively, are well below the site-specific residential PRGs for lead in soil for children (184 mg/kg for a scenario including ingestion of homegrown produce and 322 mg/kg for a scenario without ingestion of homegrown produce). The maximum concentration in any sample of 168 mg/kg is also below the PRGs calculated in Appendix I.

6.1.6 Uncertainty Analysis

Varying degrees of uncertainty exist in each step of the risk assessment process. To compensate for these uncertainties, EPA has developed toxicity values and exposure parameters that will not underestimate the risk, if in fact, any risk exists. The following subsections present the uncertainties specific to the HHRA conducted for IR Site 31 and evaluate the potential impact of the uncertainties on the calculated risk estimates.

6.1.6.1 Data Evaluation

The data are considered adequate to support the risk assessment. For this 24.9-acre site, there are 646 soil samples for PAHs from over 160 locations. There are 120 samples for metals and 123 samples for VOCs, SVOCs, metals, PCBs, and pesticides from 50 locations (see Section 3 for sample analyses summaries). There are 16 shallow groundwater samples from 16 locations with analyses for VOCs although some samples have fewer analytes.

Appendix I, Section 17.1 presents information to show that six soil samples that were not included in the EPC calculations would have no impact on the risk findings. Also, Appendix I discusses the uncertainty associated with four chemicals that had reporting (or sample quantitation) limits below risk-based screening levels that were not identified in any of the 120 samples and thus not included as COPCs. Appendix I also discusses manganese noncancer of 0.2, which is below the risk management level of 1.

6.1.6.2 Exposure Assessment

Uncertainties are also associated with the parameters presented as exposure and in the quantification of exposure. In risk assessment, the actual exposure concentration is the average concentration that an individual could be exposed to over his or her lifetime. In soil, the 95 percent UCL is used as the EPC. However, for migration of vapors from

groundwater to indoor air, the maximum concentration of each chemical found in any sample from any location was used.

Each exposure assumption is designed to estimate the potential risk protectively. In this risk assessment, for example, it was assumed that residents would engage regularly in activities that would result in exposure to site COPCs over 30 years. It was also assumed that the individual would be exposed for 24 hours per day and 350 days per year for the entire 30-year duration. Although this scenario is highly unlikely, due to frequency of relocation and time spent indoors, it provides a protective estimate of exposure that would overestimate any actual risk.

Current residential exposure by Coast Guard personnel is likely to be substantially less than 30 years. The reduction in risk due to shorter residency periods is roughly proportional. For example, if a more typical exposure period for Coast Guard personnel is 6 years, then the total EPA and Cal/EPA cancer risks will be 1/5th that estimated using the standard assumption of 30 years of exposure. In this case, all cancer risks would be well within the risk management range.

In comments in the Draft RI - Revision 1, DTSC requested that the exposure assumptions presented in a recent DTSC note for military sites be used for IR Site 31 (Cal/EPA 2005). The residential exposure assumptions were reviewed because residential risk is typically used as the initial basis for risk management decisions. The DTSC note recommends a surface area for children that is 10 percent greater than that used in the HHRA. The greatest change would be a 10 percent increase in the noncancer risk, which would not change the risk assessment results or recommendations. Also, the DTSC note states that these assumptions do not necessarily apply to non-military facilities, which is the case for IR Site 31.

6.1.6.3 Indoor Air Exposure Assessment

Exposure via vapor migration from VOCs in groundwater may also be overestimated because the risk is based on a hypothetical sample that includes the maximum concentration of each chemical found in any sample. High concentrations of naphthalene (2,030 and 1,700 µg/L) were found at two locations in the OU-5/IR-02 groundwater plume. The other nine samples of shallow groundwater had much lower concentrations. The Johnson and Ettinger model could overestimate the concentrations in indoor air because the maximum concentrations are assumed to remain unchanged for 30 years. In fact, remedial actions unrelated to IR Site 31 will result in decreasing concentrations that could reach the cleanup level in 10 years. In addition, groundwater concentrations within the shallow aquifer are lower near the groundwater table than at depth.

A study conducted by the Coast Guard on housing immediately to the north of IR Site 31 at Parcel 181 concluded that there was no evidence of vapor migration into indoor air above ambient air concentrations. Indoor and outdoor air samples were collected in 2002 from the Coast Guard housing area, including North Housing located in Parcel 181 of OU-5 (TtEMI 2002a). Outdoor air samples were collected from five locations in Parcel 181. Indoor air samples, including samples collected from crawl spaces, were collected from both occupied and unoccupied residences located in Parcel 181. Indoor air was sampled at 17 locations, and crawl-space air was sampled at 12 locations.

Statistical analyses of the indoor and outdoor air data were performed to compare indoor air with outdoor air and crawl-space air with indoor air. Conclusions of this study are as follows:

- The benzene concentrations in the crawl-space air were lower than in indoor air. If groundwater is a source of benzene, it would be expected that concentrations of VOCs in the crawl spaces would exceed the concentrations in the indoor air.
- VOC concentrations in indoor air were consistent with both outdoor air concentrations and ambient air measurements for benzene in the San Francisco Bay Area issued by the California Air Resources Board.

These conclusions suggest that although portions of the housing area in Parcel 181 are located over groundwater plumes containing benzene and naphthalene, the concentrations of these chemicals in indoor air are not above ambient conditions for the San Francisco Bay Area. Risks to human health at OU-5 and adjacent areas are thus not likely to differ from risks to human health in other areas of the San Francisco Bay Area.

6.1.6.4 Arsenic Risk Characterization

Arsenic concentrations at IR Site 31 are ambient in accordance with DTSC policy (Appendix H2). Therefore, as discussed in Section 4.1.4, arsenic is not considered above background in the site-specific risk calculations.

This section presents other information on the toxicity of arsenic that is relevant to the risk management decisions and suggests that it is likely that the cancer risk for arsenic calculated for this HHRA is an overestimate.

Studies of children exposed to arsenic in soil indicate that the assumptions used in this HHRA likely overestimate exposure. This HHRA assumed that children (0 to 6 years of age) ingest 200 milligrams of soil daily and that the arsenic in the soil is 100 percent biologically available. However, more than 24 studies on arsenic in soil show that only 10 to 50 percent (with an average of 30 percent) of the arsenic is actually transferred into the body (EPA 1996, Ruby et al. 1999, Rodriguez and Basts 1999, Roberts et al. 2002).

Similar concentrations of arsenic are also found in other areas of Alameda Point. The exposure point concentration for arsenic at IR Site 31 of 11.7 mg/kg (0-8 feet bgs) is similar to the Alameda Point yellow background data set (which is remote from IR Site 31) at 11.9 mg/kg and lower than that for the adjacent East Housing Area of 16.3 mg/kg.

Decisions on concentrations of arsenic found acceptable by EPA and DTSC at other sites are specific to those sites and the agencies may have considered other factors besides health risk. However, for perspective on the concentrations at IR Sites 31, information on these decisions is included. In 2004, DTSC agreed to a cleanup level of 36 mg/kg for arsenic, which was above the background level of 5.4 mg/kg at Village at Green Hill, Newcastle, Placer County, California (Montgomery Watson Harza [MWH] 2004). In 1996 EPA, agreed to a soil cleanup level for arsenic of 250 mg/kg for a residential neighborhood in Montana based on 28 percent bioavailability (EPA 1996).

6.1.7 Final Groundwater RI/FS for Site 25/IR-02 Risk Assessment Results

The RME cancer risk from the groundwater RI/FS for ingestion of groundwater and inhalation while showering is 2×10^{-2}, and the HI value is 145 based on the Final Groundwater RI/FS for IR Site 25/IR-02 (ERRG 2004). There is uncertainty in using these estimates as representative of residential use of groundwater at IR Site 31, but none of the aspects of this uncertainty would likely result in lower risks. The ERRG cancer risk is based on benzene and did not consider naphthalene a carcinogen. Also, ERRG did not include dermal exposure to groundwater while showering. However, these omissions would only increase the cumulative risk. Appendix I presents additional information comparing the concentrations of benzene and naphthalene used in the Final Groundwater RI/FS for Site 25/IR-02 and those found in groundwater at IR Site 31.

The concentration of benzene in the groundwater used in the ERRG risk assessment of 494 µg/L is similar to the maximum concentration of benzene in all groundwater samples, shallow and deep, at IR Site 31 of 480 µg/L. The concentration of naphthalene used in the IR Site 25/IR-02 RI risk assessment (4,171 µg/L) is similar to the maximum concentration of naphthalene in all groundwater samples, shallow and deep, at IR Site 31 (4,910 µg/L). This suggests that cancer risk estimated based on data from groundwater at IR Site 31 health effects using a 95 percent UCL for residential use of groundwater could be lower than those estimated in the ERRG risk assessment.

6.1.8 Conclusion

The EPA and Cal/EPA cancer risks and noncancer hazards are above the risk management range when residential use of groundwater is considered. However, it is unlikely that groundwater will be used as a source of drinking water because the groundwater is too shallow to meet the sanitary requirements for a drinking water well,

total dissolved solids are high, and the residents are supplied with drinking water from an offsite source. In addition, remediation of the groundwater is being conducted as part of the OU5/IR-02 plume, and the final remedy for OU-5 groundwater prohibits the domestic use of groundwater until remedial goals are met.

Without residential use of groundwater, the cancer risks and noncancer hazards for current and reasonable future use are associated with exposure to chemicals in soil and indoor and outdoor air. The cancer risk and noncancer hazards without residential use of groundwater are discussed below.

EPA and Cal/EPA make risk management decisions considering risk without ambient metals, so it is appropriate to present the risk without metals present at ambient concentrations. The statistical evaluation of arsenic and select other metals in soil shows that arsenic, cadmium, chromium, vanadium and likely iron are ambient and not the result of releases from Navy activities (Appendix H2).

The cancer risks without ambient metals (arsenic and cadmium) are below 10^{-4} and range from 7×10^{-6} for current residential users for EPA to 4×10^{-5} for reasonable future residential users for Cal/EPA. The remaining cancer risk above 10^{-6} is associated with benzo[a]pyrene, PCBs, and dieldrin in soil, and VOCs in groundwater. The factors which reduce or eliminate concerns for these chemicals are as follows:

- Benzo[a]pyrene - cancer risks are within the risk management range at 1×10^{-5}.
- Three other chemical compounds with risks above 1×10^{-6} were rarely detected and do not represent a widespread exposure or threat to humans; they are PCBs (Aroclor 1016 in 1 of 123 samples, Aroclor 1260 in 9 of 123 samples) and dieldrin in 1 of 123 samples (EPA 1989). The risk assessment assumes that these chemicals are present at every location when in fact all these chemicals were rarely detected (i.e. 1 to 8 percent of the samples). The few locations where these chemicals were found are dispersed, and there is no specific area of impact.
- Benzene, naphthalene and other VOCs in groundwater that contribute to vapors in indoor air will be remediated as part of the OU-5/IR-02 groundwater plume.

As summarized in the bullets above, EPA and Cal/EPA cancer risks are at or below the 1×10^{-6} for current and reasonable future exposure pathways when evaluations are made following EPA guidance for addressing infrequently detected COCs and following EPA and Navy policy for ambient metals. PAHs are within the acceptable risk management range for Alameda Point.

Without iron and ambient metals, the HI is below 1. Iron in soil accounts for the majority of the HI value (38 percent) for soil pathways. There is evidence that there are not any adverse health effects from increased exposure to iron in soil and food.

The EPC for lead is well below the site-specific DTSC residential values.

For construction exposure scenarios at IR Site 31, the cancer risks and noncancer hazard values are within the risk management range.

6.2 Screening-Level Ecological Risk Assessment

A screening-level ERA was conducted by the Navy for this RI to estimate the potential impacts of chemicals reported at concentrations above detection limits in soil at IR Site 31. The screening-level ERA is Tier 1 (Steps 1 and 2) of the Navy policy for conducting ERAs (DON 1999, 2001b) and employs existing data and conservative assumptions regarding contaminant exposure to evaluate whether additional assessment is warranted. Step 1 develops the screening-level conceptual model through problem formulation and toxicity evaluation. Step 2 prepares the exposure estimates and risk calculations. The ERA process of the Navy policy is substantially identical to the ERA Guidance for Superfund of EPA (1997a) and functionally equivalent to the ERA guidance documents for the State of California.

This ERA also includes an evaluation of refined exposure estimates described by EPA guidance (EPA 1997a) and Step 3a of Navy policy (DON 1999, 2001b). The supplemental refined evaluation is presented in addition to the screening-level ERA (rather than as part of the screening-level ERA) and as an aid to the risk managers. The refined exposure estimates use exposure factors that are more realistic for the site than the most-conservative values used in Steps 1 and 2. This step provides a refined list of chemicals of potential ecological concern (COPECs).

A summary of the ERA is presented in this subsection, and complete details of the ERA are presented in Appendix J. An ERA based on chemicals reported in groundwater is not included in this report; this information is included in other reports (PRC and Versar 1996, ERRG 2004).

6.2.1 Problem Formulation

The problem formulation evaluates potential exposure pathways between COPECs and ecological receptors based on considerations for site characteristics, COPECs, and representative organisms.

6.2.1.1 Facility Location and Description

IR Site 31 is located at the eastern end of Alameda Point and is bounded to the north by IR Sites 25 and 30 and to the east and south by non-Navy property (the former FISCA and Alameda Facility). The site is currently a residential setting. Adjacent land is residential and schools. The Navy formerly used this site for residential purposes as well as for parking and storage. The site includes 24.9 acres of land and is primarily

covered by pavement and buildings (Figure 1-3). A portion of the site is occupied by landscaped vegetation, such as shrubs and grass lawns.

The ground surface at IR Site 31 is flat, with an approximate elevation of 10 feet AMSL. Depth to groundwater at the site ranges from 5 to 9 feet bgs. No naturally occurring surface water bodies exist on Alameda Point.

6.2.1.2 Ecological Habitats at IR Site 31

Four ecological habitats occur within 1 mile of IR Site 31: barren habitat, urban habitat, nonnative grassland habitat, and estuarine habitat. Urban habitat, as residential housing, is the current and expected future habitat condition for IR Site 31.

Barren habitat occurs at IR Site 31 as bare soil, paved areas, and buildings. Barren habitat also occurs on adjacent land at Alameda Point and in the cities of Oakland and Alameda. Barren habitat generally offers little value to wildlife; it may serve as a corridor between other habitats or as a place of brief resting, but it is not a significant place of shelter.

Urban habitat occurs at IR Site 31 and on adjacent land at Alameda Point and in the cities of Oakland and Alameda as ornamental shrubs, trees, and landscaped areas. Urban habitat generally supports few wildlife species due to human disturbances and limited vegetation. Urban habitat is the current and expected future habitat condition for IR Site 31.

Nonnative grassland habitat occurs on Alameda Point far to the west of IR Site 31. Nonnative grassland habitat offers shelter, forage, and nesting opportunities for a variety of birds and small mammals.

Estuarine habitat occurs as intertidal and subtidal zones of the San Francisco Bay, such as those at the Oakland Inner Harbor to the north of Alameda Point, Seaplane Lagoon to the southwest of IR Site 31, and the main San Francisco Bay to the south of Alameda Point. The estuarine habitat supports submerged aquatic vegetation, such as eelgrass, numerous invertebrates, such as worms and small crustaceans, fish, birds, and marine mammals.

6.2.1.3 Threatened, Endangered, and of-Concern Species

Special-status species for IR Site 31 are those plant and animal species that are classified as threatened, endangered, or species-of-concern by state or federal agencies and that are known to occur or have the potential to occur in the terrestrial or aquatic habitats in the vicinity of IR Site 31 (California Department of Fish and Game [CDFG] 2004a,b,c,d). Five plant species, 6 fish species, and 23 avian, mammalian, and reptilian species (including the American peregrine falcon, western snowy plover, California brown

pelican, and California least tern) were identified as threatened, endangered, or species-of-concern that occur or have the potential to occur in the vicinity of IR Site 30 (Table 6-12). Local environmental impact reports were used to evaluate the likelihood of these species occurring at or in the vicinity of Alameda Point (LSA 2001; Wallace, Roberts & Todd, LLC [WRT] 2002). Because of the barren and urban habitats at IR Site 31, the listed species are unlikely to occur at the site.

6.2.1.4 Identification of Chemicals of Potential Ecological Concern

The results of investigations at IR Site 31 indicate the presence of various organic and inorganic chemical compounds in soil. Soil samples have been analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Most of the SVOCs reported in soil samples were PAHs. Any chemical reported in at least one soil sample collected at IR Site 31 was included as a COPEC.

COPECs in soil were identified using analytical data collected from soil samples located between 0 foot and 8 feet bgs. Average sample depths for samples that were homogenized over a depth range did not exceed 6 feet. The initial COPEC list for soil includes all chemicals that were reported at least once at a concentration greater than the detection limit (Table 6-13).

6.2.1.5 Exposure Pathway Analysis

Exposure pathway analysis evaluates the potential for contact between the chemicals reported in IR Site 31 soil and the ecological receptors that are representative of the ecosystem at (or potentially at) the site.

Exposure of terrestrial organisms to soil at IR Site 31 is considered a potential occurrence. Potential exposure of terrestrial organisms to chemicals may occur by direct contact, inhalation, incidental soil ingestion, and ingestion of food items that have absorbed site contaminants. Exposure by direct (e.g., dermal) contact and inhalation is not readily estimated or evaluated for ecological receptors; exposure by ingestion is assumed to be a more significant contributor to total exposure than exposure by direct contact or inhalation. Therefore, direct contact and inhalation exposures for terrestrial receptors were not evaluated in this risk assessment.

6.2.1.6 Conceptual Site Model

The CSM can be described as a representation of the known, expected, and/or predicted relationships between site COPECs and ecological receptors (Figure 6-1). The CSM is based on current knowledge about IR Site 31. Urban habitat, as residential housing, is the current and expected future habitat condition for IR Site 31.

IR Site 31 investigations have reported the presence of VOCs, SVOCs (including PAHs), pesticides, PCBs, and metals in soil. These are potential contaminants that could affect the ecological habitats and associated organisms occurring in the vicinity of IR Site 31.

Fate and transport mechanisms exist that provide models for potential exposure of terrestrial organisms to COPECs. Soil COPECs generally maintain persistent forms and stable concentrations by bonding with soil particles and materials. These soil COPECs may migrate with soil erosion patterns and may bioaccumulate in local biota. The transfer of soil COPECs to the biota of lower trophic levels (e.g., vegetation, invertebrates, and small mammals) is estimated using bioaccumulation factors (BAFs). A BAF is a ratio of the concentration of a chemical compound in biota (e.g., plants) to the concentration in soil. Transfer to biota of higher trophic orders (e.g., predators) is estimated using receptor-specific exposure factors.

Representative terrestrial receptors for IR Site 31 were selected based on a conservative review of current site conditions, reuse plans, and potential habitat. The site is presently residential and is currently covered primarily by paved surfaces. The City of Alameda General Plan Amendment Environmental Impact Report (LSA 2002) has designated the future use of the site as "medium-density residential" (LSA 2002). Adjacent sites of Alameda Point have been identified as residential. No native or natural habitat occurs or is expected to occur at IR Site 31 due to human activities.

Receptors that would be representative of lower trophic levels, such as plants or soil invertebrates, are not expected to occur at IR Site 31 because the current and expected site conditions do not include habitat areas for these receptors. Current and expected vegetation would be limited to small landscaped areas.

This screening-level risk assessment evaluates birds and mammals of the major terrestrial feeding guilds as potential ecological receptors. The deer mouse (*Peromyscus maniculatus*) is a representative species for omnivorous mammals. The California ground squirrel (*Spermophilus beecheyi*) is a representative species for herbivorous mammals. The Alameda song sparrow (*Melospiza melodia pusillula*) is a representative species for avian receptors that feed on a combination of invertebrates and plant material. The American robin (*Turdus migratorius*) is a representative species for avian receptors that feed primarily on terrestrial invertebrates. The red-tailed hawk (*Buteo jamaicensis*) is a representative species for avian predators (raptors) that feed on small mammals.

The CSM presents a model for evaluation based on a potential, but improbable, return of IR Site 31 to native habitat. Since the current and expected use of IR Site 31 is not as native habitat but as urban habitat, this model is designed to present a conservative over-estimation of site-specific potential risk. A qualitative evaluation of the potential

risk related to current and expected future site use is discussed with other uncertainties in Section 6.2.5.

6.2.2 Ecotoxicity of Chemicals of Potential Ecological Concern

COPECs identified in soil are chemicals known or suspected to cause various adverse responses in terrestrial wildlife. Guideline toxicity reference values (TRVs) originally prepared by the Navy and the EPA Region 9 Biological Technical Assistance Group (BTAG) (ERM-West 1998) are included in ERA guidance documents by Cal/EPA (Cal/EPA 2000, 2002b). Wildlife TRVs are presented as an upper estimate and a lower estimate of effect thresholds. The low-TRV, based on no-observed-adverse-effect-level (NOAEL) data, represents a threshold below which no adverse effect is expected. The high-TRV, based on an approximate midpoint of the range of effect levels, represents a threshold at which an adverse effect is likely to occur. TRVs used in this screening-level ERA are low-TRVs.

For compounds without a Navy-BTAG TRV, a TRV was selected from the scientific literature. If literature-based values were not chronic NOAEL values, a factor of 0.1 was used to convert to a chronic value, and a factor of 0.1 was used to convert to a NOAEL value, as necessary (Calabrese and Baldwin 1993). If an avian TRV was unavailable for a COPEC, the mammalian TRV was used with an adjustment factor of 0.1. An allometric adjustment was applied to a TRV if the difference in body weight was more than two orders of magnitude (Cal/EPA 1999a) between test species (usually standard laboratory animals) and selected ecological receptors for the site.

6.2.3 Exposure Estimates

Exposure estimates represent the quantity of COPECs to which the representative ecological receptors are exposed. Soil exposure estimates are evaluated as a daily dose for ingestion from soil.

6.2.3.1 Terrestrial Exposure Model

Exposure estimates for wildlife were developed from reported soil concentrations for COPECs at IR Site 31. The wildlife exposure estimate was based on an ingestion-exposure pathway. Maximum concentrations reported for each soil COPEC were assumed to represent the concentration throughout the site. Soil COPECs for IR Site 31 are listed in Table 6-13.

Tissue residue concentrations of the COPECs in prey species at IR Site 31 were estimated using soil-to-plant, soil-to-invertebrate, and soil-to-small-mammal BAFs.

6.2.3.2 Exposure Factors

Exposure factors for the ingestion pathway for terrestrial wildlife include ingestion rate, body weight, and site-use factors (SUF) (the ratio of the site area to the home range of an ecological receptor). These exposure factors are specific for each ecological receptor evaluated. Fractional intake, the dietary component, is specific for each receptor and ingested medium (food type). Gastrointestinal assimilation efficiency and bioavailability are specific to each receptor, ingested medium, and chemical compound. For this screening-level risk assessment, conservative assumptions are used for assimilation efficiency and site-use factors (values set to 1). The receptors are assumed to experience no reduction in bioavailability and are also assumed to feed only at an area influenced by conditions at IR Site 31.

Exposure factors were selected from available scientific literature, such as the EPA Wildlife Exposure Handbook (EPA 1993b) and the California Wildlife Biology, Exposure Factor, and Toxicity database (Cal/EPA 2002a). Minimum values were used for body weight. Ingestion rates are estimated from body weight with predictive equations.

6.2.4 Risk Estimation

The risk for potential ecological receptors is estimated by the HQ, obtained by dividing the exposure dose estimate by the TRV.

$$\mathbf{HQ} = \frac{\mathbf{Dose}}{\mathbf{TRV}}$$

Where:

HQ = hazard quotient

Dose = daily exposure dose for a COPEC, mg/kg-day

TRV = toxicity reference value, mg/kg-day

HI values were calculated to assess the potential for cumulative effect from multiple COPECs having similar modes of action. The HI was calculated as the sum of all of the individual HQ values for a group of COPECs (e.g., metals and PAHs).

The screening-level risk estimate for IR Site 31 assumes that the site could be occupied by a natural habitat in the future. Table 6-14 lists the HQ (HQ-low based on low-TRV) for each soil COPEC and potential terrestrial wildlife receptor (mammals and birds). Most of the HQ values for organic chemicals are less than or equal to 1, indicating that those COPECs are unlikely to represent an ecological risk for terrestrial wildlife. Nine PAH compounds, two pesticides, and most metals are presented with HQ values exceeding 1, indicating potentially unacceptable ecological risk. The COPECs with the

highest HQ values from the five representative wildlife receptors are lead (HQ 900) and nickel (HQ 800). Potential risk to terrestrial wildlife receptors should be further evaluated with refined EPCs and refined exposure factors for the representative receptors.

6.2.5 Uncertainty Analysis

In general, the risk characterization is more likely to overestimate than underestimate the actual hazard of adverse ecological effects at IR Site 31 because of the conservative nature of the assumptions used. In particular, uncertainties resulting from the extrapolation of literature-based TRVs to the representative ecological receptors for the site are due to differences in exposure scenarios, differential bioavailability, and interspecies sensitivity differences. The risk assessment implemented adjustment factors when these conditions were encountered to minimize the likelihood of underestimating the effects. Therefore, use of the selected TRVs causes an overestimation of the ecological risk.

For COPECs with estimated exposures lower than the toxicity benchmark values, the probability of significant ecological hazard is very low. Potential risk from chemical exposures that exceed the toxicity benchmark values cannot be eliminated from consideration; however, marginal exceedances of the benchmark values would suggest that significant levels of risk at the population or community level are not likely.

The screening-level risk estimate evaluates the potential ecological risk for a future-use scenario in which the entire site is an ecological habitat even though this is an unlikely future condition of the site. Such a risk estimate overestimates the potential risk represented by the existing residential site use. A qualitative evaluation of the current and expected future conditions is presented in the next section (6.3) with the refined exposure estimates.

6.3 Refined Exposure Estimate (Step 3A)

This ERA includes a step for refined exposure estimates described by Step 3a of Navy policy (DON 1999, 2001b) and EPA guidance (EPA 1997a). The refined exposure estimate uses exposure factors that are more realistic for the site than the most conservative values used for Steps 1 and 2. Only COPECs with HQ values exceeding 1 in Step 2 were retained for further risk estimation using refined exposure estimates under Step 3a.

6.3.1 Refined Exposure Factors

The refined EPCs for soil COPECs are the 95 percent UCLs representative of average exposures at IR Site 31 presented in Table 6-13. The 95 percent UCL EPC was calculated for each COPEC using distribution-dependent formulae (Appendix I, Section I4.3.1).

The maximum concentration was used as the refined EPC if the appropriate 95 percent UCL was greater than the maximum concentration. For the calculations, COPECs reported as not present at concentrations exceeding the detection limit were included as values with a concentration of one-half the detection limit.

Exposure factors for terrestrial wildlife were refined to represent average site-specific conditions for IR Site 31. Body weights, ingestion rates, and site-use factors were revised. Mean values for adults were used to estimate ecological receptor body weight and ingestion rate. Mean values were used for ecological receptor home range, which were used to calculate site-specific SUF values (1.0 for deer mouse, ground squirrel, and song sparrow; 0.92 for American robin; and 0.1 for red-tailed hawk).

6.3.2 Refined Risk Estimation

Refined risk estimations were prepared for terrestrial wildlife receptors using the refined exposure estimates.

During the refined risk estimation, inorganic COPECs with concentrations not statistically greater than the Alameda Point background concentrations were eliminated from further evaluation.

Table 6-15 lists the refined HQ for each soil COPEC and potential terrestrial wildlife receptor (mammals and birds). The refined HQ values for all of the PAHs and a few of the metals (arsenic, barium, molybdenum, and thallium) did not exceed 1, indicating that these COPECs are unlikely to represent an ecological risk for terrestrial wildlife. These compounds are eliminated from further evaluation.

One pesticide and 11 metals are presented with refined HQ values exceeding 1, indicating potentially unacceptable ecological risk. The COPECs with the highest HQ values from the five representative wildlife receptors are lead (HQ 200) and nickel (HQ 100). The refined HQ value did not exceed 5 for the other seven metals and the pesticide (4,4'-DDE).

Two inorganic COPECs (antimony and beryllium) were not statistically greater than the Alameda Point background concentrations and were eliminated from further evaluation.

To further compare Alameda Point background exposures to site exposures, refined HQ values for the remaining soil inorganic COPECs (cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, vanadium, and zinc) were prepared for the five representative wildlife receptors based on the 95 percent UCL of the Alameda Point background concentrations. The HQ values for Alameda Point background concentrations suggest that a portion of the potential risk to terrestrial receptors from IR Site 31 soil is accounted for by the Alameda Point background concentrations. Alameda

Point background concentrations of lead represent a maximum refined HQ of 100, which is approximately one-half of the maximum refined HQ calculated for the site. Alameda Point background concentrations of nickel represent a maximum refined HQ of 30, which is approximately one-third of the maximum refined HQ calculated for the site.

Due to the uncertainties in the refined risk estimate, the refined HQ values are expected to overestimate the potential risk characterization for the site-specific conditions. The refined exposure risk estimates more likely overestimate than underestimate the actual hazard of adverse ecological effects at IR Site 31 because of the conservative nature of the assumptions used. A few of the exposure parameters are as likely to overestimate as underestimate the exposure and risk, but the likelihood of overestimating the exposure that is associated with the majority of the exposure parameters leads to an overall likelihood of overestimating the exposure and risk. The conservative estimates of potential toxic effects were the same for the screening-level ERA as for the refined exposure risk estimates.

The refined risk estimate assumes a future site use as entirely an ecological habitat, and therefore, overestimates the site-specific potential ecological risk because the site is currently, and is expected to remain, residential rather than a natural habitat. Ecological receptors would use the site under current and expected future conditions much less than if a natural habitat were in place. To provide an estimate of potential ecological risk relevant to the current site conditions, a SUF of 0.1 can be applied to each representative ecological receptor. HQ values presented in Table 6-15 can be adjusted by a factor of 0.1 to account for this assumption. The SUF value of 0.1 assumes that 10 percent of the residential area is available to ecological receptors for foraging activity. This is similar to the adjacent IR Site 30 at which 13 percent of the site was landscaped (BEI 2005a). Applying the 0.1 SUF to the HQ data in Table 6-15 would eliminate most COPECs from concern. The remaining COPECs would have lower HQ values (lead 20 and nickel 10).

6.3.3 Risk Characterization and Summary

After completion of Tier 1 Steps 1 and 2, this screening-level ERA indicated several organic and inorganic soil compounds as representing potentially unacceptable ecological risk to terrestrial wildlife. Exposure estimates were further analyzed according to the procedures of Step 3a to refine the COPEC list. The refined risk estimates indicated potentially unacceptable ecological risk to terrestrial wildlife receptors from 1 organic and 10 inorganic soil COPECs based on a model of returning the site to native habitat.

Evaluation of the HQ values for Alameda Point background concentrations suggests that a portion of the potential risk to terrestrial receptors from IR Site 31 soil is

accounted for by the background concentrations (Table 6-16). A second statistical analysis using a DTSC policy for arsenic, cadmium, chromium, iron, lead and vanadium shows that arsenic, cadmium, chromium and vanadium are present at ambient concentrations and likely iron as well (Appendix H2). It is possible that other metals not included in the additional statistical analysis are also ambient.

The unacceptable potential ecological risk to terrestrial receptors, as indicated by refined HQs ranging up to 200 for potential risk to the sparrow (due to lead exposure from ingestion of soil invertebrates and incidental soil), may overstate the actual potential for ecological hazards at IR Site 31. Terrestrial receptors, such as the sparrow, were selected as a conservative representation of ecological receptors potentially occurring at the site. The risk characterization would be most applicable if the site were converted to a natural ecological habitat. Continued current site use as residential limits the potential use of the site by ecological receptors because areas characterized by human activity are avoided by ecological receptors, and the site surface is nearly completely paved or occupied by buildings. Ecological risk to current and expected terrestrial receptors is unlikely to exist due to the residential use and the absence of suitable natural habitat.

Due to the overestimation of the potential exposure and ecological effects at the site by this screening-level ERA, as well as the low risk estimates for current and expected future habitat conditions and the unlikelihood of future development of terrestrial habitat at the site, no further investigation or assessment of ecological risk for soil at IR Site 31 is recommended.

Table 6-1
Chemicals of Potential Concern in Soil and Groundwater

Chemical	Surface Soil (0-2 feet bgs)	Vadose Zone Soil (0-7 feet bgs)	Shallow Groundwater
Volatile Organic Compounds			
Acenaphthene	✔	✔	✔
Acenaphthylene	✔	✔	✔
Acetone			✔
Anthracene	✔	✔	✔
Benzene		✔	✔
Benzo(g,h,i)Perylene	✔	✔	✔
Carbon disulfide			✔
Dibenzofuran			✔
1,2-Dichloroethane			✔
Dichloromethane	✔	✔	✔
Ethylbenzene			✔
Fluorene	✔	✔	✔
4-Isopropyltoluene			✔
Methane			✔
Methylnaphthalene			✔
2-Methylnaphthalene	✔	✔	
MTBE			✔
Naphthalene	✔	✔	✔
Phenanthrene	✔	✔	✔
Pyrene	✔	✔	✔
Styrene			✔
Toluene			✔
1,2,4-Trimethylbenzene			✔
1,3,5-Trimethylbenzene			✔
Xylenes (total)	✔	✔	✔
Semivolatile Organic Compounds			
Benzo(a)Anthracene	✔	✔	
Benzo(a)Pyrene	✔	✔	
Benzo(b)Fluoranthene	✔	✔	
Benzo(k)Fluoranthene	✔	✔	
1,2-Benzphenanthracene	✔	✔	
Dibenz(A,H)Anthracene	✔	✔	
Fluoranthene	✔	✔	

Table 6-1 (continued)
Chemicals of Potential Concern in Soil and Groundwater

Chemical	Surface Soil (0-2 feet bgs)	Vadose Zone Soil (0-7 feet bgs)	Shallow Groundwater
Indeno(1,2,3-C,D)Pyrene	✔	✔	
Phenol		✔	
Pesticides/Polychlorinated Biphenyls			
Aroclor 1016	✔	✔	
Aroclor 1260	✔	✔	
4,4-DDD	✔	✔	
4,4-DDE	✔	✔	
4,4-DDT	✔	✔	
Dieldrin	✔	✔	
Endosulfan Sulfate	✔	✔	
Heptachlor		✔	
Metals			
Antimony	✔	✔	
Arsenic	✔	✔	
Barium	✔	✔	
Beryllium	✔	✔	
Cadmium	✔	✔	
Chromium	✔	✔	
Cobalt	✔	✔	
Copper	✔	✔	
Iron	✔	✔	
Lead	✔	✔	
Mercury	✔	✔	
Molybdenum	✔	✔	
Nickel	✔	✔	
Selenium	✔	✔	
Thallium	✔	✔	
Vanadium	✔	✔	
Zinc	✔	✔	

bgs - below ground surface
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
MTBE - methyl tert-butyl ether

Table 6-2
Human Health Risk Assessment by Receptor

Exposure Scenario		Total Cancer	Cancer[1]	Hazard Index
CURRENT RESIDENTIAL				
EPA	RME	6E-05	7E-06	3[1,3]
	CTE	1E-05		2
Cal/EPA	RME	4E-04	3E-05	3[1,3]
	CTE	8E-05		2
FUTURE RESIDENTIAL (Including residential use of groundwater)				
EPA[2]	RME	2E-02	1E-05[4]	149
	CTE	2E-02		147
Cal/EPA	RME	2E-02	4E-05[4]	149
	CTE	2E-02		147
CONSTRUCTION				
EPA	RME	2E-06	3E-07	0.2
	CTE	2E-06		0.2
Cal/EPA	RME	6E-06	4E-07	0.2
	CTE	6E-06		0.2

Notes:

[1] Does not include ambient metals (arsenic, cadmium, chromium and vanadium) in soil, see Section 4.1.4

[2] Cal/EPA toxicity values were used in the calculation of cancer risk for residential use of groundwater (ERRG 2004)

[3] Without iron, Hazard Index = 1. Toxicological evidence indicates that a hazard value for iron of 2 does not pose a health concern.

[4] This cancer risk value does not include residential use of groundwater

Acronyms/Abbreviations:

Cal/EPA - California Environmental Protection Agency
CTE - central tendency exposure
ERRG - Engineering/Remediation Resources Group, Inc.
RME - reasonable maximum exposure
EPA - U.S. Environmental Protection Agency

Table 6-3
Human Health Risk Assessment by Pathway
Reasonable Maximum Exposure

Exposure Pathway	EPA Cancer	Cal/EPA Cancer	Hazard Index
CURRENT RESIDENTIAL			
Ingestion of soil	3E-05	2E-04	4
Dermal contact with soil	4E-06	2E-05	0.1
Direct Contact with Soil Subtotal	**4E-05**	**2E-04**	**4**
Inhalation of vapors in indoor air from soil	5E-08	5E-07	0.02
Inhalation of vapors in indoor air from groundwater	8E-07	1E-05	0.4
Indoor Air Subtotal	**8E-07**	**1E-05**	**0.4**
Inhalation of vapors in outdoor air from soil	4E-09	3E-08	0.001
Inhalation of particulates in outdoor air from soil	3E-07	5E-07	0.01
Outdoor Air Subtotal	**3E-07**	**5E-07**	**0.02**
Ingestion of homegrown produce	2E-05	1E-04	0.3
Total without residential use of groundwater	**6E-05**	**4E-04**	**5**
Ingestion of groundwater and inhalation of vapors while showering*	–	–	–
Total	**6E-05**	**4E-04**	**5**
FUTURE RESIDENTIAL			
Ingestion of soil	3E-05	2E-04	4
Dermal contact with soil	5E-06	2E-05	0.1
Direct Contact with Soil Subtotal	**4E-05**	**2E-04**	**4**
Inhalation of vapors in indoor air from soil	5E-08	5E-07	0.02
Inhalation of vapors in indoor air from groundwater	8E-07	1E-05	0.4
Indoor Air Subtotal	**8E-07**	**1E-05**	**0.4**
Inhalation of vapors in outdoor air from soil	4E-09	3E-08	0.001
Inhalation of particulates in outdoor air from soil	4E-07	6E-07	0.02
Outdoor Air Subtotal	**4E-07**	**6E-07**	**0.02**
Ingestion of homegrown produce	2E-05	1E-04	0.3
Total without residential use of groundwater	**6E-05**	**4E-04**	**4**
Ingestion of groundwater and inhalation of vapors while showering*	**2E-02**	**2E-02**	**145**
Total with residential use of groundwater	**2E-02**	**2E-02**	**149**

Table 6-3 (continued)
Human Health Risk Assessment by Pathway
Reasonable Maximum Exposure

Exposure Pathway	EPA Cancer	Cal/EPA Cancer	Hazard Index
CONSTRUCTION			
Ingestion of soil	6E-07	3E-06	0.07
Dermal contact with soil	2E-07	1E-06	0.009
Direct Contact with Soil Subtotal	**8E-07**	**4E-06**	**0.07**
Inhalation of vapors in outdoor air from soil	2E-11	1E-10	0.000009
Inhalation of particulates in outdoor air from soil	1E-06	2E-06	0.1
Outdoor Air Subtotal	**1E-06**	**2E-06**	**0.1**
Total	**2E-06**	**6E-06**	**0.2**

* Cal/EPA toxicity values were used in the calculation of cancer risk for residential use of groundwater (ERRG 2004)

Cal/EPA - California Environmental Protection Agency
ERRG - Engineering/Remediation Resources Group, Inc.
EPA - U.S. Environmental Protection Agency

Reference:
ERRG 2004. Groundwater Remedial Investigation/Feasibility Study. Alameda Point Site 25/Annex IR-02. Final. October

Table 6-4
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - EPA (Current Residential)

Scenario Time Frame: Current
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK							
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0–2 feet bgs	**Semivolatile Organic Compounds**										
Soil	Benzo(a)Pyrene	9.53E-02	–	1E-06	5E-07	8E-11	1E-07			2E-06	3%
	Pesticides/Polychlorinated Biphenyls										
	Aroclor 1260	1.92E-02	–	6E-08	3E-08	4E-12	1E-06			1E-06	2%
	Dieldrin	5.00E-04	–	1E-08	4E-09	9E-13	1E-06			1E-06	2%
	Metals										
	Arsenic	1.25E+01	–	3E-05	3E-06	2E-08	2E-05			5E-05	88%
	Risk Drivers Across Soil			**3E-05**	**3E-06**	**2E-08**	**2E-05**	**0E+00**	**0E+00**	**6E-05**	
Risk Drivers Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	
Total Risk Across All Media and All Exposure Routes				**3E-05**	**4E-06**	**3E-07**	**2E-05**	**8E-07**	**4E-09**	**6E-05**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

bgs - below ground surface
EPC - exposure point concentration
IR - Installation Restoration
EPA - U.S. Environmental Protection Agency

Table 6-5
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - Cal/EPA (Current Residential)

Scenario Time Frame: Current
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK							
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0–2 feet bgs	**Semivolatile Organic Compounds**										
Soil	Benzo(a)Pyrene	9.53E-02	–	2E-06	9E-07	4E-11	2E-07			3E-06	1%
	Pesticides/Polychlorinated Biphenyls										
	Aroclor 1016	2.12E-02	–	2E-07	8E-08	5E-12	1E-05			1E-05	3%
	Aroclor 1260	1.92E-02	–	1E-07	7E-08	4E-12	3E-06			3E-06	1%
	Dieldrin	5.00E-04	–	1E-08	4E-09	9E-13	1E-06			1E-06	0.3%
	Metals										
	Arsenic	1.25E+01	–	2E-04	2E-05	2E-08	1E-04			3E-04	91%
	Cadmium	3.90E-01	–	2E-07	7E-10	7E-10	2E-06			2E-06	1%
	Risk Drivers Across Soil			**2E-04**	**2E-05**	**2E-08**	**1E-04**	**0E+00**	**0E+00**	**3E-04**	
Groundwater	**Volatile Organic Compounds**										
	Benzene	1.37E-01	1.84E-04					3E-06		3E-06	1%
	Naphthalene	2.03E+00	5.26E-04					9E-06		9E-06	3%
Risk Drivers Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**1E-05**	**0E+00**	**1E-05**	
Total Risk Across All Media and All Exposure Routes				**2E-04**	**2E-05**	**5E-07**	**1E-04**	**1E-05**	**3E-08**	**4E-04**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)
bgs - below ground surface
Cal/EPA - California Environmental Protection Agency
EPC - exposure point concentration
IR - Installation Restoration

Table 6-6
Summary of Hazard Index for Risk Drivers
Reasonable Maximum Exposure - EPA (Current Residential)

Scenario Time Frame: Current
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX							
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0–2 feet bgs	Metals										
Soil	Arsenic	1.25E+01	–	5E-01	5E-02	–	1E-01			7E-01	14%
	Chromium	5.39E+01	–	2E-01	6E-03	1E-02	–			2E-01	5%
	Iron	4.13E+04	–	2E+00	5E-02	–	–			2E+00	38%
	Thallium	1.69E+00	–	3E-01	9E-03	–	–			3E-01	7%
	Vanadium	5.79E+01	–	7E-01	2E-02	–	–			8E-01	16%
Risk Drivers Across Soil				**4E+00**	**1E-01**	**1E-02**	**1E-01**	**0E+00**	**0E+00**	**4E+00**	
Risk Drivers Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	
Hazard Index Across All Media and All Exposure Routes				**4E+00**	**1E-01**	**1E-02**	**3E-01**	**4E-01**	**1E-03**	**5E+00**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

bgs - below ground surface
EPC - exposure point concentration
IR - Installation Restoration
EPA - U.S. Environmental Protection Agency

Table 6-7
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - EPA (Future Residential)

Scenario Time Frame: Future
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK							
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0-7 feet bgs	**Semivolatile Organic Compounds**										
Soil	Benzo(a)Pyrene	3.41E-01		4E-06	2E-06	3E-10	5E-07			6E-06	10%
	Pesticides/Polychlorinated Biphenyls										
	Aroclor 1260	1.91E-02		6E-08	3E-08	4E-12	1E-06			1E-06	2%
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06	2%
	Metals										
	Arsenic	1.17E+01		3E-05	3E-06	2E-08	2E-05			5E-05	79%
Risk Drivers Across Soil				**3E-05**	**4E-06**	**2E-08**	**2E-05**	**0E+00**	**0E+00**	**6E-05**	
Risk Drivers Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	
Total Risk Across All Media and All Exposure Routes				**3E-05**	**5E-06**	**4E-07**	**2E-05**	**8E-07**	**4E-09**	**6E-05**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

bgs - below ground surface
EPC - exposure point concentration
IR - Installation Restoration
EPA - U.S. Environmental Protection Agency

Table 6-8
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - Cal/EPA (Future Residential)

Scenario Time Frame: Future
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK							
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0-7 feet bgs	**Semivolatile Organic Compounds**										
Soil	Benzo(a)Pyrene	3.41E-01		6E-06	3E-06	2E-10	8E-07			1E-05	3%
	Pesticides/Polychlorinated Biphenyls										
	Aroclor 1016	1.99E-02		2E-07	7E-08	5E-12	1E-05			1E-05	3%
	Aroclor 1260	1.91E-02		1E-07	7E-08	4E-12	3E-06			3E-06	1%
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06	0.3%
	Metals										
	Arsenic	1.17E+01		2E-04	2E-05	2E-08	1E-04			3E-04	87%
	Cadmium	3.08E-01		2E-07	6E-10	5E-10	2E-06			2E-06	1%
	Risk Drivers Across Soil			**2E-04**	**2E-05**	**2E-08**	**1E-04**	**0E+00**	**0E+00**	**3E-04**	
Groundwater	**Volatile Organic Compounds**										
	Benzene	1.37E-01	1.84E-04					3E-06		3E-06	1%
	Naphthalene	2.03E+00	5.26E-04					9E-06		9E-06	3%
	Risk Drivers Across Groundwater			**0E+00**	**0E+00**	**0E+00**	**0E+00**	**1E-05**	**0E+00**	**1E-05**	
Total Risk Across All Media and All Exposure Routes				**2E-04**	**2E-05**	**6E-07**	**1E-04**	**1E-05**	**3E-08**	**4E-04**	

[a]Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b]Units for vapor phase are milligrams per cubic meter (mg/m^3)
bgs - below ground surface
Cal/EPA - California Environmental Protection Agency
EPC - exposure point concentration
IR - Installation Restoration

Table 6-9
Summary of Hazard Index for Risk Drivers
Reasonable Maximum Exposure - EPA (Future Residential)

Scenario Time Frame: Future
Exposure Point: IR Site 31
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX							
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation of Dust**	**Ingestion of Homegrown Produce**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Exposure Route Total**	**Percent of Total**
0–7 feet bgs	**Metals**										
Soil	Arsenic	1.17E+01		5E-01	4E-02	–	1E-01			6E-01	15%
	Chromium	6.38E+01		3E-01	8E-03	1E-02	–			3E-01	7%
	Iron	3.86E+04		2E+00	5E-02	–	–			2E+00	38%
	Thallium	1.23E+00		2E-01	7E-03	–	–			2E-01	6%
	Vanadium	5.12E+01		7E-01	2E-02	–	–			7E-01	15%
	Risk Drivers Across Soil			**3E+00**	**1E-01**	**1E-02**	**1E-01**	**0E+00**	**0E+00**	**4E+00**	
Groundwater	**Volatile Organic Compounds**										
	Naphthalene	2.03E+00	5.26E-04					4E-01		4E-01	9%
	Risk Drivers Across Groundwater			**0E+00**	**0E+00**	**0E+00**	**0E+00**	**4E-01**	**0E+00**	**4E-01**	
Hazard Index Across All Media and All Exposure Routes				**4E+00**	**1E-01**	**2E-02**	**3E-01**	**4E-01**	**1E-03**	**4E+00**	

[a]Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b]Units for vapor phase are milligrams per cubic meter (mg/m^3)
bgs – below ground surface
EPC – exposure point concentration
IR – Installation Restoration
EPA – U.S. Environmental Protection Agency

Table 6-10
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - EPA (Construction)

Scenario Time Frame: Future
Exposure Point: IR Site 31
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK					
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total	Percent of Total
0-7 feet bgs	Semivolatile Organic Compounds								
Soil	Benzo(a)Pyrene	3.41E-01	–	6E-08	9E-08	9E-10		1E-07	8%
	Metals								
	Arsenic	1.17E+01	–	5E-07	1E-07	6E-08		7E-07	36%
	Chromium	6.38E+01	–	–	–	1E-06		1E-06	51%
Risk from Risk Drivers Across Soil				**6E-07**	**2E-07**	**1E-06**	**0E+00**	**2E-06**	
Total Risk Across All Media and All Exposure Routes				**6E-07**	**2E-07**	**1E-06**	**2E-11**	**2E-06**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)
bgs - below ground surface
EPC - exposure point concentration
IR - Installation Restoration
EPA - U.S. Environmental Protection Agency

Table 6-11
Summary of Cancer Risk for Risk Drivers
Reasonable Maximum Exposure - Cal/EPA (Construction)

Scenario Time Frame: Future
Exposure Point: IR Site 31
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK					
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Outdoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation of Dust**	**Inhalation of Outdoor Air**	**Exposure Route Total**	**Percent of Total**
0–7 feet bgs	**Metals**								
Soil	Arsenic	1.17E+01	–	3E-06	8E-07	5E-08		4E-06	65%
	Chromium	6.38E+01	–	–	–	2E-06		2E-06	29%
Risk from Risk Drivers Across Soil				**3E-06**	**8E-07**	**2E-06**	**0E+00**	**6E-06**	
Total Risk Across All Media and All Exposure Routes				**3E-06**	**1E-06**	**2E-06**	**1E-10**	**6E-06**	

[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)
bgs - below ground surface
Cal/EPA - California Environmental Protection Agency
EPC - exposure point concentration
IR - Installation Restoration

Table 6-12
Special-Status Species Occurring or Potentially Occurring in the Habitats of Alameda Point

Scientific Name	Common Name	Status
Plants		
Cordylanthus maritimus palustris	Point Reyes bird's-beak	CNPS-1B
Holocarpha macradenia	Santa Cruz tarplant	FT/SE
Horkelia cuneata sericea	Kellogg's horkelia	CNPS-1B
Lasthenia conjugens	Contra Costa goldfields	FE/CNPS-1B
Sanicula maritime	Adobe sanicle	SR
Fish		
Acipenser medirostris	Green sturgeon	FSC/CSC
Eucyclogobius newberryi	Tidewater goby	FE/CSC
Hypomesus transpacificus	Delta smelt	FT/ST
Oncorhynchus mykiss	Steelhead	FT/CSC
Oncorhynchus tshawytscha	Chinook salmon, winter run	FE/SE
Spirinichus thaleichthys	Longfin smelt	FSC/CSC
Reptiles		
Masticophis lateralis euryxanthus	Alameda whipsnake	FT/ST
Mammals		
Corynorhinus townsendii townsendii	Townsend's western big-eared bat	FSC/CSC
Eumetopias jubatus	Steller sea lion	FT
Eumops perotis californicus	California mastiff bat	FSC/CSC
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	FSC/CSC
Reithrodontomys raviventris	Salt marsh harvest mouse	FE/SE
Scapanus latimanus parvus	Alameda Island mole	FSC/CSC
Sorex vagrans halicoetes	Salt marsh wandering shrew	FSC/CSC
Birds		
Athene cunicularia	Burrowing owl	FSC/CSC
Charadrius alexandrinus nivosus	Western snowy plover	FT/CSC
Circus cyaneus	Northern harrier	CSC
Elanus leucurus	White-tailed kite	FSC/CFP

Table 6-12 (continued)
Special-Status Species Occurring or Potentially Occurring in the Habitats of Alameda Point

Scientific Name	Common Name	Status
Eremophilia alpestris actia	California horned lark	CSC
Birds		
Falco peregrinus anatum	American peregrine falcon	FSC/SE
Geothlypis trichas sinuosa	Salt marsh common yellowthroat	FSC/CSC
Lanius ludovicianus	Loggerhead shrike	FSC/CSC
Laterallus jamaicensis coturniculus	California black rail	FSC/ST
Melospiza melodia pusillula	Alameda song sparrow	FSC/CSC
Pelecanus occidentalis californicus	California brown pelican	FE/SE
Phalacrocorax auritus	Double-crested cormorant	CSC
Rallus longirostris obsoletus	California clapper rail	FE/SE
Sterna antillarum browni	California least tern	FE/SE

1B - plants rare, threatened, or endangered in California and elsewhere
CFP - California Department of Fish and Game - fully protected
CNPS - California Native Plant Society
CSC - California special-concern species
FE- federally listed - endangered
FSC - federal special-concern species
FT - federally listed - threatened
SE - California state listed - endangered
SR - California state listed - rare
ST - California state listed - threatened

Table 6-13
Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
Volatile Organic Compounds [b]								
benzene	NA	1.00E-03	3.00E-03	2.59E-03	3.55E-04	2.73E-03	2.73E-03	2/120
methylene chloride (dichloromethane)	NA	8.00E-04	2.00E-03	2.55E-03	4.60E-04	2.74E-03	2.00E-03	5/120
xylenes, total	NA	5.00E-04	3.00E-03	5.14E-03	9.16E-04	5.50E-03	3.00E-03	3/120
Semivolatile Organic Compounds [b]								
phenol	NA	2.00E-01	3.00E-01	1.33E+01	3.46E+01	2.70E+01	3.00E-01	2/120
Polynuclear Aromatic Hydrocarbons [b]								
acenaphthene	NA	2.30E-04	2.90E+00	1.87E-02	1.19E-01	3.92E-02	3.92E-02	454/646
acenaphthylene	NA	1.60E-04	1.20E+00	1.86E-02	6.52E-02	2.98E-02	2.98E-02	515/646
anthracene	NA	2.30E-04	5.00E+00	3.15E-02	2.13E-01	6.81E-02	6.81E-02	529/646
benzo(a)anthracene	NA	2.30E-04	1.50E+01	1.03E-01	7.00E-01	2.24E-01	2.24E-01	574/646
benzo(b)fluoranthene	NA	2.30E-04	1.20E+01	1.33E-01	6.26E-01	2.41E-01	2.41E-01	614/646
benzo(k)fluoranthene	NA	2.40E-04	1.30E+01	1.05E-01	6.40E-01	2.15E-01	2.15E-01	560/646
benzo(g,h,i)perylene	NA	3.40E-04	1.30E+01	1.62E-01	7.82E-01	2.96E-01	2.96E-01	596/646
benzo(a)pyrene	NA	1.70E-04	2.10E+01	1.62E-01	1.04E+00	3.41E-01	3.41E-01	600/646
chrysene (1,2-benzphenanthracene)	NA	1.90E-04	1.80E+01	1.49E-01	8.71E-01	2.98E-01	2.98E-01	599/646
dibenz(a,h)anthracene	NA	2.30E-04	1.70E+00	2.91E-02	8.98E-02	4.45E-02	4.45E-02	539/646
fluoranthene	NA	3.80E-04	3.50E+01	2.57E-01	1.93E+00	5.88E-01	5.88E-01	592/646
fluorene	NA	1.70E-04	1.80E-01	1.46E-02	3.56E-02	2.07E-02	2.07E-02	496/646

Table 6-13 (continued)
Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
indeno(1,2,3-c,d)pyrene	NA	2.70E-04	1.40E+01	1.52E-01	7.82E-01	2.86E-01	2.86E-01	566/646
2-methylnaphthalene	NA	2.40E-04	2.60E-01	1.60E-02	3.69E-02	2.23E-02	2.23E-02	520/646
naphthalene	NA	2.40E-04	1.60E+00	2.33E-02	8.39E-02	3.77E-02	3.77E-02	538/646
phenanthrene	NA	3.10E-04	2.40E+01	1.01E-01	9.55E-01	2.65E-01	2.65E-01	569/646
pyrene	NA	2.90E-04	4.70E+01	3.30E-01	2.64E+00	7.82E-01	7.82E-01	613/646
Pesticides								
4,4'-DDD	NA	4.00E-04	5.00E-03	8.85E-03	7.66E-03	1.19E-02	5.00E-03	3/123
4,4'-DDE	NA	1.00E-04	3.00E-02	8.84E-03	7.88E-03	1.19E-02	1.19E-02	8/123
4,4'-DDT	NA	2.00E-04	2.60E-03	8.96E-03	7.68E-03	1.20E-02	2.60E-03	5/123
dieldrin	NA	5.00E-04	5.00E-04	8.96E-03	7.68E-03	1.20E-02	5.00E-04	1/123
endosulfan sulfate	NA	4.00E-03	4.00E-03	1.49E-02	1.28E-02	2.00E-02	4.00E-03	1/123
heptachlor	NA	5.00E-04	5.00E-04	5.07E-03	4.35E-03	6.78E-03	5.00E-04	1/123
Polychlorinated Biphenyls								
Aroclor 1016	NA	4.70E-02	4.70E-02	1.88E-02	2.87E-03	1.99E-02	1.99E-02	1/123
Aroclor 1260	NA	5.00E-03	2.00E-02	1.79E-02	2.95E-03	1.91E-02	1.91E-02	9/123
Metals								
antimony	<Bkgd	1.40E-01	3.20E+00	1.62E+00	1.19E+00	2.10E+00	2.10E+00	17/120
arsenic	>Bkgd	2.30E+00	4.24E+01	1.06E+01	7.37E+00	1.17E+01	1.17E+01	120/120
barium	>Bkgd	3.09E+01	4.76E+02	1.67E+02	1.05E+02	1.84E+02	1.84E+02	120/120
beryllium	<Bkgd	6.50E-03	6.60E-01	1.98E-01	1.39E-01	2.53E-01	2.53E-01	75/120

Table 6-13 (continued)
Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
cadmium	>Bkgd	1.70E-02	1.50E+00	2.75E-01	2.19E-01	3.08E-01	3.08E-01	98/120
chromium	>Bkgd	3.00E+00	1.97E+02	5.77E+01	3.86E+01	6.38E+01	6.38E+01	120/120
cobalt	>Bkgd	5.50E+00	2.86E+01	1.49E+01	5.06E+00	1.57E+01	1.57E+01	120/120
copper	>Bkgd	3.60E+00	1.18E+02	3.54E+01	2.09E+01	3.88E+01	3.88E+01	120/120
iron	>Bkgd	1.05E+04	6.70E+04	3.39E+04	1.20E+04	3.86E+04	3.86E+04	120/120
lead	>Bkgd	6.10E+00	1.68E+02	2.84E+01	3.07E+01	4.06E+01	4.06E+01	120/120
mercury	>Bkgd	1.30E-01	2.40E+00	6.24E-01	5.35E-01	7.06E-01	7.06E-01	97/120
molybdenum	>Bkgd	4.70E-01	2.50E+00	1.58E-01	2.77E-01	2.68E-01	2.68E-01	4/120
nickel	>Bkgd	2.40E+00	4.74E+02	9.47E+01	1.02E+02	1.35E+02	1.35E+02	120/120
selenium	>Bkgd	8.80E-01	3.10E+00	5.19E-01	5.88E-01	7.53E-01	7.53E-01	13/120
thallium	>Bkgd	4.80E-01	3.70E+00	8.73E-01	9.07E-01	1.23E+00	1.23E+00	44/120
vanadium	>Bkgd	2.09E+01	1.04E+02	4.85E+01	1.77E+01	5.12E+01	5.12E+01	120/120
zinc	>Bkgd	2.75E+01	9.01E+02	1.03E+02	8.34E+01	1.37E+02	1.37E+02	120/120

[a] refined exposure point concentration, smaller value of the 95 percent UCL and maximum detected concentration
[b] organic compounds are grouped into categories according to toxicity assessment protocols used in the ecological risk assessment

95% UCL - 95 percent upper confidence level of the arithmetic mean, distribution dependent
>Bkgd - site data were statistically greater than the background data; see Appendix H for statistical analyses details
<Bkgd - site data were not statistically greater than the background data; see Appendix H for statistical analyses details
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
IR - Installation Restoration (Program)
NA - not analyzed for statistical difference from background
mg/kg - milligrams per kilogram

Table 6-14
Terrestrial Wildlife Receptor-Specific Hazard Quotients (HQ-Low)

COPEC	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
Volatile Organic Compounds						
benzene	1E-04	4E-05	1E-03	1E-03	1E-04	1E-03
methylene chloride	6E-04	3E-04	4E-03	2E-03	4E-04	4E-03
xylenes, total	8E-03	1E-03	6E-02	7E-02	2E-03	7E-02
Semivolatile Organic Compounds						
phenol	2E-02	5E-03	7E-01	6E-01	3E-02	7E-01
Polynuclear Aromatic Hydrocarbons						
acenaphthene	7E-03	2E-03	3E-01	3E-01	3E-01	3E-01
acenaphthylene	3E-03	9E-04	1E-01	9E-02	1E-01	1E-01
anthracene	1E-02	3E-03	4E-01	4E-01	5E-01	5E-01
benz(a)anthracene	9E-01	2E-01	1E+00	1E+00	**2E+00**	**2E+00**
benzo(b)fluoranthene	6E-01	1E-01	7E-01	8E-01	1E+00	1E+00
benzo(k)fluoranthene	6E-01	1E-01	8E-01	8E-01	**2E+00**	**2E+00**
benzo(g,h,i)perylene	5E-01	1E-01	6E-01	7E-01	**2E+00**	**2E+00**
benzo(a)pyrene	1E+00	3E-01	**2E+00**	**2E+00**	**2E+00**	**2E+00**
chrysene	**2E+00**	3E-01	**2E+00**	**2E+00**	**2E+00**	**2E+00**
dibenz(a,h)anthracene	2E-01	3E-02	2E-01	2E-01	2E-01	2E-01
fluoranthene	**3E+00**	6E-01	**3E+00**	**3E+00**	**4E+00**	**4E+00**
fluorene	3E-04	1E-04	1E-02	1E-02	2E-02	2E-02
indeno(1,2,3-cd)pyrene	1E+00	2E-01	1E+00	1E+00	**2E+00**	**2E+00**
2-methylnaphthalene	5E-04	2E-04	2E-02	2E-02	3E-02	3E-02
naphthalene	5E-03	2E-03	2E-01	1E-01	2E-01	2E-01
phenanthrene	5E-02	1E-02	**2E+00**	**2E+00**	**3E+00**	**3E+00**
pyrene	**4E+00**	9E-01	**4E+00**	**5E+00**	**6E+00**	**6E+00**
Pesticides						
4,4-DDD	8E-03	1E-03	**2E+00**	7E-01	7E-02	**2E+00**
4,4-DDE	5E-02	8E-03	**9E+00**	**4E+00**	4E-01	**9E+00**
4,4-DDT	4E-03	7E-04	8E-01	4E-01	3E-02	8E-01

Table 6-14 (continued)
Terrestrial Wildlife Receptor-Specific Hazard Quotients (HQ-Low)

COPEC	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
dieldrin	3E-02	5E-03	7E-03	9E-03	8E-04	3E-02
endosulfan sulfate	4E-02	6E-03	4E-04	5E-04	5E-05	4E-02
heptachlor	5E-03	8E-04	2E-04	3E-04	3E-05	5E-03
Polychlorinated Biphenyls						
Aroclor-1016	2E-01	3E-02	5E-01	7E-01	6E-02	7E-01
Aroclor-1260	8E-02	1E-02	2E-01	3E-01	3E-02	3E-01
Metals						
antimony	**7E+00**	1E+00	**6E+01**	**7E+01**	**3E+01**	**7E+01**
arsenic	**9E+00**	**2E+00**	5E-01	5E-01	5E-03	**9E+00**
barium	**6E+00**	**3E+00**	1E+00	1E+00	2E-01	**6E+00**
beryllium	3E-02	1E-02	4E-01	3E-01	1E+00	1E+00
cadmium	**4E+01**	**8E+00**	**2E+01**	**3E+01**	7E-01	**4E+01**
chromium	**5E+00**	1E+00	**2E+01**	**2E+01**	**2E+00**	**2E+01**
cobalt	1E+00	3E-01	**6E+00**	**6E+00**	3E-01	**6E+00**
copper	**7E+00**	**2E+00**	**6E+00**	**7E+00**	1E+00	**7E+00**
iron	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
lead	1E+01	**3E+00**	**9E+02**	**9E+02**	**1E+02**	**9E+02**
mercury	**5E+00**	1E+00	**2E+01**	**2E+01**	4E-01	**2E+01**
molybdenum	**3E+00**	6E-01	1E-01	2E-01	8E-02	**3E+00**
nickel	**8E+02**	**1E+02**	**6E+01**	**8E+01**	**1E+01**	**8E+02**
selenium	**2E+01**	**7E+00**	**4E+00**	**3E+00**	2E-01	**2E+01**
thallium	**2E+00**	4E-01	**2E+00**	**3E+00**	1E-01	**3E+00**
vanadium	**1E+01**	**5E+00**	3E-01	3E-01	2E-02	**1E+01**
zinc	**7E+01**	**1E+01**	**3E+01**	**3E+01**	**5E+00**	**7E+01**
Hazard Indices						
HI VOC	9E-03	1E-03	7E-02	7E-02	3E-03	7E-02
HI SVOC	2E-02	5E-03	7E-01	6E-01	3E-02	7E-01
HI PAH	**1E+01**	**3E+00**	**2E+01**	**2E+01**	**3E+01**	**3E+01**

Table 6-14 (continued)
Terrestrial Wildlife Receptor-Specific Hazard Quotients (HQ-Low)

COPEC	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
HI Pesticides	1E-01	2E-02	**1E+01**	**5E+00**	5E-01	**1E+01**
HI PCBs	3E-01	4E-02	7E-01	1E+00	9E-02	1E+00
HI Metals	**1E+03**	**1E+02**	**1E+03**	**1E+03**	**2E+02**	**1E+03**

* bold font indicates hazard quotient greater than 1

COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
HI - hazard index
NA - not available
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenyls
SVOC - semivolatile organic compound
VOC - volatile organic compound

Table 6-15
Terrestrial Wildlife Receptor-Specific Refined Hazard Quotients
(Refined HQ-Low)

COPEC	Background Comparison	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
Polynuclear Aromatic Hydrocarbons							
acenaphthene	NA	4E-05	1E-05	3E-03	2E-03	3E-04	3E-03
acenaphthylene	NA	3E-05	9E-06	2E-03	1E-03	3E-04	2E-03
anthracene	NA	6E-05	2E-05	4E-03	3E-03	5E-04	4E-03
benz(a)anthracene	NA	6E-03	1E-03	1E-02	1E-02	2E-03	1E-02
benzo(b)fluoranthene	NA	5E-03	1E-03	1E-02	1E-02	2E-03	1E-02
benzo(k)fluoranthene	NA	4E-03	9E-04	1E-02	9E-03	2E-03	1E-02
benzo(g,h,i)perylene	NA	5E-03	1E-03	1E-02	1E-02	3E-03	1E-02
benzo(a)pyrene	NA	1E-02	2E-03	2E-02	2E-02	3E-03	2E-02
chrysene	NA	1E-02	2E-03	2E-02	2E-02	3E-03	2E-02
dibenz(a,h)anthracene	NA	2E-03	3E-04	3E-03	3E-03	4E-04	3E-03
fluoranthene	NA	2E-02	4E-03	4E-02	4E-02	5E-03	4E-02
fluorene	NA	2E-05	5E-06	1E-03	9E-04	2E-04	1E-03
indeno(1,2,3-cd)pyrene	NA	9E-03	2E-03	2E-02	2E-02	2E-03	2E-02
2-methylnaphthalene	NA	2E-05	7E-06	2E-03	1E-03	2E-04	2E-03
naphthalene	NA	5E-05	2E-05	4E-03	2E-03	3E-04	4E-03
phenanthrene	NA	2E-04	6E-05	2E-02	1E-02	2E-03	2E-02
pyrene	NA	3E-02	6E-03	6E-02	5E-02	7E-03	6E-02
Pesticides							
4,4-DDD	NA	4E-03	5E-04	1E+00	5E-01	5E-03	1E+00
4,4-DDE	NA	9E-03	1E-03	**3E+00**	1E+00	1E-02	**3E+00**
4,4-DDT	NA	2E-03	3E-04	6E-01	2E-01	2E-03	6E-01
dieldrin	NA	1E-02	2E-03	5E-03	5E-03	6E-05	1E-02
endosulfan sulfate	NA	2E-02	2E-03	3E-04	3E-04	3E-06	2E-02
heptachlor	NA	2E-03	3E-04	2E-04	2E-04	2E-06	2E-03
Metals							
antimony	<Bkgd	**2E+00**	3E-01	**3E+01**	**3E+01**	1E+00	**3E+01**
arsenic	>Bkgd	1E+00	3E-01	1E-01	9E-02	1E-04	1E+00

Table 6-15 (continued)
Terrestrial Wildlife Receptor-Specific Refined Hazard Quotients
(Refined HQ-Low)

COPEC	Background Comparison	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
barium	>Bkgd	1E+00	4E-01	4E-01	3E-01	4E-03	1E+00
cadmium	>Bkgd	**4E+00**	6E-01	**4E+00**	**4E+00**	1E-02	**4E+00**
chromium	>Bkgd	7E-01	2E-01	**4E+00**	**3E+00**	5E-02	**4E+00**
cobalt	>Bkgd	3E-01	6E-02	**2E+00**	**2E+00**	1E-02	**2E+00**
copper	>Bkgd	9E-01	2E-01	**2E+00**	1E+00	3E-02	**2E+00**
iron	>Bkgd	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
lead	>Bkgd	1E+00	3E-01	**2E+02**	**1E+02**	**3E+00**	**2E+02**
mercury	>Bkgd	6E-01	1E-01	**5E+00**	**4E+00**	8E-03	**5E+00**
molybdenum	>Bkgd	1E-01	3E-02	1E-02	1E-02	6E-04	1E-01
nickel	>Bkgd	**1E+02**	**2E+01**	**1E+01**	**1E+01**	2E-01	**1E+02**
selenium	>Bkgd	**2E+00**	7E-01	7E-01	5E-01	4E-03	**2E+00**
thallium	>Bkgd	3E-01	5E-02	6E-01	6E-01	3E-03	6E-01
vanadium	>Bkgd	**3E+00**	9E-01	1E-01	9E-02	6E-04	**3E+00**
zinc	>Bkgd	**4E+00**	8E-01	**3E+00**	**3E+00**	5E-02	**4E+00**
Hazard Indices							
HI PAH	NA	1E-01	2E-02	2E-01	2E-01	3E-02	2E-01
HI Pesticides	NA	5E-02	6E-03	**5E+00**	**2E+00**	2E-02	**5E+00**
HI Metals	NA	**1E+02**	**2E+01**	**3E+02**	**2E+02**	**4E+00**	**3E+02**

* bold font indicates hazard quotient greater than 1

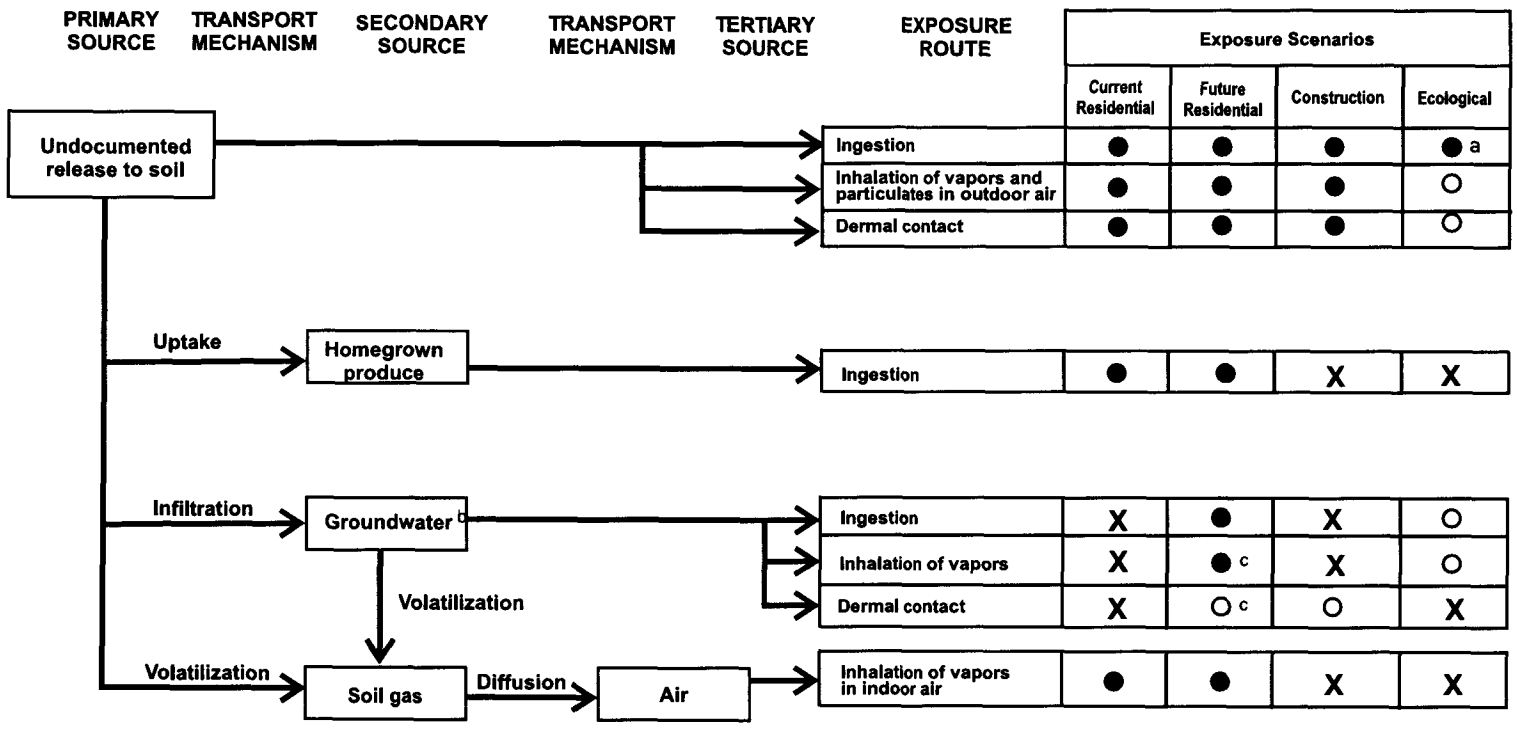
>Bkgd - site data were statistically greater than the background data; see Appendix H for statistical analyses details
<Bkgd - site data were not statistically greater than the background data; see Appendix H for statistical analyses details
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
HI - hazard index
NA - not available
PAH - polynuclear aromatic hydrocarbon

Table 6-16
Comparison of Site 31 and Background COPEC Maximum Refined Hazard Quotients (Refined HQ-Low)

COPEC	Background Maximum HQ	Site Maximum HQ
Pesticides		
4,4-DDE	NA	**3E+00**
Metals		
cadmium	**9E+00**	**4E+00**
chromium	**2E+00**	**4E+00**
cobalt	**2E+00**	**2E+00**
copper	7E-01	**2E+00**
iron	NA	NA
lead	**1E+02**	**2E+02**
mercury	**3E+00**	**5E+00**
nickel	**3E+01**	**1E+02**
selenium	NA	**2E+00**
vanadium	1E+00	**3E+00**
zinc	1E+00	**4E+00**

* bold font indicates hazard quotient greater than 1

COPEC - chemical of potential ecological concern
DDE - dichlorodiphenyldichloroethene
NA - not available



LEGEND

● = COMPLETE EXPOSURE PATHWAY

X = INCOMPLETE EXPOSURE PATHWAY

○ = COMPLETE EXPOSURE PATHWAY BUT NOT CONSIDERED A SIGNIFICANT SOURCE OF RISK. SEE TEXT FOR RATIONAL

NOTES

[a] Ingestion of soil and prey tissue potentially containing site-related contaminants

[b] Health risks are taken from the IR Site 25 Groundwater RI/FS (ERRG 2004)

[c] During showering

IR - INSTALLATION RESTORATION (PROGRAM)
FS - FEASBILITY STUDY
RI - REMEDIAL INVESTIGATION

Draft Final Soil RI Report for IR Site 31

Figure 6-1

Conceptual Site Model

Alameda, California

CDM

Date: 2-1-06
File No.
Job No. 127896-400-001-1044
Rev No.

Section 7
Conclusions and Recommendations

This section discusses the conclusions and recommendations of the IR Site 31 soil RI. This Draft Final Soil RI Report addresses input received from regulatory agencies in August 2006 to the Draft RI Report and agency input in March 2007 on the Draft RI Report - Revision I.

The NCP Section 300.400(a) requires a remedial response action be evaluated and selected in the CERCLA process when there is a release of a hazardous substance into the environment of any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare. The results of the baseline risk assessment are used to determine whether a release or potential release poses an unacceptable risk to human health or the environment. In accordance with EPA OSWER Directive 9355.0-30, when the cancer risk is greater than 10^{-4} and the noncancer HQ is greater than 1 action is generally warranted.

7.1 Conclusions

The nature and extent of chemicals in soil at IR Site 31 are identified, chemicals detected in groundwater samples at the site are compared with those in the OU-5/IR-02 groundwater plume, and the RI report provides an assessment of potential health effects of chemicals to human and ecological receptors.

This Draft Final RI report presents additional evidence that substantiates the conceptual site model of no releases from Navy activities. This RI report provides an evaluation using a DTSC policy on background metals with additional statistical, geochemical, and geophysical discussion in Appendix H2 to support conclusions that concentrations of arsenic are ambient and not related to on-site activities. The RI analytical results from 126 samples, plus historical data from 648 samples, provide the basis for the conclusions of human health risk assessment that the current soil conditions at IR Site 31 are protective of human health for residential use and risk to ecological receptors is unlikely. Therefore, this RI report recommends no further action for soil at IR Site 31.

Evaluations presented in this soil RI used methods that were comprehensive and fully considered past site use, land development history, and data from past investigations, in developing the conceptual site model and identifying data gaps. The historical and current RI analyses address the full range of potential contaminants, with soil sample locations distributed throughout the site, in a planned approach reviewed and concurred with by regulatory agencies.

Analytical results show residential PRGs were exceeded by arsenic, iron, lead, vanadium, and PAH, with a distribution showing the absence of release areas and absence of hotspot areas. The cancer risk for current and reasonable future use exposures to soil are at or below 10^{-6} when excluding metals present at ambient concentrations and rarely reported organic chemicals in soil. PAH health risks are within the risk management range and are managed by institutional controls in the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56. These institutional controls restrict uncontrolled excavations and specify a depth of 5 feet as the threshold limits for excavation in the western one-third and specifically the northwest portion of IR Site 31. The historical and RI data show that there is no evidence of a release from past activities. The RI provides supplemental evaluations supporting a possible rationale for the differences between metals in the soil at IR Site 31 and the Alameda Point pink background data set. The supplemental evaluations in Appendix H2, summarized in Section 4.1.4.3, explain that Alameda Point pink background data represent soil that is different from soil at IR Site 31 based on the original criteria for grouping background data at Alameda Point. Similar conclusions were reached for adjacent IR Site 25 in the 2002 Final OU-5 RI Report (Neptune et. al 2002).

7.1.1 Soil

The nature of the soil on this site was characterized using data collected during the November 2005 field activity for this soil RI and from three previous investigations (Section 4). The soil in the upper 2- to 4-foot depth is construction fill placed during the 1990 construction of Marina Village Housing. The soil below this depth was in place by 1927. The construction fill placed in the early 1990s was likely imported from a local borrow source in the Oakland area in accordance with common construction practices.

VOCs, SVOCs (other than PAHs), pesticides, and PCBs were reported in 8 percent or less of the soil samples and do not represent widespread impacts or concern for human exposures. These chemicals were reported at concentrations less than the regulatory comparison criteria used specifically for the IR Site 31 RI. From previous investigations, the average PAH concentration in soil samples, represented by the B[a]P equivalents (BEI 2004a), is less than 620 μg/kg.

The IR Site 31 soil RI provides supplemental evaluations supporting a possible rationale for the differences between metals in the soil at IR Site 31 and the Alameda Point pink background data set. The supplemental evaluations in Appendix H2, summarized in Section 4.1.4.3, explain that Alameda Point pink background data represent soil that is different from soil at IR Site 31 based on the original criteria for grouping background data at Alameda Point. The Alameda Point pink background data set does not include soil samples representative of the fill history for IR Site 31. The origins of the two fill materials and geochemical properties are different.

IR Site 31 was originally included in the area covered by the Alameda Point pink background (TtEMI, 2001a). Therefore, following the accepted remedial investigation and risk assessment process at Alameda Point, metal concentrations at IR Site 31 were initially compared to those in the Alameda Point pink background. Of the soil samples analyzed for the IR Site 31 RI, 15 metals (arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, thallium, vanadium, and zinc) have concentrations statistically greater than the Alameda Point pink background. Four of these (arsenic, iron, lead, and vanadium) had some concentrations greater than regulatory comparison criteria. Details of the statistical comparison to Alameda Point pink background are in Appendix H1.

An initial approach to evaluate alternative background data sets as potential sources of background data for IR Site 31 was determined unnecessary to demonstrate that the concentrations of arsenic were not the result of on-site activity. Statistical evaluations show that the concentrations of arsenic in soil at IR Site 31 meet criteria for a single population. The statistical evaluations followed methods in a DTSC policy as summarized in Section 4.1.4 (Cal/EPA 1997) with supporting analyses in Appendix H2. This conclusion is substantiated by a finding that cadmium, chromium, and vanadium also represent single populations at ambient concentrations.

Arsenic concentrations are ambient at IR Site 31 means that the arsenic is not the result of releases from onsite activities. Findings from the statistical evaluation of metals are summarized below.

- Evaluation of arsenic at IR Site 31. Application of DTSC criteria to arsenic at IR Site 31 demonstrates that arsenic concentrations in soil represent a single population. Therefore, arsenic concentrations are present at ambient concentrations, are not related to on-site activity, and do not represent a release.
- Evaluation of other metals at IR Site 31. Cadmium, chromium, and vanadium concentrations at IR Site 31 also meet the DTSC criteria for single populations. The probability plots for iron and lead suggest multiple populations. However, this characteristic of iron is also found in the Alameda Point pink background data set, suggesting that it is a common finding with major metals like iron. Lead does not meet the criteria for a single population; which is consistent with multiple environmental sources of lead.

Supplemental evaluations of the differences in the soil at IR Site 31 from the soil represented by the Alameda Point pink background is provided in a discussion of the fill history, lithology, and presence of similar concentrations of arsenic at adjacent locations (Appendix H2). The findings from the evaluation are summarized below.

- Assessment of arsenic concentrations at adjacent locations. IR Sites 31, along with the East Housing Area, and portions of the FISCA Warehouse Area between the East Housing Area and IR Site 31, represent approximately 140 acres of land with similar concentrations of arsenic. This assessment of arsenic concentrations shows that the fill, with concentrations of arsenic that are different than those in the Alameda Point pink background, was used east of Main Street. These arsenic concentrations are similar to arsenic concentrations in the Alameda Point yellow background data.
- Lithological evaluation. The lithology of adjacent areas was evaluated to identify similarities and differences between IR Sites 25, 30, 31, 35, the College of Alameda, and the East Housing Area. The comparison revealed that sites with higher arsenic concentrations tend to be associated with fill events characterized by gravel-laden soil. The physical properties, the grain-size distributions, and the descriptions of soil color indicate that soil at IR Site 31 is different from the soil at IR Site 35, located west of Main Street within the Alameda Point pink background area.
- Alameda Point pink background data set. This data set is not appropriate as a background data set for IR Site 31 based on the original criteria used to group the background data. IR Site 31 has a fill history different from the area sampled for the Alameda Point pink background data set. In addition, none of the background samples representing the Alameda Point pink background area were collected east of Main Street. Therefore, the soil east of Main Street is not represented in the background data set. Iron, considered an indicator of background conditions and used as a criteria in grouping the background data, is statistically higher at IR Site 31 than in the Alameda Point pink background data (PRC 1997a).

7.1.2 Groundwater

The groundwater beneath and around IR Site 31 is within the OU-5/IR-02 groundwater plume. The remedial decisions for the groundwater plume are independent for IR Site 31 soil and the preferred remedial alternative was presented in the Proposed Plan for which the public review was completed in April 2006. The chemical character of this plume is tracked by base-wide monitoring (ITSI 2007a), and the plume is characterized by the principal components of benzene and naphthalene. The high percentage of soil samples where VOCs were not detected at IR Site 31, and when detected, the low concentrations in soil, in combination with the low concentrations of benzene and naphthalene in groundwater samples from the upper portion of the FWBZ, indicate that IR Site 31 is not a source for the benzene and naphthalene in the OU-5/IR-02 plume beneath IR Site 31. The chemicals and their concentrations reported in discrete groundwater samples collected at IR Site 31 and from the five onsite monitoring wells

are consistent with those of the OU-5/IR-02 plume. The concentrations of benzene and naphthalene in groundwater beneath IR Site 31 increase with depth. Inorganics in groundwater beneath IR Site 31 are characterized by the five onsite monitoring wells and are consistent with concentrations of inorganics in the OU-5/IR-02 groundwater plume.

7.1.3 Human Health Risk

Cancer risk and noncancer HI values were calculated for three receptor populations potentially exposed to chemicals at IR Site 31: current residents, future residents, and construction workers.

For future residents, the risk estimates assume groundwater is used for drinking water. The total RME and CTE cancer risks (including background) for both EPA and Cal/EPA are above the risk management range at 2×10^{-2}. Over 99 percent of the risk is associated with residential use of groundwater; however, it is unlikely that groundwater will be used as a source of drinking water. Also, groundwater will be remediated consistent with the groundwater remedy selected for the OU-5/IR-02 groundwater plume.

The cancer risks are presented in two ways: as total cumulative estimates, which include metals, and as cancer risks without arsenic and cadmium at ambient concentrations. For current residents, the total EPA cancer risks (including background inorganics) are within the risk management range, and the Cal/EPA cancer risk 4×10^{-4}, with approximately 90 percent of this risk attributable to arsenic in soil. These risk values are similar to risk values for the Alameda Point background data sets.

For indoor air, the EPA cancer risk (8×10^{-7}) is below the risk management range, and Cal/EPA risk (1×10^{-5}) is within the range using the maximum concentration found in any groundwater sample.

Evidence from the fill history and statistical evaluation of metals in soil at IR Site 31 supports a conclusion that arsenic concentrations for IR Site 31 meet the DTSC criteria for an ambient population.

EPA and Cal/EPA make risk management decisions considering cancer risk without metals at ambient concentrations, so it is appropriate to present the cancer risk without ambient metals. Statistical evaluations of inorganics in soil (Appendix H2) show that arsenic and cadmium concentrations are ambient and not associated with releases from Navy activities. Therefore, the current and future risks without arsenic and cadmium, and without groundwater as a drinking water source are presented below as residual cancer risk values:

- The current residential residual cancer risk is within the risk management range, with an EPA cancer risk of 7×10^{-6} and a Cal/EPA cancer risk of 3×10^{-5}.
- The future residential residual cancer risk is within the risk management range, with an EPA cancer risk of 1×10^{-5} and a Cal/EPA cancer risk of 4×10^{-5}.

Other chemicals contributing to the residual cancer risk include PCBs, the pesticide dieldrin and benzo(a)pyrene. Prior to recommending chemicals for inclusion in remedial decisions, the following factors are considered: the level of risk and the distribution and frequency of detection. For PCBs and dieldrin, the risk assessment assumes that these chemicals are present at every location when in fact all these chemicals were rarely detected (i.e., detected in 1 to 8 percent of the samples). The few locations where these chemicals were found are dispersed and there is no specific area of impact.

Benzo(a)pyrene, a PAH, is present with an estimated cancer risk above 1×10^{-6}. The EPA cancer risk estimated for current residents is 2×10^{-6}. For current residents, the EPA and Cal/EPA cancer risks associated with all PAHs are 3×10^{-6} and 5×10^{-6}, respectively. For future residents, the EPA and Cal/EPA cancer risks associated with all PAHs are 8×10^{-6} and 1×10^{-5}, respectively. The occurrence of PAH is predominately in the northwest portion of the site. The concentrations of PAH contributing to risk are generally at a depth of 4 feet or deeper and related to the presence of the marsh crust layer. Exposure to the PAH is limited by institutional controls that restrict uncontrolled excavations and specify a depth of 5 feet as the threshold limits for excavation in the western one-third and specifically the northwest portion of IR Site 31. The institutional controls are administered through the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56.

Noncancer effects are primarily related to direct contact (ingestion) of soil (HI=4) and primarily associated with vanadium, thallium, and arsenic, with individual HQ values of less than 1, plus iron with an HQ of 2. The noncancer HI value is below 1 without iron and ambient metals (arsenic, cadmium, chromium, and vanadium). There is scientific evidence that iron has a low toxicity and the health effects are not considered additive with other chemicals. The EPC for lead is below the site-specific California residential soil PRGs.

Benzene, naphthalene, and other VOCs in groundwater that contribute to vapors in indoor air will be remediated as part of the OU-5/IR-02 groundwater plume.

7.1.4 Ecological Risk

The potential for adverse effects to current terrestrial receptors is limited due to the residential use and the absence of suitable natural habitat. Due to the unlikelihood of future development of terrestrial habitat at the site, no further investigation or

assessment of ecological risk for soil at IR Site 31 is recommended. Ecological risk to current and expected future receptors is unlikely.

7.2 Recommendations

The RI recommends that no further action or evaluation is needed for IR Site 31 based upon the data and evaluations that support the following:

- There is no evidence of a release of chemicals to soil related to a Navy activity.
- Statistical evaluations have concluded that arsenic, cadmium, chromium, and vanadium concentrations individually represent single populations and meet the DTSC criteria for ambient concentrations. Therefore, in accordance with EPA guidance and DTSC policy, these ambient metals were removed for residual risk calculations and the risks from ambient metals were not considered in the no further action recommendations of this RI.
- The EPA and Cal-EPA cancer risks for current and reasonable future use are within the risk management range. EPA and Cal/EPA cancer risks, including background metals, but without use of groundwater for drinking water, are not greater than 10^{-4}. The EPA and Cal/EPA cancer risk estimates, without groundwater as a drinking water source, and in accordance with EPA Guidance and Navy policy for background inorganics, without ambient concentrations of arsenic and cadmium are also in the risk management range. The EPA cancer risk value is 7×10^{-6} and the Cal/EPA cancer risk value is 3×10^{-5}.
- PAH health risks are within the risk management range and are managed by institutional controls in the City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56.
- The noncancer HI value is below 1 when the low toxicity of iron is considered and without ambient metals.
- Indoor air risks, within the risk management range, will decrease as groundwater remediation for OU-5 proceeds. In the proposed plan for the OU-5/IR-02 groundwater, the preferred alternative indicates the remedy will take approximately 8 years to achieve the remedial action objectives
- The screening level ecological risk estimate, completed with refined exposure assessment, has concluded that exposure pathways are not significant and ecological risk to current and expected future terrestrial receptors is unlikely for the current and expected future habitat at IR Site 31.
- The groundwater beneath IR Site 31 is consistent with the OU-5/IR-02 groundwater plume, and there is no evidence that IR Site 31 soil has contributed to a release to groundwater. The groundwater remedy selection is specific to OU-5, is unrelated to soil at IR Site 31, and is addressed in the OU-5/IR-02 groundwater remedial program.

In accordance with the NCP, in the absence of a release of hazardous substances and without a threat to human health or the environment from IR Site 31 soil, no further action is recommended, and IR Site 31 does not require evaluation of remedial alternatives through a feasibility study. The no further action remedial alternative for IR Site 31 soil can be presented in the proposed plan based upon the information presented in this soil RI report.

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Section 8
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APPENDIX A

HISTORICAL MAPS AND AERIAL PHOTOGRAPHS

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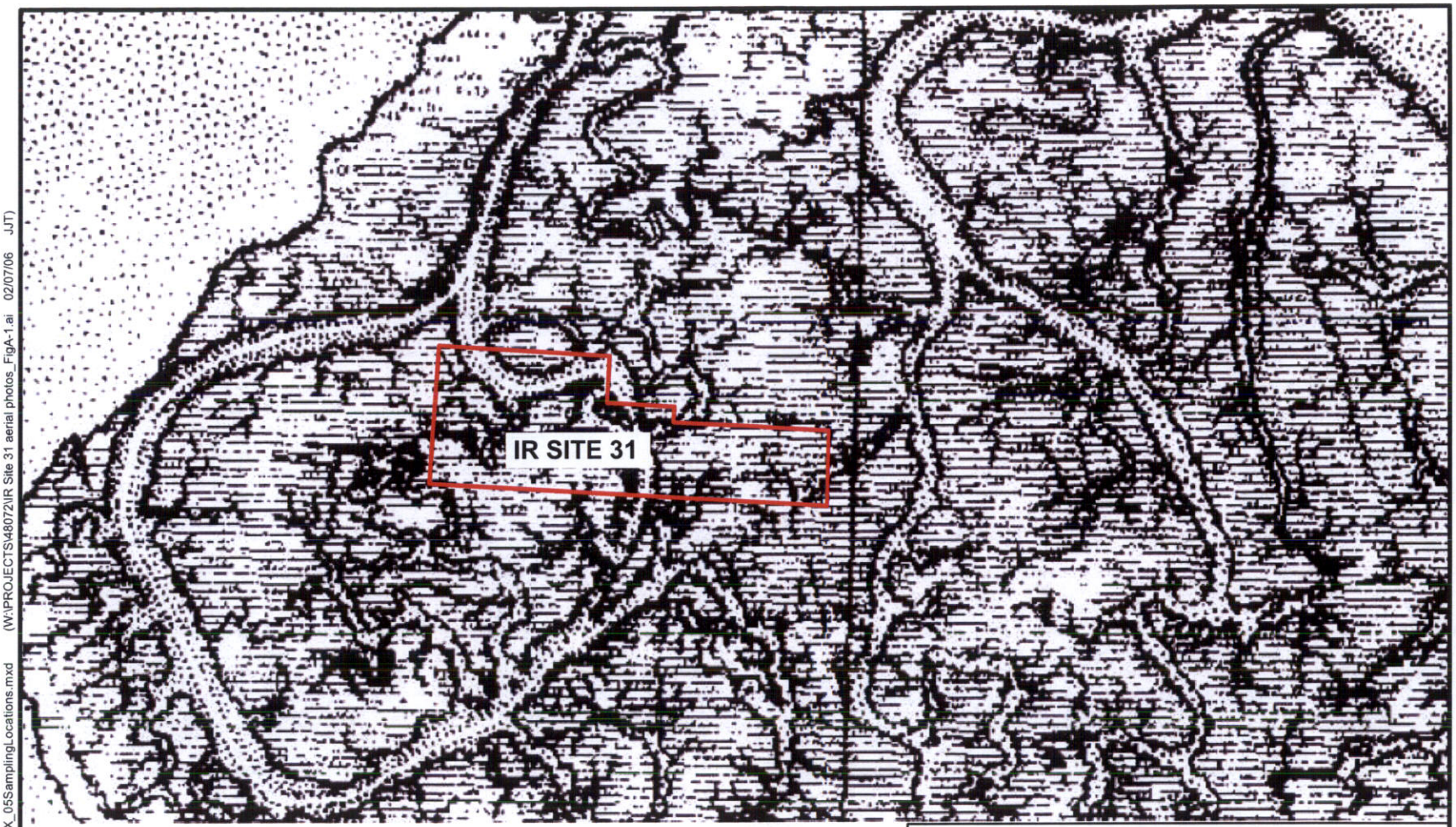

SOURCE: 1859 NAUTICAL CHART. SCALE 1:50,000.

Draft Final Soil RI Report for IR Site 31

Figure A-1

IR Site 31 Historical Map, 1859

Alameda, California

CDM

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Figure A-2

IR Site 31 Historical Map, 1903

Alameda, California

CDM

SOURCE: 1903 NAUTICAL CHART. SCALE 1:50,000.

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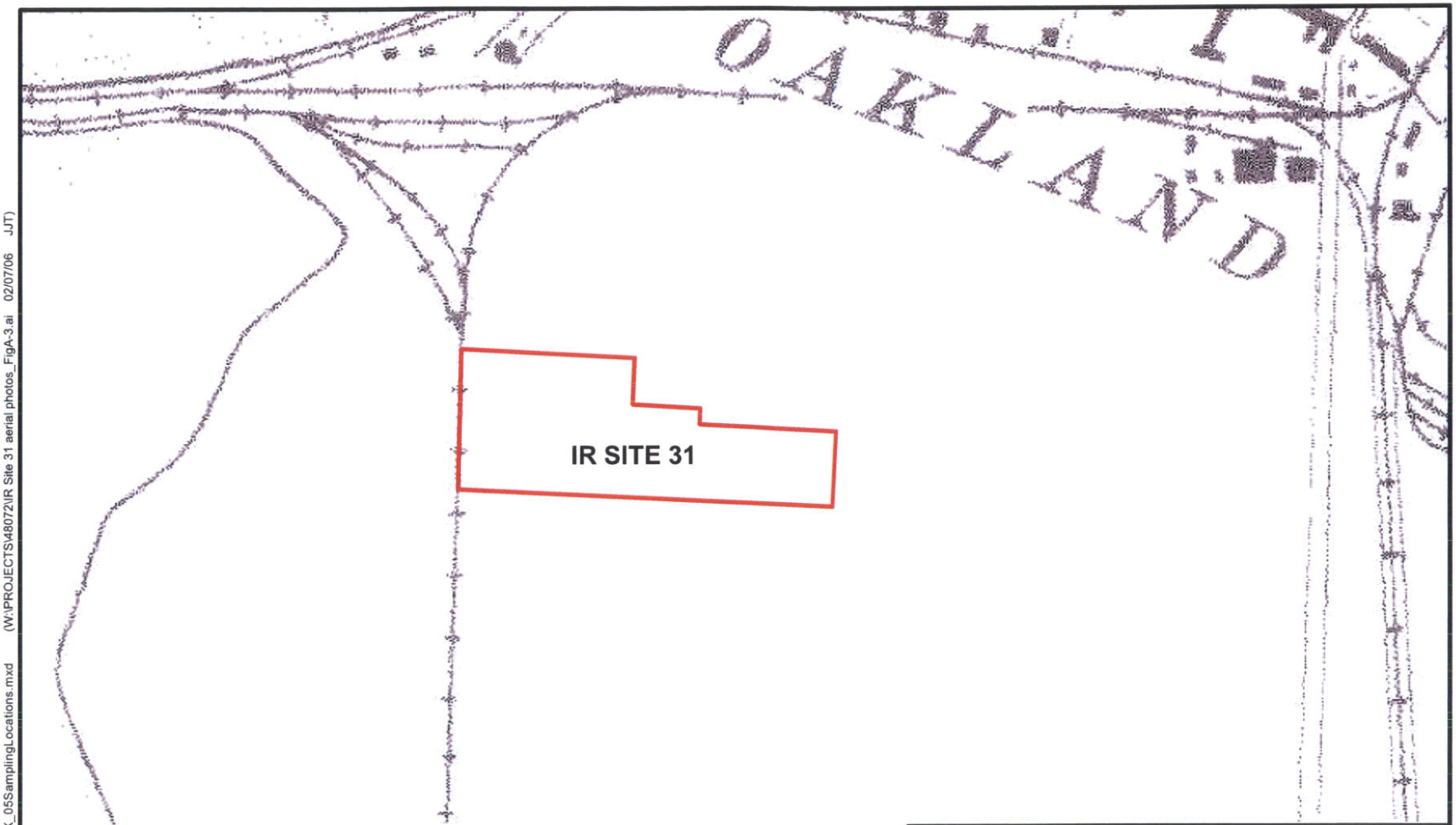

SOURCE: 1919 NAUTICAL CHART. SCALE 1:50,000.

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Figure A-3

IR Site 31 Historical Map, 1919

Alameda, California

CDM

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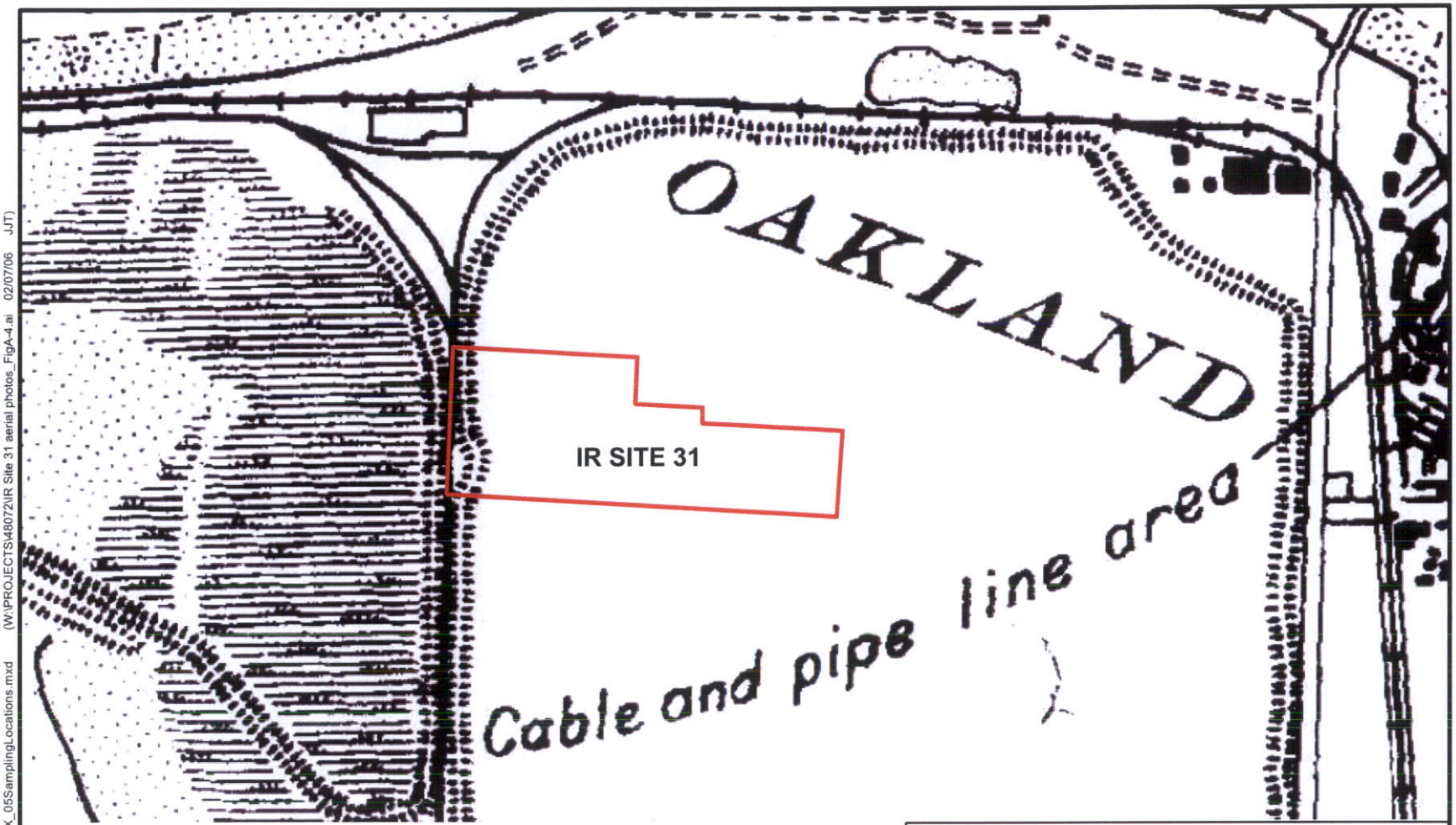

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Figure A-4

IR Site 31 Historical Map, 1927

Alameda, California

CDM

SOURCE: 1927 NAUTICAL CHART. SCALE 1:50,000.

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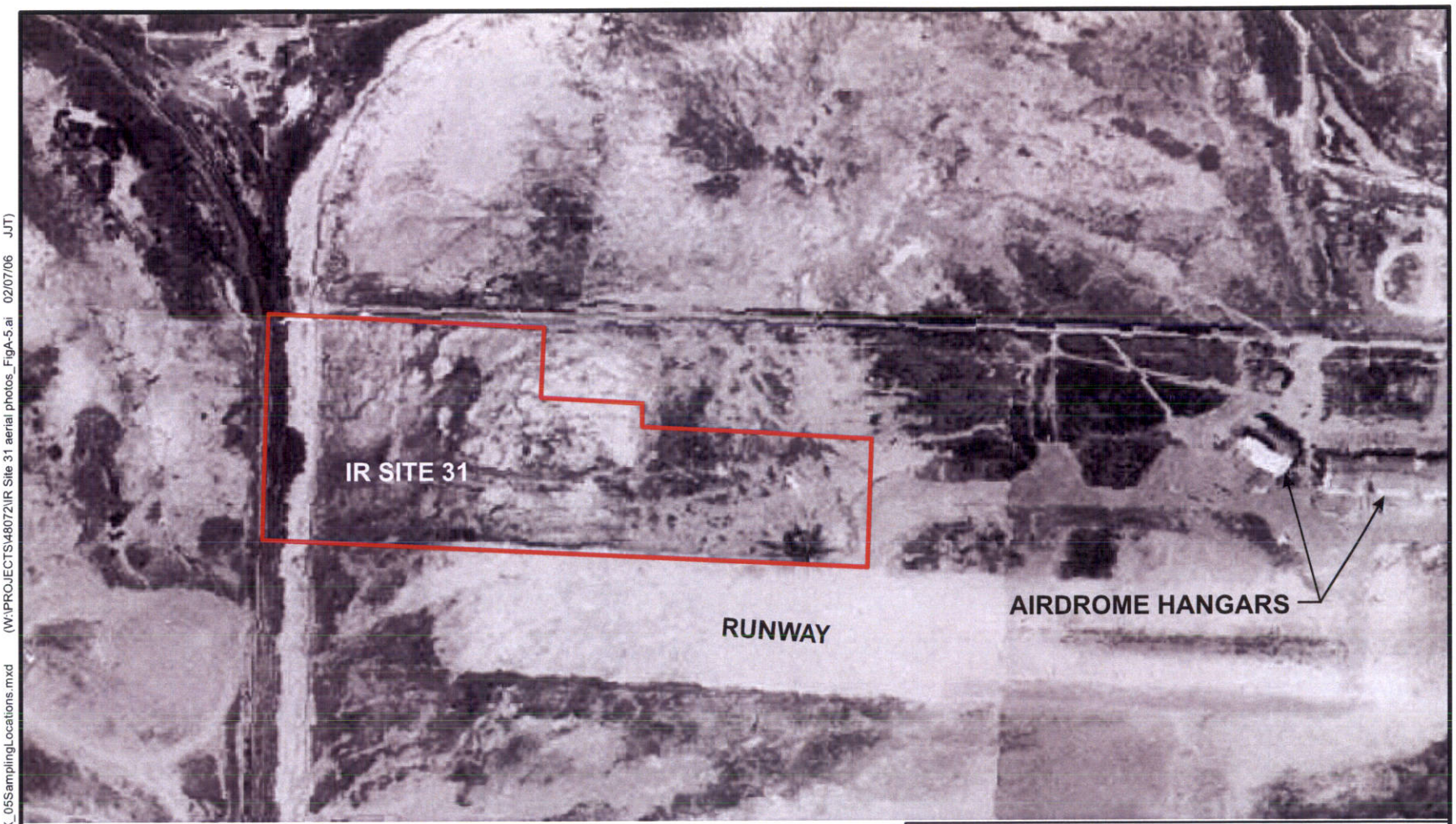

SOURCE: UNITED STATES NAVAL RESERVE. 1937. PROPOSED NAVAL AIR STATION AND SUPPLY DEPOT SITE, SOUTH WESTERN HARBOR AREA, ALAMEDA AND OAKLAND. SCALE 1:12000. SEPTEMBER.

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Figure A-5

IR Site 31 Aerial View, 1937

Alameda, California

CDM

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SOURCE: PACIFIC AERIAL SURVEYS. 1947. SCALE 1:20,000.

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Figure A-6

IR Site 31 Aerial View, 1947

Alameda, California

CDM

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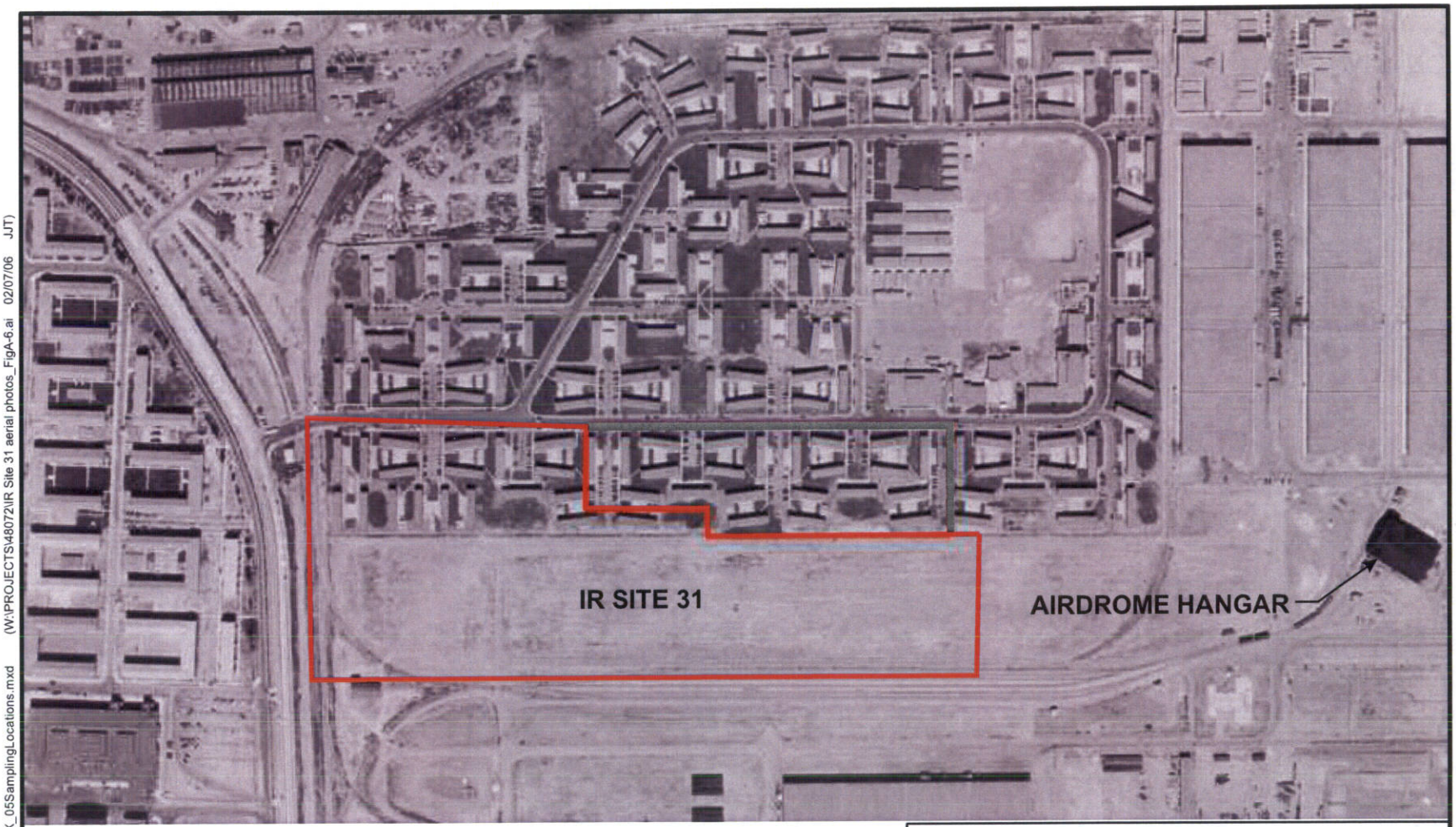

SOURCE: PACIFIC AERIAL SURVEYS. 1949. SCALE 1:9,500.

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Figure A-7

IR Site 31 Aerial View, 1949

Alameda, California

CDM

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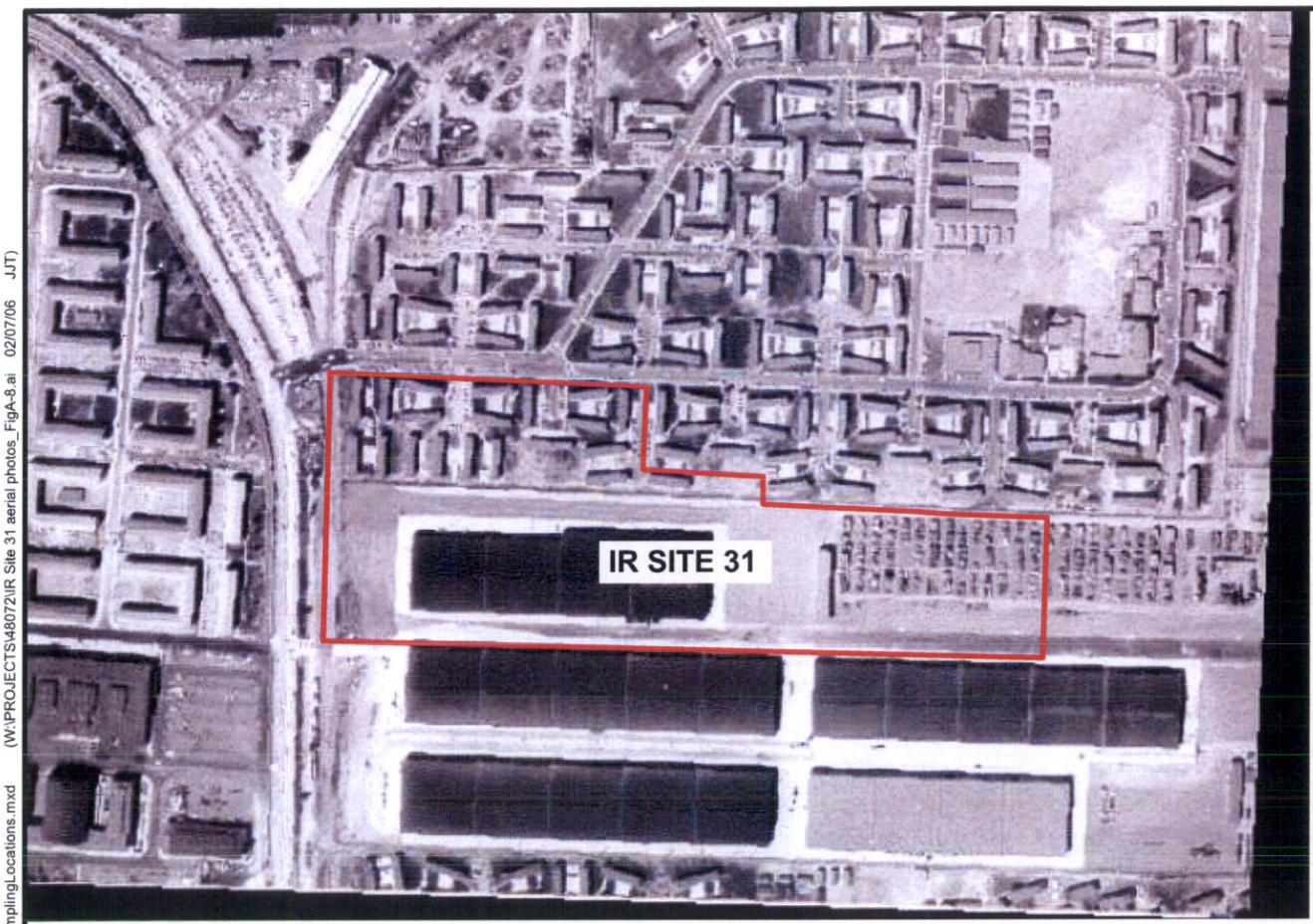

SOURCE: PACIFIC AERIAL SURVEYS. 1953. SCALE 1:10,000.

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Figure A-8

IR Site 31 Aerial View, 1953

Alameda, California

CDM

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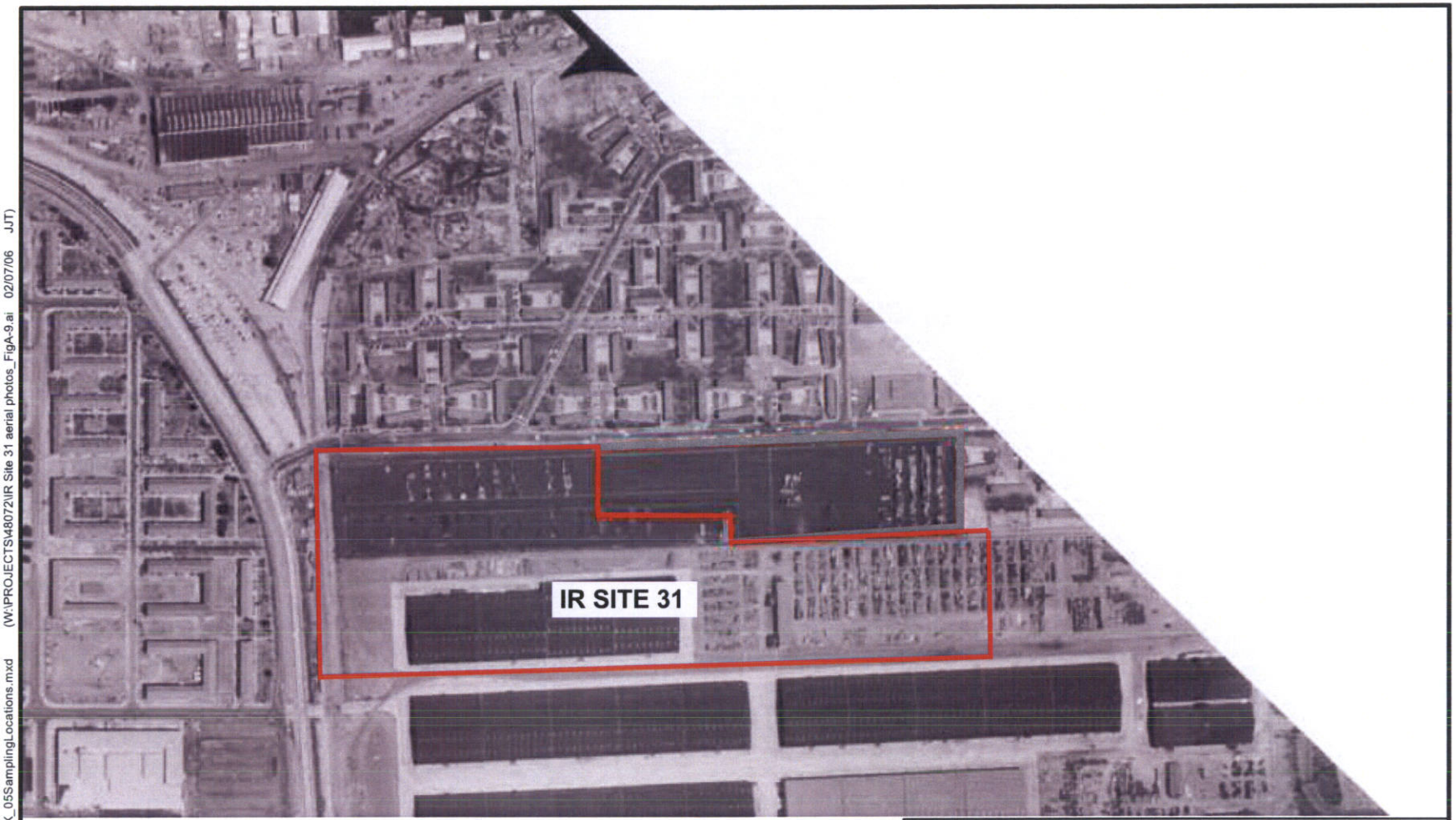

SOURCE: PACIFIC AERIAL SURVEYS. 1959. SCALE 1:9,600.

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Figure A-9

IR Site 31 Aerial View, 1959

Alameda, California

CDM

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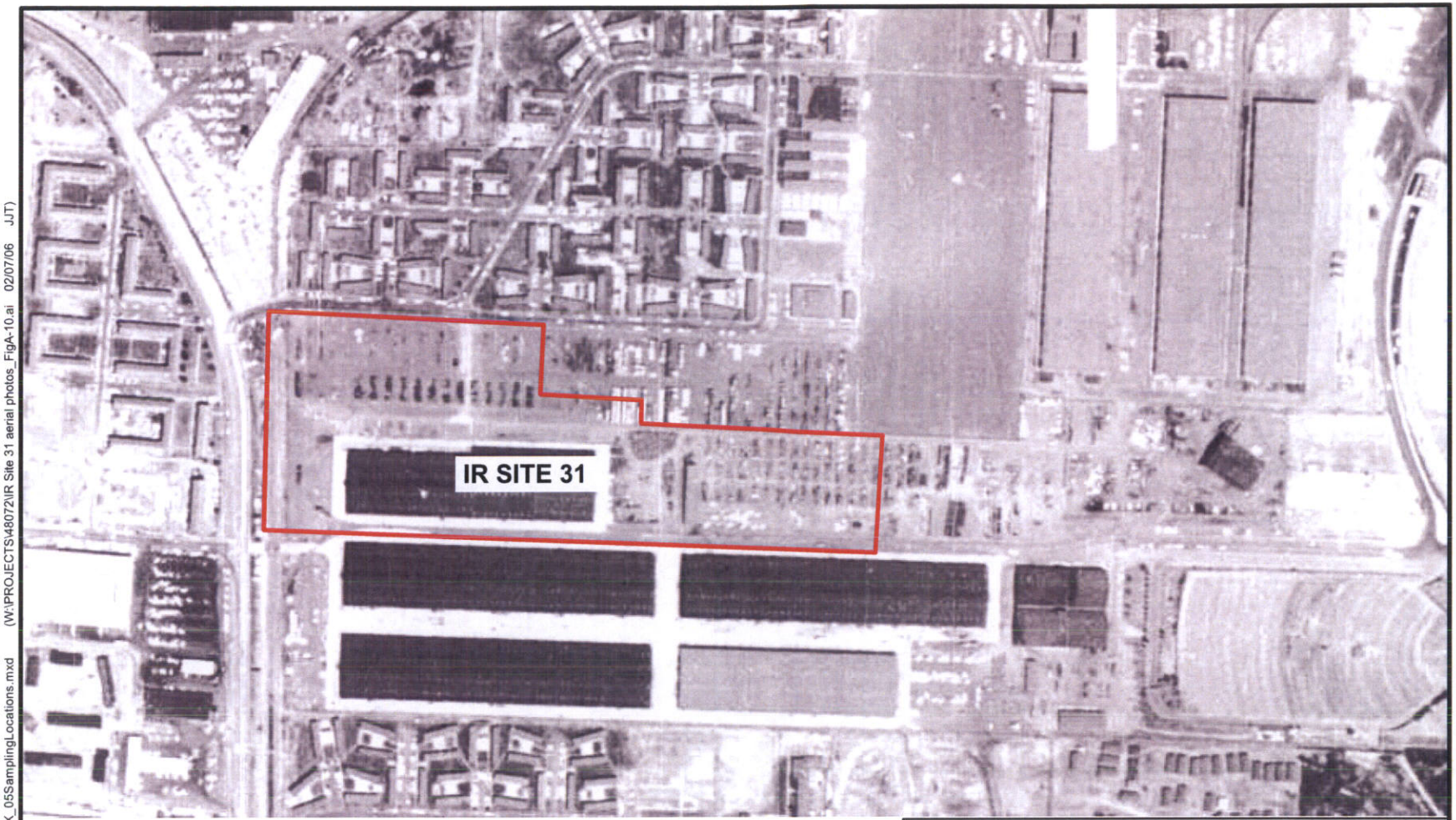

SOURCE: PACIFIC AERIAL SURVEYS. 1963. SCALE 1:6,000.

Draft Final Soil RI Report for IR Site 31

Figure A-10

IR Site 31 Aerial View, 1963

Alameda, California

CDM

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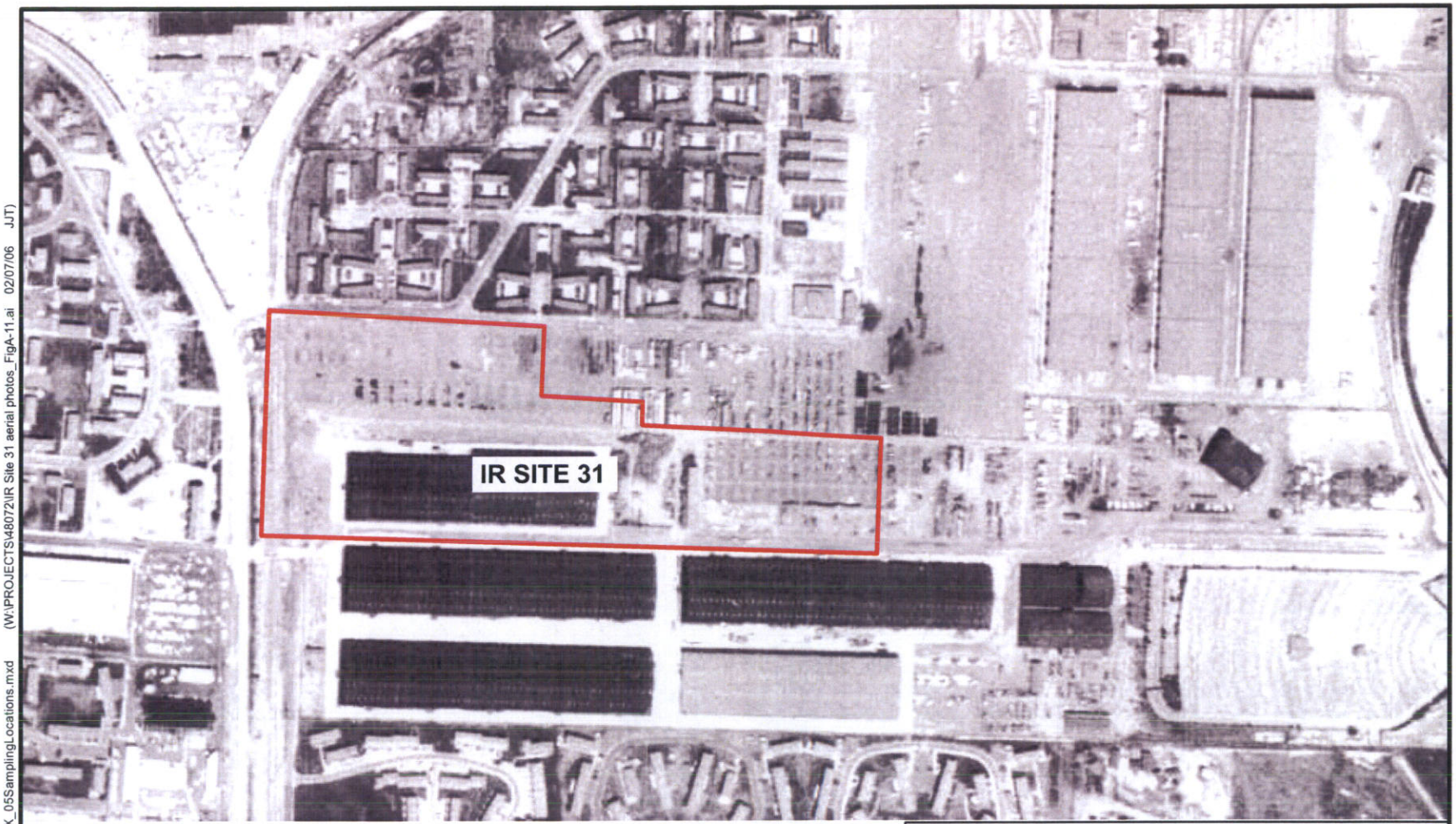

SOURCE: PACIFIC AERIAL SURVEYS. 1966. SCALE 1:6,000.

Draft Final Soil RI Report for IR Site 31

Figure A-11

IR Site 31 Aerial View, 1966

Alameda, California

CDM

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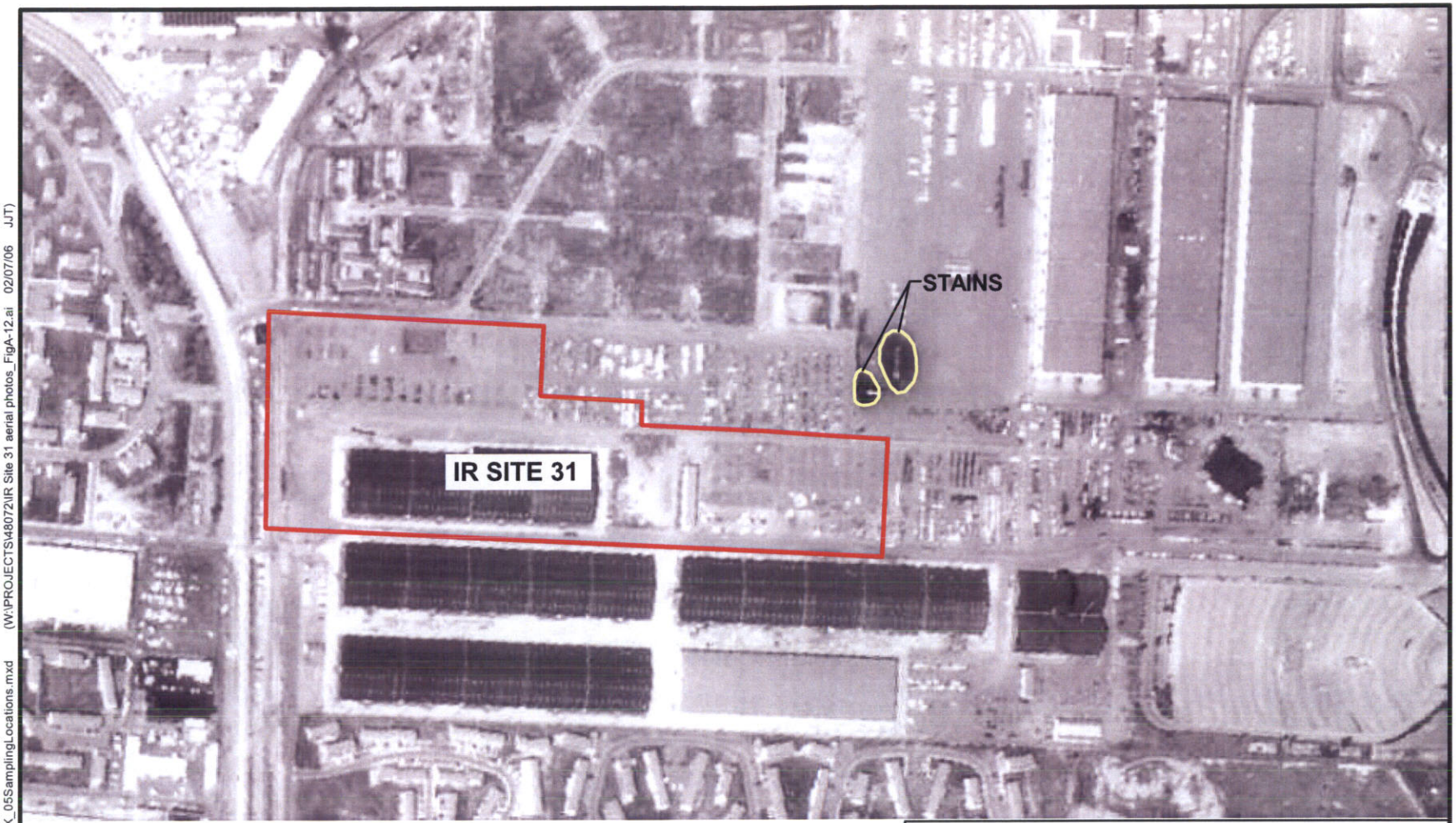

SOURCE: PACIFIC AERIAL SURVEYS. 1968. SCALE 1:6,000.

Draft Final Soil RI Report for IR Site 31

Figure A-12

IR Site 31 Aerial View, 1968

Alameda, California

CDM

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SOURCE: PACIFIC AERIAL SURVEYS. 1969. SCALE 1:12,000.

Draft Final Soil RI Report for IR Site 31

Figure A-13

IR Site 31 Aerial View, 1969

Alameda, California

CDM

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SOURCE: PACIFIC AERIAL SURVEYS. 1973. SCALE 1:12,000.

Draft Final Soil RI Report for IR Site 31

Figure A-14

IR Site 31 Aerial View, 1973

Alameda, California

CDM

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SOURCE: PACIFIC AERIAL SURVEYS. 1975. SCALE 1:12,000.

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Figure A-15

IR Site 31 Aerial View, 1975

Alameda, California

CDM

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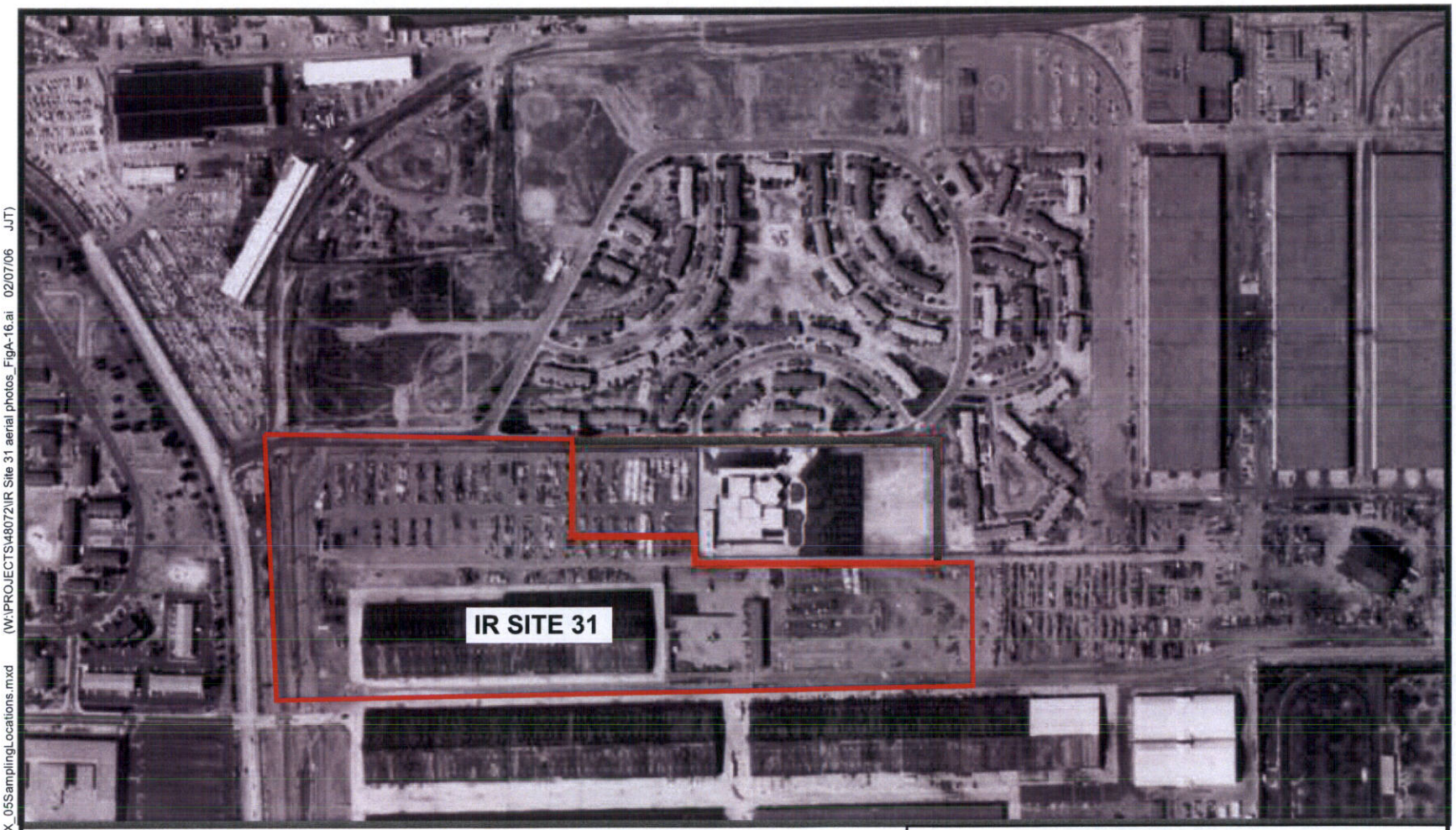

SOURCE: PACIFIC AERIAL SURVEYS. 1977. SCALE 1:12,000.

Draft Final Soil RI Report for IR Site 31

Figure A-16

IR Site 31 Aerial View, 1977

Alameda, California

CDM

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SOURCE: PACIFIC AERIAL SURVEYS. 1985. SCALE 1:12,000.

Draft Final Soil RI Report for IR Site 31

Figure A-17

IR Site 31 Aerial View, 1985

Alameda, California

CDM

Document: O:\alameda\avquery\MXD\FigureX-X_05SamplingLocations.mxd (W:\PROJECTS\48072\IR Site 31 aerial photos_FigA-17.ai 02/07/06 JJT)

SOURCE: TOWILL, INC. 1993. SCALE 1:6,000.

Draft Final Soil RI Report for IR Site 31

Figure A-18

IR Site 31 Aerial View, 1993

Alameda, California

CDM

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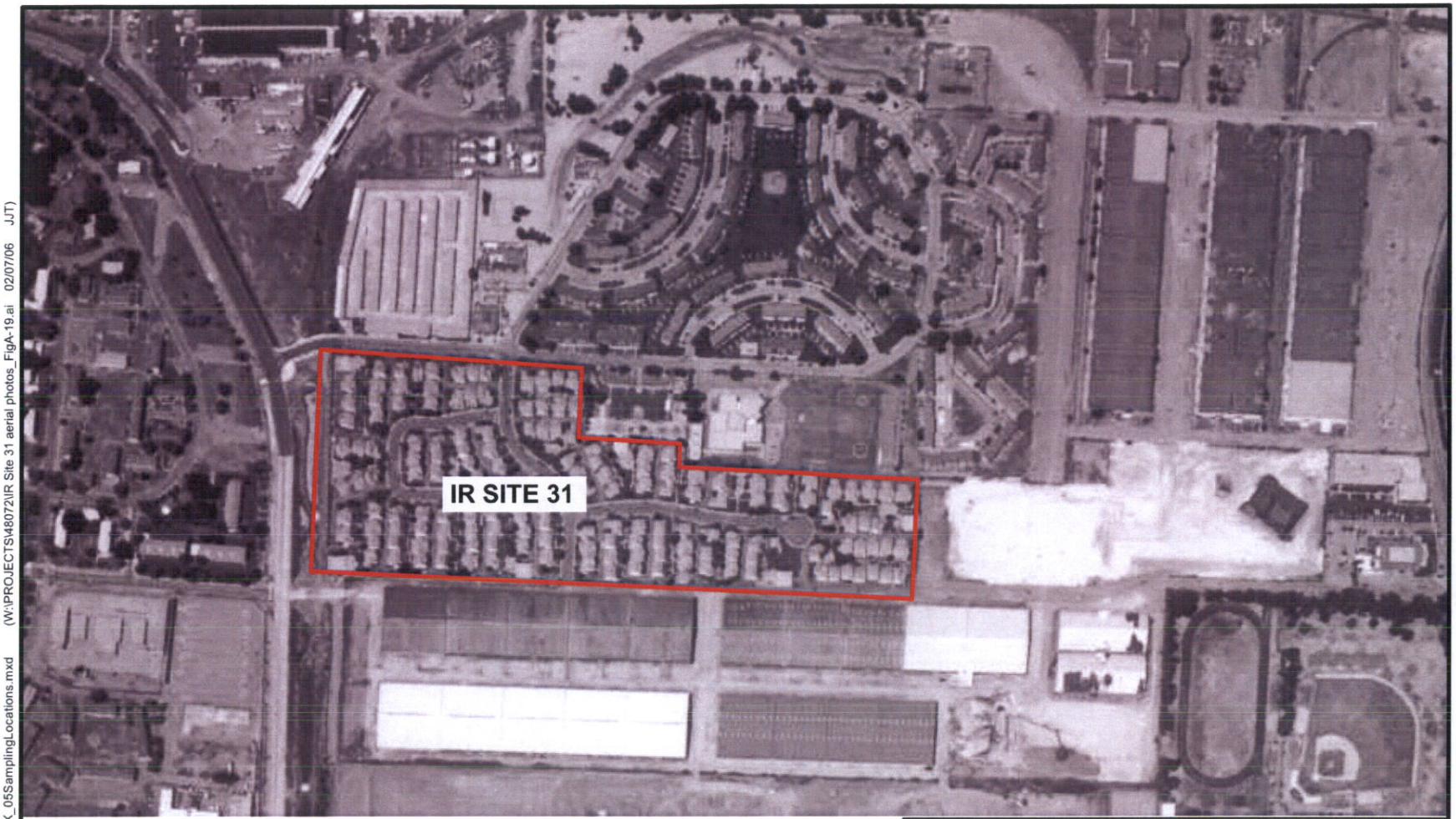

SOURCE: PACIFIC AERIAL SURVEYS. 2002. SCALE 1:12000.

Draft Final Soil RI Report for IR Site 31

Figure A-19

IR Site 31 Aerial View, 2002

Alameda, California

CDM

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APPENDIX B
HISTORICAL DATA

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B2 B[a]P Equivalent Average Concentration by Zone B-1

B3 B[A]P Equivalent from the 2002 PAH Study B-2

ATTACHMENTS

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Summary of Historical Soil Data Alameda Point IR Site 31

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B-1 2003 PAH Assessment Average B[a]P Equivalents by Zone

B-2 2002 B[a]P Equivalent Values

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B1 Summary of Historical Soil Data

Table B-1 presents a statistical summary of historic data listed below:

- The 648 normal soil samples collected from 163 locations during the polynuclear aromatic hydrocarbon (PAH) assessment (Bechtel Environmental, Inc. [BEI] 2004a) performed in 2003.
- Three surface soil samples from the Zone 16 - environmental baseline survey (EBS) Parcel 178 Evaluation (International Technology Corporation [IT] 2001). These three soil sampling locations are identified as 178-Z16-001 through 178- Z16-003 on Figure 4-1. The surface soil samples were analyzed for pesticides and polychlorinated biphenyls (PCBs).

B2 Benzo(a)pyrene [B[a]P] Equivalent Average Concentration by Zone

For Installation Restoration (IR) Site 31, the human health risk assessment (HHRA) has determined that PAHs are not primary and/or significant contributors to the human health risk. Therefore, calculating the mean by subareas and presenting discussions of nature and extent by subareas is not needed to meet the remedial investigation (RI) objectives. The nature and extent and site-wide distribution of PAH, as represented by B[a]P equivalent concentrations, is discussed in Sections 4.1.1.3 and 4.1.3.2. A map of the B[a]P equivalent concentrations was used to plan the soil investigation at IR Site 31 and is presented in the Final Work Plan for Remedial Investigation of IR Site 31 (CDM 2005a), and the PAH investigation is reported in detail in the Field Activity Report, Assessment of PAH Contamination at Selected CERCLA Sites and EBS Parcels (BEI 2004a). Therefore, the PAH distribution by zone presented on Figure B-1 is not discussed in Section 4 Nature and Extent of the IR Site 31 RI report. Figure B-1 presents estimates of the mean benzo(a)pyrene [B[a]P] equivalent values for each of the four depth intervals sampled in the 2003 PAH Assessment and calculated for three equal-area portions of IR Site 31. As stated in the response to U.S. Environmental Protection Agency (EPA) comment 7 (See Appendix L), received on the Draft Soil Remedial Investigation Report - Revision I for IR Site 31 dated November 29, 2006, the human health risk associated with PAHs is at or below 1×10^{-5}. Specifically, the EPA current and future residential risks for the PAH benzo[a]pyrene are 2×10^{-6} and 6×10^{-6} respectively. California Environmental Protection Agency (Cal/EPA) current and future residential risks for benzo[a]pyrene are 3×10^{-6} and 1×10^{-5}, respectively. As shown by the results of Figure B-1, the conclusions of Section 4 remain unchanged; the overall distribution of PAHs, based upon the mean B[a]P equivalent value in IR Site 31 soil, shows values increase primarily with depth and westward across the site.

Estimates of the mean B[a]P equivalent values for each of the four depth intervals sampled in the 2003 PAH Assessment and calculated for three equal-area portions of IR Site 31 are summarized below.

For Zone 1:

- Depth interval 0 to 0.5 feet below ground surface (bgs), mean B[a]P equivalent value is 181 micrograms per kilogram (µg/kg);
- Depth interval 0.5 to 2.0 feet bgs, mean B[a]P equivalent value is 204 µg/kg;
- Depth interval 2 to 4 feet bgs, mean B[a]P equivalent value is 474 µg/kg; and
- Depth interval 4 to 8 feet bgs, mean B[a]P equivalent value is 2392 µg/kg.

For Zone 2:

- Depth interval 0 to 0.5 feet bgs, mean B[a]P equivalent value is 199 µg/kg;
- Depth interval 0.5 to 2.0 feet bgs, mean B[a]P equivalent value is 75 µg/kg;
- Depth interval 2 to 4 feet bgs, mean B[a]P equivalent value is 205 µg/kg; and
- Depth interval 4 to 8 feet bgs, mean B[a]P equivalent value is 2166 µg/kg.

For Zone 3:

- Depth interval 0 to 0.5 feet bgs, mean B[a]P equivalent value is 180 µg/kg;
- Depth interval 0.5 to 2.0 feet bgs, mean B[a]P equivalent value is 92 µg/kg;
- Depth interval 2 to 4 feet bgs, mean B[a]P equivalent value is 58 µg/kg; and
- Depth interval 4 to 8 feet bgs, mean B[a]P equivalent value is 224 µg/kg.

B3 B[a]P Equivalent from the 2002 PAH Study

As discussed in Section 4, Figure B-2 shows the locations and the B[a]P equivalent values for the PAH samples from the 2002 study. Inclusion of the 2002 PAH data, consisting of 12 locations and 46 analyses, has no impact on the outcome of the nature and extent discussion because the presence of PAH in soil at IR Site 31 is completely characterized by the analytical results of 648 samples collected from 163 locations during the 2003 PAH Assessment study. The 2002 PAH investigation is reported in Appendix D to the Final RI Report for Transfer Parcel EDC-5, dated March 2005 (BEI 2005b).

Tables

Appendix B
Summary of Historical Soil Data Alameda Point IR Site 31

Chemical	Units	Minimum Result	Qualifier	Maximum Result	Qualifier	Location of Maximum Result	Frequency of Detection	Detection Limit Range
Polycyclic Aromatic Hydrocarbons, Soil Interval 0 to 0.5 feet below ground surface								
2-methylnaphthalene	mg/kg	0.00024		0.17		C3S031B104	133/163	0.0002-0.0883
Acenaphthene	mg/kg	0.00023		0.19		C3S031B036	130/163	0.0002-0.2143
Acenaphthylene	mg/kg	0.00016		0.078		C3S031B139	136/163	0.0002-0.2321
Anthracene	mg/kg	0.00023		1.2	D	C3S031B036	137/163	0.0002-0.1964
Benzo(a)anthracene	mg/kg	0.00023		3.3	D	C3S031B036	142/163	0.0001-0.3214
Benzo(a)pyrene	mg/kg	0.00017		2.7	D	C3S031B036	153/163	0.0001-0.25
Benzo(b)fluoranthene	mg/kg	0.00023		1.8	D	C3S031B036	156/163	0.0001-0.2321
Benzo(ghi)perylene	mg/kg	0.00034		1.1	D	C3S031B036	150/163	0.0001-0.2679
Benzo(k)fluoranthene	mg/kg	0.00024		2.3	D	C3S031B036	139/163	0.0001-0.3214
Chrysene	mg/kg	0.00019		3.7	D	C3S031B036	152/163	0.0001-0.3036
Dibenz(a,h)anthracene	mg/kg	0.00023		0.46		C3S031B036	135/163	0.0002-0.25
Fluoranthene	mg/kg	0.00038		7.1	D	C3S031B036	148/163	0.0002-1.3571
Fluorene	mg/kg	0.00017		0.16		C3S031B036	130/163	0.0002-0.179
Indeno(1,2,3-cd)pyrene	mg/kg	0.00027		1.5	D	C3S031B036	138/163	0.0001-0.3571
Naphthalene	mg/kg	0.00024		0.086		C3S031B087	134/163	0.0002-0.11
Phenanthrene	mg/kg	0.00031		3.4	D	C3S031B036	141/163	0.0001-0.3036
Pyrene	mg/kg	0.00029		5.9	D	C3S031B036	155/163	0.0001-1.1429
Polycyclic Aromatic Hydrocarbons, Soil Interval 0.5 to 2 feet below ground surface								
2-methylnaphthalene	mg/kg	0.00024		0.064		C3S031B017	133/163	0.0002-0.0883
Acenaphthene	mg/kg	0.00023		0.1		C3S031B076	108/163	0.0002-0.2143
Acenaphthylene	mg/kg	0.00016		0.12		C3S031B017	125/163	0.0002-0.2321
Anthracene	mg/kg	0.00023		0.17		C3S031B007/'C3S031B068	132/163	0.0002-0.1964
Benzo(a)anthracene	mg/kg	0.00023		1.1		C3S031B017	142/163	0.0001-0.3214
Benzo(a)pyrene	mg/kg	0.00017		1.7	D	C3S031B017	153/163	0.0001-0.25
Benzo(b)fluoranthene	mg/kg	0.00023		1.4	D	C3S031B017	157/163	0.0001-0.2321
Benzo(ghi)perylene	mg/kg	0.00034		1.9	D	C3S031B017	149/163	0.0001-0.2679

Appendix B
Summary of Historical Soil Data Alameda Point IR Site 31

Chemical	Units	Minimum Result	Qualifier	Maximum Result	Qualifier	Location of Maximum Result	Frequency of Detection	Detection Limit Range
Benzo(k)fluoranthene	mg/kg	0.00024		1.4	D	C3S031B017	135/163	0.0001-0.3214
Chrysene	mg/kg	0.00019		1.5	D	C3S031B017	148/163	0.0001-0.3036
Dibenz(a,h)anthracene	mg/kg	0.00023		0.28		C3S031B017	133/163	0.0002-0.25
Fluoranthene	mg/kg	0.00038		2.7	D	C3S031B017	150/163	0.0002-1.3571
Fluorene	mg/kg	0.00017		0.08		C3S031B068	126/163	0.0002-0.179
Indeno(1,2,3-cd)pyrene	mg/kg	0.00027		2	D	C3S031B017	140/163	0.0001-0.3571
Naphthalene	mg/kg	0.00024		0.2		C3S031B017	133/163	0.0002-0.11
Phenanthrene	mg/kg	0.00031		1.2	D	C3S031B068	141/163	0.0001-0.3036
Pyrene	mg/kg	0.00029		3	D	C3S031B017	154/163	0.0001-1.1429
Polycyclic Aromatic Hydrocarbons, Soil Interval 2 to 4 feet below ground surface								
2-methylnaphthalene	mg/kg	0.00024		0.12		C3S031B122	130/161	0.0002-0.0883
Acenaphthene	mg/kg	0.00023		0.091		C3S031B013	105/161	0.0002-0.2143
Acenaphthylene	mg/kg	0.00016		0.15		C3S031B060	125/161	0.0002-0.2321
Anthracene	mg/kg	0.00023		0.24		C3S031B060	126/161	0.0002-0.1964
Benzo(a)anthracene	mg/kg	0.00023		1.8	D	C3S031B060	143/161	0.0001-0.3214
Benzo(a)pyrene	mg/kg	0.00017		2.8	D	C3S031B060	144/161	0.0001-0.25
Benzo(b)fluoranthene	mg/kg	0.00023		2.4	D	C3S031B060	147/161	0.0001-0.2321
Benzo(ghi)perylene	mg/kg	0.00034		3.5	D	C3S031B060	146/161	0.0001-0.2679
Benzo(k)fluoranthene	mg/kg	0.00024		2.4	D	C3S031B060	139/161	0.0001-0.3214
Chrysene	mg/kg	0.00019		2.7	D	C3S031B060	149/161	0.0001-0.3036
Dibenz(a,h)anthracene	mg/kg	0.00023		0.54		C3S031B060	134/161	0.0002-0.25
Fluoranthene	mg/kg	0.00038		4.6	D	C3S031B060	145/161	0.0002-1.3571
Fluorene	mg/kg	0.00017		0.049		C3S031B017	118/161	0.0002-0.179
Indeno(1,2,3-cd)pyrene	mg/kg	0.00027		3.4	D	C3S031B060	142/161	0.0001-0.3571
Naphthalene	mg/kg	0.00024		0.2		C3S031B060	137/161	0.0002-0.11

Appendix B
Summary of Historical Soil Data Alameda Point IR Site 31

Chemical	Units	Minimum Result	Qualifier	Maximum Result	Qualifier	Location of Maximum Result	Frequency of Detection	Detection Limit Range
Phenanthrene	mg/kg	0.00031		1.3	D	C3S031B060	144/161	0.0001-0.3036
Pyrene	mg/kg	0.00029		650	D	C3S031B122	151/161	0.0001-1.1429
Polycyclic Aromatic Hydrocarbons, Soil Interval 4 to 8 feet below ground surface								
2-methylnaphthalene	mg/kg	0.00024		0.31	D	C3S031B004	140/161	0.0002-0.0883
Acenaphthene	mg/kg	0.00023		18	D	C3S031B007	136/161	0.0002-0.2143
Acenaphthylene	mg/kg	0.00016		3.4	D	C3S031B007	145/161	0.0002-0.2321
Anthracene	mg/kg	0.00023		19	D	C3S031B007	149/161	0.0002-0.1964
Benzo(a)anthracene	mg/kg	0.00023		38	D	C3S031B007	157/161	0.0001-0.3214
Benzo(a)pyrene	mg/kg	0.00017		58	D	C3S031B007	158/161	0.0001-0.25
Benzo(b)fluoranthene	mg/kg	0.00023		52	D	C3S031B007	159/161	0.0001-0.2321
Benzo(ghi)perylene	mg/kg	0.00034		24	D	C3S031B007	158/161	0.0001-0.2679
Benzo(k)fluoranthene	mg/kg	0.00024		13	D	C3S031B032/'C3S031B007	157/161	0.0001-0.3214
Chrysene	mg/kg	0.00019		31	D	C3S031B007	158/161	0.0001-0.3036
Dibenz(a,h)anthracene	mg/kg	0.00023		2.8	D	C3S031B007	149/161	0.0002-0.25
Fluoranthene	mg/kg	0.00038		100	D	C3S031B007	158/161	0.0002-1.3571
Fluorene	mg/kg	0.00017		3.3	D	C3S031B007	140/161	0.0002-0.179
Indeno(1,2,3-cd)pyrene	mg/kg	0.00027		14	D	C3S031B007/'C3S031B032	156/161	0.0001-0.3571
Naphthalene	mg/kg	0.00024		1.6	D	C3S031B032	148/161	0.0002-0.11
Phenanthrene	mg/kg	0.00031		49	D	C3S031B007	155/161	0.0001-0.3036
Pyrene	mg/kg	0.00029		130	D	C3S031B007	159/161	0.0001-1.1429
Pesticides/Polychorinated Biphenyls, Surface Soil								
Aldrin		--a		--			0/3	NA
Aroclor-1016		--		--			0/3	NA
Aroclor-1221		--		--			0/3	NA

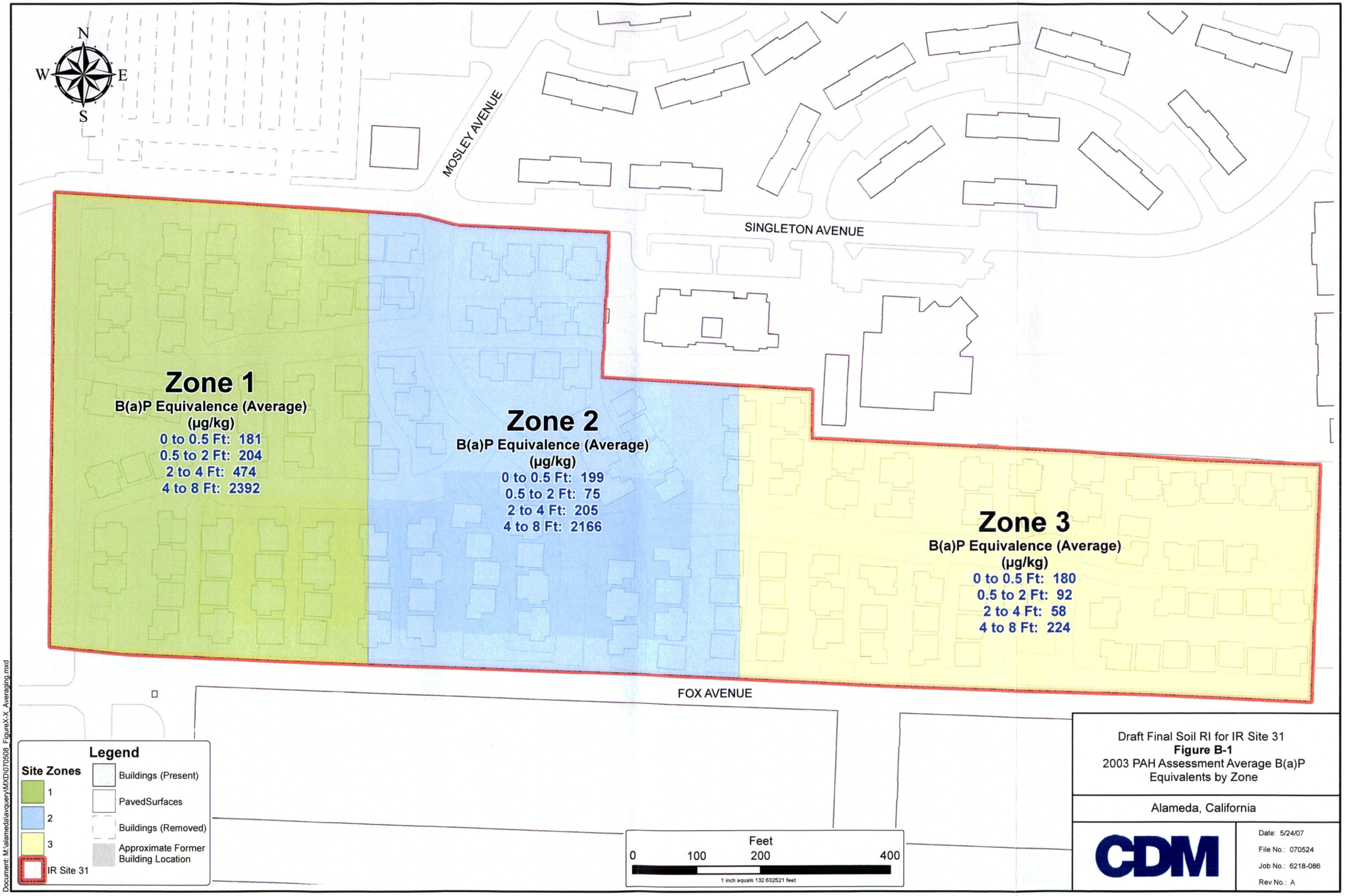
Appendix B
Summary of Historical Soil Data Alameda Point IR Site 31

Chemical	Units	Minimum Result	Qualifier	Maximum Result	Qualifier	Location of Maximum Result	Frequency of Detection	Detection Limit Range
Aroclor-1232		--		--			0/3	NA
Aroclor-1242		--		--			0/3	NA
Aroclor-1248		--		--			0/3	NA
Aroclor-1254		--		--			0/3	NA
Aroclor-1260		--		--			0/3	NA
Alpha-BHC		--		--			0/3	NA
Beta-BHC		--		--			0/3	NA
Delta-BHC		--		--			0/3	NA
Gamma-BHC (lindane)		--		--			0/3	NA
Alpha-chlordane		--		--			0/3	NA
Gamma-chlordane		--		--			0/3	NA
4,4'-DDD		--		--			0/3	NA
4,4'-DDE		--		--			0/3	NA
4,4'-DDT	ug/kg	2.6	J	2.6	J	178-Z16-003	1/3	NA
Dieldrin		--		--			0/3	NA
Endosulfan I		--		--			0/3	NA
Endosulfan II		--		--			0/3	NA
Endosulfan sulfate	ug/kg	4		4		178-Z16-001	1/3	NA
Endrin		--		--			0/3	NA
Endrin aldehyde		--		--			0/3	NA
Endrin ketone		--		--			0/3	NA
Heptachlor		--		--			0/3	NA
Heptachlor epoxide		--		--			0/3	NA
Methoxychlor		--		--			0/3	NA
Toxaphene		--		--			0/3	NA

Note:
-- [a] - analyzed for, but not detected

Acronmyns/Abbreviations:
D - diluted sample
mg/kg - milligrams per kilogram
NA - not available

Figures

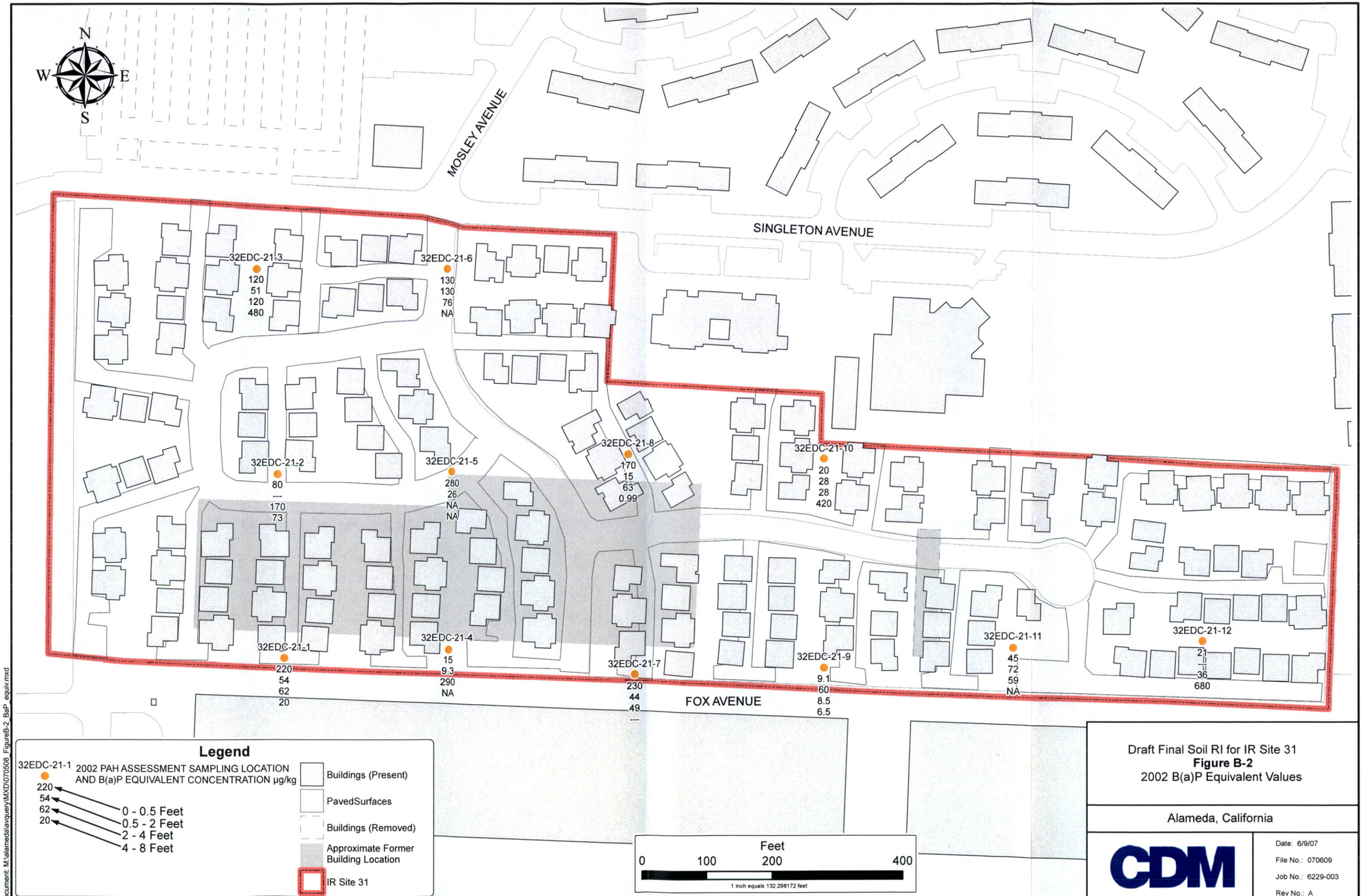


Draft Final Soil RI for IR Site 31
Figure B-1
2003 PAH Assessment Average B(a)P Equivalents by Zone

Alameda, California

CDM

Date: 5/24/07
File No.: 070524
Job No.: 6218-086
Rev No.: A



Draft Final Soil RI for IR Site 31
Figure B-2
2002 B(a)P Equivalent Values

Alameda, California

CDM

Date: 6/9/07
File No.: 070609
Job No.: 6229-003
Rev No.: A

Document: M:\alameda\avquery\MXD\070508_FigureB-2_BaP_equiv.mxd

APPENDIX C

FIELD METHODOLOGY TEXT

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ATTACHMENTS

Attachment

C-1 Chain-of-Custody Forms

C-2 Survey Coordinate Data Table

C-3 Investigation Derived Waste Disposal Manifests

ACRONYMS/ABBREVIATIONS

bgs	below ground surface
COC	chain-of-custody
DO	dissolved oxygen
FSP	field sampling plan
IDW	investigation-derived waste
IR	Installation Restoration
ORP	oxidation reduction potential
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
QC	quality control
RI	remedial investigation
SpC	specific conductivity
SOP	standard operation procedures
SVOC	semivolatile organic compound
T	temperature
VOC	volatile organic compound

Appendix C
Field Sampling Plan

The following sections serve as the Field Sampling Plan (FSP) for the field activities of the RI at IR Site 31 performed at Alameda Point. Field methods, procedures, sample custody, and documentation are discussed in the FSP. Also included with this Appendix is Attachment C-1 which consists of the chain of custody forms and the laboratory sample check in lists organized by sample delivery group number. Chain of custody forms are sometimes out of sequential numbering because the laboratory will often split up chain of custodies in accordance with laboratory sample volume and analyses. Attachment C-2 provides the survey coordinate data table, and Attachment C-3 provides the investigation derived waste manifests.

C1 Field Methods and Procedures

This section specifies CDM SOPs used in the planned assessment and describes the methods and procedures followed during field sampling activities. The SOPs and methods presented below are intended to assure that field measurements are consistent and reproducible. Sample preservation, holding, and shipping procedures are also outlined in this section.

Prior to the start-up of field work, the Navy prepared and distributed flyers to inform local residents of the upcoming activities. These flyers included emergency and non-emergency contacts, as well as equipment related safety precautions for protection of local residents. In addition, the flyers included a schedule of the proposed duration of field work. Flyers were posted in appropriate locations, and distributed on the porches of residences adjacent to the planned sample locations.

C1.1 Standard Operating Procedures

The SOPs that were followed during the RI are listed below:

- SOP 1-2, Sample Custody;
- SOP 1-4, Subsurface Soil Sampling;
- SOP 1-6, Water Level Measurement;
- SOP 1-10, Field Measurement of Organic Vapors;
- SOP 2-1, Packaging and Shipping Environmental Samples;
- SOP 2-2, Guide to Handling of Investigation-Derived Waste;
- SOP 3-1, Geoprobe Sampling (includes DPT groundwater sampling);

- SOP 3-5, Lithologic Logging;
- SOP 4-1, Field Logbook Content and Control;
- SOP 4-2, Photographic Documentation of Field Activities; and
- SOP 5-1, Control of Measurement and Test Equipment.

In addition to the CDM SOPs listed above, the following non-CDM SOP were used:

- Low-flow (Minimal Drawdown) Ground-Water Sampling Procedures (Puls and Barcelona 1996).

C1.2 County of Alameda Exploratory Borehole Permitting Process

The Alameda County Public Works – Well Standards Program is the administering agency of the General Ordinance Code, Chapter 6.88, which provides for the regulation of groundwater wells and exploratory holes as required by California Water Code.

To meet the requirements of the Well Standards Program, a completed permit application and a detailed site map were submitted at least 5 working days prior to the planned start of work. Alameda Point is fee exempt. All necessary forms and requirements of the Well Standards Program were accessed at www.acgov.org\pwa\wells .

C1.3 Utility Survey

Underground utility clearance was completed before subsurface investigation activities were began. The area within a 5-foot radius of each subsurface sampling location will be cleared using the following protocol.

- Notified Underground Service Alert and scheduled a meeting with all interested parties who may potentially be affected by drilling activities;
- Reviewed available Alameda Point and City of Alameda utility maps;
- Marked the proposed sampling locations and the utility lines in the immediate vicinity using a semi-permanent marking chalk; and
- Procured geophysical subcontractor to use geophysical methods including electromagnetic induction, magnetometry, and ground-penetrating radar to clear proposed sampling locations of potential subsurface obstructions prior to borehole advancement.

Geophysical results were analyzed before fieldwork to confirm sampling locations and optimize sampling strategies. After the existing concrete was broken apart to expose underlying soil, a hand auger was advanced to 4 to 5 feet bgs in each borehole to manually check for obstructions at the discretion of the subcontracted drilling

professionals. If hand-auger utility clearance was necessary, the sample borehole was advanced immediately adjacent, to maintain the integrity of samples from 0 to 5 feet bgs. The project field geologist monitored utility clearance data collection and interpretation.

C1.4 Land Survey

A State of California Registered Land Surveyor surveyed borehole locations for position and elevation relative to MSL. The measurements were accurate to plus or minus 0.01 foot vertically and plus or minus 0.1 foot horizontally. All measurements were referenced to the State Plane Coordinate System, North American Datum 1983 and the North American Vertical Datum 1988.

C1.5 Soil Sampling

DPT methods were used for soil sampling conducted during the field investigation. The DPT boring method was selected for field sampling for the following reasons.

- A small quantity of waste soil is generated during borehole advancement and sampling; and
- Wells will not be constructed at DPT locations; therefore, larger-diameter boreholes are not required.

The method was fast and reliable to the expected maximum sampling depth (less than 8 feet bgs) and with the expected soil type (fine-grained hydraulic fill and fine-to-medium-grained sand). The DPT method involves the use of a truck-mounted hydraulic/percussion drive point. When necessary, pavement was broken apart with the DPT rig to allow access to the soil surface. If the concrete was unusually thick or difficult to core, a field decision was made to move the boring to a more accessible location. This event was noted in the field logbook and the new soil sample location was surveyed following sampling. Data from a borehole that was relocated in the field had a notation added to the comments section of the electronic data.

After the pavement was broken apart (where paved areas are present), and a hand auger was advanced to at least 5 feet bgs to help decrease the risk of impacting underground utilities, the direct-push borehole was advanced adjacent to the hand-auger-cleared borehole. The hydraulic/percussion drive point was then advanced downward through the soil. A retractable piston inside the macro-core sampler prevented soil from filling the liners until the desired sampling interval is reached. The DPT rods were advanced to the desired interval where a soil sample was collected in a macro-core sampler with an acetate liner.

When the desired sample interval was reached, the macro-core sampler was recovered and the acetate liner was removed for sample collection. When refusal was met before

the targeted sampling depths were achieved, the borehole was backfilled with bentonite pellets and relocated up to two times per location within a 5-foot radius of the original sampling location. When any samples were successfully collected prior to refusal, these samples were retained. Samples not used for analysis were discarded and disposed as IDW.

Once the sample interval was retrieved, soil samples were collected for the required analyses including VOCs, SVOCs, pesticides, PCBs, metals, and physical properties as described in Section 3 of this report.

Non-VOC samples from the 0-feet to 2-feet bgs interval were collected according to the following procedures:

- At locations without hardscape (e.g., play areas with exposed soil) samples will be collected between 0 and 0.5 foot bgs; and
- At locations with hardscape (e.g., asphalt) where sample interference from asphalt or road base materials was anticipated, samples were collected between 0.5 foot and 2 feet bgs.

VOC samples from the 0-feet to 2-feet bgs interval were collected according to the following procedures:

- At locations without hardscape (e.g., play areas with exposed soil) samples were collected at 0.5 foot bgs; and
- At locations with hardscape (e.g., asphalt) where sample interference from asphalt or road base materials was anticipated, samples were collected at 2 feet bgs.

Samples for VOC analysis were collected immediately upon retrieval of the sample interval using the En Core® sampling device in accordance with EPA Method 5035. En Core® samples were collected prior to collecting samples for other chemical analyses. Soil samples for other chemical analyses were collected by covering the ends of a 6-inch segment of the sampler liner with Teflon® sheets and capping with plastic end caps. Soil samples for characterization of physical properties were collected in a separate 6-inch segment of the sample liner by covering each end with a Teflon® sheet and capping with plastic end caps. The samples were placed in a cooler with ice for transport to a laboratory following COC protocol.

Remaining soil not submitted for analysis was used for lithologic description in accordance with the USCS and SOP 3-5, Lithologic Logging (CDM 2004).

The boreholes were backfilled completely using bentonite pellets as outlined in SOP 3-1, Geoprobe Sampling (CDM 2004). Boring permit applications (fee-exempt) were

submitted to Alameda County Public Works Agency at least two weeks prior to the initiation of direct-push drilling activities.

Each boring location was identified by a unique four-character number. The four-character number consisted of two numbers "31" indicating IR Site 31, followed by two numbers "01" through "50" indicating the boring number.

Each soil sample was identified by a five-character sample number. The sample number is designed to help the data user distinguish between multiple samples collected. The five-character number consisted of two numbers "31" indicating IR Site 31, and three numbers beginning with "001," which indicates the sample number. Sample purpose, type, matrix, depth, and boring location identification number were identified separately on field forms. Detailed subsurface soil sampling procedures are included in SOP 1-4, Subsurface Soil Sampling (CDM 2004).

C1.6 Groundwater Sampling

Minimal drawdown (low-flow) groundwater sampling techniques were employed using a peristaltic pump at the five existing IR Site 31 monitoring wells, and from up to two discrete depths at 11 DPT locations according to Low-flow (Minimal Drawdown) Ground-Water Sampling Procedures (Puls and Barcelona 1996). Dedicated tubing was set at the mid-point of the screen interval in the monitoring wells during quarterly base-wide sampling. Upon arriving onsite, all five wells were opened and allowed to equilibrate to static water level for approximately 1 hour. Upon equilibration, the water level in each monitoring well was recorded, and the well closed until sampling. At the time of sampling at each monitoring well location, the water level was measured once again, prior to starting the pump. The surface end of the tubing was threaded through the peristaltic pump, then attached to a multi-parameter probe for monitoring of temperature (T) (in degrees Celsius), pH, specific conductivity (spC), oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity. The pump was turned on and set at a "low-flow" rate to minimize drawdown (less than 0.1 meter) during the sampling procedure. As a guide, the rate was set at 0.1 to 0.5 liters per minute, and adjusted accordingly to minimize drawdown (Puls et al. 1996). The well was purged until the parameters listed above had stabilized within 10 percent of the previous three readings. Once the parameters had stabilized, samples were collected for laboratory analysis.

C1.7 Disposal of Investigation-Derived Waste

CDM team personnel disposed of all IDW materials according to contract requirements, SOP 2-2 Guide to Handling of IDW.

C2 Field Sample Custody and Documentation

Sample custody and documentation methods that were used are described in SOP 4-1, Field Logbook Content and Control, and SOP 4-2, Photographic Documentation of Field Activities (CDM 2004). These SOPs address field logbooks, sample labels, custody seals, and COC forms.

C2.1 Field Logbooks and Records

Controlled, pre-paginated, and permanently bound logbooks were used to record field observations and measurements to provide a permanent record of daily field activities. Logbooks contained various forms for this purpose, including daily field reports, geologic drill logs, and photo documentation.

Entries were legible and written in indelible ink. Corrections consisted of lineout deletions that were initialed and dated by the person making the correction. All entries were signed and dated, and the remaining space on each page was crossed out. Completed field logbooks were delivered to the CDM office in San Diego. Other forms used to record field safety- and health-related data were maintained in project files and folders. Logbook procedures are described in SOP 4-1.

C2.2 Photographs

Photographs were taken of selected sample locations to show the surrounding area, site features, and objects used to locate the site. The photographs were used to provide backup documentation for procedures and unusual conditions encountered as well as to identify general sampling locations.

The photograph was identified by an informational sign within the photo itself. This sign displayed the site name, initials of photographer, and date. After the photographs were downloaded, they were labeled for cross-referencing with other field data. Photographic documentation procedures are described in SOP 4-2.

C2.3 Sample Containers

Sample containers were selected in accordance with EPA SW-846, Test Methods for Evaluating Solid Wastes Physical/Chemical Methods (EPA 2000b).

During DPT activities, soil samples were collected directly into new, clean, acetate sample liners provided by the drilling subcontractor. Sample liners were inspected for cleanliness prior to use and were rejected if found unacceptable.

Prior to acceptance, supplies and consumables were inspected to ensure they were in satisfactory condition and free of defects.

C2.4 Sample Labeling

Sample labels were attached to each sample container just before or at the time of sampling. The labels were made of paper with gummed backs, covered with clear tape, and completed with indelible ink. All corrections were made by drawing a single line through the error, initialing it, and entering the correct information. Sample labels clearly indicated the project name and number, sampling location identifier (four-character boring location number), five-character sample number, sampling date and time (using 24-hour notation), analysis to be performed, sample preservation, and the field sampler's name and initials (not preprinted) as described in this SAP.

C2.5 Sample Identification Numbers

All environmental samples collected to support this project were identified by a unique five-character number. The five-character number consisted of a two-character "31" indicating IR Site 31, followed by a three-character sample number beginning with "001." The five-character sample number was designed to provide a unique and sequential identification number to each sample, which distinguished between multiple samples collected. Sample date, purpose, type, matrix, depth, and boring location identification number were identified separately on field forms. The sample number and locational information was taken from the field forms and used as initial input to pre-populate the database. This initial information was used for sample tracking.

C2.6 Sample Preservation

Samples were preserved in accordance with EPA SW-846 (EPA 2000b). Field samples and associated QC samples requiring cooling were maintained at approximately 4 degrees Celsius until shipment to the laboratory.

C2.7 Sample Packaging and Shipment

Samples to be shipped to the selected project laboratories were accompanied by appropriate sample transfer and shipment paperwork as described in SOP 2-1 (CDM 2004). COC forms and custody seals were used to document possession of samples and help prevent tampering with samples during shipment to the laboratory. Field investigation crews prepared all samples for shipment by common carrier to the laboratory according to the procedures specified in applicable SOPs. Samples were packaged properly and dispatched to the designated laboratory (or laboratories) for analysis. The method of shipment, carrier name, and other pertinent information was entered on the COC forms.

Field teams packaged the samples for shipment as follows.

1. Attached a sample label to each sample container; covered sample label with clear tape.

2. Placed custody seals on the sample container.
3. Wrapped all glass containers in foam sheeting or bubble wrap and placed them in zip lock bags.
4. Lined coolers with two garbage bags to prevent leakage during shipment. Placed wet ice and zip-lock bagged samples inside inner garbage bag. Secured each garbage bag individually by closing with tie wraps or other closures.
5. Placed the completed COC forms in a plastic zip-lock bag and taped it to the inside of the cooler lid.
6. Secured the cooler with custody seals and covered the seals with clean plastic tape to prevent accidental breaks.

At the end of each day, the field crew shipped the samples to the laboratory by common carrier.

C2.8 Chain-of-Custody Records

COC records documented the transfer of sample custody from the time of sampling to receipt by the laboratory. SOP 1-2 provides a description of COC procedures. COC forms were completed by the sampler and accompanied the samples from the field to the analytical laboratory.

The custody record was completed using waterproof ink. All corrections were made by drawing a line through, initialing, and dating the error and then entering the correct information. The error remained legible after correction. All applicable information on the COC record, including signatures, was filled out completely and legibly. Unused space (rows) for sample or analysis information was crossed out, initialed, and dated. If samples were delivered to the laboratory by an overnight carrier, the air bill number was recorded and the COC record(s) were placed in a waterproof plastic bag that was taped to the lid inside the sample cooler prior to sealing.

C2.9 Custody Seals

After samples were collected, custody seals were placed on the sample containers. Custody seals were used to detect any possible tampering between sample collection and analysis. The seal was placed so that it must be broken to open the sample container. Two or more custody seals were placed on the outside of the shipping container or cooler prior to shipment by an overnight carrier. Each custody seal affixed to sample containers and sample coolers was signed and dated by the field sampler. Custody seals are described in SOP 1-2 and 2-1. Clear packing tape was placed over custody seals on each cooler to prevent accidental breaks.

C2.10 Corrections to Documentation

All original recorded data was written in waterproof ink. No accountable, serialized documents were destroyed or thrown away, even when they were illegible or contain inaccuracies that required a replacement document. If an error was made on an accountable document assigned to an individual, that individual corrected the error by drawing a line through it, initialing it, and entering the correct information. The erroneous information was not obliterated. Any subsequent error discovered on an accountable document was corrected, initialed, and dated by the person who made the entry.

C3 References

CDM Federal Programs Corporation. 2004. *Technical Standard Operating Procedures.* Revised March 1, 2004.

EPA (U.S. Environmental Protection Agency). 2000a. *Guidance for the Data Quality Objectives Process.* EPA QA/G-4. August.

_____. 2000b. *Test Methods for Evaluating Solid Wastes Physical/Chemical Methods, Fourth Edition, Update* IVB. SW-846. November.

Puls, R.W. and M.J. Barcelona. 1996. *(Minimal Drawdown) Ground-water Sampling Procedures.* EPA/540/S-95/504. April. www.acgov.org/pwa/wells.

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APPENDIX C

C1

Sample Delivery Group
4607

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 1 of 1

Client: CDM
Contact: ~~Mike Allen~~ Holly Carter
Tel #: 619-572-5050 Fax #:
Address: 9444 Farnham Ste 210
City: San Diego
State: CA
Zip code: 92123
Bill to: ~~6218.086~~ Mike Allen
Project Name/Code
Job #6218.086 P.O. #
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: Rachel Goldberg Holly Carter

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8260B	8260B/5035	8050 B/Manitoo	3550 B/8270C	3550B/8082	3550B/8014							Remarks
NOA	Trip blank 11-1-05		0900	11/1/05	W	HCl	2	X											
soil sleeve	31001		0830	11/1/05	S	—	3			X	X	X	X						
Encore	31001		0830		S	—	3		X										
soil sleeve	31002		0845		S	—	3			X	X	X	X						
Encore	31002		0845		S	—	3		X										
Soil Sleeve	31003		0900		S	—	3			X	X	X	X						
Encore	31003		0900		S	—	3		X										

4807

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Goldberg Date/Time 11/1/05/1640 Received by _____ Date/Time 11/2/05/0930

Relinquished by _____ Date/Time / Received by _____ Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

7203

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4607 **Client Name/Project:** CDM

1. Sample Arrival

Date/Time Received 11/2/05 0930 Date/Time Opened 11/2/05 0930 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By: RG/HK

3. Shipping Container/Cooler

☒ Cooler Used? # of 1 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.4 _____ _____ _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: EnCore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 2 Nov 2005 7:47 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

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Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04607 (0787_ 846) (2683383_ 846)

11/09/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/02/05 0930*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*4.4 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*RG/HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol. ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31200	VOC	05-04607-4	W	V	C	40	2	G	110105	N	0	7	☐
2	31001	SLEE	05-04607-1-α	S	B		250	3	G	110105	N	0	7	☐
	31001	EN	05-04607-1-β	S	P		5	3	G	110105	N	0	7	☐
3	31002	SLEE	05-04607-2-α	S	B		250	3	G	110105	N	0	7	☐
	31002	EN	05-04607-2-β	S	P		5	3	G	110105	N	0	7	☐
4	31003	SLEE	05-04607-3-α	S	B		250	3	G	110105	N	0	7	☐
	31003	EN	05-04607-3-β	S	P		5	3	G	110105	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* Volatile organics
- ☐ *6010B* TTLC 17 Metals
- ☐ *200.7/6010B* Iron, Fe, by ICP
- ☐ *8270C* Semi-VOC, 64 Compounds
- ☐ *8082* PCBs
- ☐ *8081A* Organochlorine pesticides
- ☐ *ASTM-D2216* Moisture, percent in soil
- ☐ *9040B/150.1* pH

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31200	VOC	05-04607-4	W	X								☐
2	31001	SLEE	05-04607-1-α	S		X	X	X	X	X	X	X	☐
	31001	EN	05-04607-1-β	S	X						X	X	☐
3	31002	SLEE	05-04607-2-α	S		X	X	X	X	X	X	X	☐
	31002	EN	05-04607-2-β	S	X						X	X	☐
4	31003	SLEE	05-04607-3-α	S		X	X	X	X	X	X	X	☐
	31003	EN	05-04607-3-β	S	X						X	X	☐

☐ Client"s Requirement: ALL METHODS: FOLLOW PROJECT QC TABLES ATTACHED.

☐ VOC: FULL SPIKE/LOW LEVEL FOR WATER

☐ 8270: FULL SPIKE FOR WATER

☐ 8270: INCLUDED 1-METHYLNAPHTHALENE/

☐ 2-METHYLNAPHTHALENE/CARBAZOLE/

☐ ISOPHORONE/PYRIDINE/ANILINE

☐ 8081A: INCLUDED TOTAL CHLORDANE

Sample Delivery Group
4614

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 1 of 1

Client: CDM Contact: HOLLY CARTER Tel #: 619.572.5050 Fax #:

Address: 9444 FARNHAM SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 / 6218.086 Job # 6218.086 P.O. # same

Project Address IR SITE 31, ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER / R. Goldberg

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8260B/5035	3050/6010B/7000	3550B/8270C	3550B/8000B	3550B/8081A	ASTM D2937/D2216	C136-96/D422-63	D5084-90	TPC-Wilkey Black	API RP 40	8260B		Remarks
31004	~~3103-0-2~~ HC	11.2.05	1120	Soil		5	X	X	X	X	X								
31005	~~3103-2-4~~ HC		1130			5	X	X	X	X	X								
31006	~~3103-4.5-6.5~~ HC		1140			5	X	X	X	X	X								
31007	~~3104-0-2~~ HC		1215			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31008	~~3104-2-4~~ HC		1225			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31009	~~3104-4-6~~ HC		1245			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31010			1600			5	X	X	X	X	X								
31011			1610			5	X	X	X	X	X								
31012			1620			5	X	X	X	X	X								
31013			1630			5	X	X	X	X	X								
TB	Trip blank		0900	Water	HCl	2											X		

4614

QC Requirement: ☑ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☑ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Kolelly Date/Time 11-2-05 / 1700 Received by [signature] Date/Time 11/3/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994. Root-file:[CUST.DATA.LAB]CHAIN_ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

2303

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4614 **Client Name/Project:** CDM / Alameda

1. Sample Arrival

Date/Time Received 11/3/05 1000 Date/Time Opened 11/3/05 1000 By (name): Jason N

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : HC, RG

3. Shipping Container/Cooler

☒ Cooler Used? # of 1 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4r5 _____ _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ **pH <2** ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: EnCore.
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 3 Nov 2005 8:17 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]samprcl.tex

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04614 (0787_ 847) (2683383_ 847)

11/09/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda IR Site 31/6218.086*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/09/05 1000*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*4.5 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*HC/RG*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31004	SLEEVE	05-04614-1-α	S	B		250	2	G	110205	N	0	7	☐
	31004	EN	05-04614-1-β	S	P		5	3	G	110205	N	0	7	☐
2	31005	SLEEVE	05-04614-2-α	S	B		250	2	G	110205	N	0	7	☐
	31005	EN	05-04614-2-β	S	P		5	3	G	110205	N	0	7	☐
3	31006	SLEEVE	05-04614-3-α	S	B		250	2	G	110205	N	0	7	☐
	31006	EN	05-04614-3-β	S	P		5	3	G	110205	N	0	7	☐
4	31007	SLEEVE	05-04614-4-α	S	B		250	2	G	110205	N	0	7	☐
	31007	EN	05-04614-4-β	S	P		5	3	G	110205	N	0	7	☐
5	31008	SLEEVE	05-04614-5-α	S	B		250	2	G	110205	N	0	7	☐
	31008	EN	05-04614-5-β	S	P		5	3	G	110205	N	0	7	☐
6	31009	SLEEVE	05-04614-6-α	S	B		250	2	G	110205	N	0	7	☐
	31009	EN	05-04614-6-β	S	P		5	3	G	110205	N	0	7	☐
7	31010	SLEEVE	05-04614-7-α	S	B		250	2	G	110205	N	0	7	☐
	31010	EN	05-04614-7-β	S	P		5	3	G	110205	N	0	7	☐
8	31011	SLEEVE	05-04614-8-α	S	B		250	2	G	110205	N	0	7	☐
	31011	EN	05-04614-8-β	S	P		5	3	G	110205	N	0	7	☐
9	31012	SLEEVE	05-04614-9-α	S	B		250	2	G	110205	N	0	7	☐
	31012	EN	05-04614-9-β	S	P		5	3	G	110205	N	0	7	☐
10	31013	SLEEVE	05-04614-10-α	S	B		250	2	G	110205	N	0	7	☐
	31013	EN	05-04614-10-β	S	P		5	3	G	110205	N	0	7	☐
11	31201	VOC	05-04614-11	W	V	C	40	2	G	110205	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31004	SLEEVE	05-04614-1-α	S		X	X	X	X	X	X	X	☐
	31004	EN	05-04614-1-β	S	X						X	X	☐
2	31005	SLEEVE	05-04614-2-α	S		X	X	X	X	X	X	X	☐

Sample Delivery Group
4650

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: MIKE HAUN Tel #: 858.268.3383 Fax #:

Address: 9444 BALBOA ST. SUITE 210 City: SAN DIEGO State: CA Zip code: ~~92123~~ 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER / R. GOLDBERG

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8015 B/8260	3050/6010/7000	8270C	8260	8082	8081A/8081B							Remarks
31014		11-3-05	0810	SOIL	NONE	5	X	X	X	X	X								
31015			0820	SOIL		5													
31016			0830			5													
31017			0850			5													
31018			0900			5													
31019			0910			5													
31020			0930			5													
31021			0940			5													
31022			0945			5													
31023			1000			13													MS/MSD
31024			1040			5													
31025			1050			5													
31026			1100			5													
31027			1110			5													
31028			1120			5													

4650

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Goldberg Date/Time 11-3-05 1715 Received by [illegible] Date/Time 11/4/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note: 3 Coolers Total

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4650 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/4/05 1000 Date/Time Opened 11/4/05 1000 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By: AC/RG

3. Shipping Container/Cooler

☒ Cooler Used? # of 2 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.8 6.2 4.4
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☒ plastic ☐ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 4 Nov 2005 8:25 a.m.

*HTs: Samples must be analysed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]imprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04650 (0787_ 848) (2683383_ 848)

11/08/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/04/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.8 4.2 4.4 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*HR/RG*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31014	EN	05-04650-1-α	S	P		5	3	G	110305	N	0	7	☐
	31014	SLEEV	05-04650-1-β	S	B		250	2	G	110305	N	0	7	☐
2	31015	EN	05-04650-2-α	S	P		5	3	G	110305	N	0	7	☐
	31015	SLEEV	05-04650-2-β	S	B		250	2	G	110305	N	0	7	☐
3	31016	EN	05-04650-3-α	S	P		5	3	G	110305	N	0	7	☐
	31016	SLEEV	05-04650-3-β	S	B		250	2	G	110305	N	0	7	☐
4	31017	EN	05-04650-4-α	S	P		5	3	G	110305	N	0	7	☐
	31017	SLEEV	05-04650-4-β	S	B		250	2	G	110305	N	0	7	☐
5	31018	EN	05-04650-5-α	S	P		5	3	G	110305	N	0	7	☐
	31018	SLEEV	05-04650-5-β	S	B		250	2	G	110305	N	0	7	☐
6	31019	EN	05-04650-6-α	S	P		5	3	G	110305	N	0	7	☐
	31019	SLEEV	05-04650-6-β	S	B		250	2	G	110305	N	0	7	☐
7	31020	EN	05-04650-7-α	S	P		5	3	G	110305	N	0	7	☐
	31020	SLEEV	05-04650-7-β	S	B		250	2	G	110305	N	0	7	☐
8	31021	EN	05-04650-8-α	S	P		5	3	G	110305	N	0	7	☐
	31021	SLEEV	05-04650-8-β	S	B		250	1	G	110305	N	0	7	☐
9	31022	EN	05-04650-9-α	S	P		5	3	G	110305	N	0	7	☐
	31022	SLEEV	05-04650-9-β	S	B		250	2	G	110305	N	0	7	☐
10	31023	EN	05-04650-10-α	S	P		5	9	G	110305	N	0	7	☐
	31023	SLEEV	05-04650-10-β	S	B		250	4	G	110305	N	0	7	☐
11	31024	EN	05-04650-11-α	S	P		5	3	G	110305	N	0	7	☐
	31024	SLEEV	05-04650-11-β	S	B		250	2	G	110305	N	0	7	☐
12	31025	EN	05-04650-12-α	S	P		5	3	G	110305	N	0	7	☐
	31025	SLEEV	05-04650-12-β	S	B		250	2	G	110305	N	0	7	☐
13	31026	EN	05-04650-13-α	S	P		5	3	G	110305	N	0	7	☐
	31026	SLEEV	05-04650-13-β	S	B		250	2	G	110305	N	0	7	☐
14	31027	EN	05-04650-14-α	S	P		5	3	G	110305	N	0	7	☐
	31027	SLEEV	05-04650-14-β	S	B		250	2	G	110305	N	0	7	☐
15	31028	EN	05-04650-15-α	S	P		5	3	G	110305	N	0	7	☐
	31028	SLEEV	05-04650-15-β	S	B		250	2	G	110305	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil

☐ *9040B/150.1* pH

☐ *Walkly-Bla/ck* Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31014	EN	05-04650-1-α	S	X						X	X	☐
	31014	SLEEV	05-04650-1-β	S		X	X	X	X	X	X	X	☐
2	31015	EN	05-04650-2-α	S	X						X	X	☐
	31015	SLEEV	05-04650-2-β	S		X	X	X	X	X	X	X	☐
3	31016	EN	05-04650-3-α	S	X						X	X	☐
	31016	SLEEV	05-04650-3-β	S		X	X	X	X	X	X	X	☐
4	31017	EN	05-04650-4-α	S	X						X	X	☐
	31017	SLEEV	05-04650-4-β	S		X	X	X	X	X	X	X	☐
5	31018	EN	05-04650-5-α	S	X						X	X	☐
	31018	SLEEV	05-04650-5-β	S		X	X	X	X	X	X	X	☐
6	31019	EN	05-04650-6-α	S	X						X	X	☐
	31019	SLEEV	05-04650-6-β	S		X	X	X	X	X	X	X	☐
7	31020	EN	05-04650-7-α	S	X						X	X	☐
	31020	SLEEV	05-04650-7-β	S		X	X	X	X	X	X	X	☐
8	31021	EN	05-04650-8-α	S	X						X	X	☐
	31021	SLEEV	05-04650-8-β	S		X	X	X	X	X	X	X	☐
9	31022	EN	05-04650-9-α	S	X						X	X	☐
	31022	SLEEV	05-04650-9-β	S		X	X	X	X	X	X	X	☐
10	31023	EN	05-04650-10-α	S	X						X	X	☐
	31023	SLEEV	05-04650-10-β	S		X	X	X	X	X	X	X	☐
11	31024	EN	05-04650-11-α	S	X						X	X	☐
	31024	SLEEV	05-04650-11-β	S		X	X	X	X	X	X	X	☐
12	31025	EN	05-04650-12-α	S	X						X	X	☐
	31025	SLEEV	05-04650-12-β	S		X	X	X	X	X	X	X	☐
13	31026	EN	05-04650-13-α	S	X						X	X	☐
	31026	SLEEV	05-04650-13-β	S		X	X	X	X	X	X	X	☐
14	31027	EN	05-04650-14-α	S	X						X	X	☐
	31027	SLEEV	05-04650-14-β	S		X	X	X	X	X	X	X	☐
15	31028	EN	05-04650-15-α	S	X						X	X	☐
	31028	SLEEV	05-04650-15-β	S		X	X	X	X	X	X	X	☐

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	TOC	
1	31014	EN	05-04650-1-α	S		☐
	31014	SLEEV	05-04650-1-β	S		☐
2	31015	EN	05-04650-2-α	S		☐
	31015	SLEEV	05-04650-2-β	S		☐
3	31016	EN	05-04650-3-α	S		☐
	31016	SLEEV	05-04650-3-β	S		☐
4	31017	EN	05-04650-4-α	S		☐

	31017	SLEEV	05-04650-4-β	S	☐
5	31018	EN	05-04650-5-α	S	☐
	31018	SLEEV	05-04650-5-β	S	☐
6	31019	EN	05-04650-6-α	S	☐
	31019	SLEEV	05-04650-6-β	S	☐
7	31020	EN	05-04650-7-α	S	☐
	31020	SLEEV	05-04650-7-β	S	☐
8	31021	EN	05-04650-8-α	S	☐
	31021	SLEEV	05-04650-8-β	S	☐
9	31022	EN	05-04650-9-α	S	☐
	31022	SLEEV	05-04650-9-β	S	☐
10	31023	EN	05-04650-10-α	S	☐
	31023	SLEEV	05-04650-10-β	S	☐
11	31024	EN	05-04650-11-α	S	☐
	31024	SLEEV	05-04650-11-β	S	☐
12	31025	EN	05-04650-12-α	S	☐
	31025	SLEEV	05-04650-12-β	S	☐
13	31026	EN	05-04650-13-α	S	☐
	31026	SLEEV	05-04650-13-β	S	☐
14	31027	EN	05-04650-14-α	S	☐
	31027	SLEEV	05-04650-14-β	S	☐
15	31028	EN	05-04650-15-α	S	☐
	31028	SLEEV	05-04650-15-β	S	☐

☐ Client"s Requirement: ALL METHODS: FOLLOW PROJECT QC TABLES ATTACHED.

☐ VOC: FULL SPIKE/LOW LEVEL FOR WATER

☐ 8270: INCLUDED 1-METHYLNAPHTHALENE/

☐ 2-METHYLNAPHTHALENE/CARBAZOLE/

☐ ISOPHORONE/PYRIDINE/ANILINE

☐ 8081A: INCLUDED TOTAL CHLORDANE

☐ 8081A: CONCENTRATE TO 1 ML FOR DW LEVEL

☐ MS/MSD# 10

Login By JASON M. NARIO

Check By

Sample Delivery Group
4651

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: M. CARROLL / R. Golden

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035/8260B	3050B/6010B	3550B/8270C	3550B/8082	3550B/8081	ASTM D2974/2216	C 128-91/D422-63	D5084-90	TOC-WALKLEY BLACK	APCL 8P 40			Remarks
31029		11-3-05	1130	SOIL	NONE	5	X	X	X	X	X								
31030			1205			5	X	X	X	X	X								
31031			1215			5	X	X	X	X	X								
31032			1225			5	X	X	X	X	X								
31033			1415			5	X	X	X	X	X								
31034			1420			5	X	X	X	X	X								
31035			1430			5	X	X	X	X	X								
31036			1440			5	X	X	X	X	X								
31037			1510			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31038			1520			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31039			1530			7	X	X	X	X	X	X	X	X	X	X			+ geotechnical
31040			1610			5	X	X	X	X	X								~~MS~~ HC
31041			1620			5	X	X	X	X	X								
31042			1630			13	X	X	X	X	X								MS/MSD
31043			1640			5	X	X	X	X	X								

4651

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Hadley Date/Time 11-3-05 / 1715 Received by [signature] Date/Time 11/4/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note: 3 Coolers Total

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3783 Fax #:

Address: 9444 FARNHAM ST SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: Same

Project Name/Code IRSITE 31 Job # 6218.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☐regular ☐rush: ___ days ___ hours Sampled by: H CAPPELL/B.Gobbes

Analysis Items: 8015 B/8020 B; 8010/8020; 7000; 8270C; 7470/7471; 8082; 8081B/8270C

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8015 B/8020 B	8010/8020	7000	8270C	7470/7471	8082	8081B/8270C								Remarks
31044		11-3-05	1650	SOIL	NONE	5	X	X	X	X	X										
31045		↓	1700	↓	↓	5	X	X	X	X	X										
31046		↓	1705	↓	↓	5	X	X	X	X	X										
TB-1		↓	0730	AQ	HCl	2	X														
TB-2		↓	0735	↓	HCl	2	X														
TB-3		↓	0740	↓	HCl	2	X														

4651

QC Requirement: ☐Regular; ☐QA/QC Report; ☐WIP; ☐Raw Data; ☐Extended Raw Data ☐CLP; ☐ACE ☐AFCEE ☐NEESA ___(E, C or D); ☐Other _____(Please specify)

Sample Disposal: ☐Return ☐Disposal by APCL ☐Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐Intact; ☐Broken. Cooler Seal: ☐Intact; ☐Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐Cold (_____ °C).

Relinquished by Rachel Yoshiy Date/Time 11-3-05/1715 Received by [illegible] Date/Time 11/4/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

5203

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4651 Client Name/Project: CDM/Alameda

1. Sample Arrival

Date/Time Received 11/4/05 1000 Date/Time Opened 11/4/05 1000 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By: HC/126

3. Shipping Container/Cooler

☒ Cooler Used? # of 3 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.8	4.2	4.4		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☐ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: [signature] Printed: 4 Nov 2005 8:25 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [usal.texfiles]smprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04651 (0787_ 849) (2683383_ 849)

11/11/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR site*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/04/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.8 4.2 4.4 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*HC/RG*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31029	EN	05-04651-1-α	S	P		5	3	G	110305	N	0	7	☐
	31029	SLEEV	05-04651-1-β	S	B		250	2	G	110305	N	0	7	☐
2	31030	EN	05-04651-2-α	S	P		5	3	G	110305	N	0	7	☐
	31030	SLEEV	05-04651-2-β	S	B		250	2	G	110305	N	0	7	☐
3	31031	EN	05-04651-3-α	S	P		5	3	G	110305	N	0	7	☐
	31031	SLEEV	05-04651-3-β	S	B		250	2	G	110305	N	0	7	☐
4	31032	EN	05-04651-4-α	S	P		5	3	G	110305	N	0	7	☐
	31032	SLEEV	05-04651-4-β	S	B		250	2	G	110305	N	0	7	☐
5	31033	EN	05-04651-5-α	S	P		5	3	G	110305	N	0	7	☐
	31033	SLEEV	05-04651-5-β	S	B		250	2	G	110305	N	0	7	☐
6	31034	EN	05-04651-6-α	S	P		5	3	G	110305	N	0	7	☐
	31034	SLEEV	05-04651-6-β	S	B		250	2	G	110305	N	0	7	☐
7	31035	EN	05-04651-7-α	S	P		5	3	G	110305	N	0	7	☐
	31035	SLEEV	05-04651-7-β	S	B		250	2	G	110305	N	0	7	☐
8	31036	EN	05-04651-8-α	S	P		5	3	G	110305	N	0	7	☐
	31036	SLEEV	05-04651-8-β	S	B		250	2	G	110305	N	0	7	☐
9	31037	EN	05-04651-9-α	S	P		5	3	G	110305	N	0	7	☐
	31037	SLEEV	05-04651-9-β	S	B		250	2	G	110305	N	0	7	☐
10	31038	EN	05-04651-10-α	S	P		5	3	G	110305	N	0	7	☐
	31038	SLEEV	05-04651-10-β	S	B		250	2	G	110305	N	0	7	☐
11	31039	EN	05-04651-11-α	S	P		5	3	G	110305	N	0	7	☐
	31039	SLEEV	05-04651-11-β	S	B		250	2	G	110305	N	0	7	☐
12	31040	EN	05-04651-12-α	S	P		5	3	G	110305	N	0	7	☐
	31040	SLEEV	05-04651-12-β	S	B		250	2	G	110305	N	0	7	☐
13	31041	EN	05-04651-13-α	S	P		5	3	G	110305	N	0	7	☐
	31041	SLEEV	05-04651-13-β	S	B		250	2	G	110305	N	0	7	☐
14	31042	EN	05-04651-14-α	S	P		5	9	G	110305	N	0	7	☐
	31042	SLEEV	05-04651-14-β	S	B		250	4	G	110305	N	0	7	☐
15	31043	EN	05-04651-15-α	S	P		5	3	G	110305	N	0	7	☐
	31043	SLEEV	05-04651-15-β	S	B		250	2	G	110305	N	0	7	☐
16	31044	EN	05-04651-16-α	S	P		5	3	G	110305	N	0	7	☐
	31044	SLEEV	05-04651-16-β	S	B		250	2	G	110305	N	0	7	☐
17	31045	EN	05-04651-17-α	S	P		5	3	G	110305	N	0	7	☐
	31045	SLEEV	05-04651-17-β	S	B		250	1	G	110305	N	0	7	☐
18	31046	EN	05-04651-18-α	S	P		5	3	G	110305	N	0	7	☐
	31046	SLEEV	05-04651-18-β	S	B		250	1	G	110305	N	0	7	☐
19	31202	VOC	05-04651-19	W	V	C	40	2	G	110305	N	0	7	☐
20	31203	VOC	05-04651-20	W	V	C	40	2	G	110305	N	0	7	☐
21	31204	VOC	05-04651-21	W	V	C	40	2	G	110305	N	0	7	☐

Part 3: Analysis Information

Sample Delivery Group
4665

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of 1

Client: CDM Contact: MIKE ALLEN Tel #: 858-268-3383 Fax #:

Address: 9444 FARNHAM ST SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: Same

Project Name/Code IRSITE 31 Job # 6218.086 P.O. # Same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER / R. Geldway

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5030B/8260B	300.0/9056	7000	8270C	3510C/8270	3510C/8082	3510C/8081A							Remarks
31050	EQ BLANK - 1	11-4-05	0915	AQ	misc.	9	X	X		X	X	X	X							
31051	EQ. BLANK - 2	↓	0930	AQ	misc.	9	X	X		X	X	X	X							
tripblank	trip blank - 1	↓	0900	AQ	HCl	2	X													

4665

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Geldley Date/Time 11-4-05 / 1630 Received by [illegible] Date/Time 11/5/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 2 of 2

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham Ste 210 City: San Diego State: CA Zip code: 92123

Bill to: Same

Project Name/Code IR Site 31 Job #16218.082 P.O. #

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by: R Goldberg/M Carter

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	5035/8260B	3050B/6010B/7000	3500/8270C	3550B/8082	3550B/8081A	D2937/D2216	C 136-96/MW846-13	D 5088-90	TDC Walkley Black	APT RP40			Remarks
31064		11-4-05	1235	Soil	—	5	X	X	X	X	X								
31065			1245			5	X	X	X	X	X								
31066			1435			~~5~~ 7	X	X	X	X	X	X	X	X	X	X			geotech
31067			1440			~~5~~ 5	X	X	X	X	X								
31068			~~1450~~ 1445			~~5~~ 7	X	X	X	X	X	X	X	X	X	X			geotech
31069			~~1455~~ 1510			5	X	X	X	X	X								
31070			1515			5	X	X	X	X	X								
31071			1540			5	X	X	X	X	X								
31072			1545			5	X	X	X	X	X								
TB-2			0800	Air	HCl	2	X												
TB-3			0810	Air	HCl	2	X												

4665

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Raoul Goldberg Date/Time 11-4-05 / 1630 Received by [signature] Date/Time 11/5/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL to terminate service or withhold delivery of any reports, if in APCL's sole discretion the terms of the contract have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

Hsin-Yi Lee

From: Miller, Lempi [MillerLE@cdm.com]
Sent: Tuesday, November 22, 2005 1:07 PM
To: Carter, Holly; Hsin-Yi Lee
Cc: Allen, Michael
Subject: small edits to COC form

4665

The following trip blanks had an analysis request for 8260B/5035B (soil) and it should have said 8260B/5030B (water):

31151
31202
31203
31204
31206
31207
31214

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

Hsin-Yi Lee

From: Hsin-Yi Lee
Sent: Friday, November 11, 2005 11:23 AM
To: Miller, Lempi; Michael Allen (AllenMC@cdm.com); Carter, Holly
Subject: Revised login confirmation for 05-4665 (new TB id)

Per your request we will rename the trip blanks as follow:

TB collected on 11/04/05 at 0900 will rename to 31205
TB collected on 11/04/05 at 0800 will rename to 31206
TB collected on 11/04/05 at 0810 will rename to 31207

If you have any questions please feel free to contact me.

Thanks You!

Hsin-Yi Lee
Project Manager
Applied Physics and Chemistry Laboratory
13760 Magnolia Ave.
Chino, CA 91710
(909)-590-1828 x113
HsinL@apclab.com

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Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4665 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/5/05 1000 Date/Time Opened 11/5/05 1000 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☐ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed, dated? By: _____
☐ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☐ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☐ #Samples OK? _____
☐ Sampled By : _____

3. Shipping Container/Cooler

☒ Cooler Used? # of 3 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.0

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 5 Nov 2005 7:44 a.m.

*HTs Samples must be analysed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [area].texfiles[sample].tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04665 (0787_ 850) (2683383_ 850)

11/11/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda IR Site 31*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/05/05 1000*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*3.4 3.8 4.0 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*HC/RG*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31050	VOC	05-04665-1-α	W	V	C	40	3	G	110405	N	0	6	☐
	31050	MET	05-04665-1-β	W	P	N	500	1	G	110405	N	0	6	☐
	31050	EXTR	05-04665-1-γ	W	G		1000	5	G	110405	N	0	6	☐
2	31051	VOC	05-04665-2-α	W	V	C	40	3	G	110405	N	0	6	☐
	31051	MET	05-04665-2-β	W	P	N	500	1	G	110405	N	0	6	☐
	31051	EXTR	05-04665-2-γ	W	G		1000	5	G	110405	N	0	6	☐
3	31205	VOC	05-04665-14	W	V	C	40	2	G	110405	N	0	6	☐
4	31064	EN	05-04665-3-α	S	P		5	3	G	110405	N	0	6	☐
	31064	SLEE	05-04665-3-β	S	B		250	2	G	110405	N	0	6	☐
5	31065	EN	05-04665-4-α	S	P		5	3	G	110405	N	0	6	☐
	31065	SLEE	05-04665-4-β	S	B		250	2	G	110405	N	0	6	☐
6	31066	EN	05-04665-5-α	S	P		5	3	G	110405	N	0	6	☐
	31066	SLEE	05-04665-5-β	S	B		250	2	G	110405	N	0	6	☐
7	31067	EN	05-04665-6-α	S	P		5	3	G	110405	N	0	6	☐
	31067	SLEE	05-04665-6-β	S	B		250	2	G	110405	N	0	6	☐
8	31068	EN	05-04665-7-α	S	P		5	3	G	110405	N	0	6	☐
	31068	SLEE	05-04665-7-β	S	B		250	2	G	110405	N	0	6	☐
9	31069	EN	05-04665-8-α	S	P		5	3	G	110405	N	0	6	☐
	31069	SLEE	05-04665-8-β	S	B		250	2	G	110405	N	0	6	☐
10	31070	EN	05-04665-9-α	S	P		5	3	G	110405	N	0	6	☐
	31070	SLEE	05-04665-9-β	S	B		250	2	G	110405	N	0	6	☐
11	31071	EN	05-04665-10-α	S	P		5	3	G	110405	N	0	6	☐
	31071	SLEE	05-04665-10-β	S	B		250	2	G	110405	N	0	6	☐
12	31072	EN	05-04665-11-α	S	P		5	3	G	110405	N	0	6	☐
	31072	SLEE	05-04665-11-β	S	B		250	2	G	110405	N	0	6	☐
13	31206	VOC	05-04665-12	W	V	C	40	2	G	110405	N	0	6	☐
14	31207	VOC	05-04665-13	W	V	C	40	2	G	110405	N	0	6	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Sample Delivery Group
4666

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 1 of 1

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham Ste 210 City: San Diego State: CA Zip code: 92123

Bill to: Same

Project Name/Code IRS Site 31 Job # 6218.082 P.O. # Same

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by: R. Goldberg / H. Carter

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035 / 8260B	3510B / 8100/8270	3550B / 8270C	8082	8015B							Remarks
31047		11-4-05	1010	Soil	—	5	X	X	X	X	X							
31048			1020			5												
31049			1030			5												
31052			1035			5												
31053			1040			5												
31054			1050			5												odor
31055			1100			5												
31056			1110			5												
31057			1115			5												
31058			1130			5												
31059			1135			5												
31060			1150			5												
31061			1155			5												
31062			1200			13												MS/MSD
31063			1225			5												

4666

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Goldberg Date/Time 11-4-05 / 1630 Received by Date/Time 11/5/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4666 Client Name/Project: CDM/Alameda

1. Sample Arrival

Date/Time Received 11/5/05 1000 Date/Time Opened 11/5/05 1000 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☐ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed, dated? By: _____
☐ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☐ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☐ #Samples OK? _____
☐ Sampled By : _____

3. Shipping Container/Cooler

☒ Cooler Used? # of 3 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.0

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☐ plastic ☐ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?

Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 5 Nov 2005 7:44 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

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Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04666 (0787_ 851) (2683383_ 851)

11/08/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason nario*
	Receiving Date/Time:	*11/05/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.4 3.8 4.0 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*RG/HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31047	EN	05-04666-1-α	S	P		5	3	G	110405	N	0	6	☐
	31047	SLEE	05-04666-1-β	S	B		250	1	G	110405	N	0	6	☐
2	31048	EN	05-04666-2-α	S	P		5	3	G	110405	N	0	6	☐
	31048	SLEE	05-04666-2-β	S	B		250	1	G	110405	N	0	6	☐
3	31049	EN	05-04666-3-α	S	P		5	3	G	110405	N	0	6	☐
	31049	SLEE	05-04666-3-β	S	B		250	1	G	110405	N	0	6	☐
4	31052	EN	05-04666-4-α	S	P		5	3	G	110405	N	0	6	☐
	31052	SLEE	05-04666-4-β	S	B		250	1	G	110405	N	0	6	☐
5	31053	EN	05-04666-5-α	S	P		5	3	G	110405	N	0	6	☐
	31053	SLEE	05-04666-5-β	S	B		250	1	G	110405	N	0	6	☐
6	31054	EN	05-04666-6-α	S	P		5	3	G	110405	N	0	6	☐
	31054	SLEE	05-04666-6-β	S	B		250	1	G	110405	N	0	6	☐
7	31055	EN	05-04666-7-α	S	P		5	3	G	110405	N	0	6	☐
	31055	SLEE	05-04666-7-β	S	B		250	1	G	110405	N	0	6	☐
8	31056	EN	05-04666-8-α	S	P		5	3	G	110405	N	0	6	☐
	31056	SLEE	05-04666-8-β	S	B		250	1	G	110405	N	0	6	☐
9	31057	EN	05-04666-9-α	S	P		5	3	G	110405	N	0	6	☐
	31057	SLEE	05-04666-9-β	S	B		250	1	G	110405	N	0	6	☐
10	31058	EN	05-04666-10-α	S	P		5	3	G	110405	N	0	6	☐
	31058	SLEE	05-04666-10-β	S	B		250	1	G	110405	N	0	6	☐
11	31059	EN	05-04666-11-α	S	P		5	3	G	110405	N	0	6	☐
	31059	SLEE	05-04666-11-β	S	B		250	1	G	110405	N	0	6	☐
12	31060	EN	05-04666-12-α	S	P		5	3	G	110405	N	0	6	☐
	31060	SLEE	05-04666-12-β	S	B		250	1	G	110405	N	0	6	☐
13	31061	EN	05-04666-13-α	S	P		5	3	G	110405	N	0	6	☐
	31061	SLEE	05-04666-13-β	S	B		250	1	G	110405	N	0	6	☐
14	31062	EN	05-04666-14-α	S	P		5	6	G	110405	N	0	6	☐
	31062	SLEE	05-04666-14-β	S	B		250	3	G	110405	N	0	6	☐
15	31063	EN	05-04666-15-α	S	P		5	3	G	110405	N	0	6	☐
	31063	SLEE	05-04666-15-β	S	B		250	1	G	110405	N	0	6	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil

Sample Delivery Group
4668

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of 1

Client: CDM Contact: Mike Allen Tel #: 858-268-3333 Fax #:

Address: 9444 Farnham Ste 210 City: San Diego State: CA Zip code: 92123

Bill to:

Project Name/Code IR Site 31 Job # 6218.086 P.O. #

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R. Goldberg/H. Carter

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8260B	5035/8260B	3050B/6010B/7470	3550B/8270C	3550B/8082	3550B/8081A	Remarks
31073		11-5-05	1130	soil	—	5		X	X	X	X	X	
31074		↓	1135	↓	—	5		X	X	X	X	X	
31075		↓	1140	↓	—	5		X	X	X	X	X	some green fragments
TB-1		↓	1100	Water	HCl	2	X						

White – With report
Yellow – Lab copy
Pink – Originator

4668

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Siddley Date/Time 1300 / 11-5-05 Received by [signature] Date/Time 11/7/05 / 0930

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4668 Client Name/Project: CDM/Alameda

1. Sample Arrival

Date/Time Received 11/7/05 0930 Date/Time Opened 11/7/05 0930 By (name) Joson N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : RG/HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 1 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.4 _____ _____ _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____
Received/Checked by: _____ Printed: 7 Nov 2005 8:52a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [pcal.texfiles]smprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04668 (0787_ 852) (2683383_ 852)

11/11/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda IR Site 31*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/07/05 0930*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*4.4 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*RG*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31073	EN	05-04668-1-α	S	P		5	3	G	110505	N	0	6	☐
	31073	SLEE	05-04668-1-β	S	B		250	2	G	110505	N	0	6	☐
2	31074	EN	05-04668-2-α	S	P		5	3	G	110505	N	0	6	☐
	31074	SLEE	05-04668-2-β	S	B		250	2	G	110505	N	0	6	☐
3	31075	EN	05-04668-3-α	S	P		5	3	G	110505	N	0	6	☐
	31075	SLEE	05-04668-3-β	S	B		250	2	G	110505	N	0	6	☐
4	31208	VOC	05-04668-4	W	V	C	40	2	G	110505	N	0	6	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* Volatile organics
- ☐ *6010B* TTLC 17 Metals
- ☐ *200.7/6010B* Iron, Fe, by ICP
- ☐ *8270C* Semi-VOC, 64 Compounds
- ☐ *8082* PCBs
- ☐ *8081A* Organochlorine pesticides
- ☐ *ASTM-D2216* Moisture, percent in soil
- ☐ *9040B/150.1* pH
- ☐ *Walkly-Bla/ck* Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31073	EN	05-04668-1-α	S	X						X	X	☐
	31073	SLEE	05-04668-1-β	S		X	X	X	X	X	X	X	☐
2	31074	EN	05-04668-2-α	S	X						X	X	☐
	31074	SLEE	05-04668-2-β	S		X	X	X	X	X	X	X	☐
3	31075	EN	05-04668-3-α	S	X						X	X	☐
	31075	SLEE	05-04668-3-β	S		X	X	X	X	X	X	X	☐
4	31208	VOC	05-04668-4	W	X								☐

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	TOC	
1	31073	EN	05-04668-1-α	S		☐
	31073	SLEE	05-04668-1-β	S		☐
2	31074	EN	05-04668-2-α	S		☐
	31074	SLEE	05-04668-2-β	S		☐
3	31075	EN	05-04668-3-α	S		☐
	31075	SLEE	05-04668-3-β	S		☐

Sample Delivery Group
4671

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of 1

Client: CDM Contact: Holly Carter Tel #: 619.572.5050 Fax #:

Address: 9444 Farnham Suite 210 City: San Diego State: CA Zip code: 92123

Bill to: same

Project Name/Code IR Site 31 / 6218.086 Job # 6218.086 P.O. # same

Project Address IR Site 31 / Alameda CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H Carter / R. Goldberg

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8260B/5035	3510B/8270C	3550B/8082	3550A/8081A	ASTM D2974	CLP 96/DHL2-63	D5088-90	TPC Walkley Black	API RP 40	8260B		Remarks
31004	~~3103-0-2~~ HC	11-2-05	1120	Soil		5	X	X	X	X	X							
31005	~~3103-2-4~~ HC		1130			5	X	X	X	X	X							
31006	~~3103-4.5-6.5~~ HC		1140			5	X	X	X	X	X							
31007	~~3104-0-2~~ HC		1215			7	X	X	X	X	X	X	X	X	X	X		+ geotechnical
31008	~~3104-2-4~~ HC		1225			7	X	X	X	X	X	X	X	X	X	X		+ geotechnical
31009	~~3104-4-6~~ HC		1245			7	X	X	X	X	X	X	X	X	X	X		+ geotechnical
31010			1600			5	X	X	X	X	X							
31011			1610			5	X	X	X	X	X							
31012			1620			5	X	X	X	X	X							
31013			1630			5	X	X	X	X	X							
TB	Trip blank		0900	Water	HCl	2										X		

4671

QC Requirement: ☑ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☑ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Goldberg Date/Time 11-2-05 / 1700 Received by [illegible] Date/Time 11/3/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

White – With report
Yellow – Lab copy
Pink – Originator

Applied P & Ch Laboratory

APCL

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Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3383 Fax #:

Address: 9444 FARNHAM ST SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: Same

Project Name/Code 12 SITE 31 Job # 6218.086 P.O. # Same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: [illegible]

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035/8260B	8015B/8000	3550B/8270C	3550B/8082	3550B/8081	ASTM D2937/2216	C 136-96	D 5921-90	TUC - [illegible]	APT RP 40			Remarks
31029		11-3-05	1130	SOIL	NONE	5	X	X	X	X	X								
31030			1205			5	X	X	X	X	X								
31031			1215			5	X	X	X	X	X								
31032			1225			5	X	X	X	X	X								
31033			1415			5	X	X	X	X	X								
31034			1420			5	X	X	X	X	X								
31035			1430			5	X	X	X	X	X								
31036			1440			5	X	X	X	X	X								
31037			1510			7	X	X	X	X	X	X	X	X	X	X			+ [illegible]
31038			1520			7	X	X	X	X	X	X	X	X	X	X			+ [illegible]
31039			1530			7	X	X	X	X	X	X	X	X	X	X			+ [illegible]
31040			1610			5	X	X	X	X	X								[illegible]
31041			1620			5	X	X	X	X	X								
31042			1630			13	X	X	X	X	X								MS/MSD
31043			1640			5	X	X	X	X	X								

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E[illegible]) ☐ Other ___ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for ___ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # ___ Temperature: ☐ Room ☐ Cold (___ °C).

Relinquished by [illegible] Date/Time 11-3-05 / 1715 Received by [illegible] Date/Time 11/4/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note: 3 Coolers Total

Clients u[illegible]stand that all terms described in the proposals, quotations for this project, and/or the [illegible]al terms provided in the current APCL price schedules will be followed. APCL reserv[illegible] right to termi[illegible] a service or withhold delivery of any reports, if in APCL's sole discretion the terms of [illegible]oject have been broken.

APCL [illegible]-101, Ver. 4.0, Dec. 20, 1994.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 2 of 2

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham Ste 210 City: San Diego State: CA Zip code: 92123

Bill to: Same

Project Name/Code IR Site 31 Job #10218.08 P.O. #

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by: R Gulberg / H Carter

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035/8260B	3050B/6010B/6000	3550/8270C	3550B/8082	3550B/8081A	D2937/D7216	C136-96/D422-63	D5088-91-90	TCLP Metals Blk	RCP 40			Remarks
31064		11-4-05	1235	Soil	—	5	X	X	X	X	X								
31065			1245			5	X	X	X	X	X								
31066			1435			~~26~~ 27	X	X	X	X	X	X	X	X	X	X			Geotech
31067			1440			~~26~~ 5	X	X	X	X	X								
31068			~~1450~~ 1445			~~26~~ 27	X	X	X	X	X	X	X	X	X	X			geotech
31069			~~1455~~ 1510			5	X	X	X	X	X								
31070			1515			5	X	X	X	X	X								
31071			1540			5	X	X	X	X	X								
31072			1545			5	X	X	X	X	X								
TB-2			0800	Aq.	HCl	2	X												
TB-3			0810	Aq	HCl	2	X												

4671

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ APCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Rachel Holley Date/Time 11-4-05 / 1630 Received by [signature] Date/Time 11/5/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: _____ **Client Name/Project:** CDM / Alameda

1. Sample Arrival

Date/Time Received 11/3/05 1000 Date/Time Opened 11/3/05 1000 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☐ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☐ Sampled By : _____

3. Shipping Container/Cooler

☒ Cooler Used? # of 1 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.5 _____ _____ _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☒ plastic ☐ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 3 Nov 2005 8:17 a.m.

NOTE: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentPile: [nccl.textfile]impcl.tea.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: _____ **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/4/05 1000 Date/Time Opened 11/4/05 1000 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By: HC/RG

3. Shipping Container/Cooler

☒ Cooler Used? # of 2 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.8 6.2 4.4
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☒ plastic ☐ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: [illegible] Printed: 4 Nov 2005 8:25 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [nesh.textfiles]smprck.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4671 Client Name/Project: CDM / Alameda

1. Sample Arrival

Date/Time Received 11/5/05 1000 Date/Time Opened 11/5/05 1000 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☐ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed, dated? By: _____
☐ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☐ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☐ #Samples OK? _____
☐ Sampled By : _____

3. Shipping Container/Cooler

☒ Cooler Used? # of 3 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.4 3.8 4.0

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 5 Nov 2005 7:44 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [acal.texfiles]smprcl.tex

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1408

Sample Login: Check List

05-04671 (0787_ 853) (2683383_ 853)

11/11/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/05/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.4 3.8 4.0 3.8 4.2 4.4 4.5 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*RG/HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*Regular*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31066		05-04671-7	S	B		300	2	G	110405	N	0	6	☐
2	31068		05-04671-8	S	B		300	2	G	110405	N	0	6	☐
3	31037		05-04671-4	S	B		300	2	G	110305	N	0	6	☐
4	31038		05-04671-5	S	B		300	2	G	110305	N	0	6	☐
5	31039		05-04671-6	S	B		300	2	G	110305	N	0	6	☐
6	31007		05-04671-1	S	B		300	2	G	110205	N	0	6	☐
7	31008		05-04671-2	S	B		300	2	G	110205	N	0	6	☐
8	31009		05-04671-3	S	B		300	2	G	110205	N	0	6	☐

Part 3: Analysis Information

Test Items: ☐ Geotechnical

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	CUSTOM	
1	31066		05-04671-7	S	X	☐
2	31068		05-04671-8	S	X	☐
3	31037		05-04671-4	S	X	☐
4	31038		05-04671-5	S	X	☐
5	31039		05-04671-6	S	X	☐
6	31007		05-04671-1	S	X	☐
7	31008		05-04671-2	S	X	☐
8	31009		05-04671-3	S	X	☐

☐ Client"s Requirement: SUBCONTRACT TO PTS LABORATORY

Login By JASON M. NARIO

Check By

Hsin-Yi Lee

From: Rachel Spitz [rspitz@ptsgeolabs.com]
Sent: Thursday, November 10, 2005 10:47 AM
To: Hsin-Yi Lee (E-mail)
Subject: Sample Acknowledgement for PTS File No.: 35694

COC35694.pdf (914 KB)

Project Name: Alameda.1R Site 31
Project No.: 6218-086
PTS File No: 35694

November 10, 2005

Dear Ms. Lee:

We received your samples on:

11/09/05

and analytical results are scheduled to be sent to you electronically on or before:

11/18/05

as requested on the attached chain of custody.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or concerns, please feel free to contact me at the phone number or email address given below.

Sincerely,

Rachel Spitz
Project Coordinator
PTS Laboratories
562-907-3607 (Santa Fe Springs, CA)
713-680-2291 (Houston, TX)
Email: revans@ptsgeolabs.com
www.ptsgeolabs.com

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Applied P & Ch Laboratory

Subcontract Chain of Custody

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Please Print in pen Page ____ of ____

Subcontract Lab: PTS Laboratories Contact: Larry Kunkel Tel #: 562-907-3607 Fax #: 562-907-3610

Address: 8100 Secura Way City: Santa Fe Springs State: CA Zip code: 90670

APCL Client: 05-4671 APCL Contact:

Project Name/Code Alameda, IR Site 31 Job # 6218-086

BILL TO APCL Sub Quotation # Q05-142

Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by:

Analysis Items: Geotechnical*

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Geotechnical*	Remarks
√ 31066		11/4/05	1435	S	—	1		
√ 31068		11/4/05	1445		—	1		
√ 31037		11/3/05	1510		—	1		
√ 31038		11/3/05	1520		—	1		
√ 31039		11/3/05	1530		—	1		
√ 31007		11/2/05	1215		—	1		
√ 31008		11/2/05	1225		—	1		
√ 31009		11/2/05	1245		—	1		

*Geotechnical: - Density and Moisture (ASTM D2937 & D2216)
- Grain Size (ASTM C136-96 + D422-63)
- Hydraulic Conductivity (ASTM D5084-90)
- Air Permeability (API RP40)

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11/8/05 / 0900 Received by [signature] PTS Date/Time 11/9/05 / 12:12

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Sample Delivery Group
4679

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of 3

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham Suite 210 City: San Diego State: CA Zip code: 92123

Bill to:

Project Name/Code IR Site 31 Job #12218.080 P.O. #

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R Goldberg/H. Carter

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8260B	5035/8260B	8050B/1010/1664	8270B/8270	8260B/8082	8550B/8081A	D8937/D7216	C 1340	D5084-90	Wet Chem	AMT RPHD	Remarks
31078		11-6-05	1030	So. 1		4	X	X	X	X	X	X						
31079			1035			4	X	X	X	X	X	X						
31080			1040			5	X	X	X	X	X	X						
31081			1100			5	X	X	X	X	X	X						
31082			1105			12	X	X	X	X	X	X						MS/MSD
TB-2			1000	water		2	X											
31083			1200	Soil		5		X	X	X	X	X						
31084			1220			5		X	X	X	X	X						
31085			1250			5		X	X	X	X	X						
31086			1255			5		X	X	X	X	X						
31087			1425			~~5~~ 7		X	X	X	X	X	X	X	X	X		Geotech
31088			1430			~~4~~ 6		X	X	X	X	X	X	X	X	X		Geotech
31089			1435			4		X	X	X	X	X						
31090			1440			~~5~~ 7		X	X	X	X	X	X	X	X	X		Geotech

White – With report
Yellow – Lab copy
Pink – Originator

4679

5 coolers

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-7-05 / 1610 Received by [signature] Date/Time 11/8/05 / 0825

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Hsin-Yi Lee
Sent: Friday, November 11, 2005 1:18 PM
To: Michael Allen (AllenMC@cdm.com); Miller, Lempi; Carter, Holly
Subject: Sample login confirmation for 05-4679 (Alameda)

Per your request, we will rename TB2 to 31210 (collected 11/06/05 at 10:00).

If you have any questions please feel free to contact me.

Thanks You!

Hsin-Yi Lee
Project Manager
Applied Physics and Chemistry Laboratory
13760 Magnolia Ave.
Chino, CA 91710
(909)-590-1828 x113
HsinL@apclab.com

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Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

1004

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4679 Client Name/Project: CDM

1. Sample Arrival

Date/Time Received 11/8/05 0825 Date/Time Opened 11/8/05 0825 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : RG/HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.2 3.9 4.3
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 8 Nov 2005 8:23 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [ncal.texfiles]smprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04679 (0787_ 854) (2683383_ 854)

11/11/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/08/05 0825*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.4 3.8 4.2 3.9 4.3 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*RG/HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31078	EN	05-04679-1-α	S	P		5	3	G	110605	N	0	7	☐
	31078	SLE	05-04679-1-β	S	B		250	2	G	110605	N	0	7	☐
2	31079	EN	05-04679-2-α	S	P		5	3	G	110605	N	0	7	☐
	31079	SLE	05-04679-2-β	S	B		250	2	G	110605	N	0	7	☐
3	31080	EN	05-04679-3-α	S	P		5	3	G	110605	N	0	7	☐
	31080	SLE	05-04679-3-β	S	B		250	2	G	110605	N	0	7	☐
4	31081	EN	05-04679-4-α	S	P		5	3	G	110605	N	0	7	☐
	31081	SLE	05-04679-4-β	S	B		250	2	G	110605	N	0	7	☐
5	31082	EN	05-04679-5-α	S	P		5	9	G	110605	N	0	7	☐
	31082	SLE	05-04679-5-β	S	B		250	3	G	110605	N	0	7	☐
6	31210	VOC	05-04679-14	W	V	C	40	2	G	110605	N	0	7	☐
7	31083	EN	05-04679-6-α	S	P		5	3	G	110605	N	0	7	☐
	31083	SLE	05-04679-6-β	S	B		250	2	G	110605	N	0	7	☐
8	31084	EN	05-04679-7-α	S	P		5	3	G	110605	N	0	7	☐
	31084	SLE	05-04679-7-β	S	B		250	2	G	110605	N	0	7	☐
9	31085	EN	05-04679-8-α	S	P		5	3	G	110605	N	0	7	☐
	31085	SLE	05-04679-8-β	S	B		250	2	G	110605	N	0	7	☐
10	31086	EN	05-04679-9-α	S	P		5	3	G	110605	N	0	7	☐
	31086	SLE	05-04679-9-β	S	B		250	2	G	110605	N	0	7	☐
11	31087	EN	05-04679-10-α	S	P		5	3	G	110605	N	0	7	☐
	31087	SLE	05-04679-10-β	S	B		250	2	G	110605	N	0	7	☐
12	31088	EN	05-04679-11-α	S	P		5	3	G	110605	N	0	7	☐
	31088	SLE	05-04679-11-β	S	B		250	2	G	110605	N	0	7	☐
13	31089	EN	05-04679-12-α	S	P		5	3	G	110605	N	0	7	☐
	31089	SLE	05-04679-12-β	S	B		250	2	G	110605	N	0	7	☐
14	31090	EN	05-04679-13-α	S	P		5	3	G	110605	N	0	7	☐
	31090	SLE	05-04679-13-β	S	B		250	2	G	110605	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31078	EN	05-04679-1-α	S	X						X	X	☐
	31078	SLE	05-04679-1-β	S		X	X	X	X	X	X	X	☐
2	31079	EN	05-04679-2-α	S	X						X	X	☐
	31079	SLE	05-04679-2-β	S		X	X	X	X	X	X	X	☐
3	31080	EN	05-04679-3-α	S	X						X	X	☐
	31080	SLE	05-04679-3-β	S		X	X	X	X	X	X	X	☐
4	31081	EN	05-04679-4-α	S	X						X	X	☐
	31081	SLE	05-04679-4-β	S		X	X	X	X	X	X	X	☐
5	31082	EN	05-04679-5-α	S	X						X	X	☐
	31082	SLE	05-04679-5-β	S		X	X	X	X	X	X	X	☐
6	31210	VOC	05-04679-14	W	X								☐
7	31083	EN	05-04679-6-α	S	X						X	X	☐
	31083	SLE	05-04679-6-β	S		X	X	X	X	X	X	X	☐
8	31084	EN	05-04679-7-α	S	X						X	X	☐
	31084	SLE	05-04679-7-β	S		X	X	X	X	X	X	X	☐
9	31085	EN	05-04679-8-α	S	X						X	X	☐
	31085	SLE	05-04679-8-β	S		X	X	X	X	X	X	X	☐
10	31086	EN	05-04679-9-α	S	X						X	X	☐
	31086	SLE	05-04679-9-β	S		X	X	X	X	X	X	X	☐
11	31087	EN	05-04679-10-α	S	X						X	X	☐
	31087	SLE	05-04679-10-β	S		X	X	X	X	X	X	X	☐
12	31088	EN	05-04679-11-α	S	X						X	X	☐
	31088	SLE	05-04679-11-β	S		X	X	X	X	X	X	X	☐
13	31089	EN	05-04679-12-α	S	X						X	X	☐
	31089	SLE	05-04679-12-β	S		X	X	X	X	X	X	X	☐
14	31090	EN	05-04679-13-α	S	X						X	X	☐
	31090	SLE	05-04679-13-β	S		X	X	X	X	X	X	X	☐

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	TOC	
1	31078	EN	05-04679-1-α	S		☐
	31078	SLE	05-04679-1-β	S		☐
2	31079	EN	05-04679-2-α	S		☐
	31079	SLE	05-04679-2-β	S		☐
3	31080	EN	05-04679-3-α	S		☐
	31080	SLE	05-04679-3-β	S		☐
4	31081	EN	05-04679-4-α	S		☐
	31081	SLE	05-04679-4-β	S		☐
5	31082	EN	05-04679-5-α	S		☐
	31082	SLE	05-04679-5-β	S		☐
6	31210	VOC	05-04679-14	W		☐
7	31083	EN	05-04679-6-α	S		☐

	31083	SLE	05-04679-6-β	S		☐
8	31084	EN	05-04679-7-α	S		☐
	31084	SLE	05-04679-7-β	S		☐
9	31085	EN	05-04679-8-α	S		☐
	31085	SLE	05-04679-8-β	S		☐
10	31086	EN	05-04679-9-α	S		☐
	31086	SLE	05-04679-9-β	S		☐
11	31087	EN	05-04679-10-α	S		☐
	31087	SLE	05-04679-10-β	S	X	☐
12	31088	EN	05-04679-11-α	S		☐
	31088	SLE	05-04679-11-β	S	X	☐
13	31089	EN	05-04679-12-α	S		☐
	31089	SLE	05-04679-12-β	S		☐
14	31090	EN	05-04679-13-α	S		☐
	31090	SLE	05-04679-13-β	S	X	☐

☐ Client"s Requirement: ALL METHODS: FOLLOW PROJECT QC TABLES ATTACHED.

☐ VOC: FULL SPIKE/LOW LEVEL FOR WATER

☐ 8270: FULL SPIKE FOR WATER

☐ 8270: INCLUDED 1-METHYLNAPHTHALENE/

☐ 2-METHYLNAPHTHALENE/CARBAZOLE/

☐ ISOPHORONE/PYRIDINE/ANILINE

☐ 8081A: INCLUDED TOTAL CHLORDANE

☐ 8081A: CONCENTRATE TO 1 ML FOR DW LEVEL

☐ MS/MSD# 5

Login By JASON M. NARIO

Check By

Sample Delivery Group
4680

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham City: San Diego State: CA Zip code:

Bill to:

Project Name/Code IR Site 31 Job #60218.086 P.O. #

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R Goldberg / H. Cortez

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5030B/8260B	300.0/E0108/300.0	3510C/8270C	3510C/8082	3510C/8081A							Remarks
31076		11-6-05	0930	water	HNO3 HCl	1 poly 3 VOA 3 amber	X	X	X	X	X							
31077		11-6-05	0945	water	HNO3 HCl	1 poly 3 VOA 3 amber	X	X	X	X	X							
TB-1		11-6-05	0930	water	HCl	2	X	X	X	X	X							
31104		11-7-05	1050	Soil	—	5	X	X	X	X	X							
31105			1055			5	X	X	X	X	X							
31106			1130			5	X	X	X	X	X							
31107			1135			5	X	X	X	X	X							
31108			1210			5	X	X	X	X	X							
31109			1215			5	X	X	X	X	X							
31110			1225			4	X	X	X	X	X							
31111			1230			4	X	X	X	X	X							
31112			1525			5	X	X	X	X	X							
31113			1530			5	X	X	X	X	X							

4680

5 coolers

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-7-05 / 1610 Received by [signature] Date/Time 11/8/05 / 0825

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

4803

Hsin-Yi Lee

From: Miller, Lempi [MillerLE@cdm.com]
Sent: Monday, November 14, 2005 10:18 AM
To: Hsin-Yi Lee
Cc: Carter, Holly
Subject: SDG 4680/ TB

Hi Hsin-Yi,

I was reviewing the COC form 4680, and noticed that there was a request made for ALL samples to be run on TB-1 later named 31209. Please do not run all samples, only VOCs. Thanks. Holly is making the correction on the original form.

Thanks!

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

Hsin-Yi Lee

From: Hsin-Yi Lee
Sent: Friday, November 11, 2005 12:56 PM
To: Michael Allen (AllenMC@cdm.com); Miller, Lempi; Carter, Holly
Subject: Sample login confirmation for 05-4680 (included new TB id)

Per your request, we will rename the TB-1, collected on 11/06/05 at 09:30, to 31209.

If you have any questions please feel free to contact me.

Thanks You!

Hsin-Yi Lee
Project Manager
Applied Physics and Chemistry Laboratory
13760 Magnolia Ave.
Chino, CA 91710
(909)-590-1828 x113
HsinL@apclab.com

This electronic communication may contain information that is privileged and/or confidential. It is intended for the sole use of the individual or entity to which it is addressed. If you have received this communication in error, please notify us immediately electronically or by telephone. If you are not the intended recipient, or the employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4680 **Client Name/Project:** CDM

1. Sample Arrival

Date/Time Received 11/8/05 0825 Date/Time Opened 11/8/05 0825 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : RG/HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.2 3.9 4.3
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 8 Nov 2005 8:23 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

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Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04680 (0787_ 855) (2683383_ 855)

11/11/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/08/05 0825*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.4 3.8 4.2 3.9 4.3 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*RG/HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31076	VOC	05-04680-1-α	W	V	C	40	3	G	110605	N	0	7	☐
	31076	EXT	05-04680-1-β	W	G		1000	5	G	110605	N	0	7	☐
	31076	MET	05-04680-1-γ	W	P	N	500	1	G	110605	N	0	7	☐
2	31077	VOC	05-04680-2-α	W	V	C	40	3	G	110605	N	0	7	☐
	31077	EXT	05-04680-2-β	W	G		1000	5	G	110605	N	0	7	☐
	31077	MET	05-04680-2-γ	W	P	N	500	1	G	110605	N	0	7	☐
3	31209	VOC	05-04680-13	W	V	C	40	3	G	110605	N	0	7	☐
4	31104	EN	05-04680-3-α	S	P		5	3	G	110705	N	0	7	☐
	31104	SLE	05-04680-3-β	S	B		250	2	G	110705	N	0	7	☐
5	31105	EN	05-04680-4-α	S	P		5	3	G	110705	N	0	7	☐
	31105	SLE	05-04680-4-β	S	B		250	2	G	110705	N	0	7	☐
6	31106	EN	05-04680-5-α	S	P		5	3	G	110705	N	0	7	☐
	31106	SLE	05-04680-5-β	S	B		250	2	G	110705	N	0	7	☐
7	31107	EN	05-04680-6-α	S	P		5	3	G	110705	N	0	7	☐
	31107	SLE	05-04680-6-β	S	B		250	2	G	110705	N	0	7	☐
8	31108	EN	05-04680-7-α	S	P		5	3	G	110705	N	0	7	☐
	31108	SLE	05-04680-7-β	S	B		250	2	G	110705	N	0	7	☐
9	31109	EN	05-04680-8-α	S	P		5	3	G	110705	N	0	7	☐
	31109	SLE	05-04680-8-β	S	B		250	2	G	110705	N	0	7	☐
10	31110	EN	05-04680-9-α	S	P		5	3	G	110705	N	0	7	☐
	31110	SLE	05-04680-9-β	S	B		250	2	G	110705	N	0	7	☐
11	31111	EN	05-04680-10-α	S	P		5	3	G	110705	N	0	7	☐
	31111	SLE	05-04680-10-β	S	B		250	2	G	110705	N	0	7	☐
12	31112	EN	05-04680-11-α	S	P		5	3	G	110705	N	0	7	☐
	31112	SLE	05-04680-11-β	S	B		250	2	G	110705	N	0	7	☐
13	31113	EN	05-04680-12-α	S	P		5	3	G	110705	N	0	7	☐
	31113	SLE	05-04680-12-β	S	B		250	2	G	110705	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Sample Delivery Group
4681

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM
Contact: Mike Allen
Tel #: 858-268-3383 Fax #:
Address: 9444 Farnham Ste 210
City: San Diego
State: CA
Zip code: 92123
Bill to:
Project Name/Code IR Site 31
Job #6218.080 P.O. #
Project Address Alameda, CA
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: R Goldberg / H. Carter

Analysis Items: 8260B; 5035/8260B; 3050B/6010B; 3550B/8270C; 3550B/8082; 3550B/8081A

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8260B	5035/8260B	3050B/6010B	3550B/8270C	3550B/8082	3550B/8081A							Remarks
31091		11-6-05	1500	Soil	—	5		X	X	X	X	X							
31092			1510			5		X	X	X	X	X							
31093			1520			5		X	X	X	X	X							
31094			1530			5		X	X	X	X	X							
31095			1535			5		X	X	X	X	X							
31096			1540			5		X	X	X	X	X							
TB-3			1500	water		2	X												
TB-4		11-7-05	0850			2	X												
31097			0900	Soil		5		X	X	X	X	X							
31098			0905			5		X	X	X	X	X							
31099			0915			4		X	X	X	X	X							
31100			0920			4		X	X	X	X	X							
31101			1010			5		X	X	X	X	X							
31102			1015			12		X	X	X	X	X							MS/MSD
31103			1025			5		X	X	X	X	X							

4881

5 coolers

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-7-05 / 1610 Received by [signature] Date/Time 11/8/05 / 0825

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

Hsin-Yi Lee

From: Hsin-Yi Lee

Sent: Friday, November 11, 2005 1:32 PM

To: Michael Allen (AllenMC@cdm.com); Miller, Lempi; Carter, Holly

Subject: Sample login confirmation for 05-~~4684~~ (extra sample received)
4681 HL/11/2005

We received an extra sample, TB5 (collected on 11/07/05 at 10:50) that was not listed in the COC.
Please let me know if we need to anlayze and report TB5 for VOC analysis.

Also, per your request, we will rename the trip blanks as follow:

TB3, collected on 11/06/05 at 15:00, will rename to 31211
TB4, collected on 11/07/05 at 08:50, will rename to 31212
TB5, collected on 11/07/05 at 10:50, will rename to 31213

If you have any questions please feel free to contact me.

Thanks You!

Hsin-Yi Lee
Project Manager
Applied Physics and Chemistry Laboratory
13760 Magnolia Ave.
Chino, CA 91710
(909)-590-1828 x113
HsinL@apclab.com

This electronic communication may contain information that is privileged and/or confidential. It is intended for the sole use of the individual or entity to which it is addressed. If you have received this communication in error, please notify us immediately electronically or by telephone. If you are not the intended recipient, or the employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited.

Hsin-Yi Lee

From: Miller, Lempi [MillerLE@cdm.com]
Sent: Monday, November 14, 2005 12:05 PM
To: Hsin-Yi Lee
Subject: RE: Sample login confirmation for 05-4671 (Geotechnical)

Hi Hsin-Yi,

Labeling the extra TB as 31213 was the right thing to do. We will add it to a second page of the COC form. Please do the VOC test on this sample.

Thanks,

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

From: Hsin-Yi Lee [mailto:HsinL@apclab.com]
Sent: Friday, November 11, 2005 2:41 PM
To: Miller, Lempi
Subject: RE: Sample login confirmation for 05-4671 (Geotechnical)

Can you find out about the extra tb received on 05-4681?

Thanks

Hsin-Yi

-----Original Message-----
From: Miller, Lempi [mailto:MillerLE@cdm.com]
Sent: Friday, November 11, 2005 2:36 PM
To: Hsin-Yi Lee
Subject: RE: Sample login confirmation for 05-4671 (Geotechnical)

Yes. I saw that right after I made the inquiry. Thank you.

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4681 Client Name/Project: CDM

1. Sample Arrival

Date/Time Received 11/8/05 0825 Date/Time Opened 11/8/05 0825 By (name(s)) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : RG/HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.2 3.9 4.3 _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 8 Nov 2005 8:23 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFiler: [neal.textfiles]smprcl.txt.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04681 (0787_ 856) (2683383_ 856)

11/11/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda IR Site 31*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/08/05 0825*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*3.4 3.8 4.2 3.9 4.3 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*RG/HC*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31091	EN	05-04681-1-α	S	P		5	3	G	110605	N	0	7	☐
	31091	SLE	05-04681-1-β	S	B		250	2	G	110605	N	0	7	☐
2	31092	EN	05-04681-2-α	S	P		5	3	G	110605	N	0	7	☐
	31092	SLE	05-04681-2-β	S	B		250	2	G	110605	N	0	7	☐
3	31093	EN	05-04681-3-α	S	P		5	3	G	110605	N	0	7	☐
	31093	SLE	05-04681-3-β	S	B		250	2	G	110605	N	0	7	☐
4	31094	EN	05-04681-4-α	S	P		5	3	G	110605	N	0	7	☐
	31094	SLE	05-04681-4-β	S	B		250	2	G	110605	N	0	7	☐
5	31095	EN	05-04681-5-α	S	P		5	3	G	110605	N	0	7	☐
	31095	SLE	05-04681-5-β	S	B		250	2	G	110605	N	0	7	☐
6	31096	EN	05-04681-6-α	S	P		5	3	G	110605	N	0	7	☐
	31096	SLE	05-04681-6-β	S	B		250	2	G	110605	N	0	7	☐
7	31211	VOC	05-04681-14	W	V	C	40	2	G	110605	N	0	7	☐
8	31212	VOC	05-04681-15	W	V	C	40	2	G	110705	N	0	7	☐
9	31097	EN	05-04681-7-α	S	P		5	3	G	110705	N	0	7	☐
	31097	SLE	05-04681-7-β	S	B		250	2	G	110705	N	0	7	☐
10	31098	EN	05-04681-8-α	S	P		5	3	G	110705	N	0	7	☐
	31098	SLE	05-04681-8-β	S	B		250	2	G	110705	N	0	7	☐
11	31099	EN	05-04681-9-α	S	P		5	3	G	110705	N	0	7	☐
	31099	SLE	05-04681-9-β	S	B		250	2	G	110705	N	0	7	☐
12	31100	EN	05-04681-10-α	S	P		5	3	G	110705	N	0	7	☐
	31100	SLE	05-04681-10-β	S	B		250	2	G	110705	N	0	7	☐
13	31101	EN	05-04681-11-α	S	P		5	3	G	110705	N	0	7	☐
	31101	SLE	05-04681-11-β	S	B		250	2	G	110705	N	0	7	☐
14	31102	EN	05-04681-12-α	S	P		5	9	G	110705	N	0	7	☐
	31102	SLE	05-04681-12-β	S	B		250	3	G	110705	N	0	7	☐
15	31103	EN	05-04681-13-α	S	P		5	3	G	110705	N	0	7	☐
	31103	SLE	05-04681-13-β	S	B		250	2	G	110705	N	0	7	☐
16	31213	VOC	05-04681-16	W	V	C	40	2	G	110705	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* Volatile organics
- ☐ *6010B* TTLC 17 Metals
- ☐ *200.7/6010B* Iron, Fe, by ICP
- ☐ *8270C* Semi-VOC, 64 Compounds
- ☐ *8082* PCBs
- ☐ *8081A* Organochlorine pesticides
- ☐ *ASTM-D2216* Moisture, percent in soil

Sample Delivery Group
4702

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page ____ of ____

Client: CDM Contact: Holly Carter Tel #: 858-268-3883 Fax #: 858-268-9677

Address: 9444 Farnham Suite 210 City: San Diego, CA State: CA Zip code: 92123

Bill to: CDM

Project Name/Code 6218.086 Job # P.O. #

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ____ days ____ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	VOC's 8260B	Metals 3100/6010/7470	SVOC 3500/8270C	PCB's 3500/8082	Pest 3500/8081								Remarks
~~3141~~	31123	11-8-05	1000	water	none	5			X	X	X								
LC ~~3141~~	31123		1000		HNO_3	1		X											
~~3141~~	31123		1000		HCl	3	X												
31125			1130		none	5			X	X	X								
31125			1130		HNO_3	1		X											
31125			1130		HCl	3	X												
31126			1200		none	5			X	X	X								
31126			1200		HNO_3	1		X											
31126			1200		HCl	3	X												
31129			0953		None	5		X	X	X	X								
31130			1145		None	5			X	X	X								
31131			1425		None	5			X	X	X								
31129			0953		HNO_3	1		X											
11130			1145		HNO_3	1		X											
11131			1425		HNO_3	1		X											

4702

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ APCEE ☐ NEESA ____ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (____ °C).

Relinquished by [signature] Date/Time 11-08-05 / 0452 Received by [signature] Date/Time 11/9/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Monday, November 21, 2005 3:50 PM
To: Hsin-Yi Lee
Subject: COC4702

Here it is in pdf...

Holly A. Carter
Geologist

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

1004

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax. (909) 590-1498

Chain of Custody

HC 11.21.05

Please Print in pen Page 1 of 2

Client: CDM Contact: Holly Carter Tel #: 858-268-3883 Fax #: 858-268-9177

Address: 9444 Balboa Ave. Suite 210 City: San Diego, CA State: CA Zip code: 92123

Bill to: CDM

Project Name/Code 6218.086 Job # P.O. #

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: HC 11.21.05

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	VOCs 8260B	Metals	[illegible]	[illegible]	[illegible]								Remarks
~~[illegible]~~	[illegible]	~~[illegible]~~	[illegible]	[illegible]	[illegible]	5			X	X	X								
~~[illegible]~~	[illegible]		[illegible]		HNO3	1		X											
~~[illegible]~~	[illegible]		[illegible]		HCl	3	X												
[illegible]			[illegible]		[illegible]	5			X	X	X								
[illegible]			[illegible]		HNO3	1		X											
[illegible]			[illegible]		HCl	3	X												
[illegible]			[illegible]		[illegible]	5			X	X	X								
[illegible]			[illegible]		HNO3	1		X											
311 [illegible]			[illegible]		HCl	3	X												
311 29			0953		None	5			X	X	X								
311 30			1145		None	5			X	X	X								
311 31			1425		None	5			X	X	X								
311 29			0953		HNO3	1		X											
~~[illegible]~~ 31130 HC 11.21.05			[illegible]		HNO3	1		X											
~~[illegible]~~ 31131			1425		HNO3	1		X											

QC Requirement: [X] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [ ] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [ ] Disposal by APCL [ ] Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 11-08-05 10452 Received by Date/Time /

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

1005

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 2 of 2

Client: CDM Contact: MIKE ALLEN Tel #: 858 260 3383 Fax #:

Address: 9444 FRENDAIN ST E 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: SAME

Project Name/Code 6218 086 Job # SAME P.O. #

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☐ regular ☐ rush: ___ days ___ hours Sampled by: [illegible]

Analysis Items: VOCs

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	VOCs	Remarks
31215		11.15	1000	Air	Tedlar	2	X	[illegible]
								[illegible]
								[illegible]

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [illegible] Date/Time 11 5 05 / 1652 Received by Date/Time / /

Relinquished by Date/Time / Received by Date/Time / /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4702 **Client Name/Project:** CDM / Alameda

1. Sample Arrival

Date/Time Received 11/9/05 1000 Date/Time Opened 11/9/05 1000 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : MC

3. Shipping Container/Cooler

☐ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	4.0	3.5	3.4	3.9	4.2

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☐ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 9 Nov 2005 8:24 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

Document File: [nesl.textiles]smprcl.tes.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04702 (0787_ 857) (2683383_ 857)

11/09/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/09/05 1000*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*4.0 3.5 3.4 3.9 4.2 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*HC*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31215	VOC	05-04702-7	W	V	C	40	3	G	110805	N	0	7	☐
2	31123	VOC	05-04702-1-α	W	V	C	40	3	G	110805	N	0	7	☐
	31123	EXTR	05-04702-1-β	W	G		1000	5	G	110805	N	0	7	☐
	31123	MET	05-04702-1-γ	W	P	N	500	1	G	110805	N	0	7	☐
3	31125	VOC	05-04702-2-α	W	V	C	40	3	G	110805	N	0	7	☐
	31125	EXTR	05-04702-2-β	W	G		1000	5	G	110805	N	0	7	☐
	31125	MET	05-04702-2-γ	W	P	N	500	1	G	110805	N	0	7	☐
4	31126	VOC	05-04702-3-α	W	V	C	40	3	G	110805	N	0	7	☐
	31126	EXTR	05-04702-3-β	W	G		1000	5	G	110805	N	0	7	☐
	31126	MET	05-04702-3-γ	W	P	N	500	1	G	110805	N	0	7	☐
5	31129	EXTR	05-04702-4-α	W	G		1000	5	G	110805	N	0	7	☐
	31129	MET	05-04702-4-β	W	P	N	500	1	G	110805	N	0	7	☐
6	31130	EXTR	05-04702-5-α	W	G		1000	5	G	110805	N	0	7	☐
	31130	MET	05-04702-5-β	W	P	N	500	1	G	110805	N	0	7	☐
7	31131	EXTR	05-04702-6-α	W	G		1000	5	G	110805	N	0	7	☐
	31131	MET	05-04702-6-β	W	P	N	500	1	G	110805	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31215	VOC	05-04702-7	W	X								☐
2	31123	VOC	05-04702-1-α	W	X								☐
	31123	EXTR	05-04702-1-β	W				X	X	X			☐
	31123	MET	05-04702-1-γ	W		X	X						☐
3	31125	VOC	05-04702-2-α	W	X								☐
	31125	EXTR	05-04702-2-β	W				X	X	X			☐
	31125	MET	05-04702-2-γ	W		X	X						☐
4	31126	VOC	05-04702-3-α	W	X								☐

Sample Delivery Group
4703

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of ____

Client: CDM Contact: MIKE ALLEN Tel #: 858-268-3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: Same

Project Name/Code IR SITE 31 Job # 628.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	5035B/8260B	8260B/8260B	8270C	8082	8081A							Remarks
TB-1	trip blank	11-8-05	0815	Aq	HCl	2	X											
31114			0840	S	—	5	X	X	X	X	X							
31115			0900	S	—	5												
31116			1010	S	—	5												
31117			1020	S	—	5												
31118			1030	S	—	5												
31119			1145	S	—	5												
31120			1155	S	—	12												MS/MSD
31121			1205	S	—	4												
31122			1210	S	—	4												
31132			1535	S	—	5												
31133			1545	S	—	5												
31134			1555	S	—	5												

4703

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ APCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-8-05 / 1600 Received by [signature] Date/Time 11/9/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Doc. 20, 1994. Root-file:[CUST.DATA.LAB]CHAIN_ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Hsin-Yi Lee

From: Carter, Holly [CarterHA@cdm.com]
Sent: Tuesday, November 08, 2005 8:27 PM
To: Hsin-Yi Lee ; Allen, Michael; Miller, Lempi
Subject: RE: QC Sample ID for Trip Blanks

Yes...please usee 31200 and up for the past trip blaams received. Startinig tomorrow morning, we will assign "official" sample numbers too trip blanks...thanks!

-----Original Message-----
From: Hsin-Yi Lee
To: Allen, Michael; Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Sent: 11/8/2005 6:03 PM
Subject: RE: QC Sample ID for Trip Blanks

Holly,

Please let me know if I can use the sample ID series 31200 and up for the past trip blank received.

Thanks

Hsin-Yi

-----Original Message-----
From: Allen, Michael [mailto:AllenMC@cdm.com]
Sent: Tuesday, November 08, 2005 1:36 PM
To: Hsin-Yi Lee; Miller, Lempi
Cc: Carter, Holly
Subject: QC Sample ID for Trip Blanks

Hsin-Yi:
Confirmed with Holly that you can use the sample ID series 31200 and up for the past trip blank samples received.

OK? Please confirm with email the actual numbers used.

Mike

Michael C. Allen P.E.

Senior Environmental Engineer

CDM Federal

1218 Third Avenue Suite 380

Seattle, WA 98101

Office Phone: 206.903.0231 xt 103

Hsin-Yi Lee

From: Hsin-Yi Lee
Sent: Friday, November 11, 2005 2:50 PM
To: Michael Allen (AllenMC@cdm.com); 'Miller, Lempi'; Carter, Holly
Subject: Sample login confirmation for 05-4703 (new TB id)

Per your request, we will rename the trip blank as 31214 (collected 11/08/05 at 08:15).

If you have any questions please feel free to contact me.

Thanks You!

Hsin-Yi Lee
Project Manager
Applied Physics and Chemistry Laboratory
13760 Magnolia Ave.
Chino, CA 91710
(909)-590-1828 x113
HsinL@apclab.com

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Hsin-Yi Lee

From: Miller, Lempi [MillerLE@cdm.com]
Sent: Tuesday, November 22, 2005 1:07 PM
To: Carter, Holly; Hsin-Yi Lee
Cc: Allen, Michael
Subject: small edits to COC form

4703

The following trip blanks had an analysis request for 8260B/5035B (soil) and it should have said 8260B/5030B (water):

31151
31202
31203
31204
31206
31207
31214

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: **4703** Client Name/Project: CDM | Alameda

1. Sample Arrival

Date/Time Received 11/9/05 1000 Date/Time Opened 11/9/05 1000 By (name): Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : HC

3. Shipping Container/Cooler

☐ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	4.0	3.5	3.4	3.9	4.2

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 9 Nov 2005 8:24 a.m.

*HT: *Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.*

DocumentFile: [aval.texfiles]smprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04703 (0787_ 858) (2683383_ 858)

11/09/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda Ir Site 31*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/09/05 1000*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*4.0 3.5 3.4 3.9 4.2 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*HC*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31214	VOC	05-04703-13	W	V	C	40	2	G	110805	N	0	7	☐
2	31114	EN	05-04703-1-α	S	P		5	3	G	110805	N	0	7	☐
	31114	SLE	05-04703-1-β	S	B		250	2	G	110805	N	0	7	☐
3	31115	EN	05-04703-2-α	S	P		5	3	G	110805	N	0	7	☐
	31115	SLE	05-04703-2-β	S	B		250	2	G	110805	N	0	7	☐
4	31116	EN	05-04703-3-α	S	P		5	3	G	110805	N	0	7	☐
	31116	SLE	05-04703-3-β	S	B		250	2	G	110805	N	0	7	☐
5	31117	EN	05-04703-4-α	S	P		5	3	G	110805	N	0	7	☐
	31117	SLE	05-04703-4-β	S	B		250	2	G	110805	N	0	7	☐
6	31118	EN	05-04703-5-α	S	P		5	3	G	110805	N	0	7	☐
	31118	SLE	05-04703-5-β	S	B		250	2	G	110805	N	0	7	☐
7	31119	EN	05-04703-6-α	S	P		5	3	G	110805	N	0	7	☐
	31119	SLE	05-04703-6-β	S	B		250	2	G	110805	N	0	7	☐
8	31120	EN	05-04703-7-α	S	P		5	9	G	110805	N	0	7	☐
	31120	SLE	05-04703-7-β	S	B		250	3	G	110805	N	0	7	☐
9	31121	EN	05-04703-8-α	S	P		5	3	G	110805	N	0	7	☐
	31121	SLE	05-04703-8-β	S	B		250	1	G	110805	N	0	7	☐
10	31122	EN	05-04703-9-α	S	P		5	3	G	110805	N	0	7	☐
	31122	SLE	05-04703-9-β	S	B		250	1	G	110805	N	0	7	☐
11	31132	EN	05-04703-10-α	S	P		5	3	G	110805	N	0	7	☐
	31132	SLE	05-04703-10-β	S	B		250	2	G	110805	N	0	7	☐
12	31133	EN	05-04703-11-α	S	P		5	3	G	110805	N	0	7	☐
	31133	SLE	05-04703-11-β	S	B		250	2	G	110805	N	0	7	☐
13	31134	EN	05-04703-12-α	S	P		5	3	G	110805	N	0	7	☐
	31134	SLE	05-04703-12-β	S	B		250	2	G	110805	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Black* — Carbon, Total Organic (TOC)

Seq. Client"s Sample ID Sample APCL

Sample Delivery Group
4723

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of ___

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. #

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H CARTER

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035B/8260B	3050B/6010B/7000	3580B/8270C	3550B/8082	3550B/8081A	ASTM D2937/D2216	C136-96D/422-63	D5084-90	TIC multiply Blank	APE EP 4D			Remarks
31135		11-9-05	0810	SOIL	—	5	X	X	X	X	X	X	NO	HC	11-9-05				
31136			0820		—	5													
31137			0920		—	5													
31138			0930		—	5													
31139			1020		—	5													
31140			1030		—	5													
31141			1115		—	5													
31142			1125		—	4													
31143			1130		—	4													
31144			1445		—	7						X	X	X	X	X			+ geotech + analytical
31145			1455		—	7						X	X	X	X	X			+ geotech + analytical
31081			1540		—	2						X	X	X	X	X			geotechnical only
31082			1545		—	2						X	X	X	X	X			geotechnical only
31151			0745	AQ	HCl	2	X												

4723

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-9-05 / 1630 Received by [signature] Date/Time 11/10/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994. Root-File:[CUST.DATA.LAB]CHAIN_ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Hsin-Yi Lee

From: Miller, Lempi [MillerLE@cdm.com]
Sent: Tuesday, November 22, 2005 1:07 PM
To: Carter, Holly; Hsin-Yi Lee
Cc: Allen, Michael
Subject: small edits to COC form

The following trip blanks had an analysis request for 8260B/5035B (soil) and it should have said 8260B/5030B (water):

31151
31202
31203
31204
31206
31207
31214

4723

Lempi E. Miller
Database Manager

CDM
9444 Farnham Street, Suite 210
San Diego, CA 92123
858-268-3383 phone
858-268-9677 fax

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4723 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/10/05 1000 Date/Time Opened 11/10/05 1000 By (name): Jason N

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : HC

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 5.8 4.0 4.2 3.9

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☒ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 10 Nov 2005 8:27 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal.texfiles]smprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04723 (0787_ 859) (2683383_ 859)

11/10/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/10/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.8 4.0 4.2 3.9 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31151	VOC	05-04723-12	W	V	C	40	2	G	110905	N	0	7	☐
2	31135	SLEEEVE	05-04723-1-α	S	B		250	2	G	110905	N	0	7	☐
	31135	EN	05-04723-1-β	S	P		5	3	G	110905	N	0	7	☐
3	31136	SLEEEVE	05-04723-2-α	S	B		250	2	G	110905	N	0	7	☐
	31136	EN	05-04723-2-β	S	P		5	3	G	110905	N	0	7	☐
4	31137	SLEEEVE	05-04723-3-α	S	B		250	2	G	110905	N	0	7	☐
	31137	EN	05-04723-3-β	S	P		5	3	G	110905	N	0	7	☐
5	31138	SLEEEVE	05-04723-4-α	S	B		250	2	G	110905	N	0	7	☐
	31138	EN	05-04723-4-β	S	P		5	3	G	110905	N	0	7	☐
6	31139	SLEEEVE	05-04723-5-α	S	B		250	2	G	110905	N	0	7	☐
	31139	EN	05-04723-5-β	S	P		5	3	G	110905	N	0	7	☐
7	31140	SLEEEVE	05-04723-6-α	S	B		250	2	G	110905	N	0	7	☐
	31140	EN	05-04723-6-β	S	P		5	3	G	110905	N	0	7	☐
8	31141	SLEEEVE	05-04723-7-α	S	B		250	2	G	110905	N	0	7	☐
	31141	EN	05-04723-7-β	S	P		5	3	G	110905	N	0	7	☐
9	31142	SLEEEVE	05-04723-8-α	S	B		250	1	G	110905	N	0	7	☐
	31142	EN	05-04723-8-β	S	P		5	3	G	110905	N	0	7	☐
10	31143	SLEEEVE	05-04723-9-α	S	B		250	1	G	110905	N	0	7	☐
	31143	EN	05-04723-9-β	S	P		5	3	G	110905	N	0	7	☐
11	31144	SLEEEVE	05-04723-10-α	S	B		250	2	G	110905	N	0	7	☐
	31144	EN	05-04723-10-β	S	P		5	3	G	110905	N	0	7	☐
12	31145	SLEEEVE	05-04723-11-α	S	B		250	2	G	110905	N	0	7	☐
	31145	EN	05-04723-11-β	S	P		5	3	G	110905	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31151	VOC	05-04723-12	W	X								☐

Sample Delivery Group
4724

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of 1

Client: COM Contact: Holy Carter Tel #: 858-268-3583 Fax #:

Address: 9444 Farnham Suite 210 City: San Diego State: CA Zip code:

Bill to: COM

Project Name/Code 6218.086 Job # P.O. #

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs 8260B/8260C	Metals: 200.8/6020/200.7	SVOC: 3510/8270C	3510C/8082	3510C/8081A							Remarks
31148		11-9-05	0950	water	none	5			X	X	X							
31148		↓	0950		HCl	3	X											
31148			0950		HNO_3	1		X										
31127		11-8-05	1550		None	5			X	X	X							
31127			1550		HCl	3	X											
31127		↓	1550		HNO_3	1		X										
31149		11-9-05	1015		None	5			X	X	X							
31149			1015		HCl	3	X											
31149		↓	1015		HNO_3	1		X										
31146		11-9-05	0900		None	5			X	X	X							
31146			0900		HNO_3	1		X										
31147			1131		None	5			X	X	X							
31147		↓	1131		HNO_3	1		X										
31150			730		HCL	2	X											

4724

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-9-05 / 1630 Received by [signature] Date/Time 11/10/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4724 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/10/05 1000 Date/Time Opened 11/10/05 1000 By (name): Jason N

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : WC

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	5.8	4.0	4.2	3.9		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☐ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 10 Nov 2005 8:27 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [local.(xxfiles)]smprcl.tes.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04724 (0787_ 860) (2683383_ 860)

11/10/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/10/05 1000*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.8 4.0 4.2 3.9 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31150	VOC	05-04724-6	W	V	C	40	2	G	110905	N	0	7	☐
2	31148	VOC	05-04724-4-α	W	V	C	40	3	G	110905	N	0	7	☐
	31148	EXTR	05-04724-4-β	W	G		1000	5	G	110905	N	0	7	☐
	31148	MET	05-04724-4-γ	W	P	N	500	1	G	110905	N	0	7	☐
3	31127	VOC	05-04724-1-α	W	V	C	40	3	G	110805	N	0	7	☐
	31127	EXTR	05-04724-1-β	W	G		1000	5	G	110805	N	0	7	☐
	31127	MET	05-04724-1-γ	W	P	N	500	1	G	110805	N	0	7	☐
4	31149	VOC	05-04724-5-α	W	V	C	40	3	G	110905	N	0	7	☐
	31149	EXTR	05-04724-5-β	W	G		1000	5	G	110905	N	0	7	☐
	31149	MET	05-04724-5-γ	W	P	N	500	1	G	110905	N	0	7	☐
5	31146	EXTR	05-04724-2-α	W	G		1000	5	G	110905	N	0	7	☐
	31146	MET	05-04724-2-β	W	P	N	500	1	G	110905	N	0	7	☐
6	31147	EXTR	05-04724-3-α	W	G		1000	5	G	110905	N	0	7	☐
	31147	MET	05-04724-3-β	W	P	N	500	1	G	110905	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31150	VOC	05-04724-6	W	X								☐
2	31148	VOC	05-04724-4-α	W	X								☐
	31148	EXTR	05-04724-4-β	W				X	X	X			☐
	31148	MET	05-04724-4-γ	W		X	X						☐
3	31127	VOC	05-04724-1-α	W	X								☐
	31127	EXTR	05-04724-1-β	W				X	X	X			☐
	31127	MET	05-04724-1-γ	W		X	X						☐
4	31149	VOC	05-04724-5-α	W	X								☐
	31149	EXTR	05-04724-5-β	W				X	X	X			☐
	31149	MET	05-04724-5-γ	W		X	X						☐

Sample Delivery Group
4742

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of ____

Client: CDM Contact: MIKE ALLEN Tel #: 858-268-3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	5030B/8260B	5030B/8260C	3510C/8270C	3510C/8082	3510C/8081A	5035B/8260C	5030B/8260C	3550B/8270C	3550B/8082	3550B/8081A			Remarks
31154		11-10-05	0820	AQ	HCl	2	X												
31155			0830	AQ	MIX	9	X	X	X	X	X								
31156			0910	SOIL	—	5						X	X	X	X	X			
31157			0920	SOIL	—	5						X	X	X	X	X			
31158			0930	SOIL	—	5						X	X	X	X	X			
31159			0940	SOIL	—	5						X	X	X	X	X			
31160			1005	SOIL	—	5						X	X	X	X	X			
31161			1015	SOIL	—	5						X	X	X	X	X			
31169			1245	AQ	MIX	9	X	X	X	X	X								
31170			1345	AQ	HCl	3	X												
31171			1645	AQ	HCl	3	X												
31172			1700	AQ	MIX	9	X	X	X	X	X								
31153			0815	AQ	HCl	2	X												

White – With report
Yellow – Lab copy
Pink – Originator

4742

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-10-05 / 1735 Received by [signature] Date/Time 11/11/05 / 1015

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 28, 1994. Root-file:[CUST.DATA.LAB]CHAIN-ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4742 **Client Name/Project:** CPM

1. Sample Arrival

Date/Time Received 11/11/05 1015 Date/Time Opened 11/11/05 1015 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 6 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	19.4	4.0	3.8	4.2	3.6	3.5

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?

Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if ~~not, see SOP~~ C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 11 Nov 2005 8:14 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]imprcl.tex.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1496

Sample Login: Check List

05-04742 (0787_ 862) (2683383_ 862)

11/11/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda IR Site 31*
	Project #:	*6218.086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/11/05 1015*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*19.4 4.0 3.8 4.2 3.6 3.5 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*HC*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Rush 5 working day(s)*
☐ QC Option:		*NEESA D*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31154	VOC	05-04742-2	W	V	C	40	2	G	111005	N	0	7	☐
2	31155	VOC	05-04742-3-α	W	V	C	40	3	G	111005	N	0	7	☐
	31155	EXT	05-04742-3-β	W	G		1000	5	G	111005	N	0	7	☐
	31155	MET	05-04742-3-γ	W	P	N	500	1	G	111005	N	0	7	☐
3	31169	VOC	05-04742-10-α	W	V	C	40	3	G	111005	N	0	7	☐
	31169	EXT	05-04742-10-β	W	G		1000	5	G	111005	N	0	7	☐
	31169	MET	05-04742-10-γ	W	P	N	500	1	G	111005	N	0	7	☐
4	31172	VOC	05-04742-13-α	W	V	C	40	3	G	111005	N	0	7	☐
	31172	EXT	05-04742-13-β	W	G		1000	5	G	111005	N	0	7	☐
	31172	MET	05-04742-13-γ	W	P	N	500	1	G	111005	N	0	7	☐
5	31170	VOC	05-04742-11	W	V	C	40	3	G	111005	N	0	7	☐
6	31171	VOC	05-04742-12	W	V	C	40	3	G	111005	N	0	7	☐
7	31153	VOC	05-04742-1	W	V	C	40	2	G	111005	N	0	7	☐
8	31156	EN	05-04742-4-α	S	P		5	3	G	111005	N	0	7	☐
	31156	SLE	05-04742-4-β	S	B		250	2	G	111005	N	0	7	☐
9	31157	EN	05-04742-5-α	S	P		5	3	G	111005	N	0	7	☐
	31157	SLE	05-04742-5-β	S	B		250	2	G	111005	N	0	7	☐
10	31158	EN	05-04742-6-α	S	P		5	3	G	111005	N	0	7	☐
	31158	SLE	05-04742-6-β	S	B		250	2	G	111005	N	0	7	☐
11	31159	EN	05-04742-7-α	S	P		5	3	G	111005	N	0	7	☐
	31159	SLE	05-04742-7-β	S	B		250	2	G	111005	N	0	7	☐
12	31160	EN	05-04742-8-α	S	P		5	3	G	111005	N	0	7	☐
	31160	SLE	05-04742-8-β	S	B		250	2	G	111005	N	0	7	☐
13	31161	EN	05-04742-9-α	S	P		5	3	G	111005	N	0	7	☐
	31161	SLE	05-04742-9-β	S	B		250	2	G	111005	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. Client"s Sample ID Sample APCL

Sample Delivery Group
4743

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 2 of ____

Client: CDM Contact: MIKE ALLEN Tel #: 858-268-3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. # same

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ____ days ____ hours Sampled by: R. GOLDBERG

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs	metals	SVOCs	PCBs	Pesticides								Remarks
31173		11-10-05	1500	water	Mixed	4	X	X											
31162		↓	0845			3	X												
31163		↓	0905			6	X	X	X	X	X								
31164		11-9-05	1400			7	X	X	X	X	X								
31165		11-10-05	0930			7	X	X	X	X	X								
31166		↓	0950			3	X												
31167		11-9-05	1100			6	X	X	X	X	X								
31168		11-10-05	1100			9	X	X	X	X	X								
31152		11-10-05	0810			2	X												

4743

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ____ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (____ °C).

Relinquished by [signature] Date/Time 11.10.05 / 1730 Received by [signature] Date/Time 11/10/05 / 1915

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Hsin-Yi Lee

From: Allen, Michael [AllenMC@cdm.com]
Sent: Friday, November 11, 2005 12:41 PM
To: Hsin-Yi Lee; Carter, Holly; Miller, Lempi
Subject: Alameda COC revisions

4743

Hsin-Yi:

Per our discussion and concurrence with the field team leader, Holly Carter, please make the following changes to the Chain of Custody form and requested analyses for the following sample ID numbers:

Sample ID 31163: please use the 2 one-liter amber bottles for analysis of pesticides/Aroclor by methods 8081A and 8082. Accordingly, owing to insufficient volume, this sample will have no analyses for SVOC.

Sample ID 31167: please use the available one-liter amber bottle for analysis of SVOC by methods 8270C. Accordingly, owing to insufficient volume, this sample will have no analyses for pesticides/Aroclor.

Any questions, please call me.
Mike

Michael C. Allen P.E.
Sr. Environmental Engineer
CDM Federal
9444 Farnham Road Suite 210
San Diego CA 92123-1360
Office Phone: 858.627.1540
Cell Phone: 206.790.9220
Fax: 858.268.9677
Email: allenmc@cdm.com

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4743 **Client Name/Project:** CDM

1. Sample Arrival

Date/Time Received 11/11/05 1015 Date/Time Opened 11/11/05 1015 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: __ ☒ #Samples OK? _____
☒ Sampled By : AC/RG

3. Shipping Container/Cooler

☒ Cooler Used? # of 6 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 19.4 4.0 3.8 4.2 3.6 3.5

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☒ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?

Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☐ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if ~~not, see SOP~~ C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 11 Nov 2005 8:14 a.m.

*HTs Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

Document File: [ncal.textfiles]smprcl.tex

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04743 (0787_ 863) (2683383_ 863)

11/11/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*Alameda IR Site 31*
		Project #:	*6218.036*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nairo*
		Receiving Date/Time:	*11/11/05 1015*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*19.4 4.0 3.8 4.2 3.6 3.5 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*RG/HC*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31173	VOC	05-04743-9-α	W	V	C	40	3	G	111005	N	0	7	☐
	31173	MET	05-04743-9-β	W	P	N	500	1	G	111005	N	0	7	☐
2	31162	VOC	05-04743-2	W	V	C	40	3	G	111005	N	0	7	☐
3	31163	VOC	05-04743-3-α	W	V	C	40	3	G	111005	N	0	7	☐
	31163	MET	05-04743-3-β	W	P	N	500	1	G	111005	N	0	7	☐
	31163	EXT	05-04743-3-γ	W	G		1000	2	G	111005	N	0	7	☐
4	31164	VOC	05-04743-4-α	W	V	C	40	3	G	110905	N	0	7	☐
	31164	MET	05-04743-4-β	W	P	N	500	1	G	110905	N	0	7	☐
	31164	EXT	05-04743-4-γ	W	G		1000	3	G	110905	N	0	7	☐
5	31165	VOC	05-04743-5-α	W	V	C	40	3	G	111005	N	0	7	☐
	31165	MET	05-04743-5-β	W	P	N	500	1	G	111005	N	0	7	☐
	31165	EXT	05-04743-5-γ	W	G		1000	3	G	111005	N	0	7	☐
6	31166	VOC	05-04743-6	W	V	C	40	3	G	111005	N	0	7	☐
7	31167	VOC	05-04743-7-α	W	V	C	40	3	G	110905	N	0	7	☐
	31167	MET	05-04743-7-β	W	P	N	500	1	G	110905	N	0	7	☐
	31167	EXT	05-04743-7-γ	W	G		1000	2	G	110905	N	0	7	☐
8	31168	VOC	05-04743-8-α	W	V	C	40	3	G	111005	N	0	7	☐
	31168	MET	05-04743-8-β	W	P	N	500	1	G	111005	N	0	7	☐
	31168	EXT	05-04743-8-γ	W	G		1000	5	G	111005	N	0	7	☐
9	31152	VOC	05-04743-1	W	V	C	40	2	G	111005	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* — Volatile organics
- ☐ *6010B* — TTLC 17 Metals
- ☐ *200.7/6010B* — Iron, Fe, by ICP
- ☐ *8270C* — Semi-VOC, 64 Compounds
- ☐ *8082* — PCBs
- ☐ *8081A* — Organochlorine pesticides
- ☐ *ASTM-D2216* — Moisture, percent in soil
- ☐ *9040B/150.1* — pH
- ☐ *Walkly-Bla/ck* — Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31173	VOC	05-04743-9-α	W	X								☐
	31173	MET	05-04743-9-β	W		X	X						☐
2	31162	VOC	05-04743-2	W	X								☐
3	31163	VOC	05-04743-3-α	W	X								☐

Sample Delivery Group
4752

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: CDM Contact: Mike Allen Tel #: 858-268-3383 Fax #:

Address: 9444 Farnham Suite 210 City: San Diego State: CA Zip code: 92123

Bill to:

Project Name/Code IR Site 31 Job #/P.O. #

Project Address Alameda, CA APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R. Goldberg / H. Carter

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8260B	5035/8260B	8015C/8015B/8260	3650B/8270	3550B/8082	3550B/8081A	D8937/D2216	C 136-"Ro/04"	D 5084-90	5030/Wet Chem	8270 RPHO		Remarks
31078		11-6-05	1030	Soil		4	X	X	X	X	X	X							
31079			1035			4	X	X	X	X	X	X							
31080			1040			5	X	X	X	X	X	X							
31081			1100			5	X	X	X	X	X	X							
31082			1105			12	X	X	X	X	X	X							MS/MSD
TB-2			1000	water		2	X												
31083			1200	Soil		5		X	X	X	X	X							
31084			1220			5		X	X	X	X	X							
31085			1250			5		X	X	X	X	X							
31086			1255			5		X	X	X	X	X							
31087			1425			7		X	X	X	X	X	X	X	X	X	X		Geotech
31088			1430			4		X	X	X	X	X	X	X	X	X	X		Geotech
31089			1435			4		X	X	X	X	X							
31090			1440			7		X	X	X	X	X	X	X	X	X	X		Geotech

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☒ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (B, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11-7-05 / 1610 Received by [signature] Date/Time 11/8/05 / 0825

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate the service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of ____

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3383 Fax #:

Address: 9444 FARNHAM ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IRSITE 31 Job # 6218.086 P.O. #

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H CARTER

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	5035B 8260B	3510B 8015B Ext	5520B 8270C	3550B 8082	3550B 8081A	ASTM D2937/D2216	C136-96/D422-63	D5084-90	Dr. Walkley Black	APE #P40			Remarks
31135		11.9.05	0810	SOIL	—	5	X	X	X	X	X	X	no						
31136			0820		—	5													
31137			0920		—	5													
31138			0930		—	5													
31139			1020		—	5													
31140			1030		—	5													
31141			1115		—	5													
31142			1125		—	4													
31143			1130		—	4													
31144			1445		—	7						X	X	X	X	X			+ grab for total
31145			1455		—	7						X	X	X	X	X			+ grab for total
31081			1540		—	2						X	X	X	X	X			grab for total only
31082			1545		—	2						X	X	X	X	X			grab for total only
31151			0745	AQ	~~HCl~~	2	X												

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (____ °C).

Relinquished by [signature] Date/Time 11.9.05 / 1630 Received by [signature] Date/Time 11/10/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients un[illegible] and that all terms described in the proposals, quotations for this project, and/or the g[illegible] terms provided in the current APCL price schedules will be followed. APCL reserves [illegible] to termin[illegible] service or withhold delivery of any reports, if in APCL's sole discretion the terms of t[illegible] ect have been broken.

APCL P[illegible] Ver. 4.0, Dec. 20, 1994.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel. (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 475 Client Name/Project: CDM

1. Sample Arrival

Date/Time Received 11/8/05 0825 Date/Time Opened 11/8/05 0825 By (name) Jason N.

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : RG/HC

3. Shipping Container/Cooler

☒ Cooler Used? # of 5 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.4 3.8 4.2 3.9 4.3
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☒ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☒ Other: Encore
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: _____ Printed: 8 Nov 2005 8:23 a.m.

Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [nea]:textfiles]empsl.txt

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 4755 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/10/05 1000 Date/Time Opened 11/10/05 1000 By (name): Jason N

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : VC

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	5.8	4.0	4.2	3.9		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?
Type: ☐ plastic ☒ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☐ Quantity OK? ☐ Leaking? ☐ Appropriate for specific method?
☐ Caps tight? ☐ Air Bubbles? ☐ Adequate Volume?
Labels: ☐ Unique ID? ☒ Date/Time ☐ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C-11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 10 Nov 2005 8:27 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

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Applied P & CH Laboratories
13700 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-04752 (0787_ 864) (2683383_ 864)

11/14/05

Part 1: General Information

☐ Company Information	Name:	*CDM Federal Programs Corp.*
	Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐ Project Information	Project Description:	*Alameda, CA*
		Site 31
	Project #:	*6218-086*
☐ Billing Information	P.O. #:	
	Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
	Lab Project ID:	
	Client Database #:	*26*
☐ Receiving Information	Who Received Sample?	*Jason Nario*
	Receiving Date/Time:	*11/10/05 10:00AM*
	COC No.	
☐ Shipping Information	Shipping Company	*Express*
	Packing Information:	*Cooler/Ice Chester*
	Cooler Temperature:	*3.8 4.0 °C*
☐ Container Information	Container Provider:	*Client*
☐ Sampling Information	Sampling Person:	*R.Goldberg/H.Carter*
	Sampling Company:	*Client*
☐ Turn-Around-Time Option:		*Normal*
☐ QC Option:		*Regular*
☐ Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31087		05-04752-3	S	B		250	2	G	110605	N	0	9	☐
2	31088		05-04752-4	S	B		250	2	G	110605	N	0	9	☐
3	31090		05-04752-5	S	B		250	2	G	110605	N	0	9	☐
4	31144		05-04752-6	S	B		250	2	G	110605	N	0	9	☐
5	31145		05-04752-7	S	B		250	2	G	110605	N	0	9	☐
6	31081		05-04752-1	S	B		250	2	G	110605	N	0	9	☐
7	31082		05-04752-2	S	B		250	2	G	110605	N	0	9	☐

Part 3: Analysis Information

Test Items: ☐ Customized-13, Sub-contract

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	CUSTOM	
1	31087		05-04752-3	S	X	☐
2	31088		05-04752-4	S	X	☐
3	31090		05-04752-5	S	X	☐
4	31144		05-04752-6	S	X	☐
5	31145		05-04752-7	S	X	☐
6	31081		05-04752-1	S	X	☐
7	31082		05-04752-2	S	X	☐

☐ Client"s Requirement: GEOTECHNICAL ANALYSIS WILL SUBCONTRACTED TO PTS

Login By Hsin Yi Lee

Check By LKR

Hsin-Yi Lee

From: Rachel Spitz [rspitz@ptsgeolabs.com]
Sent: Wednesday, November 16, 2005 7:44 AM
To: Hsin-Yi Lee (E-mail)
Subject: Sample Acknowledgement for PTS File No.: 35714

COC35714.pdf (145 KB)

Project Name: Alameda.1R Site 31
Project No.: 6218-086
PTS File No: 35714

November 15, 2005

Dear Ms. Lee:

We received your samples on:

11/15/05

and analytical results are scheduled to be sent to you electronically on or before:

11/24/05

requested on the attached chain of custody.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or concerns, please feel free to contact me at the phone number or email address given below.

Sincerely,

Rachel Spitz
Project Coordinator
PTS Laboratories
562-907-3607 (Santa Fe Springs, CA)
713-680-2291 (Houston, TX)
Email: revans@ptsgeolabs.com
www.ptsgeolabs.com

**********NOTICE**********
The information contained in this communication is confidential and privileged proprietary information intended only for the individual or entity to whom it is addressed. Any unauthorized use, distribution, copying or disclosure of this communication is prohibited. If you have received this communication in error, please contact the sender immediately.

Applied R & Ch Laboratory

Subcontract Chain of Custody

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax. (909) 590-1498

35714

Please Print in pen

Page 1 of 1

Subcontract Lab: PTS Laboratory Contact: Larry Kunkel Tel #: 562-907-3607 Fax #: 562-907-3610

Address: 8100 Secura Way City: Santa Fe Springs State: CA Zip code: 90670

APCL Client: 05-4752 APCL Contact: Hsin-Yi Lee

Project Name/Code Alameda, IRSTC-31 Job # 628.086

BILL TO APCL Sub Quotation # 005-142

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: RG/HC

Analysis Items: Geotechnical*

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Geotechnical*	Remarks
31087		11-6-05	1425	SOIL	–	1	X	
31088		11-6-05	1420	↓	↓	↓	X	
31090		11-6-05	1440				X	
31144		11-9-05	1445				X	
31145		11-9-05	1455				X	
31081		11-9-05	1540				X	
31082		11-9-05	1545	↓	↓	↓	X	

*Geotechnical included – Density and Moisture (ASTM D2937 & D2216)
– Grain Size (ASTM C136-96 & D422-63)
– Hydraulic Conductivity (ASTM D5084-90)
– Air Permeability (API RP40).

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☒ Extended Raw Data ☐ CLP; ☐ ACE ☐ APCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. If not specified, samples will be discarded 45 days after samples are received.

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☒ Room ☐ Cold (_____ °C).

Relinquished by Hsin-Yi Lee Date/Time 11/15/05 (?) Received by Reyna Guillen PTS Date/Time 11/15/05 12:45

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Sample Delivery Group
5090

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 1 of ____

Client: CDM Contact: MIKE ALLEN Tel #: 858.268.3365 Fax #:

Address: 9444 FRANKLIN ST. SUITE 210 City: SAN DIEGO State: CA Zip code: 92123

Bill to: same

Project Name/Code IR SITE 31 Job # 6218.086 P.O. #

Project Address ALAMEDA, CA APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: H. CARTER

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	5035/8260B	8260B/5035	8260B/5035	8260B/8021	8260B/5035	ASTM D4373/D2216	C136-14/D422-63	D5434-90	Dc w. Hydrometer	APE 8/40			Remarks
31135		11.9.05	0810	SOIL	—	5	X	X	X	X	X	X	X	X	11.9.05				
31136			0820		—	5													
31137			0920		—	5													
31138			0930		—	5													
31139			1020		—	5													
31140			1030		—	5													
31141			1115		—	5													
31142			1125		—	4													
31143			1130		—	4													
31144			1445		—	7						X	X	X	X	X			+ geotech analyses
31145			1455		—	7						X	X	X	X	X			+ geotech analyses
31081			1540		—	2						X	X	X	X	X			geotechnical only
31082			1545		—	2						X	X	X	X	X			geotechnical only
31151			0745	AQ	HCl	2	X												

4723

5090

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☐ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☐ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 11.9.05 / 1630 Received by [signature] Date/Time 11/10/05 / 1000

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

5090

Sample Receiving Checklist

APCL ServiceID: 4723 **Client Name/Project:** CDM/Alameda

1. Sample Arrival

Date/Time Received 11/10/05 1000 Date/Time Opened 11/10/05 1000 By (name): Jason N

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☒ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☒ With Samples? ☐ Faxed? ☒ Client has Copy? ☒ Signed, dated? By: _____
☒ Project ID? ☒ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☒ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☒ #Samples OK? _____
☒ Sampled By : MC

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☒ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	5.8	4.0	4.2	3.4	

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☒ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☒ Intact? ☐ Broken? ☐ Anomalies Documented?

Type: ☒ plastic ☒ glass ☒ Tube: brass/SS ☐ Tedlar Bag
☒ Quantity OK? ☐ Leaking? ☒ Appropriate for specific method?
☒ Caps tight? ☐ Air Bubbles? ☒ Adequate Volume?
Labels: ☒ Unique ID? ☒ Date/Time ☒ Label and ink intact?

7. Turn Around Time

☒ RUSH TAT: _____ ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☒ Other Liq ☒ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☒ ALL OK? (if not, see SOP C.11) ☐ Client Contact? (Name: _____)Date/Time: _____

Received/Checked by: _____ Printed: 10 Nov 2005 8:27 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

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Applied P & CH Laboratories
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Login: Check List

05-05090 (0787_ 881) (2683383_ 881)

12/14/05

Part 1: General Information

☐	Company Information	Name:	*CDM Federal Programs Corp.*
		Address:	*9444 Farnham Street, Ste 210 ,San Diego ,CA 92123*
☐	Project Information	Project Description:	*IR Site 31/Alameda*
		Project #:	*6218.086*
☐	Billing Information	P.O. #:	
		Bill Address:	*1331 17th Street Suite 1100 ,Denver ,CO 80202*
		Lab Project ID:	
		Client Database #:	*26*
☐	Receiving Information	Who Received Sample?	*Jason Nario*
		Receiving Date/Time:	*11/10/05 1000*
		COC No.	
☐	Shipping Information	Shipping Company	*Express*
		Packing Information:	*Cooler/Ice Chester*
		Cooler Temperature:	*3.8 4.0 4.2 3.9 °C*
☐	Container Information	Container Provider:	*Client*
☐	Sampling Information	Sampling Person:	*HC*
		Sampling Company:	*Client*
☐	Turn-Around-Time Option:		*Rush 5 working day(s)*
☐	QC Option:		*NEESA D*
☐	Disposal Option:		*Not specify*

Part 2: Sample Information

Seq. #	Sample ID (on COC)	Sample Sub-ID	APCL Sample ID	Matrix	Cont-tainer	Preser-vative	Vol, ml Am. g	# of Replica	Condition G, L, B	Collected mmddyy	Hold ?	Composite Group	TAT Days	
1	31081		05-05090-1	S	B		250	1	G	110905	N	0	7	☐
2	31082		05-05090-2	S	B		250	1	G	110905	N	0	7	☐

Part 3: Analysis Information

Test Items:

- ☐ *8260B* Volatile organics
- ☐ *6010B* TTLC 17 Metals
- ☐ *200.7/6010B* Iron, Fe, by ICP
- ☐ *8270C* Semi-VOC, 64 Compounds
- ☐ *8082* PCBs
- ☐ *8081A* Organochlorine pesticides
- ☐ *ASTM-D2216* Moisture, percent in soil
- ☐ *9040B/150.1* pH
- ☐ *Walkly-Bla/ck* Carbon, Total Organic (TOC)

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	VOC	METALS	FE	8270	8082	8081	MOIST	PH	
1	31081		05-05090-1	S									☐
2	31082		05-05090-2	S									☐

Seq. #	Client"s Sample ID (as given on COC)	Sample Sub-ID	APCL Sample ID	Matrix	TOC	
1	31081		05-05090-1	S	X	☐
2	31082		05-05090-2	S	X	☐

Login By JASON M. NARIO

Check By [illegible]

APPENDIX C

C2

APPENDIX C2
ALAMEDA POINT IR SITE 31
SURVEY COORDINATES DATA TABLE

Location ID	Survey Pt.	CCS83 Zone 3 Northing	CCS83 Zone 3 Easting	NAVD88 Ground Surface Elevation Ft.	Description
	Survey Control:				
1	1	2111474.31	6042016.14	9.13	TIDAL 7
2	2	2110018.08	6048178.11	16.81	WEB PAC
3	3	2111476.32	6043971.33	9.39	MAIN ATL
52	52	2111482.54	6042107.31	9.26	FND CONC NAIL
75	75	2113576.56	6044852.26	10.81	SET BASE/SS+TT
	DPT Soil Boring Locations:				
3134	101	2113708.54	6044783.85	11.30	SB IN GRASS
3115	103	2113420.86	6044962.01	10.93	SB@AC
3114	104	2113297.03	6044971.51	11.84	SB IN GRASS
3133	105	2113397.78	6045062.75	12.38	SB IN DIRT
3132	107	2113241.62	6045254.83	13.63	SB IN GRASS
3131	108	2113259.60	6045348.76	13.39	SB IN DIRT
3129	110	2113262.72	6045585.12	13.03	SB IN DIRT
3128	111	2113282.43	6045654.22	13.43	SB IN GRASS
3126	112	2113229.97	6045719.85	13.58	SB@AC
3123	113	2113310.26	6045921.21	14.33	SB IN DIRT
3124	114	2113459.73	6045957.90	14.86	SB IN GRASS
3125	116	2113571.61	6045883.48	14.36	SB@AC
3140	117	2113547.53	6045682.85	12.68	SB IN DIRT
3121	118	2113581.74	6045515.75	12.72	SB IN DIRT
3120	119	2113513.86	6045406.98	12.13	SB IN DIRT
3119	120	2113550.25	6045237.17	12.22	SB@AC
3116	121	2113573.04	6045141.84	11.80	SB IN GRASS
3117	122	2113675.33	6045146.84	12.73	SB IN GRASS
3118	123	2113654.74	6045071.55	12.63	SB IN GRASS
3101	150	2113859.33	6044633.19	10.41	SB@AC
3147	151	2113934.06	6044568.80	9.17	SB@DIRT
3103	152	2113943.63	6044312.97	10.53	SB@DIRT
3105	154	2113678.98	6044334.24	11.21	SB@AC
3107	155	2113603.76	6044239.08	11.25	SB@AC
3110	156	2113343.87	6044231.86	11.25	SB@DIRT
3150	157	2113346.69	6044179.44	10.36	SB@AC
3106	158	2113552.89	6044419.62	12.13	SB@DIRT
3138	159	2113656.24	6044654.64	11.04	SB@AC
3135	160	2113476.45	6044652.88	12.63	SB@DIRT
3136	161	2113262.97	6044708.51	13.84	SB@AC
3139	163	2113395.59	6044759.89	12.94	SB@DIRT
3137	164	2113278.93	6044551.13	13.39	SB@DIRT
3108	165	2113273.52	6044408.34	12.55	SB@DIRT
3111	170	2113479.53	6044528.74	12.41	SB@DIRT
3112	171	2113390.94	6044494.14	13.11	SB@AC
3109	174	2113400.97	6044362.33	12.76	SB@AC

APPENDIX C2
ALAMEDA POINT IR SITE 31
SURVEY COORDINATES DATA TABLE

Location ID	Survey Pt.	CCS83 Zone 3 Northing	CCS83 Zone 3 Easting	NAVD88 Ground Surface Elevation Ft.	Description
	Analytical and Geotechnical DPT Soil Boring Locations:				
3130	124	2113454.15	6045314.75	11.40	SB@AC
3113	125	2113620.35	6044882.41	11.75	SB IN GRASS
3122	126	2113312.22	6045796.18	13.49	SB IN DIRT
3127	127	2113218.40	6046039.10	15.56	SB@AC
3102	178	2113760.44	6044482.84	9.35	SB@AC
3104	179	2113750.60	6044186.22	11.38	SB@AC
	DPT TW Groundwater Sample Locations:				
3142	115	2113466.54	6046072.80	16.01	31GW01
3141	109	2113279.62	6045432.20	13.24	31GW02
3143	106	2113416.14	6045133.57	12.35	31GW03
3148	162	2113271.84	6044844.44	13.18	31GW04
3146	102	2113619.89	6044772.78	11.11	31GW05
3149	100	2113831.07	6044917.41	10.76	31GW07
3145	177	2113633.30	6044489.97	10.64	31GW08
3144	153	2113741.55	6044342.86	10.98	31GW09

TW = Temporary Well
DPT = Direct Push Technology
CCS83 = California Coordinate System 1983
NAV83 = North American Vertical Datum 1983
SB = Soil Boring DPT
AC = Asphalt Concrete surface

APPENDIX C

C3

State of California—Environmental Protection Agency
Form Approved OMB No. 2050-0039 (Expires 9-30-99)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA2170023236 — Manifest Document No. 8000

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
CSO-SF Bay Area Field Team
410 Palm Ave, B-1 Suite 161 (Treasure Island)
San Francisco, CA 94130-1806

4. Generator's Phone (415)743-4713 ATTN Delora

A. State Manifest Document Number: 25108567

B. State Generator's ID

5. Transporter 1 Company Name: General Environmental Mgmt Inc.

6. US EPA ID Number: CAD983649880

C. State Transporter's ID [Reserved.]

D. Transporter's Phone: 800-326-1011

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID [Reserved.]

F. Transporter's Phone

9. Designated Facility Name and Site Address
U.S. Ecology Corp.
Highway 95 - 12 miles south of Beatty
Beatty, NV 89003

10. US EPA ID Number: NVT330010000

G. State Facility's ID

H. Facility's Phone: 800 239 3943

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. Hazardous waste, solid, n.o.s., 9, NA3077, III (Chromium, Lead) w/TP DERS	002	DM	00300	P	State 181; EPA/Other D008/D007
b. Non-RCRA hazardous waste liquid	001	DM	00025	G	State 141; EPA/Other
c.					State; EPA/Other
d.					State; EPA/Other

J. Additional Descriptions for Materials Listed Above
11.a. . D008 ERG: 171 11.b. .

K. Handling Codes for Wastes Listed Above
a. b. c. d.

15. Special Handling Instructions and Additional Information
Emergency Phone: (800) 326-1011 (G.E.M.)

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
Dwayne Delora		01	30	06

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Oreal Bushnell		01	30	06

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR — TRANSPORTER — FACILITY

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

DO NOT WRITE BELOW THIS LINE.

DTSC 8022A (1/99)
EPA 8700—22

Yellow: GENERATOR RETAINS

American Ecology Corporation Land Disposal Restriction Form

GENERATOR: CSO- SF Bay Area Field Team EPA I.D. NUMBER: CA2170023236

WASTE STREAM or PROFILE NUMBER: _____ MANIFEST DOC. NO. 25108567 LINE NO. 11A

WASTE IS A: ☐ WASTEWATER ☐ NON-WASTEWATER ☐ DEBRIS

NOTIFICATION FREQUENCY: ☐ ONE TIME ☐ REQUIRED WITH EACH SHIPMENT

EPA WASTE CODES (from 40 CFR 268.40): D007 _____ _____ _____ _____ _____

D008 _____ _____ _____ _____ _____

UNDERLYING HAZARDOUS CONSTITUENTS (from 40 CFR 268.48): _____

A. ☐ **Restricted Waste Meets Treatment Standards (40 CFR 268.7(a) (3))**

The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or **Alternative LDR treatment standards for contaminated soil 40CFR268.49** and can be landfill disposed without further treatment. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

B. ☐ **Restricted Waste Treated To Treatment Standards (40 CFR 268.7(b) (I) & 268.7 (b) (2))**

The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

C. ☐ **Restricted Waste With Technology Based Treatment Standards (40 CFR 268.7(b) (4))**

I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that based on my inquiry of those individuals immediately responsible for obtaining this information. I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40, without impermissible dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

D. ☐ **Restricted Waste Decharacterized But Requires Treatment For UHC (40 CFR 268.9)**

I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains Underlying Hazardous Constituents (UHC) that require further treatment to meet the universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

E. ☒ **Restricted Waste Subject To Treatment (40 CFR 268.7(a) (2))**

The restricted waste identified above must be treated to the applicable treatment standards in 40 CFR 268.40, or treated to comply with applicable prohibitions set forth in Part 268.32 or RCRA Section 3004(d). I have attached all supporting analytical data, where available.

F. ☐ **Hazardous Debris Subject To Treatment (40 CFR 268.45)**

This hazardous debris identified above must be treated to the alternative treatment standards in 40 CFR 268.45.

G. ☐ **Restricted Waste Subject To A Variance or Extension (40 CFR 268.7(a) (4))**

This restricted waste identified above is subject to a case by case exemption under 40 CFR 268.5, an exemption under 40 CFR 268.6 or a nationwide capacity variance under Subpart C of 40 CFR 268, and is not prohibited from land disposal. LDR prohibitions become effective on _____ (date) for this restricted waste. The corresponding treatment standard(s) are promulgated in 40 CFR 268.40. I have attached all supporting analytical data, where available.

H. ☐ **Restricted Waste Managed In A "Lab Pack" (40 CFR 268.7(a) (9))**

I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only waste that have been excluded under appendix IV to 40 CFR Part 268 and that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Authorized Signature [signature] **Title** Environ Comp Mgr **Date** 1/30/2006

UHC list from 40 CFR Part 268.48 available upon request

General Environmental Management, Inc.

WORK ORDER

WORK ORDER #: 160287 Service Date: 1/31/2006 12:00:00 AM Generator EPA ID: CA2170023236

Company Name: CDM Programs Corporation-Alameda Point

Generator Address: Alameda Point
Alameda CA

Contact Name:

Contact Phone:

Comments: Pick up waste as directed

WASTE ITEMS TO BE SHIPPED: ☐ All items shipped as ordered ☒ Actual quantities vary from order (see changes below)

Qty Ordered	Qty Actual	Size/Type	Total Qty	Manifest Line	Manifest #	Profile #	Waste Name
Shipped To:	U.S. Ecology Corp.-Beatty						
~~1.00~~	2	55 Gallon Drum	450 P	Page 1 11.a.	25108567	.	SOIL CUTTING
~~2.00~~	1	55 Gallon Drum	450 P	Page 1 11.b.	25108567	.	WASTEWATER

SERVICE ITEMS: ☒ All items delivered as ordered ☐ Actual quantities vary from order (see changes below)

Qty Ordered	Qty Delivered	Description	Service Company
1.00		Transportation: LTL Minimum Stop Fee	G.E.M. Inc

Additional Materials and Equipment

Qty	Description	Qty	Description	Qty	Description
	55G Steel Open top (recon)		30G Steel Closed top Drum		Cubic Yard Box
	55G Steel Open top (new)		30G Poly Open top Drum		Oil Dry
	55G Steel Closed top (recon)		30G Poly Closed top Drum		
	55G Steel Closed top (new)		14G Fiber Open top drum		
	55G Poly Open top (recon)		14G Poly Open top drum		
	55G Poly Open top (new)		05G Poly Open top Pail		
	55G Poly Closed top (recon)		05G Poly Closed top Pail		
	55G Poly Closed top (new)		05G Fiber Open top drum		
	30G Steel Open top Drum		Vermiculite		

Labor

Name	Time In	Time Out	Lunch
BREAK	07:45	09:30	

Comments:

Authorized Representative (Customer)

Authorized Representative (GEM, Inc.)

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APPENDIX D

BORING LOGS

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)
- Bulk Sample

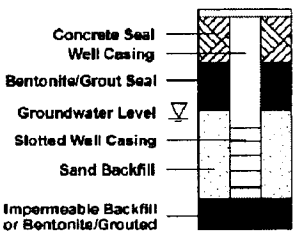
CONTACT BETWEEN UNITS

- Well-defined change in unit
- Gradational change in unit which was clearly noted in the exploration
- Change in unit which was not clearly defined

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing			Structure			General Attitude		
	Parting:	less than 1/16 in. (1/16 cm)		Pocket:	Erratic, discontinous deposit of limited extent		Near horizontal:	0 to 10 deg.
	Seam:	1/16 to 1/2 in. (1/16 to 1 1/4 cm)		Lens:	Lenticular deposit		Low angle:	10 to 45 deg.
	Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)		Varved:	Alternating seams of silt and clay		High angle:	45 to 80 deg.
	Stratum:	> 12 in. (30 1/2 cm)		Laminated:	Alternating seams		Near Vertical:	80 to 90 deg.
	Scattered:	< 1 per ft. (30 1/2 cm)		Stratified:	Alternating layers			
	Frequent:	> 1 per ft. (30 1/2 cm)						

WELL COMPLETIONS



STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water

MODIFIERS

Trace	Particles present at levels estimated < 5%
Slightly (Clayey, Silty, Sandy, Gravelly)	Particles present at levels estimated at 5 to 12%
Clayey, Silty, Sandy, Gravelly	Particles present at levels estimated at 12 to 30%
Very (Clayey, Silty, Sandy, Gravelly)	Percentage of minor constituents estimated > 30%

RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- SG - Specific Gravity
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines and fine-grained units that plot in the CL-ML area of the plasticity chart.

3. WOR = weight of rod, WOH = weight of hammer.

Legend gINT Library
Figure D-1
Location Map

Alameda, California

CDM

Date: 3/23/06
File No.: 060323
Job No.: 6218-086
Rev No.: A

Document: M:\alamedadavqueryIRI_Figures\Revised\060123_Figure2-3CrossSectionLegend.mxd

Boring Log 3101

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31001									Clayey SAND/Sandy CLAY (CL/SC), olive-brown (2.5Y 4/4), with fine subangular GRAVEL, low plasticity.	
				3.3		1					9
	31002			4.6		2		CL		Becomes olive-brown to yellowish brown.	8
				4.5		3					7
	31003					4				Silty CLAY (CL), dark olive-gray (5Y 3/2), trace fine subangular gravel, medium stiff, moist, low plasticity.	6
								CL			
						5				Clayey SAND/Sandy CLAY (SC/CL), olive-brown (2.5Y 4/4), moist, low plasticity.	5
								SC			
				2.7		6				Well graded SAND (SW), olive-gray (5Y 5/2), medium dense to loose, moist.	4
								SW			
						7					3
								CL		Lean CLAY (CL), very dark gray (5Y 3/1), stiff, very moist to wet, medium plasticity.	
				5.1		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	2
						9					1

Northing/Easting: 2113859.3294 / 6044633.185
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-1-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3101 — Figure: 2
Project No: 6218.086 — 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3102

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31144									Asphalt.	
										Gravelly SAND (SW-SM) with silt, dark brown-gray (10 YR 4/2), well graded fine to coarse sand, fine to coarse subangular gravel, loose, dry.	
				4.9		1					8
	31145					2				Same as above - becomes brown (10 YR 4/3), dense, moist.	7
								SW			
				5.9		3					6
						4					5
						5				Silty CLAY (CL), gray (10 YR 5/1), soft, moist to wet. Becomes wet.	4
						6					3
								CL			
						7					2
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	1
						9					0

Northing/Easting: 2113760.4412 / 6044482.8422
Surface Elevation: 9'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3102
Project No: 6218.086

Figure: 3
1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3103

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31004									Grass.	
										SAND (SW) with gravel, dark yellowish-brown (10YR 4/4), well graded fine to coarse sand, fine subangular gravel, medium dense, dry.	
				2.0		1					9
	31005					2					8
				3.6		3		SW			7
						4					6
	31006										
						5					5
				3.2		6					4
										Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, very moist, medium plasticity.	
						7		CL			3
				3.9		8				TD = 8 ft bgs. Groundwater encountered at 6.5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	2
						9					1

Northing/Easting: 2113943.6281 / 6044312.9733
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-2-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3103 Figure: 4
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3104

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
								Asphalt.	
	31007						SW	Sandy GRAVEL (GW) to Gravelly SAND (SW), very dark grayish brown (10YR 3/2), fine to coarse sand, fine subangular gravel, dense, dry.	
				7.8		1			10
	31008			3.9		2			9
				5.5		3	CL	Sandy CLAY (CL) with gravel, dark yellowish brown (10 YR 3/4), medium stiff, moist.	8
	31009					4			7
				4.6		5	CL	CLAY (CL), very dark gray to black (10 YR 3/1 to 2/1), moist, low to medium plasticity.	6
				4.5		6		Wet.	5
						7			4
						8		TD = 8 ft bgs. Groundwater encountered at 6 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9			2

Northing/Easting: 2113750.598 / 6044186.2208
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-2-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3104 Figure: 5
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3105

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31010									Asphalt.	
								SW		SAND and GRAVEL (SW/GM), very dark gray (10 YR 3/1), some silt (road base), subangular, dense, dry.	
				6.4		1				Silty SAND (SM) with gravel, dark yellowish brown (10 YR 4/4), fine to coarse sand, fine subangular gravel, dense, moist.	10
	31011			4.8		2					9
						3		SM			8
	31012			3.5		4					7
	31013 Duplicate			4.4							
						5				SAND (SP), dark gray (10 YR 4/1), poorly graded fine sand, dense to slightly loose, moist.	6
						6		SP			5
						7				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity.	4
								CL			
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113678.9816 / 6044334.2359
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-2-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3105 Figure: 6
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3106

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Grass.	
	31014									Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 4/6), fine to coarse sand, fine subangular, medium dense, slightly moist.	
				3.0		1					11
	31015					2		SM			10
						3					9
	31016			2.5		4				Sandy CLAY (CL), dark olive-brown (2.5 Y 3/3), slightly moist, low plasticity.	8
								CL			
						5				Lean CLAY (CL), very dark gray (7.5 YR 3/1), medium stiff, moist, low plasticity.	7
						6					6
								CL			
						7				Moist.	5
										Becomes wet.	
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113552.8894 / 6044419.6219
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3106 Figure: 7
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3107

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31017									Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine to coarse gravel subangular, moist.	
				1.6		1		SC			10
	31018			2.9		2				CLAY (CL) with sand and gravel, brown (10 YR 4/3), fine subangular gravel, soft, moist.	9
								CL			
						3				CLAY (CL) with sand, brown (10 YR 4/3), trace gravel, fine subangular gravel, soft, moist.	8
	31019			3.2		4		CL			7
				1.0		5				CLAY (CL), brown to gray (10 YR 5/2), trace very fine sand, soft, moist.	6
								CL			
						6				CLAY (CL), gray (10 YR 5/1), trace very fine sand, soft, moist.	5
						7		CL			4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113603.7568 / 6044239.0765
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3107 Figure: 8
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3108

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31020									Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 4/6), fine to medium sand, fine subangular gravel, loose to medium dense, dry.	
	31021			4.2		1					11
	31022			4.4		2					10
						3					9
	31023 (MS/MSD)			4.5		4		SM			8
						5					7
				6.3		6					6
						7				Becomes wet.	5
				3.8		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilleb by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113273.523 / 6044408.3405
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3108
Project No: 6218.086

Figure: 9
1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3109

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31024			2.8						Asphalt.	
										Silty SAND (SM) with gravel, dark yellowish brown (10 YR 3/6), fine to coarse sand, fine subangular gravel, medium dense, dry.	
				2.5		1					11
	31025			2.6		2					10
								SM			
				3.4		3					9
	31026					4					8
						5				SAND (SP) with silt, grayish brown (10 YR 5/2), fine to coarse sand, medium dense to loose, dry.	7
								SP			
				4.4		6				Lean CLAY (CL), very dark gray (7.5 YR 3/1), medium stiff, moist, low plasticity.	6
						7		CL			5
				5.1		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113400.9672 / 6044362.3257
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3109 Figure: 10
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3110

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31027			4.1						Grass.	
										SAND (SP) with silt, with gravel, dark brown (10 YR 3/3), fine to medium sand, fine subangular gravel, loose to medium dense, dry.	
						1					10
	31028			4.2		2		SP			9
				5.4		3					8
						4					7
	31029										
				4.2		5				Clayey SAND (SC), yellowish-brown (10 YR 5/6), fine to medium sand, medium dense to loose, dry.	6
				4.8		6		SC			5
						7				Becomes wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113343.8696 / 6044231.8641
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3110 Figure: 11
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3111

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
	31030			6.6				Grass.	
						1	SM	Silty SAND (SM) with gravel, brown (10 YR 4/3), fine sand, fine subangular gravel, medium dense to loose, dry.	11
	31031			5.1		2			10
				6.3		3		Clayey SAND (SC), dark yellowish-brown (10YR 4/6), fine sand, medium dense, dry to moist.	9
						4			8
	31032						SC		
						5			7
				5.8		6		Lean CLAY (CL), very dark gray (7.5 YR 3/1), medium stiff, moist, low plasticity.	6
						7	CL	Wet.	5
				5.1		8		TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9			3

Northing/Easting: 2113479.5317 / 6044528.743
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3111 Figure: 12
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3112

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31033									Asphalt.	
						1				Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 4/6), fine sand, fine subangular gravel, loose to medium dense, dry.	12
	31034			3.7		2		SM			11
				2.9		3					10
	31035 31036					4				Sandy CLAY (CL), dark brown (10 YR 3/3), trace fine subangular gravel, fine to coarse sand, medium stiff, moist, low plasticity.	9
				4.0		5					8
				4.2		6		CL			7
						7				Becomes wet.	6
								CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist to wet, low plasticity.	
				4.5		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113390.9436 / 6044494.1424
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3112 Figure: 13
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3113

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31037									Grass.	
										Silty SAND (SM) with gravel, dark yellow-brown (10 YR 4/6), fine to coarse sand, fine subangular gravel, medium dense, dry.	
						1					10
	31038			4.6		2		SM			9
						3					8
	31039			5.8		4					7
										Clayey SAND (SC), dark yellow-brown (10 YR 4/6), fine to medium sand, medium dense, dry to moist.	
						5		SC			6
						6				Lean CLAY (CL), very dark gray (10 YR 3/1), low to medium plasticity, soft, moist.	5
						7		CL		Wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113620.3459 / 6044882.4067
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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IR Site 31
Alameda, California

Boring Log 3113 Figure: 14
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3114

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31040									Grass.	
										SAND (SP-SM) with silt and gravel, brown (10 YR 5/3), fine sand, fine subangular gravel, dense to very dense, dry.	
				3.8		1		SP-SM			10
	31041					2					9
				4.0		3				Clayey SAND (SC), yellow-brown (10 YR 5/6), fine sand, dense, dry to moist.	8
	31042			3.7		4		SC			7
						5				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity.	6
						6					5
								CL			
						7				Wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113297.0304 / 6044971.5135
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3114 Figure: 15
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3115

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31043									Asphalt.	
				1.6		1		SC		Clayey SAND (SC) with gravel, brown (10 YR 5/3), fine to coarse sand, fine to coarse subangular gravel, loose, moist.	9
	31044					2					8
				2.2		3		SW		SAND (SW) with clay, brown (10 YR 5/3), fine to coarse sand, fine subangular gravel, trace gravel, loose, moist.	7
	31045					4					6
	31046										
				1.8		5		CL		CLAY (CL) with sand, grayish-brown (10 YR 5/2), fine to coarse subangular to angular gravel, trace gravel, soft, moist.	5
						6					4
				3.1		7				Becomes wet.	3
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	2
						9					1

Northing/Easting: 2113420.8587 / 6044962.0115
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-3-05

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Alameda, California

Boring Log 3115 Figure: 16
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3116

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31047			5.2						Grass.	
						1		CL		Sandy CLAY (CL) with gravel, dark brown (7.5 YR 3/2), fine sand, fine subangular gravel, medium stiff, moist, low plasticity.	10
	31048			8.4		2				Clayey SAND (SC), brown (7.5 YR 4/2), fine to coarse sand, medium dense, moist.	9
						3					8
	31049			6.2		4		SC			7
				5.3		5					6
						6				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity.	5
						7		CL		Wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113573.0352 / 6045141.8372
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3116 Figure: 17
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3117

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31052			8.2						Grass.	
								CL		Silty CLAY (CL) with gravel, black (5 Y 2.5/1), fine subangular gravel, soft, moist, low plasticity.	
						1				Sandy CLAY/Clayey SAND (CL/SC) with gravel, dark yellow-brown (10 YR 3/4), fine subangular gravel, medium stiff, moist, low plasticity.	11
	31053			10.3		2					10
						3		CL			9
	31054					4					8
						5				CLAY (CL) with sand, black (10 YR 2/1), soft to medium stiff, moist, low plasticity, organic (natural) odor.	7
				14.1		6		CL			6
						7				Wet.	5
				13.7		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113675.3285 / 6045146.8405
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3117 Figure: 18
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3118

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31055			4.3						Grass.	
										Silty CLAY (CL) with gravel, black (5 Y 2.5/1), fine subangular gravel, soft, moist, low plasticity.	
	31056					1		CL			11
	31057			11.6		2				Clayey SAND (SC) with gravel, dark yellowish-brown (10 YR 4/4), fine to medium sand, fine subangular gravel, medium dense, moist.	10
								SC			
				8.1		3				SAND (SP) with clay, dark yellowish-brown (10 YR 4/4), fine to medium sand, medium dense, moist.	9
						4					8
						5		SP		Wet.	7
						6					6
						7				Lean CLAY (CL), dark gray (10 YR 4/1), medium stiff, wet, low plasticity.	5
								CL			
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113654.735 / 6045071.5466
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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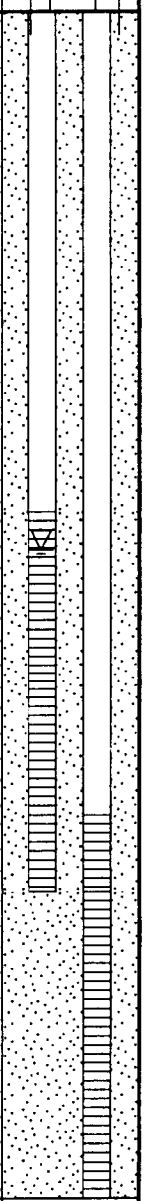
Boring Log 3118 Figure: 19
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3119

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31058			8.5						Asphalt.	
										Clayey SAND (SC) with gravel, very dark brown (10 YR 2/2), fine to medium sand, fine subangular gravel, medium dense, moist.	
	31059			7.5		2					10
								SC			
				7.6		4					8
										Wet.	
						6					6
								CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, wet, low plasticity.	
						8				Hydraulic push groundwater sample interval - not logged.	4
						10					2
						12					0
						14					-2
						16				Logging ended at 8 ft bgs. TD = 15.5 ft bgs. Groundwater encountered at 5 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-4

Well or Piezometer Completion



Northing/Easting: 2113550.2521/6045237.1694
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

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Alameda, California

Boring Log 3119
Project No: 6218.086

Figure: 20
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3120

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31060									Sandy CLAY (CL) with gravel, dark brown (10 YR 3/3) with dark yellow-brown mottles (10 YR 3/6), fine subangular gravel, medium stiff, moist, low plasticity.	
				10.5		1		CL			11
	31061			12.5		2				Clayey SAND (SC) with gravel, dark yellow-brown (10 YR 4/4), fine to coarse sand, fine subangular gravel, medium dense, moist.	10
						3					9
	31062			10.4		4					8
								SC			
						5					7
						▽6				Wet.	6
						7				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, wet, low plasticity.	5
								CL			
						8				TD = 8 ft bgs. Groundwater encountered at 6 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113513.8632 / 6045406.9793
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3120 Figure: 21
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3121

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31063			5.2						Silty SAND (SM) with clay, trace gravel, dark yellowish-brown (10 YR 3/4), fine to coarse sand, fine subangular gravel, medium dense, dry.	
						1					11
	31064			6.0		2					10
						3		SM			9
	31065			5.0		4					8
						5					7
				7.1		6					6
						7		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff to stiff, wet, low plasticity.	5
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113581.7415 / 6045515.7466
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3121 Figure: 22
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3122

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31066									SAND (SP) with silt, with gravel, yellowish-brown (10 YR 5/6), fine to medium sand, fine subangular gravel, dry.	
						1		SP			12
	31067			6.6		2					11
	31068										
	Duplicate										
										Lean CLAY (CL), dark gray (10 YR 3/1), medium stiff,moist, low to medium plasticity.	
						3					10
				5.1		4					9
						5		CL		Wet.	8
						6					7
						7					6
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113312.2236 / 6045796.1767
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3122 Figure: 23
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3123

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31069			4.1						Silty SAND (SM) with gravel, dark brown (10 YR 3/3), fine to medium sand, fine subangular gravel, medium dense, dry.	
						1					13
	31070			4.1		2		SM		Grades yellowish-brown (10 YR 5/6).	12
						3					11
				4.6		4					10
										Lean CLAY (CL), dark olive-gray (5 Y 3/2), medium stiff, moist, low to medium plasticity.	
						5					9
						▽				Wet.	
						6		CL			8
						7				Silty SAND (SM), dark gray (5 Y 4/1), very fine to fine sand, medium dense, wet.	7
								SM			
				6.3		8				TD = 8 ft bgs. Groundwater encountered at 5.5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	6
						9					5

Northing/Easting: 2113310.2599 / 6045921.2138
Surface Elevation: 14'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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Alameda, California

Boring Log 3123 Figure: 24
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3124

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31071			5.2						Grass.	
						1		CL		Silty CLAY (CL) with gravel, very dark gray-brown (10 YR 3/2), medium stiff, moist, low plasticity.	13
	31072			5.3		2				Silty SAND (SM) with gravel, dark brown (10 YR 3/3), very fine to fine sand, fine subangular gravel, medium dense, moist.	12
						3		SM			11
				5.7		4					10
						5				Lean CLAY (CL), brown (10 YR 4/3), medium stiff, wet, low plasticity.	9
				3.8		6		CL			8
						7					7
								SP		SAND (SP) with silt, very dark gray (2.5 Y 3/1), very fine sand, medium dense, wet.	
				5.8		8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	6
						9					5

Northing/Easting: 2113459.7313 / 6045957.9039
Surface Elevation: 14'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-4-05

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IR Site 31
Alameda, California

Boring Log 3124 Figure: 25
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3125

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31073			4.8						Asphalt.	
						1		SM		Silty SAND (SM) with gravel, very dark grayish-brown (10 YR 3/2), fine to coarse sand, fine subangular gravel, medium dense, moist. Grades clayey, yellowish-brown (10 YR 5/6), fine to medium sand.	13
	31074					2					12
						3					11
	31075			5.2		4					10
				6.0		5					9
						6					8
								CL		Lean CLAY (CL), very dark gray (10 YR 3/1), moist, low plasticity.	
						7					7
								SP		SAND (SP) with silt, very dark gray (10 YR 3/1), fine to medium sand, medium dense, wet.	
				9.2		8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	6
						9					5

Northing/Easting: 2113571.6095 / 6045883.48
Surface Elevation: 14'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-5-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3125 Figure: 26
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3126

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31078			7.7						Asphalt.	
	31079									Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 3/4), fine to coarse sand, fine subangular gravel, medium dense, dry.	
						1					12
	31080			7.2		2					11
								SM			
						3					10
				10.1		4					9
						▽ 5					8
										Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff to stiff, moist to wet, low plasticity.	
						6					7
								CL			
						7					6
						8					5
										TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	
						9					4

Northing/Easting: 2113229.9728 / 6045719.8499
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3126 Figure: 27
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3127

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Asphalt.	
	31081					1		SP-SM		SAND (SP-SM) with silt and gravel, yellowish-brown (10 YR 5/6), poorly graded fine to coarse sand, fine subangular gravel, trace gravel, medium dense, dry.	14
	31082					2				Grades well graded fine to coarse sand (SP-SW).	13
						3					12
						4					11
						5		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity. Becomes wet.	10
						6					9
						7					8
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	7
						9					6

Northing/Easting: 2113218.3961 / 6046039.0985
Surface Elevation: 15'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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IR Site 31
Alameda, California

Boring Log 3127 Figure: 28
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3128

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31083									Grass.	
						1		CL		Silty CLAY (CL) with sand, dark brown (10 YR 3/3), fine sand, fine subangular gravel, trace gravel, medium stiff, moist, low plasticity.	12
						2		SM		Silty SAND (SM) with gravel, yellowish-brown (10 YR 5/6), fine to coarse sand, fine subangular gravel, medium dense, moist.	11
						3		CL		Sandy CLAY/clayey SAND (CL/SC), dark yellowish-brown (10 YR 4/4), medium stiff, moist. Wet.	10
						4		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, wet, low plasticity.	9
						5					8
						6					7
						7					6
						8				TD = 8 ft bgs. Groundwater encountered at 3 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113282.4252 / 6045654.2231
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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IR Site 31
Alameda, California

Boring Log 3128
Project No: 6218.086

Figure: 29
1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3129

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31084									Grass.	
										Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 3/4), fine to coarse sand, fine subangular gravel, medium dense, moist.	
						1					12
						2		SM			11
						3				Wet.	10
						4				TD = 4 ft bgs. Groundwater encountered at 3 ft bgs. Borehole backfilled by tremie pipe with neat cement.	9
						5					8
						6					7
						7					6
						8					5
						9					4

Northing/Easting: 2113262.7167 / 6045585.1235
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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IR Site 31
Alameda, California

Boring Log 3129 Figure: 30
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3130

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Asphalt.	
	31085					1		SP		SAND (SP) with silt, black (10 YR 2/1) to dark yellow-brown (10 YR 4/6), fine to coarse sand, fine subangular gravel, trace gravel, medium dense, dry to moist.	10
	31086					2		SP			9
						3		SP			8
						4		SP			7
						5		SP		SAND and CLAY (SP/CL), very dark gray (10 YR 3/1), fine to medium sand, medium dense, medium stiff, very moist.	6
						6		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, very wet, low plasticity.	5
						7		CL			4
						8		CL		TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9		CL			2

Northing/Easting: 2113454.1512 / 6045314.745
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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Alameda, California

Boring Log 3130 — Figure: 31
Project No: 6218.086 — 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3131

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31156			1.2						Gravelly SAND (SW), brown (10 YR 4/3),well graded fine to coarse sand, fine subangular gravel, loose, moist.	
						1					12
										Grades gravelly, fine to coarse subangular to angular gravel.	
	31157					2		SW		Grades clayey, trace fine subangular gravel, dense.	11
				3		3					10
						4					9
										Clayey SAND (SC), brown (10 YR 4/3), fine to coarse sand, trace fine to coarse angular gravel, dense, moist.	
						5				Becomes wet.	8
						6		SC			7
						7					6
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113259.6011 / 6045348.7612
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-10-05

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Alameda, California

Boring Log 3131 Figure: 32
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3132

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31087									Grass.	
						1		SP-SC		SAND (SP-SC) with silt and gravel, dark brown (10 YR 3/3), poorly gradded fine to coarse sand, subangular gravel, moist, fines are low plasticity and medium stiff.	12
	31088					2		SW-SC		SAND (SW-SC) with silt and gravel, dark yellowish-brown (10 YR 4/6), well graded fine to coarse sand, fine angular gravel, medium dense, moist, low plasticity.	11
	31089					3					10
						4		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), soft to medium stiff, very moist, low plasticity.	9
	31090					5					8
						6		SW-SM		SAND (SM) with silt, dark yellowish-brown (10 YR 4/4), well graded fine to coarse sand, medium dense to dense, moist.	7
						7				Wet.	6
						8		CL		Sandy CLAY (CL), black (10 YR 2/1) with olive mottles (5 Y 4/3), soft to medium stiff, moist to wet, low plasticity, preferential flow pathways present.	5
										TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	
						9					4

Northing/Easting: 2113241.6234 / 6045254.8278
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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Alameda, California

Boring Log 3132 Figure: 33
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3133

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31091							CL		Sandy, Silty CLAY (CL), very dark brown (10 YR 2/2), fine angular gravel, trace gravel, medium stiff, moist, low plasticity.	
						1		SM		Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 4/4), fine to coarse sand, fine angular gravel, medium dense, dry to moist.	11
	31092					2					10
						3					9
						4					8
	31093					5		CL		Lean CLAY (CL), very dark gray (10 YR 3/1) with black mottles (10 YR 2/1), medium stiff, moist, low plasticity.	7
						6					6
						7					5
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113397.7796 / 6045062.7458
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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Alameda, California

Boring Log 3133 Figure: 34
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3134

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31094									Grass.	
						1		CL		Sandy, Silty CLAY (CL), dark brown (10 YR 3/3), fine angular gravel, trace gravel, medium stiff, moist, low plasticity.	10
	31095					2				Silty, clayey SAND (SC/SM), dark brown (10 YR 3/3), fine to coarse sand, fine angular gravel, trace gravel, medium dense, moist.	9
						3		SC-SM			8
						4					7
	31096					5				Lean CLAY (CL), black (10 YR 2/1), medium stiff, moist, low plasticity, trace roots.	6
						6		CL			5
						7				Becomes wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113708.5371 / 6044783.8543
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-6-05

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Boring Log 3134 Figure: 35
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3135

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) (reading/background)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31158			1.6						Grass.	
						1		SW		Gravelly SAND (SW), brown (10 YR 4/3), well graded fine to coarse sand, fine angular gravel, loose, moist.	11
	31159			3.1		2		SW		SAND (SW) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, trace clay, dense, moist.	10
						3		SC		Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular sand, dense, moist.	9
						4					8
						5					7
						6		CL		Silty CLAY (CL), gray (10 YR 5/1), soft, wet.	6
						7					5
						8				TD = 8 ft bgs. Groundwater encountered at 5.5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113476.45 / 6044652.8793
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-10-05

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Alameda, California

Boring Log 3135 Figure: 36
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3136

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31097			1.6						Asphalt.	
				5.2		1		SM		Silty SAND (SM) with gravel, very dark gray-brown (10 YR 3/2), fine to coarse sand, fine angular gravel, medium dense, dry.	12
	31098			4.7		2		CL		Sandy CLAY (CL), olive-brown (2.5 Y 4/3), trace gravel, soft to medium stiff, moist, low plasticity.	11
				6.4		3					10
	31099			4.9		4		SM		Silty SAND (SM), olive-gray (5 Y 4/2), fine to medium sand, medium dense, moist.	9
	31100					5					8
						6				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity.	7
				5.5		7		CL		Wet.	6
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113262.9741 / 6044708.5115
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

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IR Site 31
Alameda, California

Boring Log 3136 Figure: 37
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3137

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31160			1.8						SAND (SW) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, trace clay, loose, moist.	
						1		SW			12
	31161			4.1		2				Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, dense, moist.	11
						3		SC			10
						4					9
						5				CLAY (CL) with sand, gray (10 YR 5/1), fine to coarse sand, soft, wet.	8
						6		CL			7
						7					6
						8				TD = 8 ft bgs. Groundwater encountered at 5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	5
						9					4

Northing/Easting: 2113278.9329 / 6044551.1272
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-10-05

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IR Site 31
Alameda, California

Boring Log 3137 Figure: 38
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3138

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31101			4.7						Asphalt.	
						1		SM		Silty SAND (SM) with gravel, very dark brown (10 YR 2/2) to yellowish-brown (10 YR 5/6), fine to coarse sand, fine angular gravel, medium dense, moist.	10
	31102			7.1		2					9
						3					8
	31103					4		CL		Sandy, Gravelly CLAY (CL), yellowish-brown (10 YR 5/6), medium stiff to stiff, moist, low plasticity.	7
				9.6		5					6
				9.4		6		CL		Lean CLAY (CL), black (10 YR 2/1) to very dark gray (10 YR 3/1), stiff, moist, low plasticity.	5
						7				Wet.	4
						8				TD = 8 ft bgs. Groundwater encountered at 7 ft bgs. Borehole backfilled by tremie pipe with neat cement.	3
						9					2

Northing/Easting: 2113656.2412 / 6044654.636
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

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Alameda, California

Boring Log 3138 Figure: 39
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3139

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31104			7.2						Silty SAND (SM) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, medium dense, dry.	
						1					11
	31105			6.9		2					10
								SM			
						3					9
				8.8		4					8
						5					7
						▽				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, wet, low plasticity.	
						6					6
								CL			
						7					5
				12.5							
				11.1		8				TD = 8 ft bgs. Groundwater encountered at 5.5 ft bgs. Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113395.5929 / 6044759.8947
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

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Boring Log 3139 Figure: 40
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3140

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm) [reading/background]	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31106			12.3						Silty SAND (SM) with gravel, dark yellowish-brown (10 YR 4/4), fine to coarse sand, fine angular gravel, medium dense, moist to dry.	
						1		SM			11
	31107			21.8		2					10
						3		SC-SM		Clayey, Silty SAND (SM/SC), yellowish-brown (10 YR 5/6), fine to coarse sand, fine angular gravel, trace gravel, medium dense, moist.	9
				15.5		4				Silty SAND (SM) with clay, olive-brown (2.5 Y 4/3), very fine to fine sand, medium dense, moist.	8
				16.2		5		SM			7
				15.6		6				Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, very moist to wet, low plasticity.	6
				5.8		7		CL			5
				11.3		8				TD = 8 ft bgs. *Groundwater encountered at 5 to 6 ft bgs.* Borehole backfilled by tremie pipe with neat cement.	4
						9					3

Northing/Easting: 2113547.5277 / 6045682.8509
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

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Alameda, California

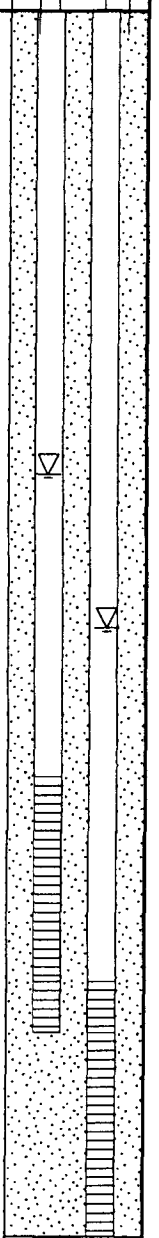
Boring Log 3140 Figure: 41
Project No: 6218.086 1 of 1

NEIS_BORING_LOG 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3141

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31108			6.2						Silty SAND (SM) with clay, dark yellowish-brown (10 YR 3/4), fine to medium sand, trace gravel, medium dense to medium loose, fine angular gravel, dry.	
	31109			10.5						Grades gravelly, dark yellowish-brown (10 YR 4/6), fine angular gravel, moist.	10
	31110			12.4				SM			
	31111					5					
				10.0						Wet.	
								ML		Clayey SILT (ML), very dark gray (10 YR 3/1), medium stiff, wet, low plasticity.	5
						10		CL		CLAY (CL), very dark gray (10 YR 3/1), stiff, wet, low plasticity.	0
						15		SP		SAND (SP) with silt, very dark gray (10 YR 3/1), fine sand, medium dense, wet.	
										Hydraulic push groundwater sample interval - not logged.	-5
						20					-10
						25				Logging ended at 16 ft bgs. TD = 24 ft bgs. *Groundwater encountered at 7 ft bgs.* Both borings backfilled by tremie pipe with neat cement.	

Well or Piezometer Completion



Northing/Easting: 2113279.6247/6045432.2038
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3141
Project No: 6218.086

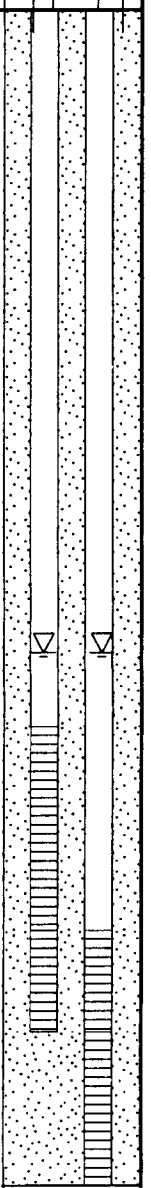
Figure: 42
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3142

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31112			21.7				SM		Grass. Silty SAND (SM) with gravel, dark brown (10 YR 3/3) to dark yellowish-brown (10 YR 4/4), fine to coarse sand, fine angular gravel, medium dense, moist.	15
	31113			22.1							
						5		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), medium stiff, moist, low plasticity.	10
								SP		SAND (SP) with silt, dark yellowish-brown (10 YR 3/6) to very dark gray (10 YR 3/1), fine to medium sand, medium dense, moist.	
						10		CL		Lean CLAY (CL), very dark gray (10 YR 3/1), soft to medium stiff, moist, low plasticity. Wet.	5
						15		SP		SAND (SP), very dark gray (10 YR 3/1), fine to medium, medium dense, wet.	0
										Hydraulic push groundwater sample interval - not logged.	
						20					-5
						25				Logging ended at 16 ft bgs. TD = 23 ft bgs. Groundwater encountered at 12 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-10

Well or Piezometer Completion



Northing/Easting: 2113466.538/6046072.7952
Surface Elevation: 16'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-7-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3142
Project No: 6218.086

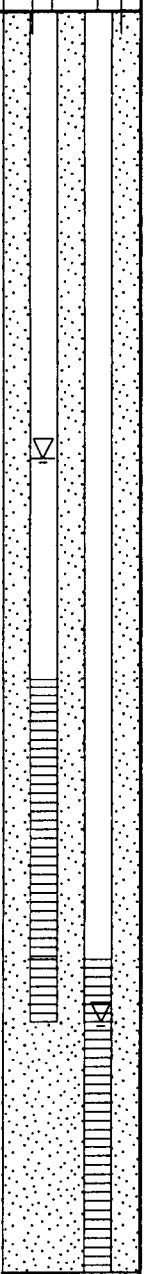
Figure: 43
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3143

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31114			3.4				SW		SAND (SW), dark brown (10 YR 3/2), fine to coarse sand, fine angular gravel, trace gravel, loose, moist.	
								SW		SAND (SW) with clay, brown (10 YR 4/3) to reddish-brown (5 YR 4/3), fine to coarse sand, fine gravel, trace gravel, dense, moist.	
	31115					2					10
				9.0				SP		SAND (SP) with silt, light brown (7.5 YR 6/3), fine sand, fine angular gravel, trace gravel, loose, dry to moist.	
						4		SP		Becomes wet.	8
								SC		Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, dense, moist.	
				4.6		6		SC			6
								CL		CLAY (CL) with silt, gray (10 YR 5/1), trace fine sand, soft, wet.	
				3.2		8		CL		Silty CLAY (CL), gray (10 YR 5/1), soft, wet.	4
						10		CL			2
								SP		SAND (SP), gray (10 YR 5/1), fine to medium sand, trace fines, wet.	
						12		SP			0
						14		SP			-2
						16		SP			-4
						18		SP			-6
						20				TD = 20 ft bgs. Groundwater encountered at 5 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-8

Well or Piezometer Completion



Northing/Easting: 2113416.1384/6045133.569
Surface Elevation: 12'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-8-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3143
Project No: 6218.086

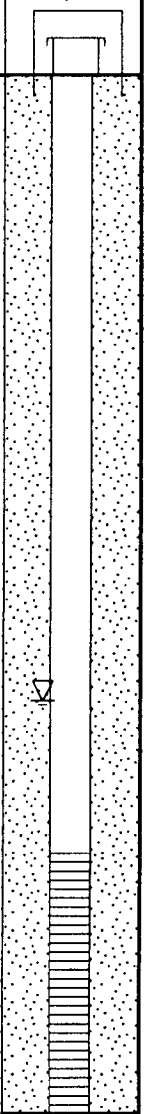
Figure: 44
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3144

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31116			2.7						Asphalt.	
								SC		Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular to subangular gravel, dense, moist.	
	31117			4.7							
	31118			7.0							
						5		CL		Silty CLAY (CL), dark gray (10 YR 4/1) to black (10 YR 2/1), trace gravel, fine angular gravel, firm, moist.	5
										Grades gray (10 YR 5/1), soft, wet.	
										Grades slightly silty.	
						10					0
										Grades silty, very soft.	
										Grades slightly silt.	
						15		CL-ML		Silty CLAY/Clayey SILT (CL/ML), gray (10 YR 5/1), very soft, wet.	-5
										Same as above, soft, wet to moist.	
						20		CL		Silty CLAY (CL) with sand, gray (10 YR 5/1), fine to coarse sand, very soft, wet.	-10
								ML		Clayey SILT (ML), gray (10 YR 5/1), soft, wet.	
						25				TD = 24 ft bgs. Temporary well installation hit refusal at 20 ft bgs. Groundwater encountered at 12 ft bgs. Boring backfilled by tremie pipe with neat cement.	-15

Well or Piezometer Completion



Northing/Easting: 2113741.5521/6044342.8571
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-8-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3144
Project No: 6218.086

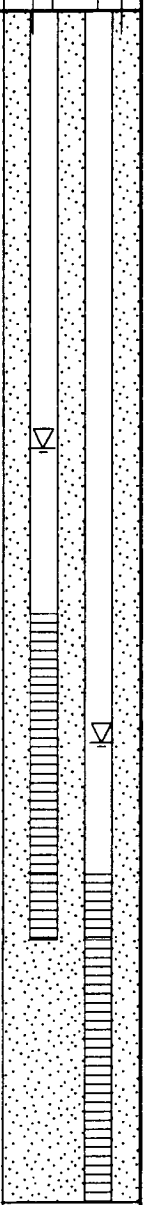
Figure: 45
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3145

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31120			2.2						Asphalt and Roadside Sand.	
										Sandy CLAY (CL) with gravel, gray (5 YR 5/1) with reddish-brown (5 YR 5/3) mottles, fine angular to subangular gravel, medium stiff, moist.	
	31119			2.4		2		CL			8
	31121			3.5		4					6
	31122									CLAY (CL) brown (7.5 YR 5/2) to gray (7.5 YR 5/1), fine to coarse sand, fine gravel, trace sand, trace gravel, hard, moist.	
				4.8		6				Grades gray (10 YR 5/1), wet.	4
				70.6		8					2
						10		CL			0
										Grades trace silt, soft to hard, wet.	
						12				Silty CLAY (CL), gray (10 YR 5/1), soft to stiff, wet.	-2
						14					-4
										Grades silty.	
						16				Hydraulic push groundwater sample interval - not logged.	-6
						18				Logging ended at 16 ft bgs. TD = 18 ft bgs. Groundwater encountered at 11 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-8
						20				NOTE: when cut open acetate liner at 7 ft bgs for visual observation, long "hiss" occurred.	-10

Well or Piezometer Completion



Northing/Easting: 2113633.3045/6044489.9686
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-8-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3145
Project No: 6218.086

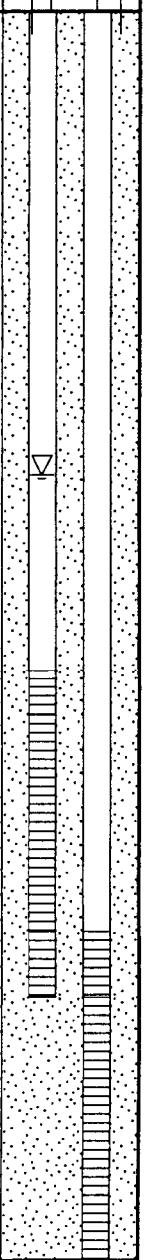
Figure: 46
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3146

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31132			1.8						Grass.	
								SW-SC		Gravelly SAND (SW-SC) with clay, brown (10 YR 5/3), well graded fine to coarse sand, fine angular, loose, brown, moist.	10
	31133			1.6		2				Clayey SAND (SC) with gravel, brown (10 YR 5/3), fine to coarse sand, fine angular gravel, dense, moist.	8
	31134			3.2		4		SC			
										CLAY (CL) with silt, gray (10 YR 5/1), soft, moist.	6
						6					4
						8		CL		Wet.	2
						10					0
						12				Hydraulic push groundwater sample interval - not logged.	-2
						14					-4
						16					-6
						18					-8
						20				Logging ended at 12 ft bgs. TD = 19 ft bgs. Groundwater encountered at 8 ft bgs. Both borings backfilled by tremie pipe with neat cement.	

Well or Piezometer Completion



Northing/Easting: 2113619.8943/6044772.7754
Surface Elevation: 11'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-8-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3146
Project No: 6218.086

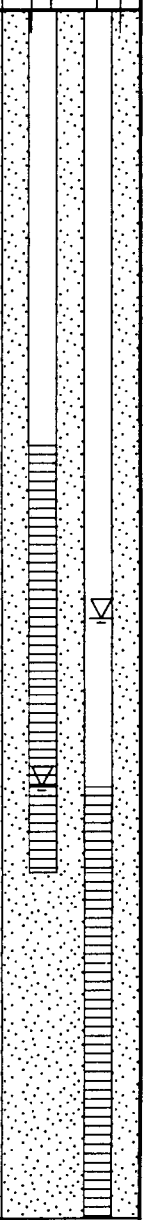
Figure: 47
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3147

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31135			5.7						SAND (SW) with gravel, brown (10 YR 5/3), fine to coarse sand, fine angular gravel, loose, dry.	8
	31136			0.0		2		SW			6
						4		SC		Clayey SAND (SC) with gravel, brown (10 YR 5/3), fine to coarse sand, fine angular gravel, dense, moist.	4
				0.0		6		CL		Sandy CLAY (CL), brown (10 YR 5/3) to gray(10 YR 5/1), fine angular gravel, trace gravel, soft, moist. CLAY (CL) with sand, gray (10 YR 5/1), fine to coarse sand, fine angular gravel, trace gravel, soft, wet.	2
						8				Silty CLAY (CL), gray (10 YR 5/1), trace sand, soft, wet.	0
						10					-2
						12				Hydraulic push groundwater sample interval - not logged.	-4
						14				Logging ended at 12 ft bgs. TD = 14 ft bgs. Groundwater encountered at 5.5 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-6

Well or Piezometer Completion



Northing/Easting: 2113934.058/6044568.7993
Surface Elevation: 9'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3147
Project No: 6218.086

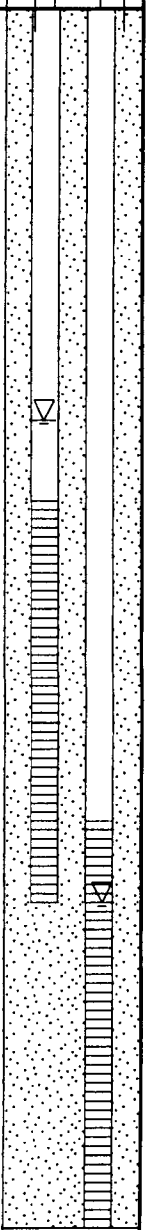
Figure: 48
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

Boring Log 3148

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31137			0.0						Asphalt.	
								SW-SC		Gravelly SAND (SW-SC) with clay, dark brown (10 YR 3/3), well graded fine to coarse sand, fine angular gravel, loose, moist.	12
	31138			0.0		2					
										Grading brown (10 YR 4/3), trace clay.	10
						4					8
						6		SC		Clayey SAND (SC) with gravel, brown (10 YR 4/3), fine to coarse sand, fine angular gravel, dense, moist.	6
						8		CL		CLAY (CL) with sand, gray (10 YR 5/1), fine to coarse sand, soft, moist.	
										Silty CLAY (CL), gray (10 YR 5/1), trace sand, wet.	4
						10					2
						12				Hydraulic push groundwater sample interval - not logged.	0
						14					-2
						16				Logging ended at 12 ft bgs. TD = 15 ft bgs. Groundwater encountered at 7 ft bgs. Both borings backfilled by tremie pipe with neat cement.	

Well or Piezometer Completion



Northing/Easting: 2113271.8362/6044844.4369
Surface Elevation: 13'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3148
Project No: 6218.086

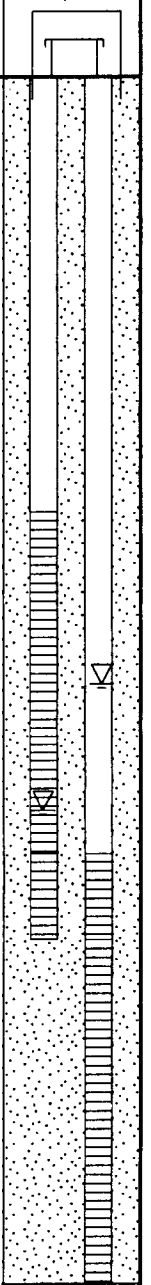
Figure: 49
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 2/14/06 REV.

Boring Log 3149

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31139			6.0				SW		Gravelly SAND (SW), brown (10 YR 5/3), well graded fine to coarse sand, fine angular gravel, loose, moist.	
	31140			8.0		2		SC		Clayey SAND (SC), brown (10 YR 5/3), fine to coarse sand, fine angular gravel, trace gravel, dense, moist.	8
						4					6
						6		CL		Sandy CLAY (CL), brown-gray (10 YR 5/2), soft, moist.	4
								CL		CLAY (CL), gray (10 YR 5/1), soft to medium stiff, wet.	
						8				Hydraulic push groundwater sample interval - not logged.	2
						10					0
						12					-2
						14				Logging ended at 8 ft bgs. TD = 14 ft bgs. Groundwater encountered at 5.5 ft bgs. Both borings backfilled by tremie pipe with neat cement.	-4

Well or Piezometer Completion



Northing/Easting: 2113831.0699/6044917.407
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3149
Project No: 6218.086

Figure: 50
1 of 1

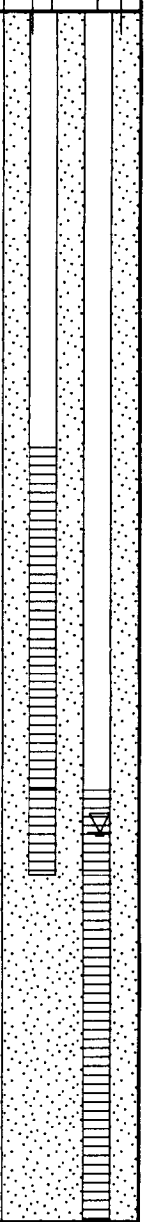
LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV

Boring Log 3150

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
	31141			6.0						Asphalt.	
										Gravelly SAND (SW), dark brown (10 YR 3/2), well graded fine to coarse sand, fine angular gravel, loose, moist.	
	31142			15.1		2				Grades gravelly, brown (10 YR 4/3).	8
	31143										
						4		SW			6
										Grades clayey, trace gravel, medium dense, moist.	
						6					4
										Becomes wet.	
						8				Hydraulic push groundwater sample interval - not logged.	2
						10					0
						12					-2
						14				Logging ended at 8 ft bgs.	-4

TD = 14 ft bgs.
Groundwater encountered at 7 ft bgs.
Both borings backfilled by tremie pipe with neat cement.

Well or Piezometer Completion



Northing/Easting: 2113346.6949/6044179.436
Surface Elevation: 10'
Logged By: H. Carter

Drill Rig: Direct Push
Equipment/Hammer: Direct Push - Macrocore/NA
Date Completed: 11-9-05

Department of the Navy
IR Site 31
Alameda, California

Boring Log 3150
Project No: 6218.086

Figure: 51
1 of 1

LOG OF BORING WITH 2 WELLS AND HI/LOW WATER LEVELS 45657 ALAMEDA BORING LOGS.GPJ CDM_BLLV.GDT 1/25/06 REV.

APPENDIX E

GEOTECHNICAL DATA

Table E-1
Alameda Site 31 Soil RI Report
Geotechnical Data

SAMPLE ID.	DEPTH, ft.	LOCATION	SAMPLE ORIENT. (1)	TOTAL SAMPLE VOLUME cc measured	MOISTURE CONTENT (% wt) ASTM D2216	VOLUMETRIC WATER CONTENT, FRACTION Vb ASTM D2216	DRY BULK DENSITY (g/cc) ASTM D2937	Volume of Solid (cc) Calculated	Volume of Voids (cc) Calculated	Total Porosity (fraction) Calculated	Unsaturated Fraction of Porosity * (fraction) Calculated	Soil type from Sieve analysis	25.0 PSI CONFINING STRESS: NATIVE STATE EFFECTIVE PERMEABILITY TO AIR (2) (millidarcy) API RP40	NATIVE STATE EFFECTIVE PERMEABILITY TO AIR (2) (cm^2) API RP40	NATIVE STATE EFFECTIVE PERMEABILITY TO WATER (2,3) (millidarcy)	NATIVE STATE EFFECTIVE PERMEABILITY TO WATER (2,3) (cm^2) ASTM D5084	NATIVE STATE EFFECTIVE HYDRAULIC CONDUCTIVITY (2,3) (cm/s)
31087	0.00 -2.00	3132	V	47.70	12.3	0.246	2.00	36.06	11.64	0.24	-0.01	medium sand	1.23	1.22E-11	0.322	3.18E-12	3.10E-07
31144	0.00 -2.00	3102	V	47.70	9.4	0.172	1.82	32.82	14.89	0.31	0.45	coarse sand	1836	1.81E-08	32.2	3.18E-10	3.08E-05
31081	0.00 -2.00	3127	V	29.88	8.9	0.214	2.41	27.21	2.67	0.09	-1.40	coarse sand	0.826	8.15E-12	0.400	3.94E-12	3.77E-07
31066	0.00 -2.00	3122	V	47.70	10.1	0.188	1.86	33.57	14.14	0.30	0.37	medium sand	2810	2.77E-08	2.26	2.23E-11	2.21E-06
31037	0.00 -2.00	3113	V	47.70	6.5	0.109	1.69	30.40	17.30	0.36	0.70	coarse sand	5601	5.53E-08	54.6	5.39E-10	5.39E-05
31007	0.00 -2.00	3104	V	47.70	11.1	0.210	1.89	33.97	13.74	0.29	0.27	medium sand	5704	5.63E-08	4.74	4.67E-11	4.69E-06
31088	2.00 - 4.00	3132	V	47.90	12.5	0.265	2.12	38.32	9.58	0.20	-0.32	medium sand	0.604	5.96E-12	0.962	9.49E-12	9.12E-07
31145	2.00 - 4.00	3102	V	32.03	14.1	0.286	2.04	24.61	7.42	0.23	-0.24	coarse sand	8.95	8.83E-11	0.906	8.94E-12	8.65E-07
31082	2.00 - 4.00	3127	V	32.13	8.1	0.154	1.91	23.18	8.95	0.28	0.45	medium sand	1987	1.96E-08	66.2	6.54E-10	6.26E-05
31068	2.00 - 4.00	3122	V	48.88	51.1	0.564	1.10	20.38	28.50	0.58	0.03	silt	20.7	2.04E-10	0.064	6.34E-13	6.34E-08
31038	2.00 - 4.00	3113	V	47.33	10.3	0.181	1.75	31.25	16.07	0.34	0.47	medium sand	522	5.15E-09	7.92	7.82E-11	7.83E-06
31008	2.00 - 4.00	3104	V	48.68	6.5	0.115	1.77	32.54	16.15	0.33	0.65	medium sand	612	6.04E-09	15.7	1.55E-10	1.56E-05
31039	4.00-6.00	3113	V	47.51	11.6	0.204	1.76	31.48	16.04	0.34	0.39	fine sand	364	3.59E-09	107	1.05E-09	1.06E-04
31009	4.00-6.00	3104	V	47.70	50.6	0.564	1.11	20.05	27.65	0.58	0.03	silt	0.395	3.90E-12	0.053	5.18E-13	5.22E-08
31090	5.00 - 7.00	3132	V	47.51	8.9	0.162	1.82	32.70	14.81	0.31	0.48	medium sand	852	8.41E-09	12.5	1.23E-10	1.20E-05
			Mean Value:	46.41	16.74	0.24	1.68	29.45	16.97	0.37	0.35			1.82E-08		2.72E-10	

Notes:

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State = As received with pore fluids in place (3) Permeability to water and conductivity measured at saturated conditions

(2) Native State = As received with pore fluids in place

(3) Permeability to water and conductivity measured at saturated conditions

* Negative unsaturated fraction indicates sample was oversaturated

Assumptions:

Grain S.G.:	2.65				
Water Density:	1.00	gm/cc	9.87E-09	cm^2/darcy	P. 29 Freeze and Cherry, 1979

PHYSICAL PROPERTIES DATA

PROJECT NAME: Alameda.IR Site 31
PROJECT NO: 6229.003

METHODOLOGY:

			API RP40	ASTM D5084	
			25.0 PSI CONFINING STRESS		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	NATIVE STATE EFFECTIVE PERMEABILITY TO AIR (2) (millidarcy)	NATIVE STATE EFFECTIVE PERMEABILITY TO WATER (2,3) (millidarcy)	NATIVE STATE EFFECTIVE HYDRAULIC CONDUCTIVITY (2,3) (cm/s)
31066	N/A	V	2810	2.26	2.21E-06
31068	N/A	V	20.7	0.064	6.34E-08
31037	N/A	V	5601	54.6	5.39E-05
31038	N/A	V	522	7.92	7.83E-06
31039	N/A	V	364	107	1.06E-04
31007	N/A	V	5704	4.74	4.69E-06
31008	N/A	V	612	15.7	1.56E-05
31009	N/A	V	0.395	0.053	5.22E-08

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State = As received with pore fluids in place (3) Permeability to water and conductivity measured at saturated conditions ND = Not Detected

DRY BULK DENSITY OF IN-PLACE SOIL

(METHODOLOGY: ASTM D2937)

PROJECT NAME: Alameda.IR Site 31
PROJECT NO: 6229.003

	METHODOLOGY:	MEASURED	ASTM D 2216/ASTM D 2937		
SAMPLE ID.	DEPTH, ft.	TOTAL SAMPLE VOLUME cc	MOISTURE CONTENT (% wt)	VOLUMETRIC WATER CONTENT, FRACTION Vb	DRY BULK DENSITY, g/cc
31066	N/A	47.70	10.1	0.188	1.86
31068	N/A	48.88	51.1	0.564	1.10
31037	N/A	47.70	6.5	0.109	1.69
31038	N/A	47.33	10.3	0.181	1.75
31039	N/A	47.51	11.6	0.204	1.76
31007	N/A	47.70	11.1	0.210	1.89
31008	N/A	48.68	6.5	0.115	1.77
31009	N/A	47.70	50.6	0.564	1.11

* Vb = Bulk Volume

PTS Laboratories, Inc.

APCL
PTS File No: 35694

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Alameda.IR Site 31
PROJECT NO: 6229.003

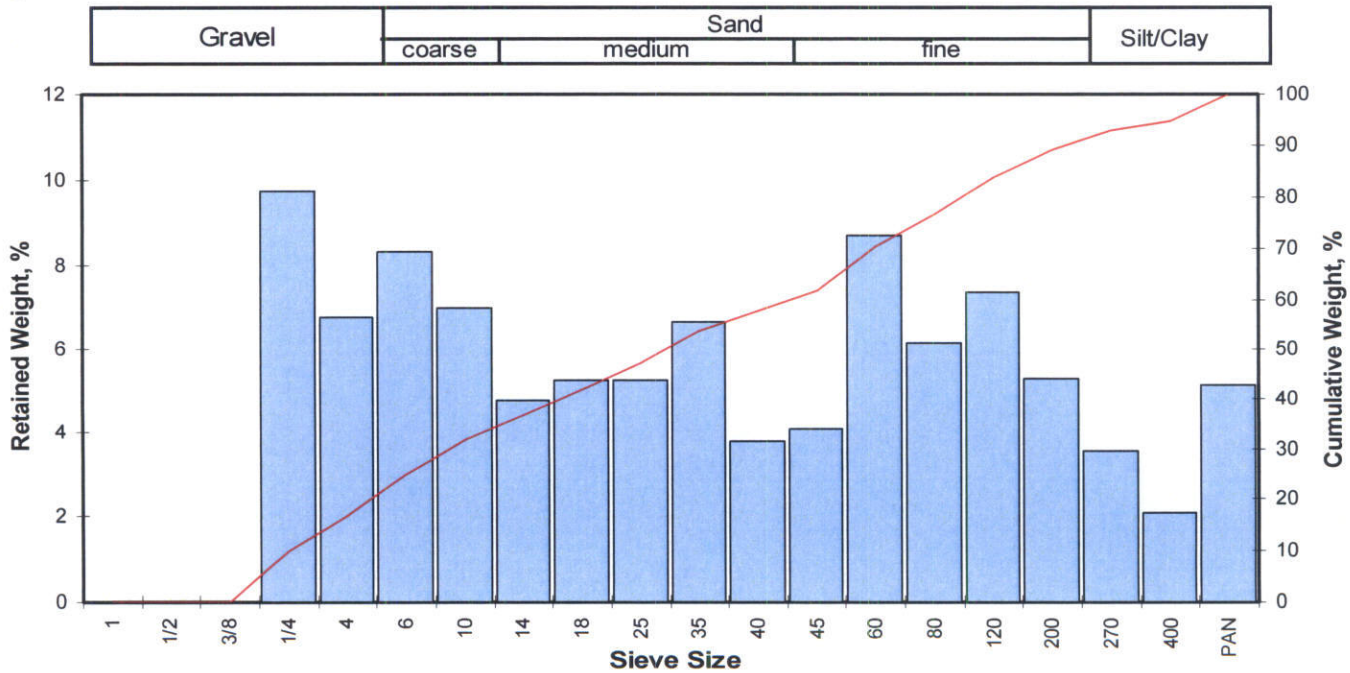
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
31066	N/A	Medium sand	0.610	16.52	15.34	25.75	31.60	(2)	(2)	10.79
31068	N/A	Silt	0.014	0.00	0.00	2.27	25.17	46.24	26.33	72.56
31037	N/A	Coarse sand	1.863	23.52	24.66	32.67	14.78	(2)	(2)	4.37
31038	N/A	Medium sand	0.523	13.67	15.45	25.86	31.66	(2)	(2)	13.36
31039	N/A	Fine sand	0.301	4.69	6.81	28.11	44.50	(2)	(2)	15.90
31007	N/A	Medium sand	0.899	18.44	18.50	27.24	25.17	(2)	(2)	10.65
31008	N/A	Medium sand	1.049	14.76	21.38	33.21	22.64	(2)	(2)	8.02
31009	N/A	Silt	0.007	0.00	0.00	0.00	3.72	54.64	41.64	96.28

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fractions

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31066
Project No:	6229.003	**Depth, ft:**	N/A



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	3.81	9.74	9.74
0.1873	4.757	-2.25	4	2.65	6.78	16.52
0.1324	3.364	-1.75	6	3.26	8.34	24.85
0.0787	2.000	-1.00	10	2.74	7.01	31.86
0.0557	1.414	-0.50	14	1.87	4.78	36.64
0.0394	1.000	0.00	18	2.05	5.24	41.88
0.0278	0.707	0.50	25	2.06	5.27	47.15
0.0197	0.500	1.00	35	2.61	6.67	53.82
0.0166	0.420	1.25	40	1.48	3.78	57.61
0.0139	0.354	1.50	45	1.60	4.09	61.70
0.0098	0.250	2.00	60	3.41	8.72	70.42
0.0070	0.177	2.50	80	2.40	6.14	76.55
0.0049	0.125	3.00	120	2.88	7.36	83.92
0.0029	0.074	3.75	200	2.07	5.29	89.21
0.0021	0.053	4.25	270	1.39	3.55	92.76
0.0015	0.037	4.75	400	0.81	2.07	94.84
			PAN	2.02	5.16	100.00
TOTALS				39.11	100.00	100.00

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.95	0.3042	7.726
10	-2.65	0.2473	6.281
16	-2.28	0.1915	4.863
25	-1.73	0.1310	3.327
40	-0.18	0.0446	1.133
50	0.71	0.0240	0.610
60	1.40	0.0150	0.380
75	2.37	0.0076	0.193
84	3.01	0.0049	0.124
90	3.86	0.0027	0.069
95	4.60	0.0016	0.041

Measure	Trask	Inman	Folk-Ward
Median, phi	0.71	0.71	0.71
Median, in.	0.0240	0.0240	0.0240
Median, mm	0.610	0.610	0.610
Mean, phi	-0.82	0.36	0.48
Mean, in.	0.0693	0.0306	0.0282
Mean, mm	1.760	0.776	0.716
Sorting	4.152	2.647	2.467
Skewness	1.314	-0.132	-0.051
Kurtosis	0.252	0.426	0.753
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

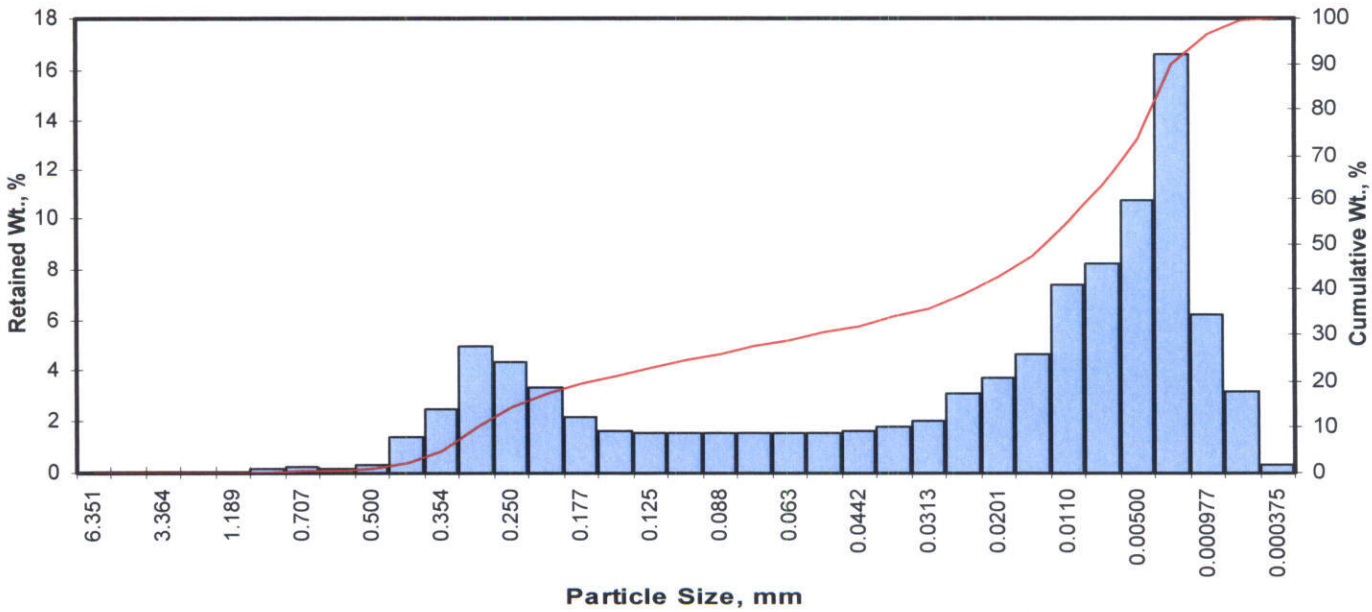
Description	Retained on Sieve #	Weight Percent
Gravel	4	16.52
Coarse Sand	10	15.34
Medium Sand	40	25.75
Fine Sand	200	31.60
Silt/Clay	<200	10.79
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31068
Project No:	6229.003	**Depth, ft:**	N/A

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.16	0.16	0.16
0.0278	0.707	0.50	25	0.24	0.24	0.40
0.0234	0.595	0.75	30	0.13	0.13	0.53
0.0197	0.500	1.00	35	0.33	0.33	0.86
0.0166	0.420	1.25	40	1.41	1.41	2.27
0.0139	0.354	1.50	45	2.48	2.48	4.75
0.0117	0.297	1.75	50	5.00	5.00	9.75
0.0098	0.250	2.00	60	4.35	4.35	14.10
0.0083	0.210	2.25	70	3.31	3.31	17.41
0.0070	0.177	2.50	80	2.17	2.17	19.58
0.0059	0.149	2.75	100	1.65	1.65	21.23
0.0049	0.125	3.00	120	1.57	1.57	22.80
0.0041	0.105	3.25	140	1.57	1.57	24.37
0.0035	0.088	3.50	170	1.54	1.54	25.91
0.0029	0.074	3.75	200	1.53	1.53	27.44
0.0025	0.063	4.00	230	1.52	1.52	28.96
0.0021	0.053	4.25	270	1.53	1.53	30.49
0.00174	0.0442	4.50	325	1.61	1.61	32.10
0.00146	0.0372	4.75	400	1.77	1.77	33.87
0.00123	0.0313	5.00	450	2.03	2.03	35.90
0.000986	0.0250	5.32	500	3.11	3.11	39.01
0.000790	0.0201	5.64	635	3.75	3.75	42.76
0.000615	0.0156	6.00		4.66	4.66	47.42
0.000435	0.0110	6.50		7.35	7.35	54.76
0.000308	0.00781	7.00		8.21	8.21	62.97
0.000197	0.00500	7.65		10.70	10.70	73.67
0.000077	0.00195	9.00		16.60	16.60	90.27
0.000038	0.000977	10.00		6.20	6.20	96.47
0.000019	0.000488	11.00		3.19	3.19	99.66
0.000015	0.000375	11.38		0.34	0.34	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.51	0.0138	0.350
10	1.76	0.0116	0.294
16	2.14	0.0089	0.226
25	3.35	0.0039	0.098
40	5.40	0.0009	0.024
50	6.18	0.0005	0.014
60	6.82	0.0003	0.009
75	7.75	0.0002	0.005
84	8.49	0.0001	0.003
90	8.98	0.0001	0.002
95	9.76	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	6.18	6.18	6.18
Median, in.	0.0005	0.0005	0.0005
Median, mm	0.014	0.014	0.014
Mean, phi	4.29	5.32	5.60
Mean, in.	0.0020	0.0010	0.0008
Mean, mm	0.051	0.025	0.021
Sorting	4.596	3.172	2.836
Skewness	1.540	-0.271	-0.201
Kurtosis	0.159	0.300	0.768
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

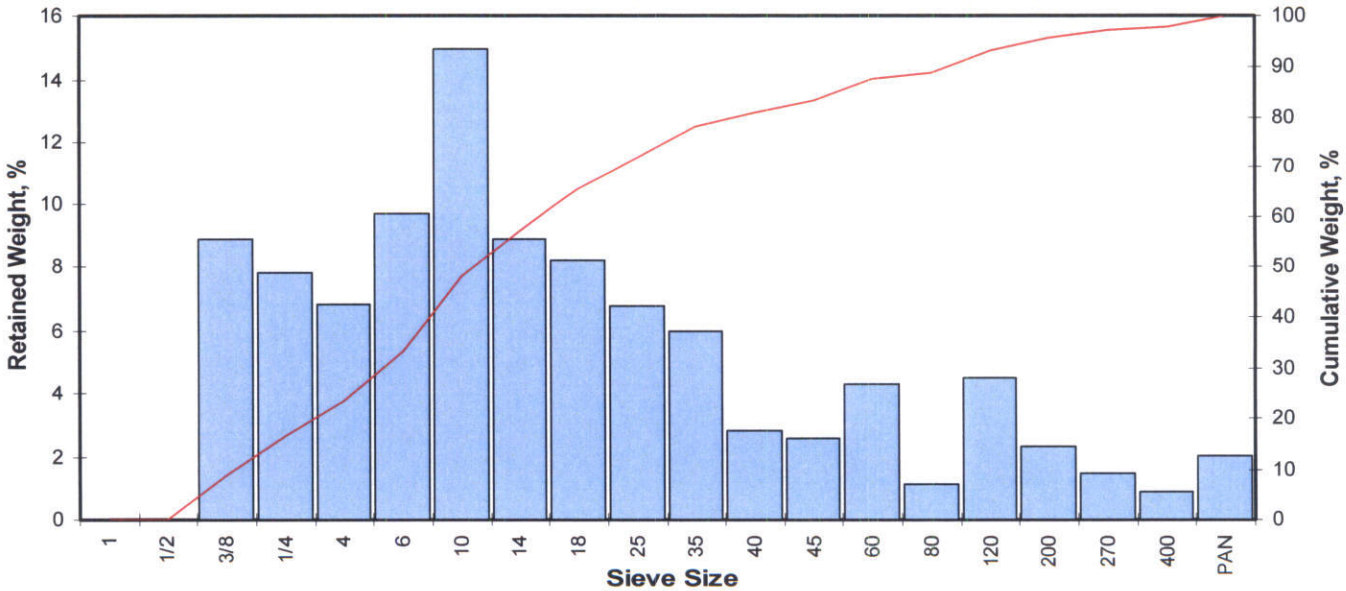
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	2.27
Fine Sand	200	25.17
Silt	>0.005 mm	46.24
Clay	<0.005 mm	26.33
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31037
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	2.20	8.91	8.91
0.2500	6.351	-2.67	1/4	1.93	7.81	16.72
0.1873	4.757	-2.25	4	1.68	6.80	23.52
0.1324	3.364	-1.75	6	2.39	9.68	33.20
0.0787	2.000	-1.00	10	3.70	14.98	48.18
0.0557	1.414	-0.50	14	2.20	8.91	57.09
0.0394	1.000	0.00	18	2.03	8.22	65.30
0.0278	0.707	0.50	25	1.67	6.76	72.06
0.0197	0.500	1.00	35	1.48	5.99	78.06
0.0166	0.420	1.25	40	0.69	2.79	80.85
0.0139	0.354	1.50	45	0.63	2.55	83.40
0.0098	0.250	2.00	60	1.06	4.29	87.69
0.0070	0.177	2.50	80	0.28	1.13	88.83
0.0049	0.125	3.00	120	1.11	4.49	93.32
0.0029	0.074	3.75	200	0.57	2.31	95.63
0.0021	0.053	4.25	270	0.36	1.46	97.09
0.0015	0.037	4.75	400	0.22	0.89	97.98
			PAN	0.50	2.02	100.00
TOTALS				24.70	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.42	0.4219	10.716
10	-3.17	0.3535	8.980
16	-2.72	0.2595	6.591
25	-2.17	0.1776	4.512
40	-1.41	0.1046	2.656
50	-0.90	0.0734	1.863
60	-0.32	0.0492	1.251
75	0.74	0.0235	0.597
84	1.57	0.0133	0.337
90	2.63	0.0064	0.161
95	3.55	0.0034	0.086

Measure	Trask	Inman	Folk-Ward
Median, phi	-0.90	-0.90	-0.90
Median, in.	0.0734	0.0734	0.0734
Median, mm	1.863	1.863	1.863
Mean, phi	-1.35	-0.58	-0.68
Mean, in.	0.1006	0.0587	0.0632
Mean, mm	2.554	1.490	1.605
Sorting	2.750	2.145	2.128
Skewness	0.881	0.150	0.213
Kurtosis	0.222	0.624	0.978
Grain Size Description (ASTM-USCS Scale)		Coarse sand (based on Mean from Trask)	

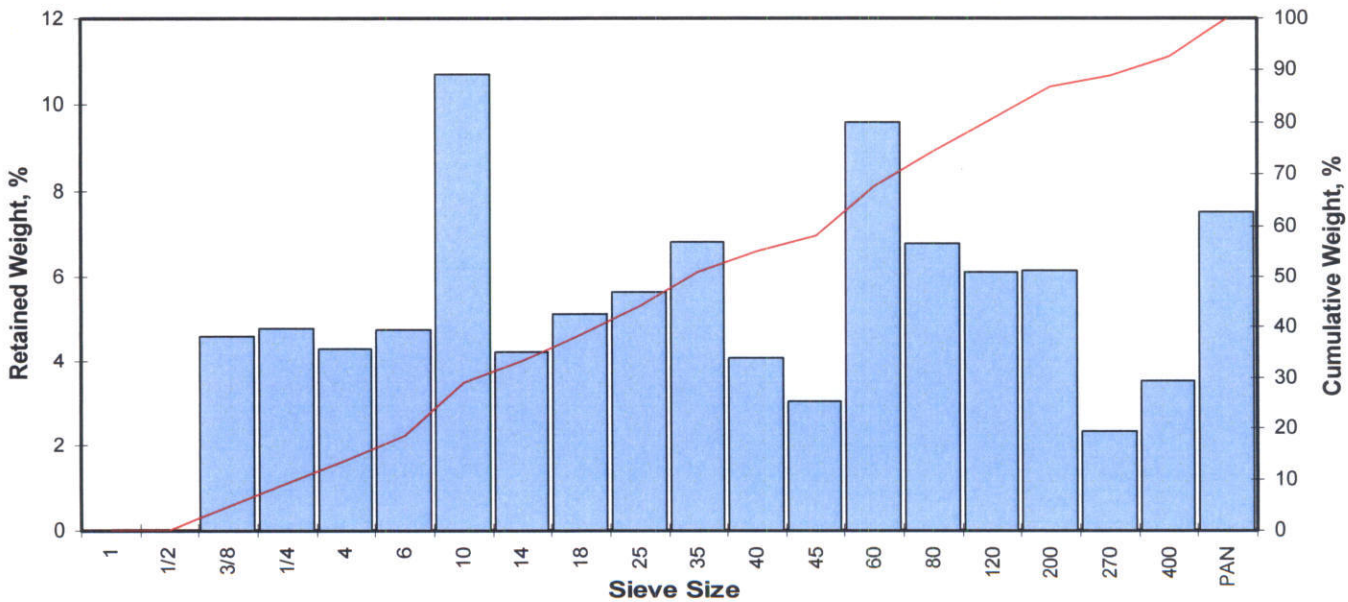
Description	Retained on Sieve #	Weight Percent
Gravel	4	23.52
Coarse Sand	10	24.66
Medium Sand	40	32.67
Fine Sand	200	14.78
Silt/Clay	<200	4.37
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31038
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	1.50	4.61	4.61
0.2500	6.351	-2.67	1/4	1.55	4.76	9.37
0.1873	4.757	-2.25	4	1.40	4.30	13.67
0.1324	3.364	-1.75	6	1.54	4.73	18.40
0.0787	2.000	-1.00	10	3.49	10.72	29.12
0.0557	1.414	-0.50	14	1.38	4.24	33.35
0.0394	1.000	0.00	18	1.66	5.10	38.45
0.0278	0.707	0.50	25	1.83	5.62	44.07
0.0197	0.500	1.00	35	2.22	6.82	50.89
0.0166	0.420	1.25	40	1.33	4.08	54.98
0.0139	0.354	1.50	45	0.99	3.04	58.02
0.0098	0.250	2.00	60	3.12	9.58	67.60
0.0070	0.177	2.50	80	2.21	6.79	74.39
0.0049	0.125	3.00	120	1.99	6.11	80.50
0.0029	0.074	3.75	200	2.00	6.14	86.64
0.0021	0.053	4.25	270	0.76	2.33	88.97
0.0015	0.037	4.75	400	1.14	3.50	92.48
			PAN	2.45	7.52	100.00
TOTALS				32.56	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.20	0.3618	9.190
10	-2.61	0.2396	6.087
16	-2.00	0.1578	4.009
25	-1.29	0.0961	2.442
40	0.14	0.0358	0.909
50	0.93	0.0206	0.523
60	1.60	0.0130	0.329
75	2.55	0.0067	0.171
84	3.43	0.0037	0.093
90	4.40	0.0019	0.047
95	3.16	0.0044	0.112

Measure	Trask	Inman	Folk-Ward
Median, phi	0.93	0.93	0.93
Median, in.	0.0206	0.0206	0.0206
Median, mm	0.523	0.523	0.523
Mean, phi	-0.39	0.71	0.79
Mean, in.	0.0514	0.0240	0.0228
Mean, mm	1.306	0.610	0.580
Sorting	3.782	2.716	2.321
Skewness	1.234	-0.082	-0.191
Kurtosis	0.188	0.170	0.679
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

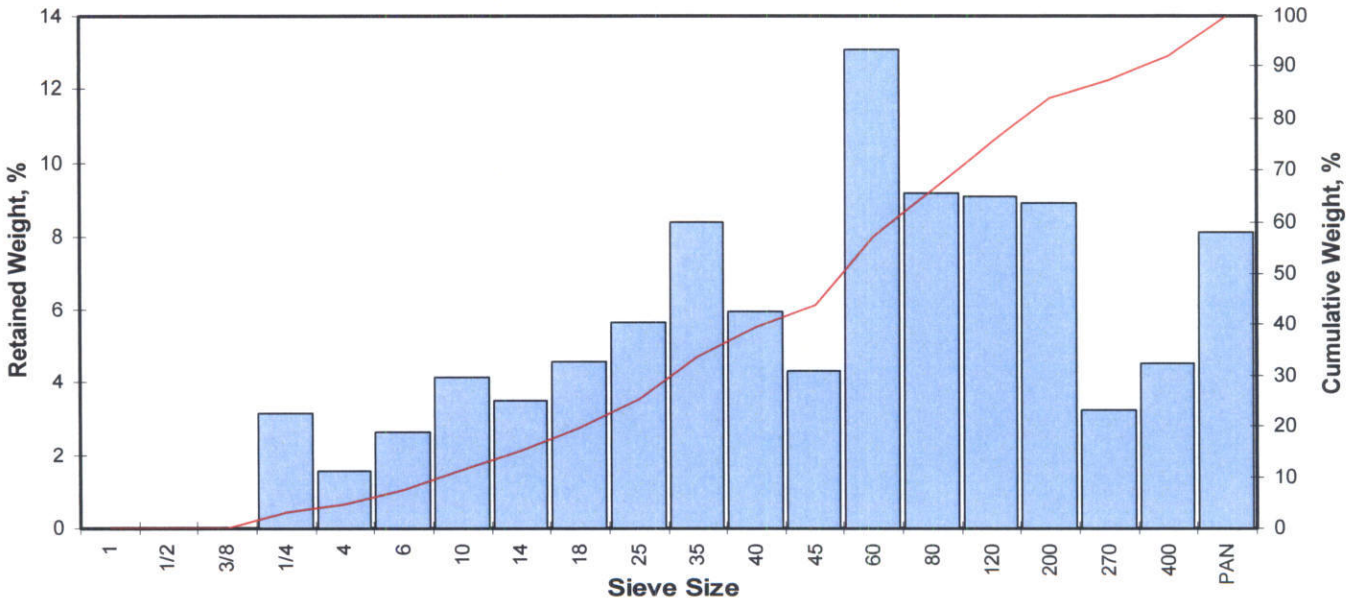
Description	Retained on Sieve #	Weight Percent
Gravel	4	13.67
Coarse Sand	10	15.45
Medium Sand	40	25.86
Fine Sand	200	31.66
Silt/Clay	<200	13.36
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31039
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	1.09	3.13	3.13
0.1873	4.757	-2.25	4	0.54	1.55	4.69
0.1324	3.364	-1.75	6	0.92	2.64	7.33
0.0787	2.000	-1.00	10	1.45	4.17	11.50
0.0557	1.414	-0.50	14	1.22	3.51	15.00
0.0394	1.000	0.00	18	1.60	4.60	19.60
0.0278	0.707	0.50	25	1.97	5.66	25.27
0.0197	0.500	1.00	35	2.91	8.36	33.63
0.0166	0.420	1.25	40	2.08	5.98	39.61
0.0139	0.354	1.50	45	1.51	4.34	43.95
0.0098	0.250	2.00	60	4.54	13.05	57.00
0.0070	0.177	2.50	80	3.19	9.17	66.17
0.0049	0.125	3.00	120	3.15	9.05	75.22
0.0029	0.074	3.75	200	3.09	8.88	84.10
0.0021	0.053	4.25	270	1.13	3.25	87.35
0.0015	0.037	4.75	400	1.58	4.54	91.89
			PAN	2.82	8.11	100.00
TOTALS				34.79	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.19	0.1797	4.565
10	-1.27	0.0949	2.411
16	-0.39	0.0517	1.312
25	0.48	0.0283	0.719
40	1.27	0.0163	0.414
50	1.73	0.0119	0.301
60	2.16	0.0088	0.223
75	2.99	0.0050	0.126
84	3.74	0.0029	0.075
90	4.54	0.0017	0.043
95	2.93	0.0052	0.131

Measure	Trask	Inman	Folk-Ward
Median, phi	1.73	1.73	1.73
Median, in.	0.0119	0.0119	0.0119
Median, mm	0.301	0.301	0.301
Mean, phi	1.24	1.67	1.69
Mean, in.	0.0166	0.0123	0.0122
Mean, mm	0.422	0.313	0.309
Sorting	2.388	2.066	1.809
Skewness	1.000	-0.028	-0.280
Kurtosis	0.125	0.239	0.836
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

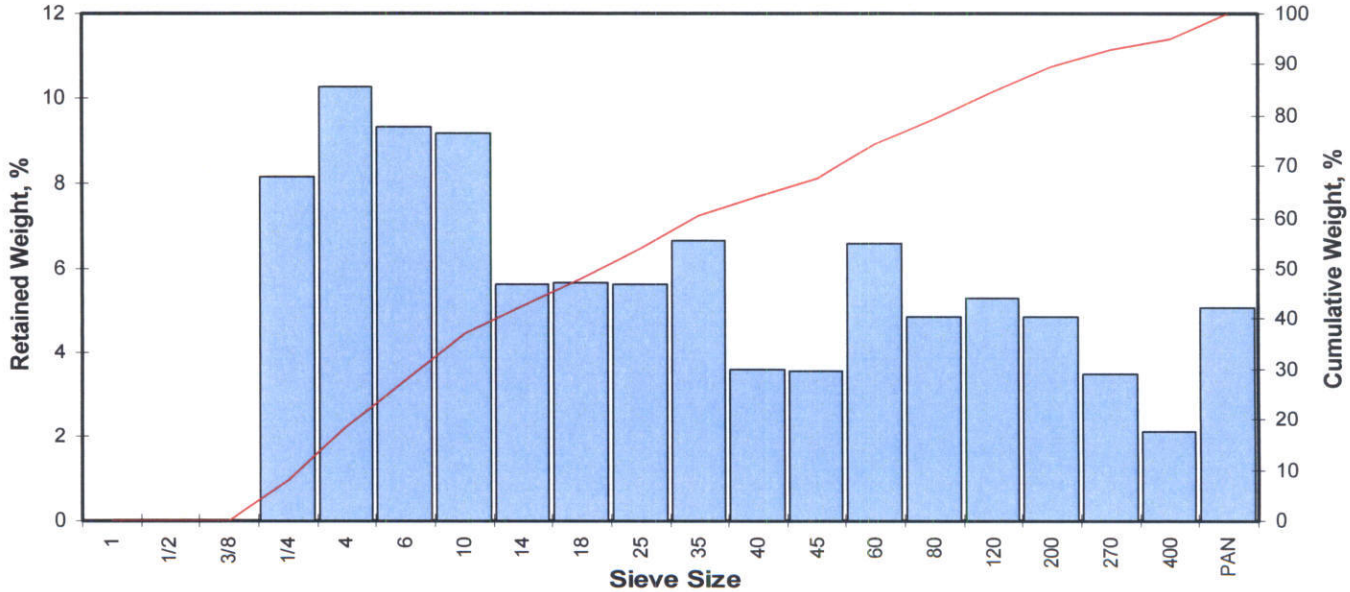
Description	Retained on Sieve #	Weight Percent
Gravel	4	4.69
Coarse Sand	10	6.81
Medium Sand	40	28.11
Fine Sand	200	44.50
Silt/Clay	<200	15.90
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31007
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	2.40	8.16	8.16
0.1873	4.757	-2.25	4	3.02	10.27	18.44
0.1324	3.364	-1.75	6	2.74	9.32	27.76
0.0787	2.000	-1.00	10	2.70	9.18	36.94
0.0557	1.414	-0.50	14	1.66	5.65	42.59
0.0394	1.000	0.00	18	1.67	5.68	48.27
0.0278	0.707	0.50	25	1.66	5.65	53.91
0.0197	0.500	1.00	35	1.96	6.67	60.58
0.0166	0.420	1.25	40	1.06	3.61	64.18
0.0139	0.354	1.50	45	1.04	3.54	67.72
0.0098	0.250	2.00	60	1.94	6.60	74.32
0.0070	0.177	2.50	80	1.43	4.86	79.18
0.0049	0.125	3.00	120	1.56	5.31	84.49
0.0029	0.074	3.75	200	1.43	4.86	89.35
0.0021	0.053	4.25	270	1.02	3.47	92.82
0.0015	0.037	4.75	400	0.62	2.11	94.93
			PAN	1.49	5.07	100.00
TOTALS				29.40	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.89	0.2923	7.424
10	-2.59	0.2374	6.031
16	-2.35	0.2006	5.094
25	-1.90	0.1467	3.726
40	-0.73	0.0653	1.657
50	0.15	0.0354	0.899
60	0.96	0.0203	0.515
75	2.07	0.0094	0.238
84	2.95	0.0051	0.129
90	3.84	0.0027	0.070
95	4.69	0.0015	0.039

Measure	Trask	Inman	Folk-Ward
Median, phi	0.15	0.15	0.15
Median, in.	0.0354	0.0354	0.0354
Median, mm	0.899	0.899	0.899
Mean, phi	-0.99	0.30	0.25
Mean, in.	0.0780	0.0319	0.0330
Mean, mm	1.982	0.811	0.839
Sorting	3.956	2.651	2.474
Skewness	1.048	0.056	0.126
Kurtosis	0.293	0.429	0.783
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

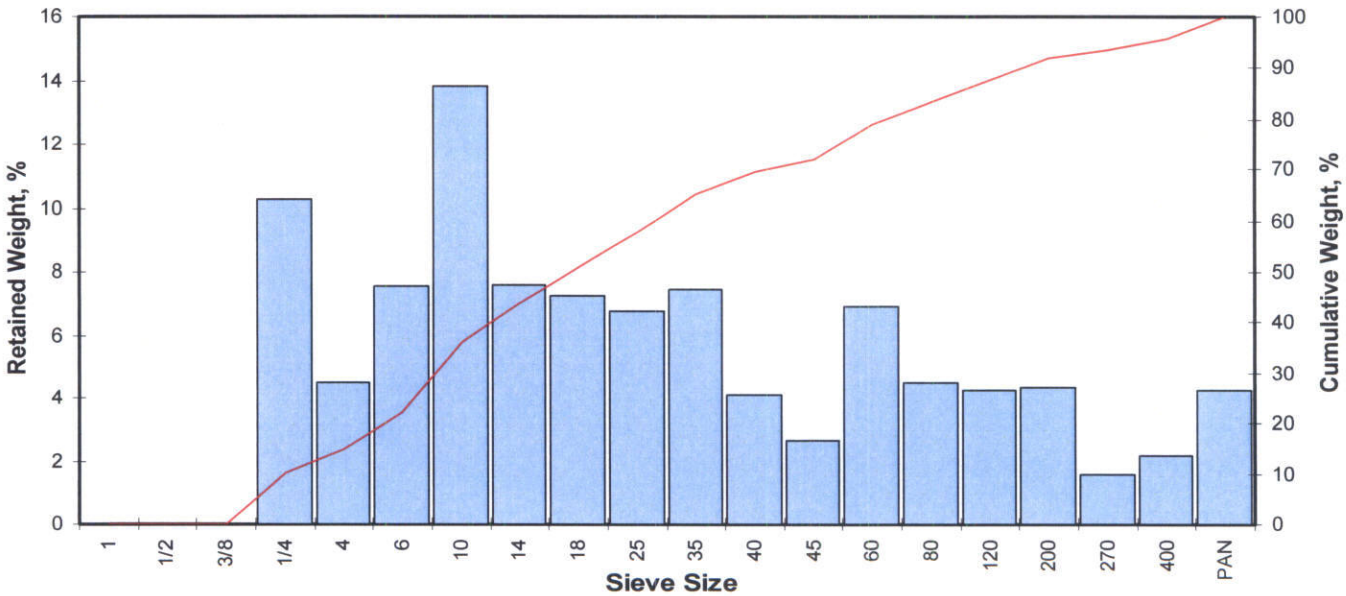
Description	Retained on Sieve #	Weight Percent
Gravel	4	18.44
Coarse Sand	10	18.50
Medium Sand	40	27.24
Fine Sand	200	25.17
Silt/Clay	<200	10.65
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31008
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	4.49	10.26	10.26
0.1873	4.757	-2.25	4	1.97	4.50	14.76
0.1324	3.364	-1.75	6	3.30	7.54	22.29
0.0787	2.000	-1.00	10	6.06	13.84	36.14
0.0557	1.414	-0.50	14	3.33	7.61	43.74
0.0394	1.000	0.00	18	3.18	7.26	51.01
0.0278	0.707	0.50	25	2.96	6.76	57.77
0.0197	0.500	1.00	35	3.27	7.47	65.24
0.0166	0.420	1.25	40	1.80	4.11	69.35
0.0139	0.354	1.50	45	1.16	2.65	72.00
0.0098	0.250	2.00	60	3.02	6.90	78.89
0.0070	0.177	2.50	80	1.96	4.48	83.37
0.0049	0.125	3.00	120	1.87	4.27	87.64
0.0029	0.074	3.75	200	1.90	4.34	91.98
0.0021	0.053	4.25	270	0.70	1.60	93.58
0.0015	0.037	4.75	400	0.95	2.17	95.75
			PAN	1.86	4.25	100.00
TOTALS				43.78	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.96	0.3074	7.807
10	-2.68	0.2526	6.415
16	-2.17	0.1769	4.492
25	-1.60	0.1196	3.038
40	-0.75	0.0660	1.677
50	-0.07	0.0413	1.049
60	0.65	0.0251	0.637
75	1.72	0.0120	0.304
84	2.57	0.0066	0.168
90	3.41	0.0037	0.094
95	4.58	0.0016	0.042

Measure	Trask	Inman	Folk-Ward
Median, phi	-0.07	-0.07	-0.07
Median, in.	0.0413	0.0413	0.0413
Median, mm	1.049	1.049	1.049
Mean, phi	-0.74	0.20	0.11
Mean, in.	0.0658	0.0342	0.0364
Mean, mm	1.671	0.869	0.925
Sorting	3.161	2.371	2.328
Skewness	0.916	0.115	0.173
Kurtosis	0.216	0.591	0.931
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

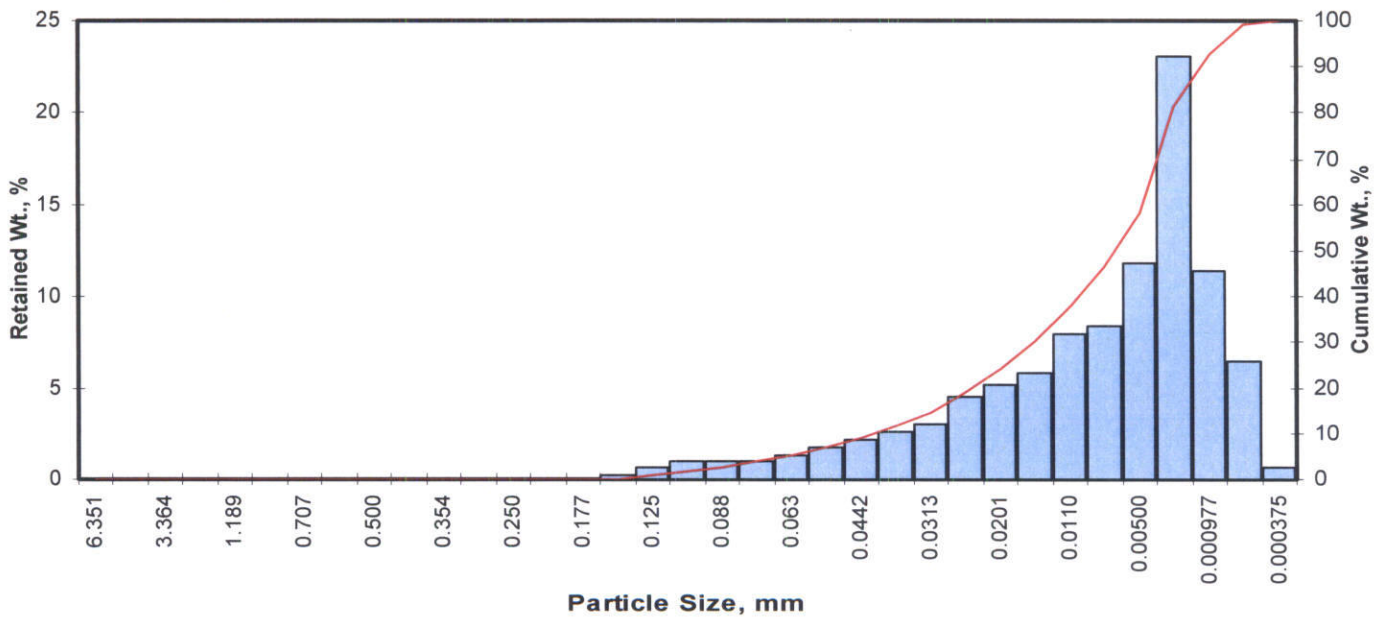
Description	Retained on Sieve #	Weight Percent
Gravel	4	14.76
Coarse Sand	10	21.38
Medium Sand	40	33.21
Fine Sand	200	22.64
Silt/Clay	<200	8.02
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	APCL	**PTS File No:**	35694
Project:	Alameda.IR Site 31	**Sample ID:**	31009
Project No:	6229.003	**Depth, ft:**	N/A

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.01	0.01	0.01
0.0059	0.149	2.75	100	0.17	0.17	0.18
0.0049	0.125	3.00	120	0.67	0.67	0.85
0.0041	0.105	3.25	140	0.96	0.96	1.81
0.0035	0.088	3.50	170	0.93	0.93	2.74
0.0029	0.074	3.75	200	0.98	0.98	3.72
0.0025	0.063	4.00	230	1.28	1.28	5.00
0.0021	0.053	4.25	270	1.73	1.73	6.73
0.00174	0.0442	4.50	325	2.20	2.20	8.93
0.00146	0.0372	4.75	400	2.61	2.61	11.54
0.00123	0.0313	5.00	450	3.03	3.03	14.57
0.000986	0.0250	5.32	500	4.51	4.51	19.08
0.000790	0.0201	5.64	635	5.15	5.15	24.23
0.000615	0.0156	6.00		5.86	5.86	30.10
0.000435	0.0110	6.50		8.01	8.01	38.11
0.000308	0.00781	7.00		8.44	8.44	46.55
0.000197	0.00500	7.65		11.80	11.80	58.36
0.000077	0.00195	9.00		23.10	23.11	81.46
0.000038	0.000977	10.00		11.40	11.40	92.87
0.000019	0.000488	11.00		6.44	6.44	99.31
0.000015	0.000375	11.38		0.69	0.69	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	4.00	0.0025	0.062
10	4.60	0.0016	0.041
16	5.10	0.0011	0.029
25	5.69	0.0008	0.019
40	6.61	0.0004	0.010
50	7.19	0.0003	0.007
60	7.74	0.0002	0.005
75	8.62	0.0001	0.003
84	9.22	0.0001	0.002
90	9.75	0.0000	0.001
95	10.33	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	7.19	7.19	7.19
Median, in.	0.0003	0.0003	0.0003
Median, mm	0.007	0.007	0.007
Mean, phi	6.51	7.16	7.17
Mean, in.	0.0004	0.0003	0.0003
Mean, mm	0.011	0.007	0.007
Sorting	2.764	2.061	1.989
Skewness	1.024	-0.013	-0.010
Kurtosis	0.211	0.536	0.884
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	3.72
Silt	>0.005 mm	54.64
Clay	<0.005 mm	41.64
	Total	**100**

PHYSICAL PROPERTIES DATA

PROJECT NAME: Alameda, IR Site 31
PROJECT NO: 6229.003

METHODOLOGY:

			API RP40	ASTM D5084	
			25.0 PSI CONFINING STRESS		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	NATIVE STATE EFFECTIVE PERMEABILITY TO AIR (2) (millidarcy)	NATIVE STATE EFFECTIVE PERMEABILITY TO WATER (2,3) (millidarcy)	NATIVE STATE EFFECTIVE HYDRAULIC CONDUCTIVITY (2,3) (cm/s)
31087	N/A	V	1.23	0.322	3.10E-07
31088	N/A	V	0.604	0.962	9.12E-07
31090	N/A	V	852	12.5	1.20E-05
31144	N/A	V	1836	32.2	3.08E-05
31145	N/A	V	8.95	0.906	8.65E-07
31081	N/A	V	0.826	0.400	3.77E-07
31082	N/A	V	1987	66.2	6.26E-05

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State = As received with pore fluids in place (3) Permeability to water and conductivity measured at saturated conditions

DRY BULK DENSITY OF IN-PLACE SOIL

(METHODOLOGY: ASTM D2937)

PROJECT NAME: Alameda.IR Site 31
PROJECT NO: 6229.003

	METHODOLOGY:	MEASURED	ASTM D 2216/ASTM D 2937		
SAMPLE ID.	DEPTH, ft.	TOTAL SAMPLE VOLUME cc	MOISTURE CONTENT (% wt)	VOLUMETRIC WATER CONTENT, FRACTION Vb	DRY BULK DENSITY, g/cc
31087	N/A	47.70	12.3	0.246	2.00
31088	N/A	47.90	12.5	0.265	2.12
31090	N/A	47.51	8.9	0.162	1.82
31144	N/A	47.70	9.4	0.172	1.82
31145	N/A	32.03	14.1	0.286	2.04
31081	N/A	29.88	8.9	0.214	2.41
31082	N/A	32.13	8.1	0.154	1.91

* Vb = Bulk Volume

PTS Laboratories, Inc.

PTS File No: 35714

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Alameda, IR Site 31
PROJECT NO: 6229.003

Sample ID	Depth, ft.	Description USCS/ASTM (1)	Median Grain Size, mm	Particle Size Distribution, wt. percent				
				Gravel	Sand Size			Silt/Clay
					Coarse	Medium	Fine	
31087	N/A	Medium sand	1.093	20.30	18.00	30.86	24.40	6.45
31088	N/A	Medium sand	0.643	10.60	14.08	36.20	27.69	11.44
31090	N/A	Medium sand	0.448	10.46	11.32	30.26	39.13	8.83
31144	N/A	Coarse sand	1.286	20.85	18.28	39.22	16.44	5.20
31145	N/A	Coarse sand	1.737	21.09	25.13	33.08	15.65	5.05
31081	N/A	Coarse sand	1.178	22.60	18.15	31.28	22.02	5.94
31082	N/A	Medium sand	0.393	1.51	9.55	37.00	42.05	9.89

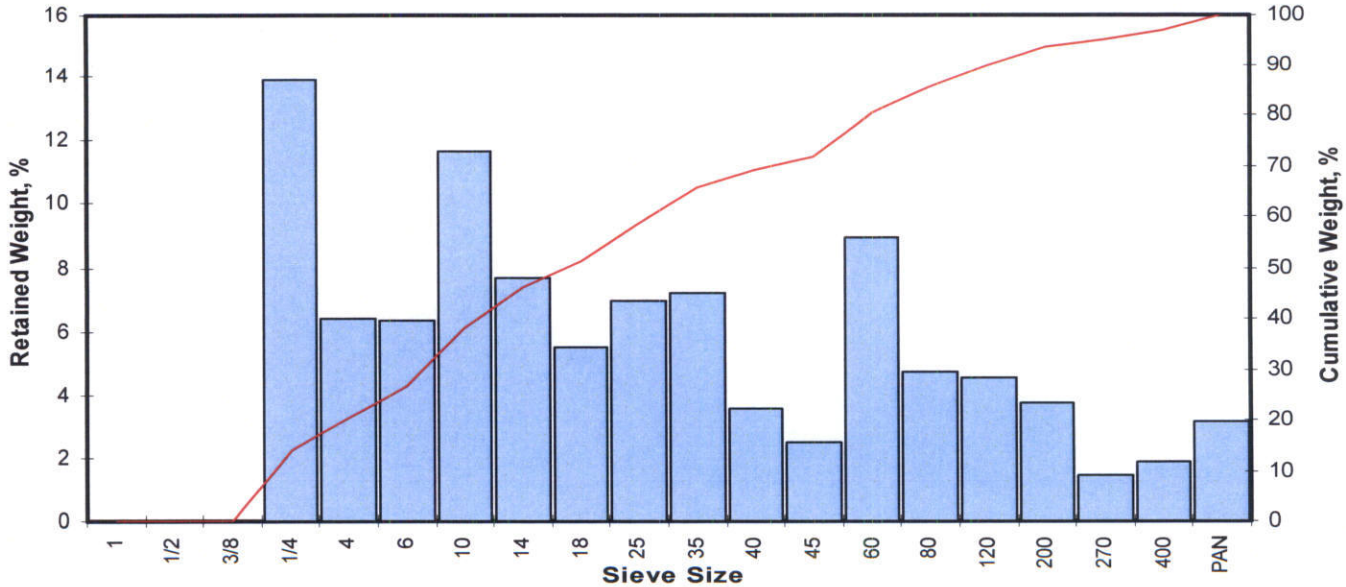
(1) based on Mean fromTrask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31087
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	13.00	13.90	13.90
0.1873	4.757	-2.25	4	5.98	6.39	20.30
0.1324	3.364	-1.75	6	5.95	6.36	26.66
0.0787	2.000	-1.00	10	10.88	11.63	38.29
0.0557	1.414	-0.50	14	7.15	7.65	45.94
0.0394	1.000	0.00	18	5.12	5.47	51.41
0.0278	0.707	0.50	25	6.52	6.97	58.38
0.0197	0.500	1.00	35	6.73	7.20	65.58
0.0166	0.420	1.25	40	3.34	3.57	69.15
0.0139	0.354	1.50	45	2.31	2.47	71.62
0.0098	0.250	2.00	60	8.34	8.92	80.54
0.0070	0.177	2.50	80	4.43	4.74	85.28
0.0049	0.125	3.00	120	4.24	4.53	89.81
0.0029	0.074	3.75	200	3.50	3.74	93.55
0.0021	0.053	4.25	270	1.35	1.44	95.00
0.0015	0.037	4.75	400	1.77	1.89	96.89
			PAN	2.91	3.11	100.00
TOTALS				93.52	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.04	0.3236	8.219
10	-2.83	0.2800	7.111
16	-2.53	0.2274	5.776
25	-1.88	0.1449	3.681
40	-0.89	0.0729	1.851
50	-0.13	0.0430	1.093
60	0.61	0.0258	0.654
75	1.69	0.0122	0.310
84	2.37	0.0076	0.194
90	3.04	0.0048	0.122
95	4.25	0.0021	0.053

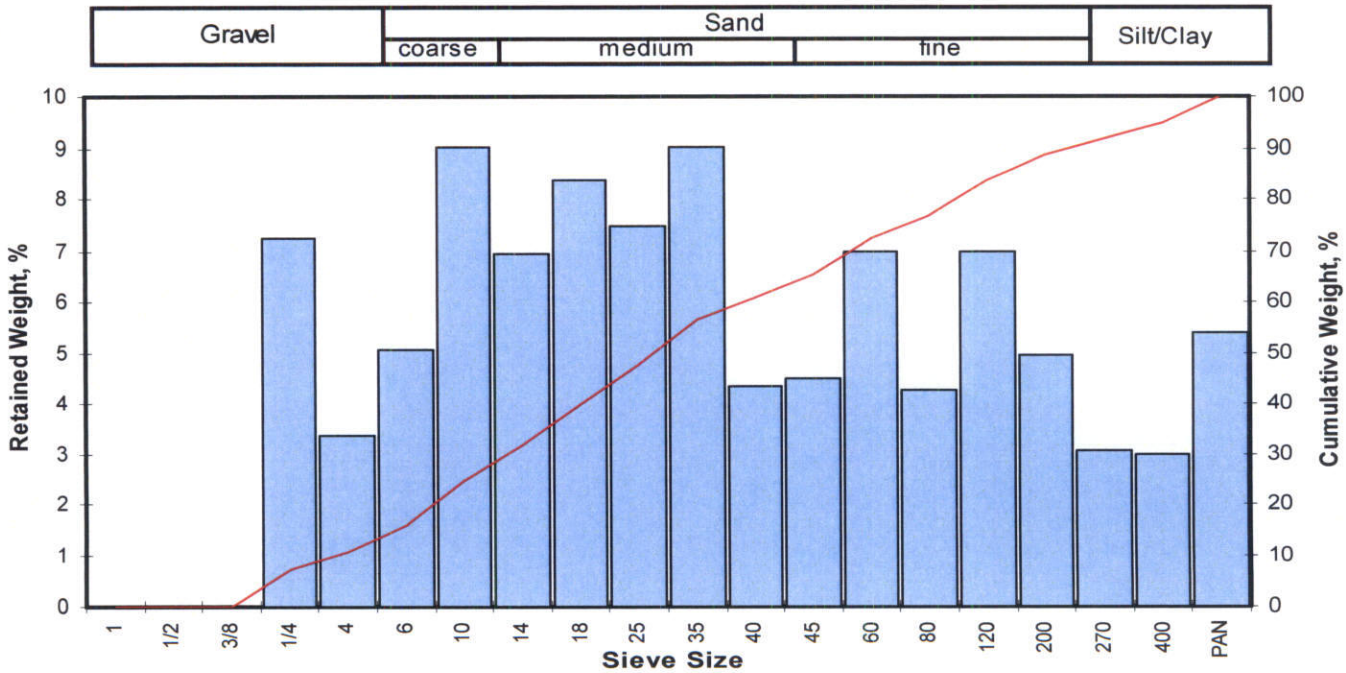
Measure	Trask	Inman	Folk-Ward
Median, phi	-0.13	-0.13	-0.13
Median, in.	0.0430	0.0430	0.0430
Median, mm	1.093	1.093	1.093
Mean, phi	-1.00	-0.08	-0.10
Mean, in.	0.0786	0.0417	0.0421
Mean, mm	1.996	1.059	1.070
Sorting	3.446	2.448	2.328
Skewness	0.977	0.019	0.110
Kurtosis	0.241	0.489	0.837
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	20.30
Coarse Sand	10	18.00
Medium Sand	40	30.86
Fine Sand	200	24.40
Silt/Clay	<200	6.45
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31088
Project No:	6229.003	**Depth, ft:**	N/A



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	2.33	7.24	7.24
0.1873	4.757	-2.25	4	1.08	3.36	10.60
0.1324	3.364	-1.75	6	1.63	5.07	15.66
0.0787	2.000	-1.00	10	2.90	9.01	24.67
0.0557	1.414	-0.50	14	2.24	6.96	31.63
0.0394	1.000	0.00	18	2.70	8.39	40.02
0.0278	0.707	0.50	25	2.41	7.49	47.51
0.0197	0.500	1.00	35	2.90	9.01	56.53
0.0166	0.420	1.25	40	1.40	4.35	60.88
0.0139	0.354	1.50	45	1.45	4.51	65.38
0.0098	0.250	2.00	60	2.25	6.99	72.37
0.0070	0.177	2.50	80	1.37	4.26	76.63
0.0049	0.125	3.00	120	2.25	6.99	83.62
0.0029	0.074	3.75	200	1.59	4.94	88.56
0.0021	0.053	4.25	270	0.98	3.05	91.61
0.0015	0.037	4.75	400	0.96	2.98	94.59
			PAN	1.74	5.41	100.00
TOTALS				32.18	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.85	0.2832	7.194
10	-2.32	0.1972	5.008
16	-1.72	0.1299	3.299
25	-0.98	0.0775	1.968
40	0.00	0.0394	1.001
50	0.64	0.0253	0.643
60	1.20	0.0171	0.435
75	2.31	0.0079	0.202
84	3.06	0.0047	0.120
90	3.99	0.0025	0.063
95	4.39	0.0019	0.048

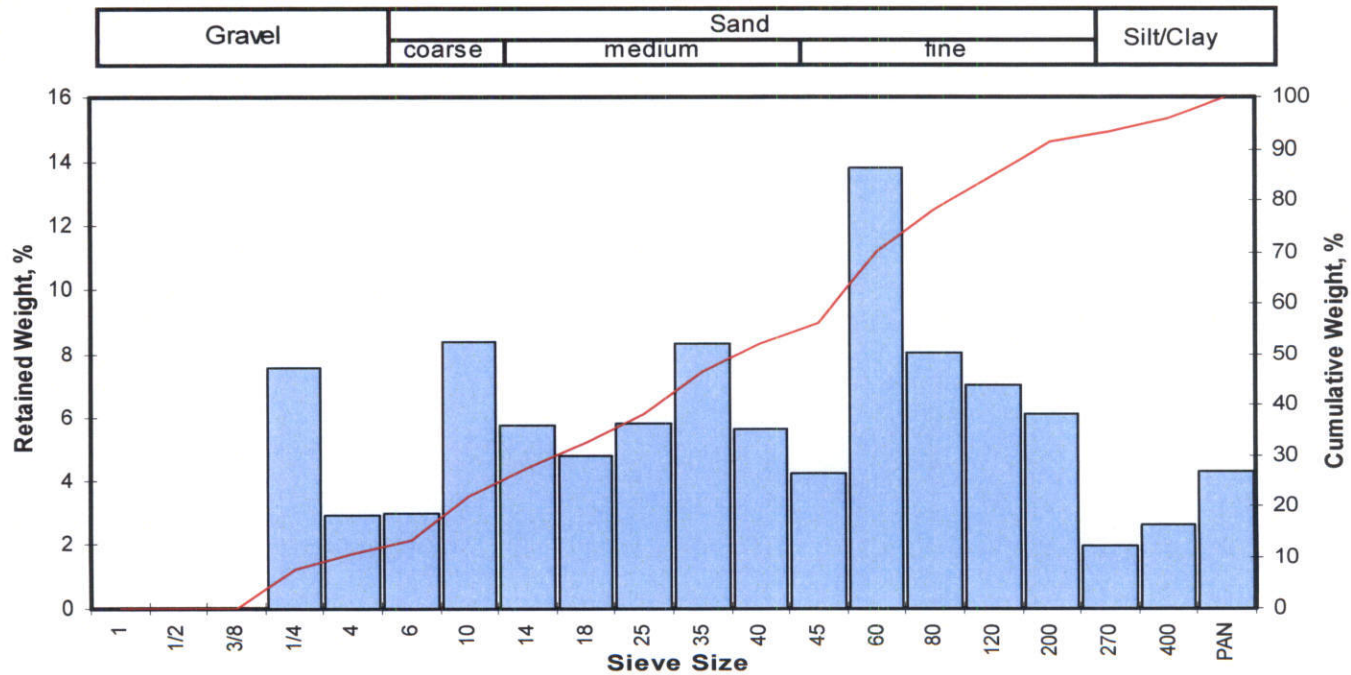
Measure	Trask	Inman	Folk-Ward
Median, phi	0.64	0.64	0.64
Median, in.	0.0253	0.0253	0.0253
Median, mm	0.643	0.643	0.643
Mean, phi	-0.12	0.67	0.66
Mean, in.	0.0427	0.0248	0.0250
Mean, mm	1.085	0.630	0.634
Sorting	3.122	2.390	2.292
Skewness	0.981	0.012	0.025
Kurtosis	0.179	0.515	0.903
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	10.60
Coarse Sand	10	14.08
Medium Sand	40	36.20
Fine Sand	200	27.69
Silt/Clay	<200	11.44
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31090
Project No:	6229.003	**Depth, ft:**	N/A



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	5.69	7.54	7.54
0.1873	4.757	-2.25	4	2.20	2.92	10.46
0.1324	3.364	-1.75	6	2.21	2.93	13.39
0.0787	2.000	-1.00	10	6.33	8.39	21.78
0.0557	1.414	-0.50	14	4.34	5.75	27.53
0.0394	1.000	0.00	18	3.58	4.75	32.28
0.0278	0.707	0.50	25	4.36	5.78	38.06
0.0197	0.500	1.00	35	6.30	8.35	46.41
0.0166	0.420	1.25	40	4.25	5.63	52.04
0.0139	0.354	1.50	45	3.19	4.23	56.27
0.0098	0.250	2.00	60	10.42	13.81	70.08
0.0070	0.177	2.50	80	6.04	8.01	78.09
0.0049	0.125	3.00	120	5.27	6.99	85.07
0.0029	0.074	3.75	200	4.60	6.10	91.17
0.0021	0.053	4.25	270	1.46	1.94	93.11
0.0015	0.037	4.75	400	1.95	2.58	95.69
			PAN	3.25	4.31	100.00
TOTALS				75.44	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-2.86	0.2864	7.274
10	-2.32	0.1960	4.978
16	-1.52	0.1126	2.861
25	-0.72	0.0649	1.647
40	0.62	0.0257	0.652
50	1.16	0.0176	0.448
60	1.64	0.0127	0.322
75	2.31	0.0080	0.202
84	2.92	0.0052	0.132
90	3.61	0.0032	0.082
95	4.62	0.0016	0.041

Measure	Trask	Inman	Folk-Ward
Median, phi	1.16	1.16	1.16
Median, in.	0.0176	0.0176	0.0176
Median, mm	0.448	0.448	0.448
Mean, phi	0.11	0.70	0.86
Mean, in.	0.0364	0.0242	0.0218
Mean, mm	0.925	0.614	0.553
Sorting	2.855	2.220	2.243
Skewness	1.289	-0.205	-0.141
Kurtosis	0.148	0.685	1.013
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

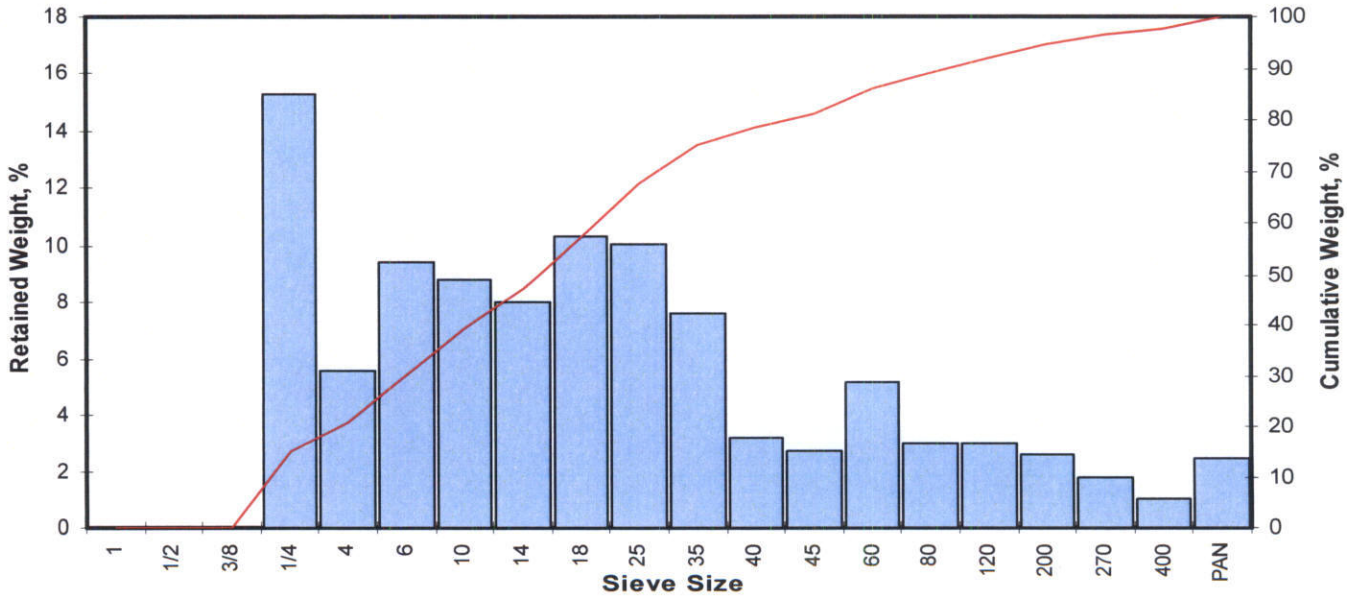
Description	Retained on Sieve #	Weight Percent
Gravel	4	10.46
Coarse Sand	10	11.32
Medium Sand	40	30.26
Fine Sand	200	39.13
Silt/Clay	<200	8.83
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31144
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	11.88	15.26	15.26
0.1873	4.757	-2.25	4	4.35	5.59	20.85
0.1324	3.364	-1.75	6	7.37	9.47	30.32
0.0787	2.000	-1.00	10	6.86	8.81	39.13
0.0557	1.414	-0.50	14	6.26	8.04	47.17
0.0394	1.000	0.00	18	8.04	10.33	57.50
0.0278	0.707	0.50	25	7.84	10.07	67.57
0.0197	0.500	1.00	35	5.90	7.58	75.15
0.0166	0.420	1.25	40	2.49	3.20	78.35
0.0139	0.354	1.50	45	2.11	2.71	81.06
0.0098	0.250	2.00	60	4.01	5.15	86.22
0.0070	0.177	2.50	80	2.35	3.02	89.23
0.0049	0.125	3.00	120	2.31	2.97	92.20
0.0029	0.074	3.75	200	2.02	2.60	94.80
0.0021	0.053	4.25	270	1.39	1.79	96.58
0.0015	0.037	4.75	400	0.78	1.00	97.58
			PAN	1.88	2.42	100.00
TOTALS				77.84	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.06	0.3278	8.326
10	-2.87	0.2873	7.297
16	-2.61	0.2407	6.113
25	-2.03	0.1609	4.087
40	-0.95	0.0758	1.927
50	-0.36	0.0506	1.286
60	0.12	0.0361	0.918
75	0.99	0.0198	0.504
84	1.78	0.0114	0.290
90	2.63	0.0064	0.162
95	3.81	0.0028	0.071

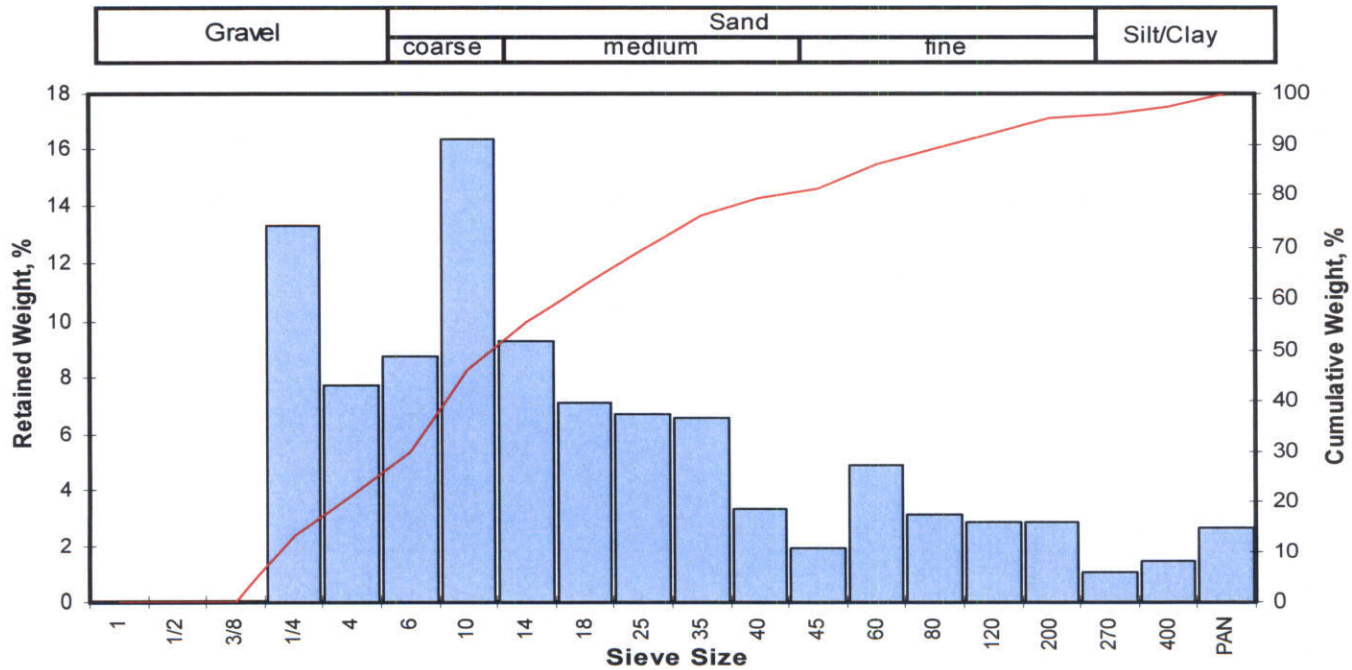
Measure	Trask	Inman	Folk-Ward
Median, phi	-0.36	-0.36	-0.36
Median, in.	0.0506	0.0506	0.0506
Median, mm	1.286	1.286	1.286
Mean, phi	-1.20	-0.41	-0.40
Mean, in.	0.0904	0.0524	0.0518
Mean, mm	2.295	1.332	1.317
Sorting	2.849	2.198	2.139
Skewness	1.115	-0.023	0.096
Kurtosis	0.251	0.561	0.931
Grain Size Description (ASTM-USCS Scale)		Coarse sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	20.85
Coarse Sand	10	18.28
Medium Sand	40	39.22
Fine Sand	200	16.44
Silt/Clay	<200	5.20
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31145
Project No:	6229.003	**Depth, ft:**	N/A



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	8.40	13.33	13.33
0.1873	4.757	-2.25	4	4.89	7.76	21.09
0.1324	3.364	-1.75	6	5.51	8.74	29.83
0.0787	2.000	-1.00	10	10.33	16.39	46.22
0.0557	1.414	-0.50	14	5.85	9.28	55.51
0.0394	1.000	0.00	18	4.50	7.14	62.65
0.0278	0.707	0.50	25	4.25	6.74	69.39
0.0197	0.500	1.00	35	4.14	6.57	75.96
0.0166	0.420	1.25	40	2.11	3.35	79.31
0.0139	0.354	1.50	45	1.18	1.87	81.18
0.0098	0.250	2.00	60	3.09	4.90	86.08
0.0070	0.177	2.50	80	1.99	3.16	89.24
0.0049	0.125	3.00	120	1.79	2.84	92.08
0.0029	0.074	3.75	200	1.81	2.87	94.95
0.0021	0.053	4.25	270	0.63	1.00	95.95
0.0015	0.037	4.75	400	0.90	1.43	97.38
			PAN	1.65	2.62	100.00
TOTALS				63.02	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.03	0.3216	8.168
10	-2.81	0.2765	7.023
16	-2.52	0.2264	5.750
25	-2.03	0.1604	4.074
40	-1.28	0.0959	2.436
50	-0.80	0.0684	1.737
60	-0.19	0.0448	1.137
75	0.93	0.0207	0.526
84	1.79	0.0114	0.290
90	2.63	0.0063	0.161
95	3.77	0.0029	0.073

Measure	Trask	Inman	Folk-Ward
Median, phi	-0.80	-0.80	-0.80
Median, in.	0.0684	0.0684	0.0684
Median, mm	1.737	1.737	1.737
Mean, phi	-1.20	-0.37	-0.51
Mean, in.	0.0905	0.0508	0.0561
Mean, mm	2.300	1.291	1.425
Sorting	2.783	2.155	2.109
Skewness	0.843	0.199	0.271
Kurtosis	0.259	0.578	0.944
Grain Size Description (ASTM-USCS Scale)		Coarse sand (based on Mean from Trask)	

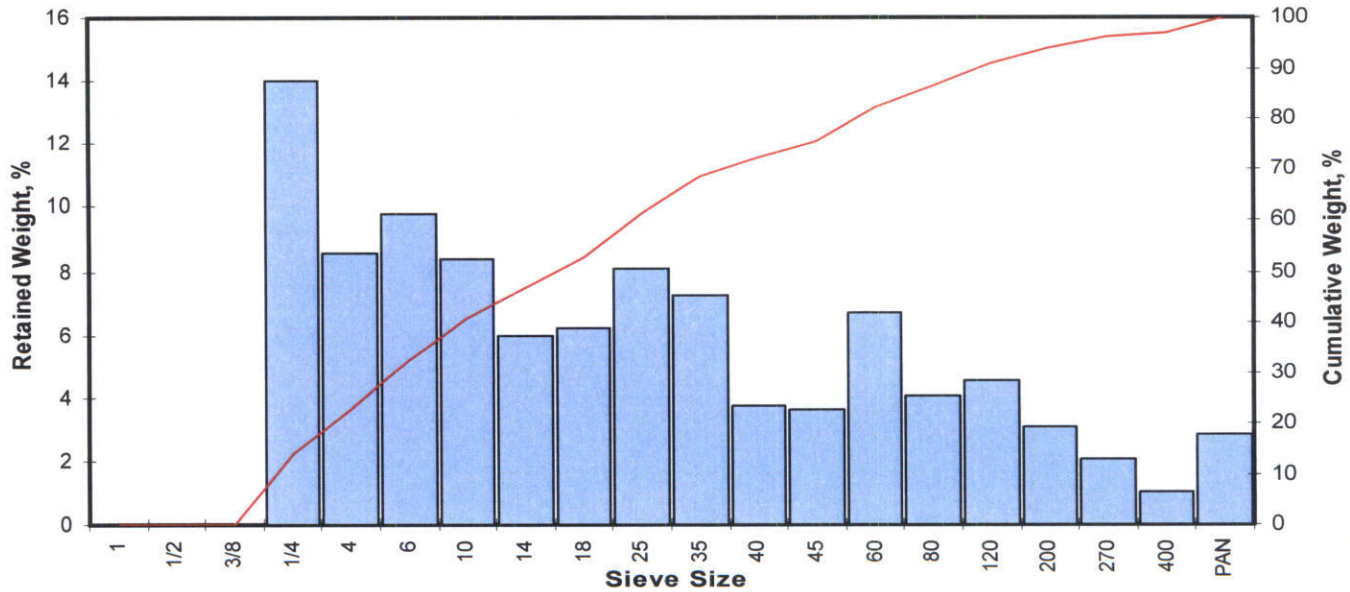
Description	Retained on Sieve #	Weight Percent
Gravel	4	21.09
Coarse Sand	10	25.13
Medium Sand	40	33.08
Fine Sand	200	15.65
Silt/Clay	<200	5.05
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31081
Project No:	6229.003	**Depth, ft:**	N/A

Gravel	Sand			Silt/Clay
	coarse	medium	fine	



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	9.16	14.00	14.00
0.1873	4.757	-2.25	4	5.63	8.60	22.60
0.1324	3.364	-1.75	6	6.40	9.78	32.38
0.0787	2.000	-1.00	10	5.48	8.37	40.75
0.0557	1.414	-0.50	14	3.90	5.96	46.71
0.0394	1.000	0.00	18	4.08	6.23	52.95
0.0278	0.707	0.50	25	5.30	8.10	61.05
0.0197	0.500	1.00	35	4.76	7.27	68.32
0.0166	0.420	1.25	40	2.43	3.71	72.04
0.0139	0.354	1.50	45	2.36	3.61	75.64
0.0098	0.250	2.00	60	4.40	6.72	82.37
0.0070	0.177	2.50	80	2.66	4.06	86.43
0.0049	0.125	3.00	120	2.98	4.55	90.98
0.0029	0.074	3.75	200	2.01	3.07	94.06
0.0021	0.053	4.25	270	1.33	2.03	96.09
0.0015	0.037	4.75	400	0.69	1.05	97.14
			PAN	1.87	2.86	100.00
TOTALS				65.44	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-3.04	0.3239	8.228
10	-2.83	0.2805	7.125
16	-2.57	0.2338	5.938
25	-2.13	0.1720	4.369
40	-1.07	0.0825	2.096
50	-0.24	0.0464	1.178
60	0.44	0.0291	0.740
75	1.46	0.0144	0.365
84	2.20	0.0086	0.217
90	2.89	0.0053	0.135
95	3.98	0.0025	0.063

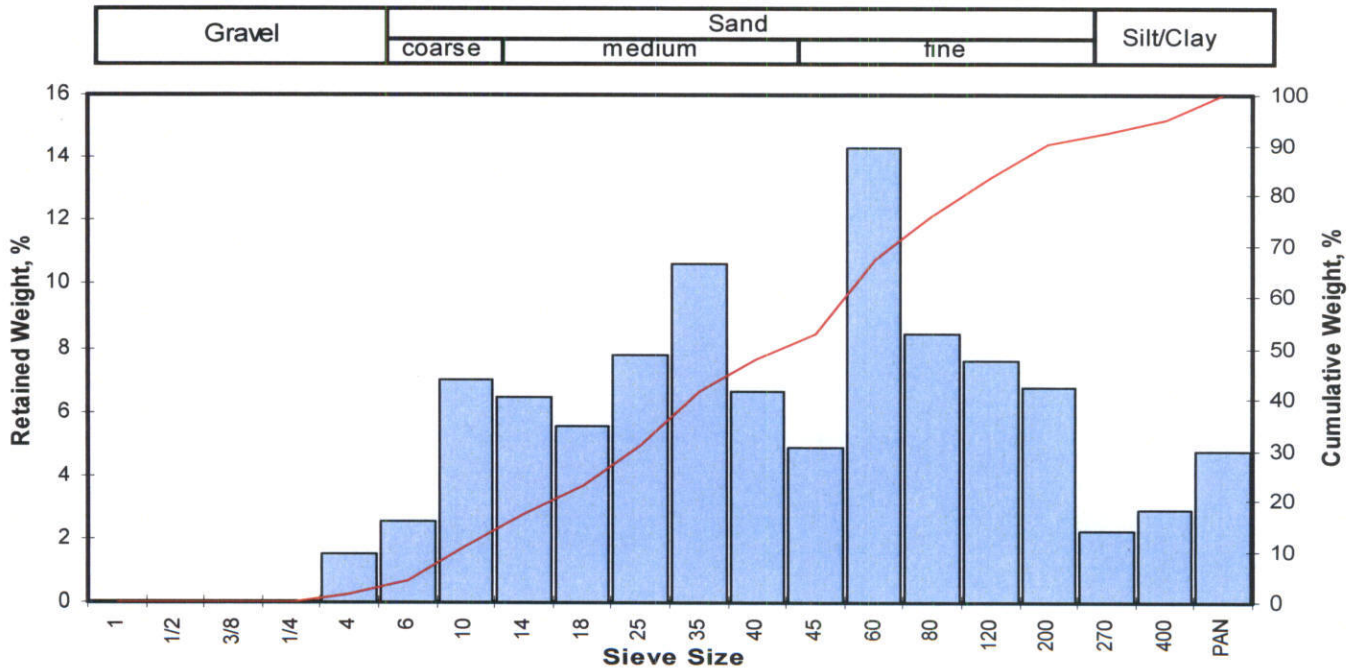
Measure	Trask	Inman	Folk-Ward
Median, phi	-0.24	-0.24	-0.24
Median, in.	0.0464	0.0464	0.0464
Median, mm	1.178	1.178	1.178
Mean, phi	-1.24	-0.18	-0.20
Mean, in.	0.0932	0.0447	0.0453
Mean, mm	2.367	1.136	1.150
Sorting	3.462	2.385	2.257
Skewness	1.071	0.022	0.112
Kurtosis	0.286	0.472	0.803
Grain Size Description (ASTM-USCS Scale)		Coarse sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	22.60
Coarse Sand	10	18.15
Medium Sand	40	31.28
Fine Sand	200	22.02
Silt/Clay	<200	5.94
	Total	100

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D422M

Client:	APCL	**PTS File No:**	35714
Project:	Alameda, IR Site 31	**Sample ID:**	31082
Project No:	6229.003	**Depth, ft:**	N/A



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.89	1.51	1.51
0.1324	3.364	-1.75	6	1.49	2.53	4.04
0.0787	2.000	-1.00	10	4.14	7.02	11.06
0.0557	1.414	-0.50	14	3.80	6.45	17.51
0.0394	1.000	0.00	18	3.26	5.53	23.04
0.0278	0.707	0.50	25	4.58	7.77	30.81
0.0197	0.500	1.00	35	6.25	10.60	41.41
0.0166	0.420	1.25	40	3.92	6.65	48.06
0.0139	0.354	1.50	45	2.89	4.90	52.96
0.0098	0.250	2.00	60	8.44	14.32	67.28
0.0070	0.177	2.50	80	4.99	8.46	75.74
0.0049	0.125	3.00	120	4.49	7.62	83.36
0.0029	0.074	3.75	200	3.98	6.75	90.11
0.0021	0.053	4.25	270	1.32	2.24	92.35
0.0015	0.037	4.75	400	1.70	2.88	95.23
			PAN	2.81	4.77	100.00
TOTALS				58.95	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-1.65	0.1233	3.132
10	-1.11	0.0852	2.163
16	-0.62	0.0604	1.534
25	0.13	0.0361	0.916
40	0.93	0.0206	0.524
50	1.35	0.0155	0.393
60	1.75	0.0117	0.298
75	2.46	0.0072	0.182
84	3.07	0.0047	0.119
90	3.74	0.0030	0.075
95	4.71	0.0015	0.038

Measure	Trask	Inman	Folk-Ward
Median, phi	1.35	1.35	1.35
Median, in.	0.0155	0.0155	0.0155
Median, mm	0.393	0.393	0.393
Mean, phi	0.86	1.23	1.27
Mean, in.	0.0216	0.0168	0.0163
Mean, mm	0.549	0.427	0.415
Sorting	2.242	1.844	1.885
Skewness	1.041	-0.066	-0.004
Kurtosis	0.176	0.724	1.118
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	1.51
Coarse Sand	10	9.55
Medium Sand	40	37.00
Fine Sand	200	42.05
Silt/Clay	<200	9.89
	Total	100

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APPENDIX F

F1 - DATA USABILITY AND ASSESSMENT REVIEW

F2 - DATA VALIDATION REPORTS (CD)

APPENDIX F1

DATA USABILITY AND ASSESSMENT REVIEW

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ACRONYMS/ABBREVIATIONS

µg/L	micrograms per liter
APCL	Applied Physical and Chemical Laboratories
bgs	below ground surface
CDM	CDM Federal Programs Corporation
CRDL	Contract Required Detection Limit
DPT	direct-push technology
DQI	data quality indicators
DQOs	data quality objectives
EPA	U.S. Environmental Protection Agency
EWI	Environmental Work Instruction
IDL	Instrument Detection Limit
IR	Installation Restoration
LCSs	laboratory control samples
mg/kg	milligrams per kilogram
MS/MSDs	matrix spike/matrix spike duplicates
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
RI	remedial investigation
RPD	relative percent difference
SVOCs	semivolatile organic compounds
TW	temporary well
VOC	volatile organic compound

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Appendix F
Data Usability and Assessment Review

CDM Federal Programs Corporation (CDM) performed field activities during the remedial investigation (RI) at the Alameda Point Installation Restoration (IR) Program Site 31. Samples were collected in November 2005.

The purpose of this assessment is to evaluate the data collected and determine whether they meet the quality objectives outlined in the Final Work Plan for Remedial Investigation at IR Site 31, Alameda Point, Alameda, California (final work plan) (CDM 2005).

The results of the data evaluations completed by CDM are presented in this section.

F1 Usability Summary

Samples were collected and analyzed in accordance with the work plan except for some field changes enacted during the investigation. These changes did not have an adverse impact on the field program objectives. The changes are summarized below in Section F3.1.

The data reported in this RI draft report is usable as reported with the data validation qualifiers added.

F2 Project Objectives

Quality assurance (QA) objectives for measuring data are expressed in terms of precision, accuracy, representativeness, comparability, and completeness. The QA objectives provide a mechanism for on-going control, and evaluating and measuring data quality throughout the project.

Field data collection activities conducted at IR Site 31 during the investigation included collection of 50 soil borings using direct push technology and groundwater grab samples collected from up to two depths at 11 direct-push technology (DPT) locations. These samples were collected in support of the RI activities.

F3 Summary of Field Activities

CDM completed sampling activities in accordance with the approved final work plan. A summary of the data collected and the analysis performed is presented in Table 1. Samples were collected and shipped to Applied Physical and Chemical Laboratories (APCL) under subcontract to CDM. The final work plan and associated attachments

defined the procedures to be followed and the data quality requirements for the field program.

Matrix spike/matrix spike duplicates (MS/MSDs), field duplicates and field blanks were collected at the frequency described in the final work plan to determine the quality of the field data. For this sampling event, 21 trip blank samples, 13 field duplicates, 5 equipment rinsate samples, 6 MS/MSD samples, and one source blank were collected. Equipment rinsate blanks were collected on each day of soil sample collection. Trip blanks were included with each shipment of groundwater samples for volatile organic analysis (two per day).

F3.1 Deviations from Field Procedures

Due to conditions encountered in the field, some deviations were made from the final work plan (CDM 2005) during the fieldwork portion of the soil RI at IR Site 31. Descriptions of deviations are provided below.

Soil Sampling

Two deviations were made to the proposed soil sampling design as described in the final work plan (CDM 2005):

- Proposed: A total of 165 soil samples were to be collected, including 150 normal samples and 15 field duplicate samples. Soil samples were to be collected from each of the following depth intervals: 0 foot to 2 feet below ground surface (bgs), 2 to 4 feet bgs, and 4 to 8 feet bgs (or to groundwater, whichever was encountered first).

  Deviation: Soil samples were collected until visual observation indicated groundwater had been encountered. Saturation was encountered above 6 feet bgs in various locations and above 4 feet bgs in some instances. Specific sample depths and analyses per location are shown in Table 3-2 in this draft RI report. Specific depths of saturation are shown on boring logs in Appendix D. The actual total number of samples collected was 138, comprised of 126 environmental samples and 12 field duplicate samples. All 50 locations had samples collected from the 0 to 2 foot bgs interval. The 2 to 4 foot interval was not sampled in two locations (3128, 3129). There are 22 locations that did not have samples collected below a depth of 4 feet bgs. Table 3-2 in this draft RI report shows the specific locations.

- Proposed: Soil samples were to be collected in 2-foot long carbon-steel split spoon samplers fitted with stainless steel sleeves.

  Deviation: Soil samples were collected in a 4-foot long carbon-steel macro-core sampler fitted with acetate liners. The acetate liners were cut into 6-inch sections, using a decontaminated hack-saw, for submittal to the laboratory.

Groundwater Sampling

Four deviations were made to the proposed groundwater sampling design as described in the final work plan (CDM 2005):

- Proposed: Discrete groundwater sampling will be performed using DPT equipment by the HydroPunch® (or equivalent) method. If an adequate amount of groundwater could not be collected by the HydroPunch® (or equivalent) method, the sampling rods would be removed from the ground, and 1-inch PVC TW casing with 0.010-inch slotted well screen would be inserted into the boring.

  Deviation: Due to the variably high clay content in subsurface soils, it was determined in the field that TW installation would be more efficient for groundwater sampling than using DPT Hydropunch tooling, based on observed conditions at each location. Groundwater conditions were variable from location to location, but in general recharge was poor due to high clay content in the subsurface soils.

- Proposed: Depth-discrete samples will be collected from two depths to evaluate if groundwater beneath IR Site 31 has characteristics consistent with the area-wide OU-5/IR-02 groundwater plume or if a site-specific release has occurred and has contributed unique contaminants to groundwater and to provide data in support of the HHRA.

  Deviation: Due to the clayey nature of subsurface soils, it was difficult to establish actual water table depths prior to installation of the TWs. Individual sampling locations are described in Section 3.2.2 of this draft RI report. Of the two depth intervals at each of 11 locations where TWs were installed (total of 22 TWs installed), six depth intervals had insufficient yield or groundwater was too shallow and only one sample was collected. Locations with one groundwater sample are: 3141, 3143, 3144, 3146, 3147, and 3150. Specific sample depths per location are shown in Table 3-4 of this draft RI report.

- Proposed: Groundwater samples were to be analyzed for the following chemical parameters: VOCs, SVOCs, pesticides, PCBs, and dissolved inorganics.

  Deviation: Due to the clayey nature of subsurface soils, insufficient groundwater yield made it impossible to collect the necessary groundwater volume for all proposed analyses at some locations. It was necessary to select analyses most pertinent to meeting data quality objectives at these locations. All locations have samples analyzed for VOCs. In the first depth interval at four locations (3119, 3145, 3148, 3149) the sample volume was adequate for analyses of VOCs only. At three locations (3144, 3148, 3150) limited yield allowed sufficient volume for collection of VOC and metals, but sample volume was not adequate for either SVOCs and/or pesticide/PCBs. Specific sample depths and analyses collected per location are shown in Table 3-4 of this draft RI report.

- Proposed: Depth-discrete samples will be collected at 10 DPT locations and six monitoring well locations.

Deviation: Monitoring well PW-10A was recently decommissioned, but the abandonment report had not yet been submitted. The soil boring location 3119 was sampled as an additional groundwater TW location in place of PW-10A. Therefore, depth-discrete samples were collected at 11 DPT locations and five monitoring well locations.

All other field activities complied with the requirements of the final work plan.

F4 Field Quality Assurance/ Quality Control (QA/QC)

Field Quality Assurance/Quality Control (QA/QC) objectives were accomplished through the use of appropriate sampling techniques and collection of field duplicates, equipment rinsate blanks and trip blanks. Analytical QA/QC was assessed by internal QC checks, method blanks, surrogate spikes, sample custody tracking, sample preservation, adherence to holding times, laboratory control samples (LCSs) and MS/MSDs.

F4.1 Methods

Samples were analyzed using the following methods:

- SW-846 8260B for volatile organic compounds (VOCs);
- SW-846 8270C for semi-volatile organic compounds (SVOCs);
- SW-846 8081A for organochlorine pesticides (Pests);
- SW-846 8082 for polychlorinated biphenols (PCBs);
- SW-846 6010B for dissolved metals (metals);
- SW-846 7470 for mercury in water samples;
- SW-846 7471 for mercury in soil samples;
- SW-846 9045C for pH;
- ASTM D 2216 for moisture content;
- Grain Size using ASTM C136-96 and D422-63;
- Hydrolic Conductivity using ASTM D5084-90;
- Walkly-Black (TOC); and
- Air Permability, using the American Petroleum Institute Recommended Practice API RP 40.

Data were subsequently validated by Laboratory Data Consultants, Inc. under subcontract to CDM. The data validation was performed in accordance with SWDIV's Environmental Work Instruction (EWI) No. 1, Chemical Data Validation (SWDIV 2001).

EWI No. 1 is compiled from USEPA Contract Laboratory Program National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999).

The data validation strategy employed was 20 percent Level IV and 80 percent Level III. Under this strategy, 20 percent of the data was subjected to a Level IV validation and the remaining 80 percent of the data was validated per Level III procedures. A copy of EWI No. 1 was provided to the independent laboratory validation contractor. Where specific guidance was not available, the data was evaluated in a conservative manner consistent with industry standards using professional experience. The analyses were validated using the following documents, as applicable to each method:

- EPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999;
- EPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004;
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January1995; update III, December 1996; and
- Standard Methods for the Examination of Water and Wastewater, 17th Edition, American Public Health Association 1989.

The data validation narratives indicate that the sample analyses generally met the QC criteria cited in the methods. Results associated with QC outliers were appropriately qualified by data validators.

Data Quality Indicators (DQI) criteria were established to ensure accuracy, precision, sensitivity, and completeness of analysis for the analytical fractions and for the media sampled. Analytical QC procedures are detailed in the most current revisions of SW-846 methodologies and laboratory specific criteria. Analytical accuracy, precision, and sensitivity DQOs required for this project are provided in the laboratory SOW.

F4.2 Data Completeness

Completeness of the field program is defined as the percentage of samples planned for collection as listed in the final work plan versus the actual samples collected during the field program (see equation A).

Completeness for acceptable data is defined as the percentage of acceptable data obtained judged to be valid versus the total quantity of data generated (see equation B.) Acceptable data includes both data which passes all the QC criteria (unqualified data) and data that may not pass all of the QC criteria but had appropriate corrective actions taken (qualified but useable data).

A. $$\%\text{Completeness} = C x \frac{100}{n}$$

Where: C = actual number of samples collected
n = total number of samples planned

B. $$\%\text{Completeness} = V x \frac{100}{n'}$$

Where: V = number of measurements judged valid
n' = total number of measurements made

Analytical results from all samples for analyses listed in the final work plan are presented in this RI report. The list of samples collected and parameters analyzed are shown on Table F1.

No sample results were rejected. Therefore, the completeness of acceptable data based upon sample analyses is 100 percent. However, seven groundwater samples from six locations had insufficient volume for complete analysis of all analytical parameters. The completeness goal was to generate a complete data set for at least 90 percent of the samples planned to be collected and 90 percent valid data of the samples analyzed.

It was estimated that three samples could be collected from the vadose zone of 50 locations. During sample collection, it was discovered that the vadose layer was not of sufficient depth to obtain three samples at all locations. Therefore even though only 126 of the 250 planned samples were collected, a completeness of 100 percent for sample collection was achieved as relates to the sampling objectives.

For groundwater samples, it was planned to collect two samples from 10 locations for a total of 20 samples. As stated previously, due to the clayey nature of subsurface soils, insufficient groundwater yield made it impossible to collect the necessary groundwater volume for all proposed analyses at some locations. All samples though were analyzed for VOCs, which is the analysis most pertinent to meeting data quality objectives at these locations. A completeness goal of 100 percent was met for the collection and analysis of VOCs. A completeness goal of 85 percent was met for the remaining analyses. Since the most pertinent analysis was completed, data quality objectives have been met.

Completeness of the environmental data set achieved by CDM is shown in Table F2 and details regarding sample collection can be found under Section F3.1.

F5 Data Quality Indicators (DQI)

Achievement of the project's quality objectives were determined by the use of data quality indicators (DQI). Table 6-3 of the Sampling and Analyses Plan in the final work plan outlines the DQI requirements for the project. These DQIs for measuring data,

formerly called QA objectives, are expressed in terms of precision, accuracy, representativeness, comparability, and completeness. These DQIs provide a mechanism for on-going control, to evaluate and measure data quality throughout the project. These criteria are defined in the appropriate sections below.

F5.1 Accuracy

Accuracy is a measurement of agreement for a given measurement against an accepted reference value. It is typically assessed through the analysis of matrix spike and calibration check samples, and expressed as a percent recovery.

Analytical accuracy for the entire data collection activity is difficult to measure because several sources of error exist. Errors can be introduced by any of the following:

- Sampling procedure
- Field contamination
- Sample preservation and handling
- Sample matrix
- Sample preparation
- Analytical techniques

By adhering to the approved field and analytical SOPs, the data generated is believed to be accurate. CDM's subcontract validators reviewed the laboratories' data for accuracy, that is, the reported surrogate, internal standards, calibration and MS and MSD results. Some laboratory spike recoveries were outside criteria. The data validator qualified the data as required by the validation guidance.

The extraction holding time and cooler temperatures were met for all samples and analyses.

Instrument calibration checks and internal standard recoveries were also measured and reviewed during data validation. Applicable sample results for the following analytes in several SDGs were qualified as "J/UJ" due to organic calibration data results: 4,4-DDE; 4,4-DDT; 4,4-DDD; a-BHC; b-BHC; g-BHC; aldrin; endrin; endosulfan; endosulfan II; endosulfan sulfate; toxaphene; chlordane (technical); aroclors 1016, 1221, 1232; chloromethane; acetone; 1,2,4-trichlorobenzene; dichlorodifluoromethane; 1,24-trichlorobenzene; 1,2-dibromo-3-chloropropane; 1,2,3-trichloropropane; 4-nitroaniline; bis(2-chloroethyl)ether; hexachlorbenzene; and n-nitroso-di-n-propylamine. No samples were qualified as rejected due to other calibration criteria being exceeded.

Surrogate recoveries for 2,4,5,6-tetrachlor-meta-xylene and 1,2-dichloroethane-d4 were outside criteria for a few samples and toluene-d8 was out in a matrix spike. Sample

results were non-detect for the associated samples, therefore no action was required. No action is taken on organic MS/MSD data.

Field sampling accuracy was attained through strict adherence to the approved final work plan and by using EPA approved analytical methods for sample analyses. Based on this, the data should represent as near as possible the actual field conditions at the time of sampling.

F5.2 Precision

Precision is a quantitative term that estimates the reproducibility of a set of replicate measurements under a given set of conditions. It is defined as a measurement of mutual agreement between measurements of the same property, and is expressed in terms of relative percent difference (RPD) between duplicate determinations.

RPD is calculated as follows:

$$\mathbf{RPD = absolute\ value\ [(C1-C2)/\{(C1+C2)/2)\}] \times 100\%}$$

Where: C1 = Concentration of split sample #1

C2 = Concentration of split sample #2

The analytical precision for the reported data was determined by review of organic MS/MSD and inorganic laboratory duplicate results. Field and analytical precision was determined from the review of the field duplicate results. The sample results were compared based upon their RPD. The field duplicate samples were collected in the same manner as the original samples but were collected in separate, individual containers, given separate sample identifiers and treated as individual samples by the laboratory.

Some analytical RPDs were outside criteria. The data validator qualified as estimated "J/UJ" some of the metals data for chromium, copper, selenium, and nickel as required by validation guidelines for laboratory duplicates.

Tables F3a and F3b report the field duplicate data results. Analytical precision cannot be determined if the reported value is less than the instrument detection limit or the reporting limit. Therefore results not detected in any duplicate pair are not included in the duplicate table. RPDs for result pairs with one detected value and one non-detected are noted as not calculable (NC). Relative percent difference objectives ranged from 20 percent to 35 percent for groundwater and from 20 to 30 percent for soils. These objectives are analyte dependent. Duplicate results for low concentration samples are reviewed based on their absolute differences as compared to their respective practical quantitation limit (PQL) values.

Various analyte RPDs were outside of the appropriate criteria described above. However, no qualifications were made to sample results due to field duplicate precision. There is no discernable pattern or reason for the exceedences. Also, soil data is inherently more heterogeneous in nature and is therefore expected to have lower sampling precision.

Impact to data usability cannot be easily quantified. Both results from duplicate analyses should be considered when reporting the data.

F5.3 Blank Contamination

Tables F4a, F4b and F4c show the contaminants detected in the trip, equipment rinsate and source water blanks respectively. Field blanks are used to evaluate the presence of contaminants on sampling equipment following decontamination and the potential for cross contamination during sample collection. Water blanks are used to determine the presence of contaminants in the reagent grade source water used to prepare rinsate blanks. Laboratory method blanks are analyzed to indicate possible contamination introduced by sample handling, preparation, and/or analysis.

All sample results for the VOC trip blanks were non-detect, therefore no qualification was necessary based on the trip blanks (Table F4a).

Antimony, cadmium, chromium, copper, lead, molybdenum, nickel, mercury, silver, and zinc were detected above reporting limits in one or more of the equipment rinsate blanks (Table F4b). Other compounds were detected below reporting limits in one or more equipment rinsate blanks. The data validators qualified the associated and affected metal sample data for these blank contaminants as required by relevant data validation guidelines. The reported sample results are judged to be valid after validation.

Table F4c contains a list of contaminants found in the source water blank. These results are only used to identify potential source of contamination if field rinsate blanks or trip blanks are not associated with each sample. Since all samples had associated field and/or trip blanks, contamination from the source water did not impact sample data.

Antimony, arsenic, barium, beryllium, cadmium, copper, lead, mercury, molybdenum, silver, selenium, thallium, and zinc were detected in the laboratory method blanks. The data validators qualified the associated and affected metal sample data for these blank contaminants as required by relevant data validation guidelines. The reported sample results are judged to be valid after validation. Method blank results are shown in the individual data packages included as a CD with this appendix.

F6 Representativeness and Comparability

Representativeness and comparability are achieved by using EPA approved sampling procedures and analytical methodologies. By following approved final work plan procedures for groundwater, surface water and sediment sampling, this and future sampling events should yield results representative of environmental conditions at the time of sampling. Similarly, reasonable comparability of analytical results for this and future sampling events can be achieved if the approved EPA analytical methods and standardized reporting units are employed.

F6.1 Representativeness

Representativeness is a qualitative term that expresses the degree to which the sample data accurately and precisely represent the environmental conditions corresponding to the location and depth interval of sample collection. Requirements and procedures for sample collection are designed to maximize sample representativeness. Representativeness also can be monitored by reviewing field documentation and by performing field audits. Appropriate laboratory QA/QC requirements were described in the Work Plan and laboratory SOWs to ensure that the laboratory analytical results were representative of true field conditions.

Sample representativeness was achieved by CDM through the use of EPA analytical methods, decontaminated sampling equipment, the use of inert materials to collect samples, clean sample gloves, and standard sampling procedures as described in the final work plan. Samples were collected and packaged and kept at 4oC and received intact at the laboratories. The generally low concentrations of blank contaminants as discussed above indicate that sample results are representative of the site conditions.

F6.2 Comparability

Comparability is a qualitative term that expresses the confidence with which a data set can be compared with another. Strict adherence to standard sample collection procedures, analytical detection limits, and analytical methods assures that data from like samples and sample conditions are comparable. This comparability is independent of laboratory personnel, data reviewers, or sampling personnel. Comparability criteria are met for the project if, based on data review, the sample collection and analytical procedures are determined to have been followed, or defined to show that variations did not affect the values reported.

To ensure comparability of data generated for the site, standard sample collection procedures and EPA-approved analytical methods were utilized by CDM. The sample analyses were performed by EPA and the subcontract laboratories using the same methodology. Utilizing such procedures and methods enables the current data to be comparable with the previous data sets generated with similar methods. All sediment

sample data were consistently reported in milligrams per kilogram (mg/kg), and detection limits were low enough to compare the data with applicable cleanup goals. Water samples were reported in micrograms per liter (µg/L), and detection limits were also low enough to compare the data with applicable cleanup goals.

F7 Assessment of Data Usability and Reconciliation with Final Work Plan Goals

The data reported is suitable for its intended use as stated in the final work plan. No data was rejected for this RI. The achievement of the completeness goal for usable data provides sufficient data for project decisions. The detection limits reported do not exceed the expected limits as documented in the SAP for the final work plan.

F8 Data Qualifiers

F8.1 Organic Qualifiers

U - Compound was analyzed for but not detected. The associated numerical value is the sample quantitation limit.

J - Estimated data due to exceeded quality control criteria.

B - Analyte is found in the associated blank and in the sample.

D - Compound is identified at a secondary dilution factor.

R - Data is rejected due to exceeded quality control criteria.

F8.2 Inorganic Qualifiers

B - Reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

J - Estimated data due to exceeded quality control criteria.

U - Analyte was analyzed for but not detected.

R - Data is rejected.

F9 References

CDM Federal Programs. 2005. *Draft Final Proposed Plan for OU-5 Groundwater.*

Southwest Division Naval Facilities Engineering Command. 2001. Environmental Work Instruction (EWI) No. 1, Chemical Data Validation.

SWDIV. See Southwest Division Naval Facilities Engineering Command.

U.S. Environmental Protection Agency (EPA). 1999.

_____. 2004. ProUCL- Version 3.0 accompanied by "ProUCL User's Guide." Prepared for EPA by Lockheed Martin.

Table F1
Sample Summary

SAMPLE LOCATION INFORMATION									SOIL ANALYSES										GROUNDWATER ANALYSES					
Site	Well/Borehole ID	Sample Name	Type*	SDG	Matrix	Sample Date	Start Depth (feet below grouund surface)	End Depth (feet below ground surface)	Density and Moisture ASTM D2937 and D2216	Grain Size ASTM C136-96 and D422-63	Hydraulic Conductivity ASTM D5084-90	Total Organic Carbon (TOC) Walkley Black	Air Permeability API RP 40	VOCs EPA Method 5035/8260B	Title 22 Metals and Iron EPA Method 3050B/6010B and 7000	SVOCs (PAHs) EPA Method 3550B/8270C	PCBs EPA Method 3550B/8082	Pesticides EPA Method 3550B/8081A	VOCs EPA Method 5030B/8260B	Title 22 Dissolved Metals and Iron EPA Method 3010A/6010B and 7000	SVOCs (PAHs) EPA Method 3510C/8270C	PCBs EPA Method 3510C/8082	Pesticides EPA Method 3510C/8081A	Comments
Normal (Base) Samples																								
31	3101	31001	N	4607	soil	20051101	0	2						1	1	1	1	1						
31	3101	31002	N	4607	soil	20051101	2	4						1	1	1	1	1						
31	3101	31003	N	4607	soil	20051101	4	6						1	1	1	1	1						
31	3102	31144	N	4723	soil	20051109	0	2	1	1	1	1	1	1	1	1	1	1						
31	3102	31145	N	4723	soil	20051109	2	4	1	1	1	1	1	1	1	1	1	1						
31	3103	31004	N	4614	soil	20051102	0	2						1	1	1	1	1						
31	3103	31005	N	4614	soil	20051102	2	4						1	1	1	1	1						
31	3103	31006	N	4614	soil	20051102	4.5	6.5						1	1	1	1	1						
31	3104	31007	N	4614/4671	soil	20051102	0	2	1	1	1	1	1	1	1	1	1	1						
31	3104	31008	N	4614/4671	soil	20051102	2	4	1	1	1	1	1	1	1	1	1	1						
31	3104	31009	N	4614/4671	soil	20051102	4	6	1	1	1	1	1	1	1	1	1	1						
31	3105	31010	N	4614	soil	20051102	0	2						1	1	1	1	1						
31	3105	31011	N	4614	soil	20051102	2	4						1	1	1	1	1						
31	3105	31012	N	4614	soil	20051102	4	6						1	1	1	1	1						
31	3106	31014	N	4650	soil	20051103	0	2						1	1	1	1	1						
31	3106	31015	N	4650	soil	20051103	2	4						1	1	1	1	1						
31	3106	31016	N	4650	soil	20051103	4	6						1	1	1	1	1						
31	3107	31017	N	4650	soil	20051103	0	2						1	1	1	1	1						
31	3107	31018	N	4650	soil	20051103	2	4						1	1	1	1	1						
31	3107	31019	N	4650	soil	20051103	4	6						1	1	1	1	1						
31	3108	31020	N	4650	soil	20051103	0	2						1	1	1	1	1						
31	3108	31022	N	4650	soil	20051103	2	4						1	1	1	1	1						
31	3108	31023	N	4650	soil	20051103	4	7						1	1	1	1	1						MS/MSD sample taken
31	3109	31024	N	4650	soil	20051103	0	2						1	1	1	1	1						
31	3109	31025	N	4650	soil	20051103	2	4						1	1	1	1	1						
31	3109	31026	N	4650	soil	20051103	4	6						1	1	1	1	1						
31	3110	31027	N	4650	soil	20051103	0	2						1	1	1	1	1						
31	3110	31028	N	4650	soil	20051103	3	4						1	1	1	1	1						
31	3110	31029	N	4651	soil	20051103	4.5	6.5						1	1	1	1	1						
31	3111	31030	N	4651	soil	20051103	0	2						1	1	1	1	1						
31	3111	31031	N	4651	soil	20051103	2	4						1	1	1	1	1						
31	3111	31032	N	4651	soil	20051103	4	6						1	1	1	1	1						
31	3112	31033	N	4651	soil	20051103	0	2						1	1	1	1	1						
31	3112	31034	N	4651	soil	20051103	2	4						1	1	1	1	1						
31	3112	31035	N	4651	soil	20051103	4.5	6.5						1	1	1	1	1						
31	3113	31037	N	4651	soil	20051103	0	2	1	1	1	1	1	1	1	1	1	1						
31	3113	31038	N	4651	soil	20051103	2	4	1	1	1	1	1	1	1	1	1	1						
31	3113	31039	N	4651	soil	20051103	4	6	1	1	1	1	1	1	1	1	1	1						
31	3114	31040	N	4651	soil	20051103	0	2						1	1	1	1	1						
31	3114	31041	N	4651	soil	20051103	2	4						1	1	1	1	1						
31	3114	31042	N	4651	soil	20051103	4	7						1	1	1	1	1						MS/MSD sample taken
31	3115	31043	N	4651	soil	20051103	0	2						1	1	1	1	1						
31	3115	31044	N	4651	soil	20051103	2	4						1	1	1	1	1						
31	3115	31045	N	4651	soil	20051103	4	6						1	1	1	1	1						
31	3116	31047	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3116	31048	N	4666	soil	20051104	2	4						1	1	1	1	1						
31	3116	31049	N	4666	soil	20051104	4	6						1	1	1	1	1						
31	3117	31052	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3117	31053	N	4666	soil	20051104	2	4						1	1	1	1	1						

SAMPLE LOCATION INFORMATION									SOIL ANALYSES										GROUNDWATER ANALYSES					
Site	Well/Borehole ID	Sample Name	Type*	SDG	Matrix	Sample Date	Start Depth (feet below grouund surface)	End Depth (feet below ground surface)	Density and Moisture ASTM D2937 and D2216	Grain Size ASTM C136-96 and D422-63	Hydraulic Conductivity ASTM D5084-90	Total Organic Carbon (TOC) Walkley Black	Air Permeability API RP 40	VOCs EPA Method 5035/8260B	Title 22 Metals and Iron EPA Method 3050B/6010B and 7000	SVOCs (PAHs) EPA Method 3550B/8270C	PCBs EPA Method 3550B/8082	Pesticides EPA Method 3550B/8081A	VOCs EPA Method 5030B/8260B	Title 22 Dissolved Metals and Iron EPA Method 3010A/6010B and 7000	SVOCs (PAHs) EPA Method 3510C/8270C	PCBs EPA Method 3510C/8082	Pesticides EPA Method 3510C/8081A	Comments
31	3117	31054	N	4666	soil	20051104	4	6						1	1	1	1	1						
31	3118	31055	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3118	31057	N	4666	soil	20051104	2	4						1	1	1	1	1						
31	3119	31058	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3119	31059	N	4666	soil	20051104	2	4						1	1	1	1	1						
31	3120	31060	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3120	31061	N	4666	soil	20051104	2	4						1	1	1	1	1						
31	3120	31062	N	4666	soil	20051104	4	6.5						1	1	1	1	1						MS/MSD sample taken
31	3121	31063	N	4666	soil	20051104	0	2						1	1	1	1	1						
31	3121	31064	N	4665	soil	20051104	2	4						1	1	1	1	1						
31	3121	31065	N	4665	soil	20051104	4	6						1	1	1	1	1						
31	3122	31066	N	4665	soil	20051104	0	2	1	1	1	1	1	1	1	1	1	1						
31	3122	31068	N	4665	soil	20051104	2	4	1	1	1	1	1	1	1	1	1	1						
31	3123	31069	N	4665	soil	20051104	0	2						1	1	1	1	1						
31	3123	31070	N	4665	soil	20051104	2	4						1	1	1	1	1						
31	3124	31071	N	4665	soil	20051104	0	2						1	1	1	1	1						
31	3124	31072	N	4665	soil	20051104	2	4						1	1	1	1	1						
31	3125	31073	N	4668	soil	20051105	0	2						1	1	1	1	1						
31	3125	31074	N	4668	soil	20051105	2	4						1	1	1	1	1						
31	3125	31075	N	4668	soil	20051105	4	6						1	1	1	1	1						
31	3126	31078	N	4679	soil	20051106	0	2						1	1	1	1	1						
31	3126	31080	N	4679	soil	20051106	2	4						1	1	1	1	1						
31	3127	31081	N	4679/4723	soil	20051106	0	2	1	1	1	1	1	1	1	1	1	1						
31	3127	31082	N	4679/4723	soil	20051106	2	4	1	1	1	1	1	1	1	1	1	1						MS/MSD sample taken
31	3128	31083	N	4679	soil	20051106	0	2						1	1	1	1	1						
31	3129	31084	N	4679	soil	20051106	0	2						1	1	1	1	1						
31	3130	31085	N	4679	soil	20051106	0	2						1	1	1	1	1						
31	3130	31086	N	4679	soil	20051106	2	4						1	1	1	1	1						
31	3131	31156	N	4742	soil	20051110	0	2						1	1	1	1	1						
31	3131	31157	N	4742	soil	20051110	2	4						1	1	1	1	1						
31	3132	31087	N	4679	soil	20051106	0	2	1	1	1	1	1	1	1	1	1	1						
31	3132	31088	N	4679	soil	20051106	2	4	1	1	1	1	1	1	1	1	1	1						
31	3132	31090	N	4679	soil	20051106	5	7	1	1	1	1	1	1	1	1	1	1						
31	3133	31091	N	4681	soil	20051106	0	2						1	1	1	1	1						
31	3133	31092	N	4681	soil	20051106	2	4						1	1	1	1	1						
31	3133	31093	N	4681	soil	20051106	5	7						1	1	1	1	1						
31	3134	31094	N	4681	soil	20051106	0	2						1	1	1	1	1						
31	3134	31095	N	4681	soil	20051106	2	4						1	1	1	1	1						
31	3134	31096	N	4681	soil	20051106	4.5	6.5						1	1	1	1	1						
31	3135	31158	N	4742	soil	20051110	0	2						1	1	1	1	1						
31	3135	31159	N	4742	soil	20051110	2	4						1	1	1	1	1						
31	3136	31097	N	4681	soil	20051107	0	2						1	1	1	1	1						
31	3136	31098	N	4681	soil	20051107	2	4						1	1	1	1	1						
31	3136	31099	N	4681	soil	20051107	4	6						1	1	1	1	1						
31	3137	31160	N	4742	soil	20051110	0	2						1	1	1	1	1						
31	3137	31161	N	4742	soil	20051110	2	4						1	1	1	1	1						
31	3138	31101	N	4681	soil	20051107	0	2						1	1	1	1	1						
31	3138	31102	N	4681	soil	20051107	2	4						1	1	1	1	1						MS/MSD sample taken
31	3138	31103	N	4681	soil	20051107	4	6						1	1	1	1	1						
31	3139	31104	N	4680	soil	20051107	0	2						1	1	1	1	1						

SAMPLE LOCATION INFORMATION									SOIL ANALYSES										GROUNDWATER ANALYSES					
Site	Well/Borehole ID	Sample Name	Type*	SDG	Matrix	Sample Date	Start Depth (feet below grouund surface)	End Depth (feet below ground surface)	Density and Moisture ASTM D2937 and D2216	Grain Size ASTM C136-96 and D422-63	Hydraulic Conductivity ASTM D5084-90	Total Organic Carbon (TOC) Walkley Black	Air Permeability API RP 40	VOCs EPA Method 5035/8260B	Title 22 Metals and Iron EPA Method 3050B/6010B and 7000	SVOCs (PAHs) EPA Method 3550B/8270C	PCBs EPA Method 3550B/8082	Pesticides EPA Method 3550B/8081A	VOCs EPA Method 5030B/8260B	Title 22 Dissolved Metals and Iron EPA Method 3010A/6010B and 7000	SVOCs (PAHs) EPA Method 3510C/8270C	PCBs EPA Method 3510C/8082	Pesticides EPA Method 3510C/8081A	Comments
31	3139	31105	N	4680	soil	20051107	2	4						1	1	1	1	1						
31	3140	31106	N	4680	soil	20051107	0	2						1	1	1	1	1						
31	3140	31107	N	4680	soil	20051107	2	4						1	1	1	1	1						
31	3141	31108	N	4680	soil	20051107	0	2						1	1	1	1	1						
31	3141	31109	N	4680	soil	20051107	2	4						1	1	1	1	1						
31	3141	31110	N	4680	soil	20051107	4	6						1	1	1	1	1						
31	3142	31112	N	4680	soil	20051107	0	2						1	1	1	1	1						
31	3142	31113	N	4680	soil	20051107	2	4						1	1	1	1	1						
31	3143	31114	N	4703	soil	20051108	0	2						1	1	1	1	1						
31	3143	31115	N	4703	soil	20051108	2	4						1	1	1	1	1						
31	3144	31116	N	4703	soil	20051108	0	2						1	1	1	1	1						
31	3144	31117	N	4703	soil	20051108	2	4						1	1	1	1	1						
31	3144	31118	N	4703	soil	20051108	4	6						1	1	1	1	1						
31	3145	31119	N	4703	soil	20051108	2	4						1	1	1	1	1						
31	3145	31120	N	4703	soil	20051108	0	2						1	1	1	1	1						MS/MSD sample taken
31	3145	31121	N	4703	soil	20051108	4	6						1	1	1	1	1						
31	3146	31132	N	4703	soil	20051108	0	2						1	1	1	1	1						
31	3146	31133	N	4703	soil	20051108	2	4						1	1	1	1	1						
31	3146	31134	N	4703	soil	20051108	4	6						1	1	1	1	1						
31	3147	31135	N	4723	soil	20051109	0	2						1	1	1	1	1						
31	3147	31136	N	4723	soil	20051109	2	4						1	1	1	1	1						
31	3148	31137	N	4723	soil	20051109	0	2						1	1	1	1	1						
31	3148	31138	N	4723	soil	20051109	2	4						1	1	1	1	1						
31	3149	31139	N	4723	soil	20051109	0	2						1	1	1	1	1						
31	3149	31140	N	4723	soil	20051109	2	4						1	1	1	1	1						
31	3150	31141	N	4723	soil	20051109	0	2						1	1	1	1	1						
31	3150	31142	N	4723	soil	20051109	2	4						1	1	1	1	1						
31	3119	31171	N	4742	water	20051110	7	12											1					insufficient volume for complete analysis
31	3119	31172	N	4742	water	20051110	11	16											1	1	1	1	1	
31	3141	31123	N	4702	water	20051108	15	20											1	1	1	1	1	
31	3142	31125	N	4702	water	20051108	14	19											1	1	1	1	1	
31	3142	31126	N	4702	water	20051108	18	23											1	1	1	1	1	
31	3143	31127	N	4724	water	20051108	12	17											1	1	1	1	1	
31	3144	31167	N	4743	water	20051109	15	20											1	1	1			insufficient volume for complete analysis
31	3145	31165	N	4743	water	20051110	13	18											1	1	1	1	1	
31	3145	31166	N	4743	water	20051110	9	14											1					insufficient volume for complete analysis
31	3146	31148	N	4724	water	20051109	9.5	14.5											1	1	1	1	1	
31	3147	31164	N	4743	water	20051109	9	14											1	1	1	1	1	
31	3148	31162	N	4743	water	20051110	6	11											1					insufficient volume for complete analysis
31	3148	31163	N	4743	water	20051110	10	15											1	1		1	1	insufficient volume for complete analysis
31	3149	31169	N	4742	water	20051110	9	14											1	1	1	1	1	
31	3149	31170	N	4742	water	20051110	5	10											1					insufficient volume for complete analysis
31	3150	31173	N	4743	water	20051110	9	14											1	1				
31	MW25-06	31146	N	4724	water	20051109	14.75	14.75												1	1	1	1	
31	MW25-07	31147	N	4724	water	20051109	14.75	14.75												1	1	1	1	

SAMPLE LOCATION INFORMATION									SOIL ANALYSES										GROUNDWATER ANALYSES					
Site	Well/Borehole ID	Sample Name	Type*	SDG	Matrix	Sample Date	Start Depth (feet below grouund surface)	End Depth (feet below ground surface)	Density and Moisture ASTM D2937 and D2216	Grain Size ASTM C136-96 and D422-63	Hydraulic Conductivity ASTM D5084-90	Total Organic Carbon (TOC) Walkley Black	Air Permeability API RP 40	VOCs EPA Method 5035/8260B	Title 22 Metals and Iron EPA Method 3050B/6010B and 7000	SVOCs (PAHs) EPA Method 3550B/8270C	PCBs EPA Method 3550B/8082	Pesticides EPA Method 3550B/8081A	VOCs EPA Method 5030B/8260B	Title 22 Dissolved Metals and Iron EPA Method 3010A/6010B and 7000	SVOCs (PAHs) EPA Method 3510C/8270C	PCBs EPA Method 3510C/8082	Pesticides EPA Method 3510C/8081A	Comments
31	MW25-09	31131	N	4702	water	20051108	14.75	14.75												1	1	1	1	
31	MW25-01	31129	N	4702	water	20051108	14.95	14.95												1	1	1	1	
31	PW-12	31130	N	4702	water	20051108	14.5	14.5												1	1	1	1	
31	PW-10A																							not sampled, well was previously abandoned
Total Environmental Base Samples									15	15	15	15	15	126	126	126	126	126	16	17	15	15	15	
QC Samples - Duplicates																								
31	3105	31013	FD	4614	soil	20051102	4	6						1	1	1	1	1						Duplicate
31	3108	31021	FD	4650	soil	20051103	0	2						1	1	1	1	1						Duplicate
31	3112	31036	FD	4651	soil	20051103	4.5	6.5						1	1	1	1	1						Duplicate
31	3115	31046	FD	4651	soil	20051103	4	6						1	1	1	1	1						Duplicate
31	3118	31056	FD	4666	soil	20051104	0	2						1	1	1	1	1						Duplicate
31	3122	31067	FD	4665	soil	20051104	2	4						1	1	1	1	1						Duplicate
31	3126	31079	FD	4679	soil	20051106	0	2						1	1	1	1	1						Duplicate
31	3132	31089	FD	4679	soil	20051106	2	4						1	1	1	1	1						Duplicate
31	3136	31100	FD	4681	soil	20051107	4	6						1	1	1	1	1						Duplicate
31	3141	31111	FD	4680	soil	20051107	4	6						1	1	1	1	1						Duplicate
31	3145	31122	FD	4703	soil	20051108	4	6						1	1	1	1	1						Duplicate
31	3150	31143	FD	4723	soil	20051109	2	4						1	1	1	1	1						Duplicate
31	3146	31149	FD	4724	water	20051109	9.5	14.5											1	1	1	1	1	Duplicate of 31148
Total Environmental Samples Plus Field Duplicates														138	138	138	138	138	17	18	16	16	16	
QC Samples - Source Blank																								
31		31077	SB	4680	water	20051106													1	1	1	1	1	Source Blank
QC Samples - Matrix Spikes																								
31	3108	31023	MS	4650	soil	20051103	4	7						1	1	1	1	1						MS/MSD
31	3114	31042	MS	4651	soil	20051103	4	7						1	1	1	1	1						MS/MSD
31	3120	31062	MS	4666	soil	20051104	4	6.5						1	1	1	1	1						MS/MSD
31	3127	31082	MS	4679/4723	soil	20051106	2	4	1	1	1	1	1	1	1	1	1	1						MS/MSD
31	3138	31102	MS	4681	soil	20051107	2	4						1	1	1	1	1						MS/MSD
31	3145	31120	MS	4703	soil	20051108	0	2						1	1	1	1	1						MS/MSD
QC Samples - Trip Blanks																								
		31150	TB	4724	water	20051109													1					Trip Blank
		31151	TB	4723	water	20051109													1					Trip Blank
		31152	TB	4743	water	20051110													1					Trip Blank
		31153	TB	4742	water	20051110													1					Trip Blank
		31154	TB	4742	water	20051110													1					Trip Blank
		31200	TB	4607	water	20051101													1					Trip Blank
		31201	TB	4614	water	20051102													1					Trip Blank
		31205	TB	4665	water	20051104													1					Trip Blank
		31206	TB	4665	water	20051104													1					Trip Blank
		31207	TB	4665	water	20051104													1					Trip Blank
		31202	TB	4651	water	20051103													1					Trip Blank
		31203	TB	4651	water	20051103													1					Trip Blank
		31204	TB	4651	water	20051103													1					Trip Blank
		31208	TB	4668	water	20051105													1					Trip Blank
		31209	TB	4680	water	20051106													1					Trip Blank
		31210	TB	4679	water	20051106													1					Trip Blank
		31211	TB	4681	water	20051106													1					Trip Blank
		31212	TB	4681	water	20051106													1					Trip Blank
		31213	TB	4681	water	20051106													1					Trip Blank

Table F1 (continued)
Sample Summary

SAMPLE LOCATION INFORMATION									SOIL ANALYSES										GROUNDWATER ANALYSES					
Site	Well/Borehole ID	Sample Name	Type*	SDG	Matrix	Sample Date	Start Depth (feet below grouund surface)	End Depth (feet below ground surface)	Density and Moisture ASTM D2937 and D2216	Grain Size ASTM C136-96 and D422-63	Hydraulic Conductivity ASTM D5084-90	Total Organic Carbon (TOC) Walkley Black	Air Permeability API RP 40	VOCs EPA Method 5035/8260B	Title 22 Metals and Iron EPA Method 3050B/6010B and 7000	SVOCs (PAHs) EPA Method 3550B/8270C	PCBs EPA Method 3550B/8082	Pesticides EPA Method 3550B/8081A	VOCs EPA Method 5030B/8260B	Title 22 Dissolved Metals and Iron EPA Method 3010A/6010B and 7000	SVOCs (PAHs) EPA Method 3510C/8270C	PCBs EPA Method 3510C/8082	Pesticides EPA Method 3510C/8081A	Comments
		31214	TB	4703	water	20051108													1					Trip Blank
		31215	TB	4702	water	20051108													1					Trip Blank
QC Samples - Equipment Rinsate Samples (one per day)																								
31		31050	EB	4665	water	20051104													1	1	1	1	1	Equipment Rinsate Blank
31		31051	EB	4665	water	20051104													1	1	1	1	1	Equipment Rinsate Blank
31		31076	EB	4680	water	20051106													1	1	1	1	1	Equipment Rinsate Blank
31		31155	EB	4742	water	20051110													1	1	1	1	1	Equipment Rinsate Blank
31		31168	EB	4743	water	20051110													1	1	1	1	1	Equipment Rinsate Blank
QC TOTALS (not including duplicate samples)									1	1	1	1	1	6	6	6	6	6	27	6	6	6	6	
GRAND TOTALS									16	16	16	16	16	144	144	144	144	144	44	24	22	22	22	

* Sample Type Designations:
N = Normal or base environmental sample
FD = Field duplicate sample
SB = Source blank sample
MS = Matrix Spike/Matrix Splike Duplicate Sample
TB = Trip Blank
EB = Equipment Rinsate Blank

ID = Identification
SDG = Sample Delivery Group
VOCs = Volatile Organic Compounds
EPA = Environmental Protection Agency
SVOCs = Semivolatile Organic Compounds

PAHs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
QC = Quality Control

Table F2
Completeness Summary

Method Name	Common Name	TOTAL	REJECTS	"J's" and "UJ's"	Percent Rejected	Percent Estimated
SW-846 8260B	Volatile Organics	7854	0	213	0.00%	2.71%
SW-846 8270C	Semi-volatile organics	6474	0	201	0.00%	3.10%
SW-846 8081A	Pesticides	2656	0	413	0.00%	15.55%
SW-846 8082	PCBs	1162	0	38	0.00%	3.27%
SW-846 6010	Metals	3024	0	594	0.00%	19.64%
SW-846 7470	Mercury - in aqueous	24	0	12	0.00%	50.00%
SW-846 7471	Mercury - in solids	144	0	41	0.00%	28.47%
SW-846 9045 & 9045C	pH	43	0	0	0.00%	0.00%
ASTM D 2216	Moisture Content	144	0	0	0.00%	0.00%
	Totals	**21525**	**0**	**1512**		
		Percentages	**0**	**7.02**		

Notes:

PCBs = Polychlorinated Biphenyls

J = Estimated detected value

UJ = Estimated nondetect value

Table F3a
Groundwater Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31148	7440-36-0	Antimony	GW	6010B	ug/L	8.9	B	31149	6.8	B	26.8
31148	7440-39-3	Barium	GW	6010B	ug/L	589		31149	611		-3.7
31148	7440-41-7	Beryllium	GW	6010B	ug/L	0.078	B	31149	<2		NC
31148	7440-43-9	Cadmium	GW	6010B	ug/L	0.89	B	31149	0.82	B	8.2
31148	7440-47-3	Chromium	GW	6010B	ug/L	12		31149	12.4		-3.3
31148	7440-48-4	Cobolt	GW	6010B	ug/L	1.5	B	31149	1.7	B	-12.5
31148	7439-89-6	Iron	GW	6010B	ug/L	12000		31149	11800		1.7
31148	7439-92-1	Lead	GW	6010B	ug/L	8.1		31149	13.3		-48.6
31148	7439-98-7	Molybdenum	GW	6010B	ug/L	5.9		31149	6.6		-11.2
31148	7440-02-0	Nickel	GW	6010B	ug/L	0.71	B	31149	1.7		-82.2
31148	7440-62-2	Vanadium	GW	6010B	ug/L	6.7	B	31149	6.9	B	-2.9
31148	71-43-2	Benzene	GW	8260B	ug/L	137		31149	89		42.5
31148	100-41-4	Ethylbenzene	GW	8260B	ug/L	52		31149	42		21.3
31148	100-42-5	Styrene	GW	8260B	ug/L	5	J	31149	4	J	22.2
31148	108-88-3	Toluene	GW	8260B	ug/L	40		31149	31		25.4
31148	95-63-6	1,2,4-Trimethylbenzene	GW	8260B	ug/L	9		31149	10		-10.5
31148	108-67-8	1,3,5-Trimethylbenzene	GW	8260B	ug/L	4	J	31149	5	J	-22.2
31148	1330-20-7	Xylenes	GW	8260B	ug/L	50		31149	43		15.1
31148	83-32-9	Acenaphthene	GW	8270C	ug/L	100		31149	130		-26.1
31148	208-96-8	Acentaphthylene	GW	8270C	ug/L	91		31149	75		19.3
31148	120-12-7	Anthracene	GW	8270C	ug/L	12		31149	10	J	18.2
31148	56-55-3	Benzo(A)anthracene	GW	8270C	ug/L	2	J	31149	2	J	0.0
31148	50-32-8	Benzo(A)pyrene	GW	8270C	ug/L	3	J	31149	2	J	40.0
31148	205-99-2	Benzo(B)fluoranthene	GW	8270C	ug/L	2	J	31149	2	J	0.0
31148	191-24-2	Benzo(G,II,I)perylene	GW	8270C	ug/L	1	J	31149	2	J	-66.7
31148	86-74-8	Carbazole	GW	8270C	ug/L	43		31149	37		15.0
31148	218-01-9	Chrysene	GW	8270C	ug/L	4		31149	3	J	28.6
31148	132-64-9	Dibenzofuran	GW	8270C	ug/L	6	J	31149	6	J	0.0
31148	206-44-0	Fluoranthene	GW	8270C	ug/L	18		31149	17		5.7
31148	86-73-7	Fluorene	GW	8270C	ug/L	43		31149	37		15.0
31148	1321-94-4	Methylnaphthalene (Total)	GW	8270C	ug/L	180		31149	160		11.8
31148	91-20-3	Naphthalene	GW	8270C	ug/L	2030		31149	2500		-20.8
31148	85-01-8	Phenanthrene	GW	8270C	ug/L	92		31149	82		11.5
31148	129-00-0	Pyrene	GW	8270C	ug/L	18		31149	16		11.8

Notes:

NC = Not calculated, result below detection limit in parent or duplicate sample

ug/L = Microgram per liter

ID = Identification

RPD = Relative percent difference

Table F3b
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31142	7440-36-0	Antimony	Soil	6010B	mg/kg	0.33	B	31143	<5.6		NC
31142	7440-38-2	Arsenic	Soil	6010B	mg/kg	6.2		31143	2.8		75.6
31142	7440-39-3	Barium	Soil	6010B	mg/kg	55		31143	34.9		44.7
31142	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.33		31143	0.27		20.0
31142	7440-47-3	Chromium	Soil	6010B	mg/kg	33.8		31143	26.8		23.1
31142	7440-48-4	Cobalt	Soil	6010B	mg/kg	6.6		31143	4.6		35.7
31142	7440-50-8	Copper	Soil	6010B	mg/kg	16.5		31143	9		58.8
31142	7439-89-6	Iron	Soil	6010B	mg/kg	15900		31143	10800		38.2
31142	7439-92-1	Lead	Soil	6010B	mg/kg	19.8		31143	6.2		104.6
31142	7439-97-6	Mercury	Soil	7471A	mg/kg	0.15	B	31143	0.1	B	40.0
31142	7440-02-0	Nickel	Soil	6010B	mg/kg	31.9		31143	25.8		21.1
31142	7440-62-2	Vanadium	Soil	6010B	mg/kg	31.7		31143	20.4		43.4
31142	7440-66-6	Zinc	Soil	6010B	mg/kg	93.5		31143	53.7		54.1
31142	7732-18-5	Moisture	Soil	ASTM D 2216	%	9.8		31143	10		-2.0
31020	7440-36-0	Antimony	Soil	6010B	mg/kg	<5.3		31021	0.3	B	NC
31020	7440-38-2	Arsenic	Soil	6010B	mg/kg	14.2		31021	6.5		74.4
31020	7440-39-3	Barium	Soil	6010B	mg/kg	261		31021	211		21.2
31020	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.0065	B	31021	0.21		-188.0
31020	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.35		31021	0.24		37.3
31020	7440-47-3	Chromium	Soil	6010B	mg/kg	35.1		31021	28.6		20.4
31020	7440-48-4	Cobalt	Soil	6010B	mg/kg	14.4		31021	10.5		31.3
31020	7440-50-8	Copper	Soil	6010B	mg/kg	26.6		31021	40.5		-41.4
31020	7439-89-6	Iron	Soil	6010B	mg/kg	40700		31021	31000		27.1
31020	7439-92-1	Lead	Soil	6010B	mg/kg	17.7		31021	13		30.6
31020	7439-97-6	Mercury	Soil	6010B	mg/kg	0.48		31021	0.11		125.4
31020	7440-02-0	Nickel	Soil	6010B	mg/kg	60.5		31021	27.5		75.0
31020	7782-49-2	Selenium	Soil	6010B	mg/kg	1.7		31021	1.3		26.7
31020	7440-28-0	Thallium	Soil	6010B	mg/kg	2.3		31021	1.5		42.1
31020	7440-62-2	Vanadium	Soil	6010B	mg/kg	48.8		31021	41.5		16.2
31020	7440-66-6	Zinc	Soil	6010B	mg/kg	113		31021	87.7		25.2
31020	7732-18-5	Moisture	Soil	ASTM D 2216	%	5.2		31021	13.1		-86.3
31035	7440-36-0	Antimony	Soil	6010B	mg/kg	0.74	B	31036	<5.5	U	NC
31035	7440-38-2	Arsenic	Soil	6010B	mg/kg	9.7		31036	4.1		81.2
31035	7440-39-3	Barium	Soil	6010B	mg/kg	157		31036	65.8		81.9
31035	7440-41-7	Beryllium	Soil	6010B	mg/kg	<0.22	U	31036	0.31		NC
31035	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.1	B	31036	0.026	B	117.5
31035	7440-47-3	Chromium	Soil	6010B	mg/kg	29.9		31036	118		-119.1

Table F3b (continued)
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31035	7440-48-4	Cobalt	Soil	6010B	mg/kg	13.1		31036	20.4		-43.6
31035	7440-50-8	Copper	Soil	6010B	mg/kg	26.8		31036	15.3		54.6
31035	7439-89-6	Iron	Soil	6010B	mg/kg	22600		31036	24100		-6.4
31035	7439-92-1	Lead	Soil	6010B	mg/kg	12.5		31036	18.6		-39.2
31035	7439-97-6	Mercury	Soil	6010B	mg/kg	0.33		31036	1.2		-113.7
31035	7440-02-0	Nickel	Soil	6010B	mg/kg	53.9		31036	309		-140.6
31035	7782-49-2	Selenium	Soil	6010B	mg/kg	0.82		31036	0.55		39.4
31035	7440-28-0	Thallium	Soil	6010B	mg/kg	<0.55	U	31036	0.71		NC
31035	7440-62-2	Vanadium	Soil	6010B	mg/kg	26.7		31036	30.3		-12.6
31035	7440-66-6	Zinc	Soil	6010B	mg/kg	72.5		31036	55.9		25.9
31035	7732-18-5	Moisture	Soil	ASTM D 2216	%	8.8		31036	9.2		-4.4
31045	7440-36-0	Antimony	Soil	6010B	mg/kg	0.72	B	31046	2.5	B	-110.6
31045	7440-38-2	Arsenic	Soil	6010B	mg/kg	7.1		31046	36.5		-134.9
31045	7440-39-3	Barium	Soil	6010B	mg/kg	43.5		31046	479		-166.7
31045	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.089	B	31046	0.44		-132.7
31045	7440-47-3	Chromium	Soil	6010B	mg/kg	77.7		31046	28.4		92.9
31045	7440-48-4	Cobalt	Soil	6010B	mg/kg	12.3		31046	13.1		-6.3
31045	7440-50-8	Copper	Soil	6010B	mg/kg	41		31046	22.3		59.1
31045	7439-89-6	Iron	Soil	6010B	mg/kg	37700		31046	33000		13.3
31045	7439-92-1	Lead	Soil	6010B	mg/kg	14.9		31046	31.5		-71.6
31045	7439-97-6	Mercury	Soil	6010B	mg/kg	0.37		31046	1.1		-99.3
31045	7439-98-7	MOLYBDENUM	Soil	6010B	mg/kg	<0.27	U	31046	1.7		NC
31045	7440-02-0	Nickel	Soil	6010B	mg/kg	62.8		31046	30.1		70.4
31045	7782-49-2	Selenium	Soil	6010B	mg/kg	1.3		31046	0.44	B	98.9
31045	7440-28-0	Thallium	Soil	6010B	mg/kg	<0.67	U	31046	1.3		NC
31045	7440-62-2	Vanadium	Soil	6010B	mg/kg	63.5		31046	40.2		44.9
31045	7440-66-6	Zinc	Soil	6010B	mg/kg	106		31046	138		-26.2
31045	7732-18-5	Moisture	Soil	ASTM D 2216	%	24.8		31046	12.5		66.0
31068	7440-36-0	Antimony	Soil	6010B	mg/kg	2.1	B	31067	<8.5	U	NC
31068	7440-38-2	Arsenic	Soil	6010B	mg/kg	12.5		31067	6.2		67.4
31068	7440-39-3	Barium	Soil	6010B	mg/kg	110		31067	102		7.5
31068	7440-43-9	Cadmium	Soil	6010B	mg/kg	<0.30	U	31067	0.08	B	NC
31068	7440-47-3	Chromium	Soil	6010B	mg/kg	94.1		31067	91.6		2.7
31068	7440-48-4	Cobalt	Soil	6010B	mg/kg	12.8		31067	11.8		8.1
31068	7440-50-8	Copper	Soil	6010B	mg/kg	70.9		31067	34.1		70.1
31068	7439-89-6	Iron	Soil	6010B	mg/kg	44000		31067	39700		10.3
31068	7439-92-1	Lead	Soil	6010B	mg/kg	50.5		31067	13.4		116.1

Table F3b (continued)
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31068	7439-97-6	Mercury	Soil	6010B	mg/kg	0.38		31067	0.43		-12.3
31068	7439-98-7	Molybdenum	Soil	6010B	mg/kg	0.47		31067	<0.34	U	NC
31068	7440-02-0	Nickel	Soil	6010B	mg/kg	78		31067	77.2		1.0
31068	7440-28-0	Thallium	Soil	6010B	mg/kg	<0.76	U	31067	1.4		NC
31068	7440-62-2	Vanadium	Soil	6010B	mg/kg	74.2		31067	72.1		2.9
31068	7440-66-6	Zinc	Soil	6010B	mg/kg	114		31067	87.1		26.8
31068	7732-18-5	Moisture	Soil	ASTM D 2216	%	34.3		31067	41.4		-18.8
31055	7440-36-0	Antimony	Soil	6010B	mg/kg	<5.5	U	31056	0.32	B	NC
31055	7440-38-2	Arsenic	Soil	6010B	mg/kg	6.9		31056	6.8		1.5
31055	7440-39-3	Barium	Soil	6010B	mg/kg	135		31056	78		53.5
31055	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.17		31056	0.11		42.9
31055	7440-47-3	Chromium	Soil	6010B	mg/kg	63.8		31056	48.4		27.5
31055	7440-48-4	Cobalt	Soil	6010B	mg/kg	18.6		31056	11.3		48.8
31055	7440-50-8	Copper	Soil	6010B	mg/kg	35.8		31056	21.5		49.9
31055	7439-89-6	Iron	Soil	6010B	mg/kg	31000		31056	21000		38.5
31055	7439-92-1	Lead	Soil	6010B	mg/kg	13.4		31056	13		3.0
31055	7439-97-6	Mercury	Soil	6010B	mg/kg	0.75		31056	0.51		38.1
31055	7440-02-0	Nickel	Soil	6010B	mg/kg	141		31056	73.8		62.6
31055	7440-28-0	Thallium	Soil	6010B	mg/kg	0.99		31056	<0.55		NC
31055	7440-62-2	Vanadium	Soil	6010B	mg/kg	55.9		31056	38.7		36.4
31055	7440-66-6	Zinc	Soil	6010B	mg/kg	70.2		31056	53.8		26.5
31055	7732-18-5	Moisture	Soil	ASTM D 2216	%	9.3		31056	8.7		6.7
31078	7440-36-0	Antimony	Soil	6010B	mg/kg	<5.6		31079	2.7	F	NC
31078	7440-38-2	Arsenic	Soil	6010B	mg/kg	10.2		31079	13.4		-27.1
31078	7440-39-3	Barium	Soil	6010B	mg/kg	161		31079	141		13.2
31078	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.13	F	31079	<0.22		NC
31078	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.26		31079	0.53		-68.4
31078	7440-47-3	Chromium	Soil	6010B	mg/kg	45.5		31079	34.6		27.2
31078	7440-48-4	Cobalt	Soil	6010B	mg/kg	14.3		31079	10.6		29.7
31078	7440-50-8	Copper	Soil	6010B	mg/kg	41.6		31079	26.6		44.0
31078	7439-89-6	Iron	Soil	6010B	mg/kg	39500		31079	26400		39.8
31078	7439-92-1	Lead	Soil	6010B	mg/kg	17.6		31079	114		-146.5
31078	7439-97-6	Mercury	Soil	6010B	mg/kg	0.55		31079	0.33		50.0
31078	7440-02-0	Nickel	Soil	6010B	mg/kg	72.3		31079	34.4		71.0
31078	7440-28-0	Thallium	Soil	6010B	mg/kg	0.82		31079	1.6		-64.5
31078	7440-62-2	Vanadium	Soil	6010B	mg/kg	51.7		31079	38.6		29.0
31078	7440-66-6	Zinc	Soil	6010B	mg/kg	98.1		31079	129		-27.2

Table F3b (continued)
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31078	7732-18-5	Moisture	Soil	ASTM D 2216	%	10		31079	8.2		19.8
31088	7440-36-0	Antimony	Soil	6010B	mg/kg	<5.6		31089	0.69	F	NC
31088	7440-38-2	Arsenic	Soil	6010B	mg/kg	3.4		31089	2.4		34.5
31088	7440-39-3	Barium	Soil	6010B	mg/kg	56.3		31089	56		0.5
31088	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.096	F	31089	0.22	F	-78.5
31088	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.096	F	31089	0.092	F	4.3
31088	7440-47-3	Chromium	Soil	6010B	mg/kg	39.4		31089	44.5		-12.2
31088	7440-48-4	Cobalt	Soil	6010B	mg/kg	10.8		31089	10.1		6.7
31088	7440-50-8	Copper	Soil	6010B	mg/kg	33.2		31089	20.5		47.3
31088	7439-89-6	Iron	Soil	6010B	mg/kg	23700		31089	17800		28.4
31088	7439-92-1	Lead	Soil	6010B	mg/kg	11.7		31089	12.9		-9.8
31088	7439-97-6	Mercury	Soil	6010B	mg/kg	1		31089	1.1		-9.5
31088	7440-02-0	Nickel	Soil	6010B	mg/kg	68.7		31089	78.2		-12.9
31088	7440-62-2	Vanadium	Soil	6010B	mg/kg	52		31089	31.8		48.2
31088	7440-66-6	Zinc	Soil	6010B	mg/kg	56.4		31089	49.1		13.8
31088	7732-18-5	Moisture	Soil	ASTM D 2216	%	10.2		31089	16.7		-48.3
31110	7440-36-0	Antimony	Soil	6010B	mg/kg	1.5	B	31111	<5.5	U	NC
31110	7440-38-2	Arsenic	Soil	6010B	mg/kg	6.2		31111	3.6		53.1
31110	7440-39-3	Barium	Soil	6010B	mg/kg	30.9		31111	41.3		-28.8
31110	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.22		31111	0.068	B	105.6
31110	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.071		31111	0.042	B	51.3
31110	7440-47-3	Chromium	Soil	6010B	mg/kg	32.3		31111	40.5		-22.5
31110	7440-48-4	Cobalt	Soil	6010B	mg/kg	10.5		31111	9.5		10.0
31110	7440-50-8	Copper	Soil	6010B	mg/kg	12.9		31111	12.5		3.1
31110	7439-89-6	Iron	Soil	6010B	mg/kg	12700		31111	13800		-8.3
31110	7439-92-1	Lead	Soil	6010B	mg/kg	13.9		31111	9.4		38.6
31110	7439-97-6	Mercury	Soil	6010B	mg/kg	0.21	B	31111	0.11	B	62.5
31110	7440-02-0	Nickel	Soil	6010B	mg/kg	34.5		31111	31.9		7.8
31110	7440-62-2	Vanadium	Soil	6010B	mg/kg	20.9		31111	27.6		-27.6
31110	7440-66-6	Zinc	Soil	6010B	mg/kg	33.1		31111	34.7		-4.7
31110	7732-18-5	Moisture	Soil	ASTM D 2216	%	12.4		31111	8.6		36.2
31099	7440-36-0	Antimony	Soil	6010B	mg/kg	<5.7	U	31100	0.36	B	NC
31099	7440-38-2	Arsenic	Soil	6010B	mg/kg	3.5		31100	4.2		-18.2
31099	7440-39-3	Barium	Soil	6010B	mg/kg	70		31100	81.4		-15.1
31099	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.53		31100	0.54		-1.9
31099	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.023	B	31100	<0.23	U	NC
31099	7440-47-3	Chromium	Soil	6010B	mg/kg	22.7		31100	42.5		-60.7

Table F3b (continued)
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31099	7440-48-4	Cobalt	Soil	6010B	mg/kg	10.5		31100	11.7		-10.8
31099	7440-50-8	Copper	Soil	6010B	mg/kg	10.8		31100	10.3		4.7
31099	7439-89-6	Iron	Soil	6010B	mg/kg	18100		31100	18300		-1.1
31099	7439-92-1	Lead	Soil	6010B	mg/kg	8.9		31100	8.6		3.4
31099	7439-97-6	Mercury	Soil	6010B	mg/kg	0.57		31100	1.2		-71.2
31099	7440-02-0	Nickel	Soil	6010B	mg/kg	55.7		31100	89.5		-46.6
31099	7440-62-2	Vanadium	Soil	6010B	mg/kg	25.2		31100	29.3		-15.0
31099	7440-66-6	Zinc	Soil	6010B	mg/kg	42.8		31100	41.1		4.1
31099	7732-18-5	Moisture	Soil	ASTM D 2216	%	12.4		31100	13.3		-7.0
31012	7440-36-0	Antimony	Soil	6010B	mg/kg	5.2	U	31013	5.2	U	0.0
31012	7440-38-2	Arsenic	Soil	6010B	mg/kg	9.7	J	31013	2		131.6
31012	7440-39-3	Barium	Soil	6010B	mg/kg	90.3	J	31013	47		63.1
31012	7440-41-7	Beryllium	Soil	6010B	mg/kg	0.33	J	31013	0.21	U	44.4
31012	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.066	J	31013	0.21	U	-104.3
31012	7440-47-3	Chromium	Soil	6010B	mg/kg	73.1	J	31013	30.3	J	82.8
31012	7440-48-4	Cobalt	Soil	6010B	mg/kg	15.3	J	31013	4.7		106.0
31012	7440-50-8	Copper	Soil	6010B	mg/kg	27.8	J	31013	4.9		140.1
31012	7439-89-6	Iron	Soil	6010B	mg/kg	25300	J	31013	8000		103.9
31012	7439-92-1	Lead	Soil	6010B	mg/kg	8.9	J	31013	1.9		129.6
31012	7439-97-6	Mercury	Soil	6010B	mg/kg	0.22	J	31013	0.041	J	137.2
31012	7440-02-0	Nickel	Soil	6010B	mg/kg	69.1	J	31013	23.6	J	98.2
31012	7782-49-2	Selenium	Soil	6010B	mg/kg	0.88	J	31013	0.71	J	21.4
31012	7440-28-0	Thallium	Soil	6010B	mg/kg	0.67	UJ	31013	0.52	U	25.2
31012	7440-62-2	Vanadium	Soil	6010B	mg/kg	52.6	J	31013	19.3		92.6
31012	7440-66-6	Zinc	Soil	6010B	mg/kg	86.3	J	31013	15.6		138.8
31012	7732-18-5	Moisture	Soil	ASTM D 2216	%	4.6		31013	4.7		-2.2
31012		Ph				8.43		31013	8.55		-1.4
31012	108-88-3	Toluene	Soil	8260B	mg/kg	0.0053	UJ	31013	0.0054	UJ	-1.9
31012	156-60-5	Trans-1,2-Dichloroethene	Soil	8260B	mg/kg	0.0053	UJ	31013	0.0054	UJ	-1.9
31121	7440-38-2	Arsenic	Soil	6010B	mg/kg	13.9		31122	13.8		0.7
31121	7440-39-3	Barium	Soil	6010B	mg/kg	118		31122	105		11.7
31121	7440-43-9	Cadmium	Soil	6010B	mg/kg	0.017	J	31122	0.083	J	-132.0
31121	7440-47-3	Chromium	Soil	6010B	mg/kg	99.4		31122	98.2		1.2
31121	7440-48-4	Cobalt	Soil	6010B	mg/kg	13.2		31122	14.6	J	-10.1
31121	7440-50-8	Copper	Soil	6010B	mg/kg	48.5		31122	47.6		1.9
31121	7439-89-6	Iron	Soil	6010B	mg/kg	52000	J	31122	49200	J	5.5

Table F3b (continued)
Soil Sample Duplicate Results

Parent Sample ID	CAS Number	Chemical Name	Matrix	Analytical Method	Units	Parent Result	Parent Qualifier	Duplicate Sample ID	Duplicate Result	Duplicate Qualifier	RPD
31121	7439-92-1	Lead	Soil	6010B	mg/kg	42.7	J	31122	42.1	J	1.4
31121	7439-97-6	Mercury	Soil	6010B	mg/kg	0.94	J	31122	0.47		66.7
31121	7439-98-7	Molybdenum	Soil	6010B	mg/kg	0.26	UJ	31122	0.3U		NC
31121	7440-02-0	Nickel	Soil	6010B	mg/kg	81.9	J	31122	80.7	J	1.5
31121	7440-28-0	Thallium	Soil	6010B	mg/kg	0.65	UJ	31122	0.66	UJ	-1.5
31121	7440-62-2	Vanadium	Soil	6010B	mg/kg	74.9		31122	74		1.2
31121	7440-66-6	Zinc	Soil	6010B	mg/kg	104		31122	105		-1.0
31121	7732-18-5	Moisture	Soil	ASTM D 2216	%	23.6		31122	24.6		-4.1
31121		Ph				5.71		31122	6.07		-6.1
31121	1031-07-8	Endosulfan Sulfate	Soil	8081A	mg/kg	0.065	UJ	31122	0.0066	UJ	163.1
31121	319-84-6	A-BHC	Soil	8081A	mg/kg	0.022	UJ	31122	0.0023	UJ	162.1
31121	71-43-2	Benzene	Soil	8260B	mg/kg	0.003	J	31122	0.003	J	0.0
31121	74-87-3	Chloromethane	Soil	8260B	mg/kg	0.0068	UJ	31122	0.0065	UJ	4.5
31121	75-09-2	Dichloromethane	Soil	8260B	mg/kg	0.0068		31122	0.0065		4.5
31121	100-01-6	P-Nitroaniline	Soil	8260B	mg/kg	3.3	UJ	31122	330	UJ*	-196.0
31121	111-44-4	BIS(2-Chloroethyl)ether	Soil	8260B	mg/kg	0.65	UJ	31122	66	UJ*	-196.1
31121	118-74-1	Hexachlorobenzene	Soil	8260B	mg/kg	0.65	UJ	31122	66	UJ*	-196.1
31121	621-64-7	N-Nitrosodi-N-Propylamine	Soil	8260B	mg/kg	0.65	U	31122	66	UJ*	-196.1

Notes:

NC = Not calculated, result below detection limit in parent or duplicate sample

UJ* = Sample results are from a dilution

ID = Identification

RPD = Relative percent difference

mg/kg = Milligram per kilogram

Table F4a
Trip Blank Results

Sample ID	Analysis Date	Analytes Detected
31150 (SDG 4724)	11/17/2005	All nondetect
31151 (SDG 4723)	11/17/2005	All nondetect
31152 (SDG 4743)	11/17/2005	All nondetect
31153 (SDG 4742)	11/10/2005	All nondetect
31200 (SDG 4607)	11/2/2005	All nondetect
31201 (SDG 4614)	11/2/2005	All nondetect
31205 (SDG 4665)	11/16/2005	All nondetect
31206 (SDG 4665)	11/16/2005	All nondetect
31207 (SDG 4665)	11/16/2005	All nondetect
31202 (SDG 4651)	11/9/2005	All nondetect
31203 (SDG 4651)	11/9/2005	All nondetect
31204 (SDG 4651)	11/9/2005	All nondetect
31208 (SDG 4668)	11/15/2005	All nondetect
31209 (SDG 4680)	11/15/2005	All nondetect
31210 (SDG 4679)	11/15/2005	All nondetect
31211 (SDG 4681)	11/15/2005	All nondetect
31212 (SDG 4681)	11/15/2005	All nondetect
31213 (SDG 4681)	1/15/2005	All nondetect
31214 (SDG 4703)	11/8/2005	All nondetect
31215 (SDG 4702)	11/8/2005	All nondetect

Notes:

ID = Identification

SDG = Sample Delivery Group

Table F4b
Equipment Blank Hits

Sample ID	Sample Date	Analysis	CAS Number	Chemical Name	Result	RL	Qualifiers	Units
31050 (SDG 4665)	11/4/2005	6010B	7440-36-0	Antimony	6.8	10	B	ug/L
				MAX Value	**6.8**			
31050 (SDG 4665)	11/4/2005	6010B	7440-39-3	Barium	4.1	10	B	ug/L
31051 (SDG 4665)	11/4/2005	6010B	7440-39-3	Barium	9.6	10	B	ug/L
31155 (SDG 4742)		6010B	7440-39-3	Barium	1.3		J	ug/L
31168 (SDG 4743)		6010B	7440-39-3	Barium	0.82		J	ug/L
				MAX Value	**9.6**			
31051 (SDG 4665)	11/4/2005	6010B	7440-41-7	Beryllium	0.078	2	B	ug/L
31076 (SDG 4680)	11/6/2005	6010B	7440-41-7	Beryllium	0.078	2	B	ug/L
				MAX Value	**0.078**			
31168 (SDG 4743)		6010B	7440-43-9	Cadmium	11.6			ug/L
				MAX Value	**11.6**			
31050 (SDG 4665)	11/4/2005	6010B	7440-47-3	Chromium	0.78	5	B	ug/L
31051 (SDG 4665)	11/4/2005	6010B	7440-47-3	Chromium	4.9	5	B	ug/L
31155 (SDG 4742)		6010B	7440-47-3	Chromium	2		J	ug/L
31168 (SDG 4743)		6010B	7440-47-3	Chromium	1		J	ug/L
				MAX Value	**4.9**			
31051 (SDG 4665)	11/4/2005	6010B	7440-48-4	Cobalt	0.84	5	B	ug/L
				MAX Value	**0.84**			

Table F4b (continued)
Equipment Blank Hits

Sample ID	Sample Date	Analysis	CAS Number	Chemical Name	Result	RL	Qualifiers	Units
31050 (SDG 4665)	11/4/2005	6010B	7440-50-8	Copper	1.9	10	B	ug/L
31051 (SDG 4665)	11/4/2005	6010B	7440-50-8	Copper	3.3	10	B	ug/L
				MAX Value	**3.3**			
31050 (SDG 4665)	11/4/2005	6010B	7439-89-6	Iron	267	50		ug/L
31051 (SDG 4665)	11/4/2005	6010B	7439-89-6	Iron	1560	50		ug/L
31076 (SDG 4680)	11/6/2005	6010B	7439-89-6	Iron	55.7	50		ug/L
31155 (SDG 4742)		6010B	7439-89-6	Iron	264			ug/L
31168 (SDG 4743)		6010B	7439-89-6	Iron	21.3		J	ug/L
				MAX Value	**1560**			
31155 (SDG 4742)		6010B	7439-92-1	Lead	27.9			ug/L
31168 (SDG 4743)		6010B	7439-92-1	Lead	71			ug/L
				MAX Value	**71**			
31051 (SDG 4665)	11/4/2005	6010B	7439-98-7	Molybdenum	1.5	5	B	ug/L
				MAX Value	**1.5**			
31050 (SDG 4665)	11/4/2005	6010B	7440-02-0	Nickel	2.3	5	B	ug/L
31051 (SDG 4665)	11/4/2005	6010B	7440-02-0	Nickel	9.6	5		ug/L
31155 (SDG 4742)		6010B	7440-02-0	Nickel	0.8		J	ug/L
31168 (SDG 4743)		6010B	7440-02-0	Nickel	0.74		J	ug/L
				MAX Value	**9.6**			
31050 (SDG 4665)	11/4/2005	6010B	7440-22-4	Silver	1.4	10	B	ug/L
				MAX Value	**1.4**			

Table F4b (continued)
Equipment Blank Hits

Sample ID	Sample Date	Analysis	CAS Number	Chemical Name	Result	RL	Qualifiers	Units
31051 (SDG 4665)	11/4/2005	6010B	7440-23-5	Selenium	3.7	10	B	ug/L
31076 (SDG 4680)	11/6/2005	6010B	7440-23-5	Selenium	4.5	10	B	ug/L
				MAX Value	**4.5**			
31051 (SDG 4665)	11/4/2005	6010B	7440-28-0	Thallium	3.5	10	B	ug/L
				MAX Value	**3.5**			
31050 (SDG 4665)	11/4/2005	6010B	7440-62-2	Vanadium	0.94	10	B	ug/L
31051 (SDG 4665)	11/4/2005	6010B	7440-62-2	Vanadium	2.6	10	B	ug/L
31076 (SDG 4680)	11/6/2005	6010B	7440-62-2	Vanadium	1.6	10	B	ug/L
				MAX Value	**2.6**			
31051 (SDG 4665)	11/4/2005	6010B	7440-66-6	Zinc	17.9	10		ug/L
				MAX Value	**17.9**			
31050 (SDG 4665)	11/4/2005	7470A	7439-97-6	Mercury	0.061	0.5	B	ug/L
31051 (SDG 4665)	11/4/2005	7470A	7439-97-6	Mercury	0.098	0.5	B	ug/L
31076 (SDG 4680)	11/6/2005	7470A	7439-97-6	Mercury	0.091	0.5	B	ug/L
31168 (SDG 4743)		7470A	7439-97-6	Mercury	0.28		J	ug/L
				MAX Value	**0.28**			
31076 (SDG 4680)	11/6/2005	8260B	67-66-3	Chloroform	0.6	5		ug/L
31168 (SDG 4743)		8260B	67-66-3	Chloroform	0.4		J	ug/L
				MAX Value	**0.6**			
31155 (SDG 4742)		8260B	127-18-4	Tetrachloroethene	0.4		J	ug/L

Table F4b (continued)
Equipment Blank Hits

Sample ID	Sample Date	Analysis	CAS Number	Chemical Name	Result	RL	Qualifiers	Units
				MAX Value	**0.4**			
31155 (SDG 4742)		8270C	100-01-6	P-Nitroaniline	50		UJ	ug/L
				MAX Value	**50**			
31168 (SDG 4743)		8081A	8001-35-2	Camphechlor	10		UJ	ug/L
				MAX Value	**10**			

Notes:

ID = Identification

SDG = Sample Delivery Group

RL = Reporting Limit

Max = Maximum

ug/L = Micrograms per liter

Table 4c
Source Blank Hits

Sample ID	Sample Date	Analysis	CAS Number	Chemical Name	Result	RL	Qualifiers	Units
31077	11/15/2005	6010B	7782-49-2	Selenium	4.6	10	B	ug/L
				MAX Value	**4.6**			
31077	11/15/2005	6010B	7440-22-4	Silver	1.7	10	B	ug/L
				MAX Value	**1.7**			
31077	11/15/2005	7470A	7439-97-6	Mercury	0.98	0.5		ug/L
				MAX Value	**0.98**			
31077	11/15/2005	8260B	67-66-3	Chloroform	0.6	0.5		ug/L
				MAX Value	**0.6**			
31077	11/15/2005	8260B	127-18-4	Tetrachloroethene	0.4	0.5	J	ug/L
				MAX Value	**0.4**			

Notes:

ID = Identification

RL = Reporting Limit

ug/L = Micrograms per liter

MAX = Maximum

N00236.002789
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX F2
DATA VALIDATION REPORTS

FINAL SOIL REMEDIAL INVESTIGATION REPORT FOR MARINA VILLAGE HOUSING

DATED 1 AUGUST 2007

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

CDM Federal
9444 Farnham Road, Suite 210
San Diego, CA 92123
ATTN: Mr. Mike Allen

December 16, 2005

SUBJECT: NAS Alameda Point Data Validation

Dear Mr. Allen,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 2, 2005.

LDC Project # 14354:

SDG #	Fraction
05-4607	Volatiles (EPA Method SW 846 8260B) Semivolatiles (EPA Method SW 846 8270C) Pesticides (EPA Method SW 846 8081A) Polychlorinated Biphenyls (EPA Method SW 846 8082B) Metals (EPA Method SW 846 6010B/7471A)

The following deliverables are submitted under this report:

- Attachment I — Sample ID Cross Reference and Data Review Level
- Attachment II — CDM Database Qualification Summary
- Attachment III — Overall Data Qualification Summary
- Enclosure I — EPA Level III ADR Outliers

The data validation was performed in accordance with the U.S. EPA National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience. The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Initial Calibration
- Continuing Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Detection and Quantitation Limits
- Field QC Samples

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda Rauto
Operations Manager/Senior Chemist

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
01-Nov-2005	31001	05-4607-1	N	3050B	6010B	III
01-Nov-2005	31001	05-4607-1	N	3550B	8081A	III
01-Nov-2005	31001	05-4607-1	N	3550B	8082	III
01-Nov-2005	31001	05-4607-1	N	3550B	8270C	III
01-Nov-2005	31001	05-4607-1	N	5035	8260B	III
01-Nov-2005	31001	05-4607-1	N	7471A	7471A	III
01-Nov-2005	31001	05-4607-1DL	N	3050B	6010B	III
01-Nov-2005	31002	05-4607-2	N	3050B	6010B	III
01-Nov-2005	31002	05-4607-2	N	3550B	8081A	III
01-Nov-2005	31002	05-4607-2	N	3550B	8082	III
01-Nov-2005	31002	05-4607-2	N	3550B	8270C	III
01-Nov-2005	31002	05-4607-2	N	5035	8260B	III
01-Nov-2005	31002	05-4607-2	N	7471A	7471A	III
01-Nov-2005	31003	05-4607-3	N	3050B	6010B	III
01-Nov-2005	31003	05-4607-3	N	3550B	8081A	III
01-Nov-2005	31003	05-4607-3	N	3550B	8082	III
01-Nov-2005	31003	05-4607-3	N	3550B	8270C	III
01-Nov-2005	31003	05-4607-3	N	5035	8260B	III
01-Nov-2005	31003	05-4607-3	N	7471A	7471A	III
01-Nov-2005	31003	05-4607-3DL	N	3050B	6010B	III
01-Nov-2005	31003DUP	05-4607-3MD	DUP	3050B	6010B	III
01-Nov-2005	31003DUP	05-4607-3MD	DUP	7471A	7471A	III
01-Nov-2005	31003MS	05-4607-3MS	MS	3050B	6010B	III
01-Nov-2005	31003MS	05-4607-3MS	MS	7471A	7471A	III
01-Nov-2005	31003MSD	05-4607-3MSD	MSD	3050B	6010B	III
01-Nov-2005	31003MSD	05-4607-3MSD	MSD	7471A	7471A	III

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
01-Nov-2005	31200	05-4607-4	TB	5030B	8260B	III

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal Programs

Project No # : 14354

Reason for Qualified Results

SDG Nos. : 54607

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54607	31001	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54607	31001	6010B	7440020	J		NICKEL	Matrix spike recovery
54607	31001	6010B	7782492	J		SELENIUM	Lab Duplicate Difference
54607	31001	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54607	31002	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54607	31002	6010B	7440020	J		NICKEL	Matrix spike recovery
54607	31002	6010B	7782492	J		SELENIUM	Lab Duplicate Difference
54607	31002	6010B	7440280	U		THALLIUM	Present in method blank
54607	31002	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54607	31003	6010B	7440417	U		BERYLLIUM	Present in method blank
54607	31003	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54607	31003	6010B	7440020	J		NICKEL	Matrix spike recovery
54607	31003	6010B	7782492	J		SELENIUM	Lab Duplicate Difference
54607	31003	6010B	7440280	U		THALLIUM	Present in method blank
54607	31003	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54607										
6010B	31001	SO	N							
				ANTIMONY	5.5	3.2B		J	mg/kg	
				BERYLLIUM	0.22	0.14B		J	mg/kg	
				CHROMIUM	0.55	20.0		J	mg/kg	
				NICKEL	0.33	17.1		J	mg/kg	
				SELENIUM	0.55	3.0		J	mg/kg	
6010B	31002	SO	N							
				CADMIUM	0.24	0.12B		J	mg/kg	
				CHROMIUM	0.61	106		J	mg/kg	
				NICKEL	0.37	200		J	mg/kg	
				SELENIUM	0.61	3.1		J	mg/kg	
				THALLIUM	0.61	0.26B		U	mg/kg	
6010B	31003	SO	N							
				ANTIMONY	5.7	1.2B		J	mg/kg	
				BERYLLIUM	0.23	0.0095B		U	mg/kg	
				CHROMIUM	0.57	73.1		J	mg/kg	
				NICKEL	0.34	111		J	mg/kg	
				SELENIUM	0.57	1.3		J	mg/kg	
				THALLIUM	0.57	0.85		U	mg/kg	
8260B	31001	SO	N							
				DICHLORODIFLUOROMETHANE	0.0044	0.0044U		UJ	mg/kg	
8260B	31002	SO	N							
				DICHLORODIFLUOROMETHANE	0.0050	0.0050U		UJ	mg/kg	
8260B	31003	SO	N							
				DICHLORODIFLUOROMETHANE	0.0050	0.0050U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4607

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3351- 2 **Analysis Method :** 8260B **Analysis Date :** 11/04/2005

Lab Reporting Batch : 54607 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
DICHLORODIFLUOROMETHANE	0.128	-30.1	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31001	05-4607-1
31002	05-4607-2
31003	05-4607-3

Matrix Spike / Matrix Spike Duplicate Recovery and RPD Outlier Report

Method Batch : 05M2105L **Analysis Method :** 6010B **Analysis Date :** 11/04/2005
Preparation Batch : 05M2105L **Preparation Type :** 3050B **Preparation Date :** 11/04/2005
Lab Reporting Batch : 54607 **Lab ID:** APCL

				Reported *		Project Limits (Percent)			
Client Sample ID	**Lab Sample ID**	**Matrix**	**Analyte Name**	**Percent Recovery**	**RPD**	**Rejection Point****	**Lower Limit**	**Upper Limit**	**RPD**
31003MS	05-4607-3MS	SO	CHROMIUM	131		30.00	75.00	125.00	20.00
			NICKEL	154		30.00	75.00	125.00	20.00
31003MSD	05-4607-3MSD		CHROMIUM	131		30.00	75.00	125.00	20.00
			NICKEL	154		30.00	75.00	125.00	20.00

Associated Samples: All samples in Method Batch

Client Sample ID	Lab Sample ID
31001	05-4607-1DL
31001	05-4607-1
31002	05-4607-2
31003	05-4607-3DL
31003	05-4607-3

Only those Percent Recovery and/or RPD values outside project limits are listed in this report.
** Metal are also assessed against an upper rejection point of 150 percent for waters and 200 percent for soils and sediments

Project Number and Name: 6218.086 - Alameda Pt

Matrix Duplicate Difference Outlier Report

Method Batch : 05M2105L
Preparation Batch : 05M2105L
Lab Reporting Batch : 54607

Analysis Method : 6010B
Preparation Type : 3050B
Lab ID: APCL

Analysis Date : 11/04/2005
Preparation Date : 11/04/2005

Client Sample ID	Lab Sample ID	Matrix	Analyte Name	Difference	Limit
31003DUP	05-4607-3DUP	SO	SELENIUM	1.49 mg/Kg	1.14 mg/Kg

Associated Samples: All samples in Method Batch

Client Sample ID	Lab Sample ID
31001	05-4607-1
31002	05-4607-2
31003	05-4607-3

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05M2105L **Analysis Method :** 6010B **Analysis Date : 11/04/2005**
Lab ID: APCL

Analyte Name	Concentration	Blank ID
Beryllium	0.093 ug/L	ICB/CCB
Thallium	4.645 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Thallium	0.26 mg/Kg	31002	05-4607-2
Beryllium	0.0095 mg/Kg	31003	05-4607-3
Thallium	0.85 mg/Kg	31003	05-4607-3

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54607 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31001	05-4607-1	6010B	SO	ANTIMONY	B	3.2	5.5	mg/kg
				BERYLLIUM	B	0.14	0.22	mg/kg
31002	05-4607-2			CADMIUM	B	0.12	0.24	mg/kg
				THALLIUM	B	0.26	0.61	mg/kg
31003	05-4607-3			ANTIMONY	B	1.2	5.7	mg/kg
				BERYLLIUM	B	0.0095	0.23	mg/kg

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

CDM Federal
9444 Farnham Road, Suite 210
San Diego, CA 92123
ATTN: Mr. Mike Allen

December 22, 2005

SUBJECT: NAS Alameda Point Data Validation

Dear Mr. Allen,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 7, 2005.

LDC Project # 14378:

SDG #	Fraction
05-4614, 05-4703	Volatiles (EPA Method SW 846 8260B) Semivolatiles (EPA Method SW 846 8270C) Pesticides (EPA Method SW 846 8081A) Polychlorinated Biphenyls (EPA Method SW 846 8082B) Metals (EPA Method SW 846 6010B/7471A)

The following deliverables are submitted under this report:

- Attachment I — Sample ID Cross Reference and Data Review Level
- Attachment II — CDM Database Qualification Summary
- Attachment III — Overall Data Qualification Summary
- Enclosure I — EPA Level III ADR Outliers
- Enclosure II — EPA Level IV Validation Reports

The data validation was performed in accordance with the U.S. EPA National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience. The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Initial Calibration
- Continuing Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Detection and Quantitation Limits
- Field QC Samples

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda Rauto
Operations Manager/Senior Chemist

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
02-Nov-2005	31004	05-4614-1	N	3050B	6010B	3
02-Nov-2005	31004	05-4614-1	N	3550B	8081A	3
02-Nov-2005	31004	05-4614-1	N	3550B	8082	3
02-Nov-2005	31004	05-4614-1	N	3550B	8270C	3
02-Nov-2005	31004	05-4614-1	N	5035	8260B	3
02-Nov-2005	31004	05-4614-1	N	7471A	7471A	3
02-Nov-2005	31013	05-4614-10	FD	3050B	6010B	3
02-Nov-2005	31013	05-4614-10	FD	3550B	8081A	3
02-Nov-2005	31013	05-4614-10	FD	3550B	8082	3
02-Nov-2005	31013	05-4614-10	FD	3550B	8270C	3
02-Nov-2005	31013	05-4614-10	FD	5035	8260B	3
02-Nov-2005	31013	05-4614-10	FD	7471A	7471A	3
02-Nov-2005	31013MS	05-4614-10MS	MS	3550B	8081A	3
02-Nov-2005	31013MS	05-4614-10MS	MS	3550B	8082	3
02-Nov-2005	31013MS	05-4614-10MS	MS	3550B	8270C	3
02-Nov-2005	31013MSD	05-4614-10MSD	MSD	3550B	8081A	3
02-Nov-2005	31013MSD	05-4614-10MSD	MSD	3550B	8082	3
02-Nov-2005	31013MSD	05-4614-10MSD	MSD	3550B	8270C	3
02-Nov-2005	31201	05-4614-11	TB	5030B	8260B	3
02-Nov-2005	31005	05-4614-2	N	3050B	6010B	3
02-Nov-2005	31005	05-4614-2	N	3550B	8081A	3
02-Nov-2005	31005	05-4614-2	N	3550B	8082	3
02-Nov-2005	31005	05-4614-2	N	3550B	8270C	3
02-Nov-2005	31005	05-4614-2	N	5035	8260B	3
02-Nov-2005	31005	05-4614-2	N	7471A	7471A	3
02-Nov-2005	31006	05-4614-3	N	3050B	6010B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
02-Nov-2005	31006	05-4614-3	N	3550B	8081A	3
02-Nov-2005	31006	05-4614-3	N	3550B	8082	3
02-Nov-2005	31006	05-4614-3	N	3550B	8270C	3
02-Nov-2005	31006	05-4614-3	N	5035	8260B	3
02-Nov-2005	31006	05-4614-3	N	7471A	7471A	3
02-Nov-2005	31007	05-4614-4	N	3050B	6010B	3
02-Nov-2005	31007	05-4614-4	N	3550B	8081A	3
02-Nov-2005	31007	05-4614-4	N	3550B	8082	3
02-Nov-2005	31007	05-4614-4	N	3550B	8270C	3
02-Nov-2005	31007	05-4614-4	N	5035	8260B	3
02-Nov-2005	31007	05-4614-4	N	7471A	7471A	3
02-Nov-2005	31008	05-4614-5	N	3050B	6010B	3
02-Nov-2005	31008	05-4614-5	N	3550B	8081A	3
02-Nov-2005	31008	05-4614-5	N	3550B	8082	3
02-Nov-2005	31008	05-4614-5	N	3550B	8270C	3
02-Nov-2005	31008	05-4614-5	N	5035	8260B	3
02-Nov-2005	31008	05-4614-5	N	7471A	7471A	3
02-Nov-2005	31009	05-4614-6	N	3050B	6010B	3
02-Nov-2005	31009	05-4614-6	N	3550B	8081A	3
02-Nov-2005	31009	05-4614-6	N	3550B	8082	3
02-Nov-2005	31009	05-4614-6	N	3550B	8270C	3
02-Nov-2005	31009	05-4614-6	N	5035	8260B	3
02-Nov-2005	31009	05-4614-6	N	7471A	7471A	3
02-Nov-2005	31010	05-4614-7	N	3050B	6010B	3
02-Nov-2005	31010	05-4614-7	N	3550B	8081A	3
02-Nov-2005	31010	05-4614-7	N	3550B	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
02-Nov-2005	31010	05-4614-7	N	3550B	8270C	3
02-Nov-2005	31010	05-4614-7	N	5035	8260B	3
02-Nov-2005	31010	05-4614-7	N	7471A	7471A	3
02-Nov-2005	31010MS	05-4614-7MS	MS	5035	8260B	3
02-Nov-2005	31010MSD	05-4614-7MSD	MSD	5035	8260B	3
02-Nov-2005	31011	05-4614-8	N	3050B	6010B	3
02-Nov-2005	31011	05-4614-8	N	3550B	8081A	3
02-Nov-2005	31011	05-4614-8	N	3550B	8082	3
02-Nov-2005	31011	05-4614-8	N	3550B	8270C	3
02-Nov-2005	31011	05-4614-8	N	5035	8260B	3
02-Nov-2005	31011	05-4614-8	N	7471A	7471A	3
02-Nov-2005	31012	05-4614-9	N	3050B	6010B	3
02-Nov-2005	31012	05-4614-9	N	3550B	8081A	3
02-Nov-2005	31012	05-4614-9	N	3550B	8082	3
02-Nov-2005	31012	05-4614-9	N	3550B	8270C	3
02-Nov-2005	31012	05-4614-9	N	5035	8260B	3
02-Nov-2005	31012	05-4614-9	N	7471A	7471A	3
08-Nov-2005	31114	05-4703-1	N	3050B	6010B	4
08-Nov-2005	31114	05-4703-1	N	3550B	8081A	4
08-Nov-2005	31114	05-4703-1	N	3550B	8082	4
08-Nov-2005	31114	05-4703-1	N	3550B	8270C	4
08-Nov-2005	31114	05-4703-1	N	5035	8260B	4
08-Nov-2005	31114	05-4703-1	N	7471A	7471A	4
08-Nov-2005	31132	05-4703-10	N	3050B	6010B	4
08-Nov-2005	31132	05-4703-10	N	3550B	8081A	4
08-Nov-2005	31132	05-4703-10	N	3550B	8082	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
08-Nov-2005	31132	05-4703-10	N	3550B	8270C	4
08-Nov-2005	31132	05-4703-10	N	5035	8260B	4
08-Nov-2005	31132	05-4703-10	N	7471A	7471A	4
08-Nov-2005	31133	05-4703-11	N	3050B	6010B	4
08-Nov-2005	31133	05-4703-11	N	3550B	8081A	4
08-Nov-2005	31133	05-4703-11	N	3550B	8082	4
08-Nov-2005	31133	05-4703-11	N	3550B	8270C	4
08-Nov-2005	31133	05-4703-11	N	5035	8260B	4
08-Nov-2005	31133	05-4703-11	N	7471A	7471A	4
08-Nov-2005	31134	05-4703-12	N	3050B	6010B	4
08-Nov-2005	31134	05-4703-12	N	3550B	8081A	4
08-Nov-2005	31134	05-4703-12	N	3550B	8082	4
08-Nov-2005	31134	05-4703-12	N	3550B	8270C	4
08-Nov-2005	31134	05-4703-12	N	5035	8260B	4
08-Nov-2005	31134	05-4703-12	N	7471A	7471A	4
08-Nov-2005	31214	05-4703-13	TB	5030B	8260B	4
08-Nov-2005	31115	05-4703-2	N	3050B	6010B	4
08-Nov-2005	31115	05-4703-2	N	3550B	8081A	4
08-Nov-2005	31115	05-4703-2	N	3550B	8082	4
08-Nov-2005	31115	05-4703-2	N	3550B	8270C	4
08-Nov-2005	31115	05-4703-2	N	5035	8260B	4
08-Nov-2005	31115	05-4703-2	N	7471A	7471A	4
08-Nov-2005	31116	05-4703-3	N	3050B	6010B	4
08-Nov-2005	31116	05-4703-3	N	3550B	8081A	4
08-Nov-2005	31116	05-4703-3	N	3550B	8082	4
08-Nov-2005	31116	05-4703-3	N	3550B	8270C	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
08-Nov-2005	31116	05-4703-3	N	5035	8260B	4
08-Nov-2005	31116	05-4703-3	N	7471A	7471A	4
08-Nov-2005	31117	05-4703-4	N	3050B	6010B	4
08-Nov-2005	31117	05-4703-4	N	3550B	8081A	4
08-Nov-2005	31117	05-4703-4	N	3550B	8082	4
08-Nov-2005	31117	05-4703-4	N	3550B	8270C	4
08-Nov-2005	31117	05-4703-4	N	5035	8260B	4
08-Nov-2005	31117	05-4703-4	N	7471A	7471A	4
08-Nov-2005	31118	05-4703-5	N	3050B	6010B	4
08-Nov-2005	31118	05-4703-5	N	3550B	8081A	4
08-Nov-2005	31118	05-4703-5	N	3550B	8082	4
08-Nov-2005	31118	05-4703-5	N	3550B	8270C	4
08-Nov-2005	31118	05-4703-5	N	5035	8260B	4
08-Nov-2005	31118	05-4703-5	N	7471A	7471A	4
08-Nov-2005	31119	05-4703-6	N	3050B	6010B	4
08-Nov-2005	31119	05-4703-6	N	3550B	8081A	4
08-Nov-2005	31119	05-4703-6	N	3550B	8082	4
08-Nov-2005	31119	05-4703-6	N	3550B	8270C	4
08-Nov-2005	31119	05-4703-6	N	5035	8260B	4
08-Nov-2005	31119	05-4703-6	N	7471A	7471A	4
08-Nov-2005	31120	05-4703-7	N	3050B	6010B	4
08-Nov-2005	31120	05-4703-7	N	3550B	8081A	4
08-Nov-2005	31120	05-4703-7	N	3550B	8082	4
08-Nov-2005	31120	05-4703-7	N	3550B	8270C	4
08-Nov-2005	31120	05-4703-7	N	5035	8260B	4
08-Nov-2005	31120	05-4703-7	N	7471A	7471A	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
08-Nov-2005	31120DUP	05-4703-7MD	DUP	3050B	6010B	4
08-Nov-2005	31120DUP	05-4703-7MD	DUP	7471A	7471A	4
08-Nov-2005	31120MS	05-4703-7MS	MS	3050B	6010B	4
08-Nov-2005	31120MS	05-4703-7MS	MS	3550B	8081A	4
08-Nov-2005	31120MS	05-4703-7MS	MS	3550B	8082	4
08-Nov-2005	31120MS	05-4703-7MS	MS	3550B	8270C	4
08-Nov-2005	31120MS	05-4703-7MS	MS	5035	8260B	4
08-Nov-2005	31120MS	05-4703-7MS	MS	7471A	7471A	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	3050B	6010B	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	3550B	8081A	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	3550B	8082	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	3550B	8270C	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	5035	8260B	4
08-Nov-2005	31120MSD	05-4703-7MSD	MSD	7471A	7471A	4
08-Nov-2005	31121	05-4703-8	N	3050B	6010B	4
08-Nov-2005	31121	05-4703-8	N	3550B	8081A	4
08-Nov-2005	31121	05-4703-8	N	3550B	8082	4
08-Nov-2005	31121	05-4703-8	N	3550B	8270C	4
08-Nov-2005	31121	05-4703-8	N	5035	8260B	4
08-Nov-2005	31121	05-4703-8	N	7471A	7471A	4
08-Nov-2005	31122	05-4703-9	FD	3050B	6010B	4
08-Nov-2005	31122	05-4703-9	FD	3550B	8081A	4
08-Nov-2005	31122	05-4703-9	FD	3550B	8082	4
08-Nov-2005	31122	05-4703-9	FD	3550B	8270C	4
08-Nov-2005	31122	05-4703-9	FD	5035	8260B	4
08-Nov-2005	31122	05-4703-9	FD	7471A	7471A	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal P[illegible]ams

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54614	31004	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31004	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31004	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31004	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31004	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31005	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31005	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31005	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31005	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31005	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31006	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31006	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31006	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31006	6010B	7440280	U		THALLIUM	Present in method blank
54614	31006	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31006	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31007	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31007	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31007	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31007	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54614	31007	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54614	31007	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54614	31007	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54614	31007	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54614	31007	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54614	31007	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54614	31007	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54614	31007	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54614	31007	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31007	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31008	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31008	6010B	7440020	J		NICKEL	Matrix spike recovery

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54614	31008	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31008	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31008	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31009	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31009	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31009	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31009	6010B	7440280	U		THALLIUM	Present in method blank
54614	31009	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31009	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31010	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31010	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31010	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31010	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54614	31010	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54614	31010	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54614	31010	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54614	31010	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54614	31010	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54614	31010	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54614	31010	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54614	31010	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54614	31010	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31010	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31010	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	Matrix spike recovery
54614	31011	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31011	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31011	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31011	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31011	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31012	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31012	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31012	6010B	7782492	J		SELENIUM	Lab Duplicate RPD

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54614	31012	6010B	7440280	U		THALLIUM	Present in method blank
54614	31012	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31012	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54614	31013	6010B	7440473	J		CHROMIUM	Matrix spike recovery
54614	31013	6010B	7440020	J		NICKEL	Matrix spike recovery
54614	31013	6010B	7782492	J		SELENIUM	Lab Duplicate RPD
54614	31013	8260B	108883		J	TOLUENE	LCS spike recovery
54614	31013	8260B	156605		J	TRANS-1,2-DICHLOROETHENE	LCS spike recovery
54703	31114	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31114	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31114	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31114	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31114	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31114	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31114	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31114	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31115	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31115	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31115	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31115	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31115	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31115	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31115	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31115	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31115	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31116	6010B	7439987	U		MOLYBDENUM	Present in method blank
54703	31116	6010B	7440280	J		THALLIUM	Matrix spike recovery
54703	31116	6010B	7440280	U		THALLIUM	Present in method blank
54703	31116	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31116	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31116	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31116	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54703	31116	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31116	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31116	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31116	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31117	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31117	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31117	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31117	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31117	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31117	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31117	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31117	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31117	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31118	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31118	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31118	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31118	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31118	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31118	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31118	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31118	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31119	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31119	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31119	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31119	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31119	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31119	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31119	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31119	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31119	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31120	6010B	7439987	U		MOLYBDENUM	Present in method blank
54703	31120	6010B	7440280		J	THALLIUM	Matrix spike recovery

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54703	31120	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31120	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31120	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31120	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31120	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31120	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31120	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31121	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31121	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31121	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31121	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31121	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31121	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31121	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31121	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31122	6010B	7439987	U		MOLYBDENUM	Present in method blank
54703	31122	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31122	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31122	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31122	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31122	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31122	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31122	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31122	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31122	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31132	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31132	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54703	31132	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54703	31132	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31132	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31132	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31132	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54614,54703

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54703	31132	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31132	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31133	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31133	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54703	31133	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31133	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31133	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31133	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31133	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31133	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference
54703	31134	6010B	7439987	U		MOLYBDENUM	Present in method blank
54703	31134	6010B	7440280		J	THALLIUM	Matrix spike recovery
54703	31134	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54703	31134	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54703	31134	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54703	31134	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54703	31134	8270C	111444		J	BIS(2-CHLOROETHYL) ETHER	Continuing calibration percent difference
54703	31134	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54703	31134	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54614										
6010B	31004	SO	N							
				CHROMIUM	0.51	26.8		J	mg/kg	
				NICKEL	0.31	24.3		J	mg/kg	
				SELENIUM	0.51	2.1		J	mg/kg	
6010B	31005	SO	N							
				CHROMIUM	0.52	25.2		J	mg/kg	
				NICKEL	0.31	24.5		J	mg/kg	
				SELENIUM	0.52	1.3		J	mg/kg	
6010B	31006	SO	N							
				ANTIMONY	5.4	1.7F		J	mg/kg	
				CHROMIUM	0.54	63.2		J	mg/kg	
				NICKEL	0.32	105		J	mg/kg	
				SELENIUM	0.54	1.4		J	mg/kg	
				THALLIUM	0.54	1.0		U	mg/kg	
6010B	31007	SO	N							
				ANTIMONY	5.3	0.30F		J	mg/kg	
				CHROMIUM	0.53	19.2		J	mg/kg	
				NICKEL	0.32	22.6		J	mg/kg	
				SELENIUM	0.53	1.9		J	mg/kg	
6010B	31008	SO	N							
				ANTIMONY	5.5	0.28F		J	mg/kg	
				CADMIUM	0.22	0.11F		J	mg/kg	
				CHROMIUM	0.55	62.4		J	mg/kg	
				NICKEL	0.33	109		J	mg/kg	
				SELENIUM	0.55	2.7		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54614										
6010B	31009	SO	N							
				ANTIMONY	6.5	0.60F		J	mg/kg	
				BERYLLIUM	0.26	0.066F		J	mg/kg	
				CADMIUM	0.26	0.14F		J	mg/kg	
				CHROMIUM	0.65	69.4		J	mg/kg	
				NICKEL	0.39	67.7		J	mg/kg	
				SELENIUM	0.65	1.4		J	mg/kg	
				THALLIUM	0.65	0.35F		U	mg/kg	
6010B	31010	SO	N							
				CHROMIUM	0.52	28.9		J	mg/kg	
				NICKEL	0.31	24.7		J	mg/kg	
				SELENIUM	0.52	2.8		J	mg/kg	
6010B	31011	SO	N							
				CHROMIUM	0.53	24.3		J	mg/kg	
				NICKEL	0.32	17.8		J	mg/kg	
				SELENIUM	0.53	2.2		J	mg/kg	
6010B	31012	SO	N							
				ARSENIC	0.31	9.7		J	mg/kg	
				BARIUM	1.0	90.3		J	mg/kg	
				BERYLLIUM	0.21	0.33		J	mg/kg	
				CADMIUM	0.21	0.066F		J	mg/kg	
				CHROMIUM	0.52	73.1		J	mg/kg	
				COBALT	0.52	15.3		J	mg/kg	
				COPPER	0.52	27.8		J	mg/kg	
				IRON	3.1	25300		J	mg/kg	
				LEAD	0.31	8.9		J	mg/kg	
				NICKEL	0.31	69.1		J	mg/kg	
				SELENIUM	0.52	0.88		J	mg/kg	
				THALLIUM	0.52	0.67		UJ	mg/kg	
				VANADIUM	0.52	52.6		J	mg/kg	
				ZINC	0.52	86.3		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54614										
6010B	31013	SO	FD							
				CHROMIUM	0.52	30.3		J	mg/kg	
				NICKEL	0.31	23.6		J	mg/kg	
				SELENIUM	0.52	0.71		J	mg/kg	
7471A	31004	SO	N							
				MERCURY	0.21	0.17F		J	mg/kg	
7471A	31007	SO	N							
				MERCURY	0.21	0.20F		J	mg/kg	
7471A	31010	SO	N							
				MERCURY	0.21	0.13F		J	mg/kg	
7471A	31012	SO	N							
				MERCURY	0.21	0.22		J	mg/kg	
7471A	31013	SO	FD							
				MERCURY	0.21	0.041F		J	mg/kg	
8081A	31007	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				4,4'-DDE	0.032	0.032U		UJ	mg/kg	
				4,4'-DDT	0.032	0.032U		UJ	mg/kg	
				ALDRIN	0.018	0.018U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				BETA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.053	0.053U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	

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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54614										
8081A	31010	SO	N							
				4,4'-DDD	0.031	0.031U		UJ	mg/kg	
				4,4'-DDE	0.031	0.031U		UJ	mg/kg	
				4,4'-DDT	0.031	0.031U		UJ	mg/kg	
				ALDRIN	0.018	0.018U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				BETA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.052	0.052U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8082	31010	SO	N							
				AROCLOR 1260	0.034	0.02F		J	mg/kg	
8260B	31004	SO	N							
				TOLUENE	0.0044	0.0044U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0044	0.0044U		UJ	mg/kg	
8260B	31005	SO	N							
				TOLUENE	0.0054	0.0054U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0054	0.0054U		UJ	mg/kg	
8260B	31006	SO	N							
				TOLUENE	0.0045	0.0045U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0045	0.0045U		UJ	mg/kg	
8260B	31007	SO	N							
				TOLUENE	0.0046	0.0046U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0046	0.0046U		UJ	mg/kg	
				XYLENES	0.0092	0.0007F		J	mg/kg	
8260B	31008	SO	N							
				TOLUENE	0.0047	0.0047U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0047	0.0047U		UJ	mg/kg	
8260B	31009	SO	N							
				TOLUENE	0.0061	0.0061U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0061	0.0061U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54614										
8260B	31010	SO	N							
				TOLUENE	0.0047	0.0047U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0047	0.0047U		UJ	mg/kg	
8260B	31011	SO	N							
				TOLUENE	0.0047	0.0047U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0047	0.0047U		UJ	mg/kg	
8260B	31012	SO	N							
				TOLUENE	0.0053	0.0053U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0053	0.0053U		UJ	mg/kg	
8260B	31013	SO	FD							
				TOLUENE	0.0054	0.0054U		UJ	mg/kg	
				TRANS-1,2-DICHLOROETHENE	0.0054	0.0054U		UJ	mg/kg	
8270C	31006	SO	N							
				PHENOL	0.54	0.2F		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
6010B	31114	SO	N							
				CADMIUM	0.21	0.030B		J	mg/kg	
				COBALT	0.53	9.1		J	mg/kg	
				IRON	3.2	18500		J	mg/kg	
				LEAD	0.32	9.8		J	mg/kg	
				NICKEL	0.32	34.5		J	mg/kg	
				THALLIUM	0.53	0.53U		UJ	mg/kg	
6010B	31115	SO	N							
				COBALT	0.52	6.4		J	mg/kg	
				IRON	3.1	10500		J	mg/kg	
				LEAD	0.31	10.6		J	mg/kg	
				NICKEL	0.31	33.5		J	mg/kg	
				THALLIUM	0.52	0.52U		UJ	mg/kg	
6010B	31116	SO	N							
				ANTIMONY	5.3	0.60B		J	mg/kg	
				COBALT	0.53	10.3		J	mg/kg	
				IRON	32	47200		J	mg/kg	
				LEAD	0.32	110		J	mg/kg	
				MOLYBDENUM	0.21	0.79		U	mg/kg	
				NICKEL	0.32	11.9		J	mg/kg	
				THALLIUM	0.53	0.67		UJ	mg/kg	
6010B	31117	SO	N							
				BERYLLIUM	0.22	0.089B		J	mg/kg	
				COBALT	0.56	23.5		J	mg/kg	
				IRON	3.3	25400		J	mg/kg	
				LEAD	0.33	10.0		J	mg/kg	
				NICKEL	0.33	364		J	mg/kg	
				THALLIUM	0.56	0.56U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
6010B	31118	SO	N							
				COBALT	0.60	17.5		J	mg/kg	
				IRON	3.6	30000		J	mg/kg	
				LEAD	0.36	30.8		J	mg/kg	
				NICKEL	0.36	65.3		J	mg/kg	
				THALLIUM	0.60	0.60U		UJ	mg/kg	
6010B	31119	SO	N							
				COBALT	0.60	12.8		J	mg/kg	
				IRON	3.6	30800		J	mg/kg	
				LEAD	0.36	36.9		J	mg/kg	
				NICKEL	0.36	67.4		J	mg/kg	
				THALLIUM	0.60	0.60U		UJ	mg/kg	
6010B	31120	SO	N							
				COBALT	0.56	10.2		J	mg/kg	
				IRON	3.3	20800		J	mg/kg	
				LEAD	0.33	88.1		J	mg/kg	
				MOLYBDENUM	0.22	0.19B		U	mg/kg	
				NICKEL	0.33	40.6		J	mg/kg	
				THALLIUM	0.56	0.56U		UJ	mg/kg	
6010B	31121	SO	N							
				CADMIUM	0.26	0.017B		J	mg/kg	
				COBALT	0.65	13.2		J	mg/kg	
				IRON	39	52000		J	mg/kg	
				LEAD	0.39	42.7		J	mg/kg	
				MOLYBDENUM	0.26	0.26U		J	mg/kg	
				NICKEL	0.39	81.9		J	mg/kg	
				THALLIUM	0.65	0.65U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
6010B	31122	SO	FD							
				CADMIUM	0.27	0.083B		J	mg/kg	
				COBALT	0.66	14.6		J	mg/kg	
				IRON	40	49200		J	mg/kg	
				LEAD	0.40	42.1		J	mg/kg	
				MOLYBDENUM	0.27	0.30		U	mg/kg	
				NICKEL	0.40	80.7		J	mg/kg	
				THALLIUM	0.66	0.66U		UJ	mg/kg	
6010B	31132	SO	N							
				BERYLLIUM	0.22	0.17B		J	mg/kg	
				COBALT	0.55	14.6		J	mg/kg	
				IRON	33	44400		J	mg/kg	
				LEAD	0.33	19.9		J	mg/kg	
				NICKEL	0.33	33.5		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31133	SO	N							
				COBALT	0.56	19.6		J	mg/kg	
				IRON	3.3	21800		J	mg/kg	
				LEAD	0.33	6.1		J	mg/kg	
				NICKEL	0.33	297		J	mg/kg	
				THALLIUM	0.56	0.56U		UJ	mg/kg	
6010B	31134	SO	N							
				CADMIUM	0.28	0.13B		J	mg/kg	
				COBALT	0.69	13.7		J	mg/kg	
				IRON	4.1	34500		J	mg/kg	
				LEAD	0.41	24.7		J	mg/kg	
				MOLYBDENUM	0.28	0.46		U	mg/kg	
				NICKEL	0.41	81.1		J	mg/kg	
				THALLIUM	0.69	0.69U		UJ	mg/kg	
7471A	31121	SO	N							
				MERCURY	0.26	0.94		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
8081A	31114	SO	N							
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.053	0.053U		UJ	mg/kg	
8081A	31115	SO	N							
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0052	0.0052U		UJ	mg/kg	
8081A	31116	SO	N							
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.053	0.053U		UJ	mg/kg	
8081A	31117	SO	N							
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.056	0.056U		UJ	mg/kg	
8081A	31118	SO	N							
				ALPHA-BHC	0.020	0.020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.060	0.060U		UJ	mg/kg	
8081A	31119	SO	N							
				ALPHA-BHC	0.020	0.020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.060	0.060U		UJ	mg/kg	
8081A	31120	SO	N							
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.056	0.056U		UJ	mg/kg	
8081A	31121	SO	N							
				ALPHA-BHC	0.022	0.022U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.065	0.065U		UJ	mg/kg	
8081A	31122	SO	FD							
				ALPHA-BHC	0.0023	0.0023U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0066	0.0066U		UJ	mg/kg	
8081A	31132	SO	N							
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0055	0.0055U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
8081A	31133	SO	N							
				ENDRIN	0.0033	0.0033U		UJ	mg/kg	
8081A	31134	SO	N							
				ENDRIN	0.0041	0.0041U		UJ	mg/kg	
8082	31114	SO	N							
				AROCLOR 1260	0.035	0.007J		J	mg/kg	
8082	31115	SO	N							
				AROCLOR 1260	0.034	0.009J		J	mg/kg	
8082	31116	SO	N							
				AROCLOR 1260	0.035	0.006J		J	mg/kg	
8260B	31114	SO	N							
				CHLOROMETHANE	0.0049	0.0049U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0049	0.002J		U	mg/kg	
8260B	31115	SO	N							
				CHLOROMETHANE	0.0051	0.0051U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0051	0.002J		U	mg/kg	
8260B	31116	SO	N							
				CHLOROMETHANE	0.0050	0.0050U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0050	0.002J		U	mg/kg	
8260B	31117	SO	N							
				CHLOROMETHANE	0.0053	0.0053U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0053	0.002J		U	mg/kg	
8260B	31118	SO	N							
				CHLOROMETHANE	0.0063	0.0063U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0063	0.002J		U	mg/kg	
8260B	31119	SO	N							
				CHLOROMETHANE	0.0056	0.0056U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0056	0.002J		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
8260B	31120	SO	N							
				CHLOROMETHANE	0.0058	0.0058U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0058	0.003J		U	mg/kg	
8260B	31121	SO	N							
				BENZENE	0.0068	0.003J		J	mg/kg	
				CHLOROMETHANE	0.0068	0.0068U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0068	0.002J		U	mg/kg	
8260B	31122	SO	FD							
				BENZENE	0.0065	0.003J		J	mg/kg	
				CHLOROMETHANE	0.0065	0.0065U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0065	0.002J		U	mg/kg	
8260B	31132	SO	N							
				CHLOROMETHANE	0.0048	0.0048U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0048	0.001J		U	mg/kg	
8260B	31133	SO	N							
				CHLOROMETHANE	0.0055	0.0055U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0055	0.002J		U	mg/kg	
8260B	31134	SO	N							
				CHLOROMETHANE	0.0075	0.0075U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0075	0.002J		U	mg/kg	
8270C	31114	SO	N							
				4-Nitroaniline	13	13U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	2.7	2.7U		UJ	mg/kg	
				HEXACHLOROBENZENE	2.7	2.7U		UJ	mg/kg	
8270C	31115	SO	N							
				4-Nitroaniline	2.6	2.6U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	0.52	0.52U		UJ	mg/kg	
				HEXACHLOROBENZENE	0.52	0.52U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	0.52	0.52U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
8270C	31116	SO	N							
				4-Nitroaniline	130	130U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	27	27U		UJ	mg/kg	
				HEXACHLOROBENZENE	27	27U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	27	27U		UJ	mg/kg	
8270C	31117	SO	N							
				4-Nitroaniline	28	28U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	5.6	5.6U		UJ	mg/kg	
				HEXACHLOROBENZENE	5.6	5.6U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	5.6	5.6U		UJ	mg/kg	
8270C	31118	SO	N							
				4-Nitroaniline	30	30U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	6.0	6.0U		UJ	mg/kg	
				HEXACHLOROBENZENE	6.0	6.0U		UJ	mg/kg	
8270C	31119	SO	N							
				4-Nitroaniline	9.0	9.0U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	1.8	1.8U		UJ	mg/kg	
				HEXACHLOROBENZENE	1.8	1.8U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	1.8	1.8U		UJ	mg/kg	
8270C	31120	SO	N							
				4-Nitroaniline	280	280U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	56	56U		UJ	mg/kg	
				HEXACHLOROBENZENE	56	56U		UJ	mg/kg	
8270C	31121	SO	N							
				4-Nitroaniline	3.3	3.3U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	0.65	0.65U		UJ	mg/kg	
				HEXACHLOROBENZENE	0.65	0.65U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54703										
8270C	31122	SO	FD							
				4-Nitroaniline	330	330U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	66	66U		UJ	mg/kg	
				HEXACHLOROBENZENE	66	66U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	66	66U		UJ	mg/kg	
8270C	31132	SO	N							
				4-Nitroaniline	8.3	8.3U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	1.7	1.7U		UJ	mg/kg	
				HEXACHLOROBENZENE	1.7	1.7U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	1.7	1.7U		UJ	mg/kg	
8270C	31133	SO	N							
				4-Nitroaniline	2.8	2.8U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	0.56	0.56U		UJ	mg/kg	
				HEXACHLOROBENZENE	0.56	0.56U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	0.56	0.56U		UJ	mg/kg	
8270C	31134	SO	N							
				4-Nitroaniline	3.5	3.5U		UJ	mg/kg	
				BIS(2-CHLOROETHYL) ETHER	0.69	0.69U		UJ	mg/kg	
				HEXACHLOROBENZENE	0.69	0.69U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	0.69	0.69U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4614

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054614 **Analysis Method :** 8081A **Analysis Date :** 11/07/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	22.637	15.0	-15.0
beta-BHC	17.643	15.0	-15.0
gamma-BHC	20.535	15.0	-15.0
Aldrin	16.026	15.0	-15.0
4,4'-DDE	21.113	15.0	-15.0
Endosulfan II	19.211	15.0	-15.0
4,4'-DDD	16.099	15.0	-15.0
Endosulfan sulfate	33.750	15.0	-15.0
4,4'-DDT	15.956	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31007	05-04614-4
31010	05-04614-7

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4614 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Thallium	4.645 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Thallium	1.0 mg/Kg	31006	05-04614-3
Thallium	0.35 mg/Kg	31009	05-04614-6
Thallium	0.67 mg/Kg	31012	05-04614-9

Matrix Spike / Matrix Spike Duplicate Recovery and RPD Outlier Report

Method Batch : 05G3364 **Analysis Method :** 8260B **Analysis Date :** 11/07/2005

Preparation Batch : 05G3364 **Preparation Type :** 5035 **Preparation Date :** 11/07/2005

Lab Reporting Batch : 54614 **Lab ID:** APCL

				Reported *		Project Limits (Percent)			
Client Sample ID	**Lab Sample ID**	**Matrix**	**Analyte Name**	**Percent Recovery**	**RPD**	**Rejection Point****	**Lower Limit**	**Upper Limit**	**RPD**
31010MS	05-4614-7MS	SO	TRANS-1,2-DICHLOROETHENE	68		0.00	75.00	125.00	20.00
31010MSD	05-4614-7MSD		TRANS-1,2-DICHLOROETHENE	68		0.00	75.00	125.00	20.00

Associated Samples: Parent sample only

Client Sample ID	Lab Sample ID
31010	05-4614-7

Only those Percent Recovery and/or RPD values outside project limits are listed in this report.
** Metal are also assessed against an upper rejection point of 150 percent for waters and 200 percent for soils and sediments

Project Number and Name: 6218.086 - Alameda Pt

Laboratory Control Sample / Laboratory Control Sample Duplicate Outlier Report

Method Batch : 05G3364 **Analysis Method :** 8260B **Analysis Date :** 11/07/2005

Preparation Batch : 05G3364 **Preparation Type :** 5035 **Preparation Date :** 11/07/2005

Lab Reporting Batch : 54614 **Lab ID:** APCL

			Reported Values		Project Limits (Percent)			
LCS Lab Sample ID	**Matrix**	**Analyte Name**	**Percent Recovery**	**RPD**	**Rejection Point**	**Lower Limit**	**Upper Limit**	**RPD**
05G3364-LCS-01	SO	TOLUENE	79		10.00	80.00	115.00	20.00
		TRANS-1,2-DICHLOROETHENE	72		10.00	75.00	125.00	20.00

Associated Samples

Client Sample ID	**Lab Sample ID**
31004	05-4614-1
31005	05-4614-2
31006	05-4614-3
31007	05-4614-4
31008	05-4614-5
31009	05-4614-6
31010	05-4614-7
31011	05-4614-8
31012	05-4614-9
31013	05-4614-10

Scope of Data Qualification: The outlier in the LCS qualifies that analyte in all samples with the same Preparation Batch ID as the LCS

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54614 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ARSENIC	31012	RES	9.7		31013	RES	2.0		131.6	50	mg/kg
	SO	BARIUM		RES	90.3			RES	47.0		63.1	50	mg/kg
	SO	BERYLLIUM		RES	0.33			RES	0.21	U	200.0	50	mg/kg
	SO	CADMIUM		RES	0.066	F		RES	0.21	U	200.0	50	mg/kg
	SO	CHROMIUM		RES	73.1			RES	30.3		82.8	50	mg/kg
	SO	COBALT		RES	15.3			RES	4.7		106.0	50	mg/kg
	SO	COPPER		RES	27.8			RES	4.9		140.1	50	mg/kg
	SO	IRON		RES	25300			RES	8000		103.9	50	mg/kg
	SO	LEAD		RES	8.9			RES	1.9		129.6	50	mg/kg
	SO	NICKEL		RES	69.1			RES	23.6		98.2	50	mg/kg
	SO	THALLIUM		RES	0.67			RES	0.52	U	200.0	50	mg/kg
	SO	VANADIUM		RES	52.6			RES	19.3		92.6	50	mg/kg
	SO	ZINC		RES	86.3			RES	15.6		138.8	50	mg/kg
7471A	SO	MERCURY		RES	0.22			RES	0.041	F	137.2	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54614 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31004	05-4614-1	7471A	SO	MERCURY	F	0.17	0.21	mg/kg
31006	05-4614-3	6010B		ANTIMONY	F	1.7	5.4	mg/kg
		8270C		PHENOL	F	0.2	0.54	mg/kg
31007	05-4614-4	6010B		ANTIMONY	F	0.30	5.3	mg/kg
		7471A		MERCURY	F	0.20	0.21	mg/kg
		8260B		XYLENES	F	0.0007	0.0092	mg/kg
31008	05-4614-5	6010B		ANTIMONY	F	0.28	5.5	mg/kg
				CADMIUM	F	0.11	0.22	mg/kg
31009	05-4614-6			ANTIMONY	F	0.60	6.5	mg/kg
				BERYLLIUM	F	0.066	0.26	mg/kg
				CADMIUM	F	0.14	0.26	mg/kg
				THALLIUM	F	0.35	0.65	mg/kg
31010	05-4614-7	7471A		MERCURY	F	0.13	0.21	mg/kg
		8082		AROCLOR 1260	F	0.02	0.034	mg/kg
31012	05-4614-9	6010B		CADMIUM	F	0.066	0.21	mg/kg
31013	05-4614-10	7471A		MERCURY	F	0.041	0.21	mg

Quality Control Outlier Reports

SDG 05-4703

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4703 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Thallium	0.11 mg/Kg	PB
Thallium	4.096 ug/L	ICB/CCB
Molybdenum	3.259 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Thallium	0.67 mg/Kg	31116	05-04703-3
Molybdenum	0.79 mg/Kg	31116	05-04703-3
Molybdenum	0.19 mg/Kg	31120	05-04703-7
Molybdenum	0.30 mg/Kg	31122	05-04703-9
Molybdenum	0.46 mg/Kg	31133	05-04703-12

Method Blank Outlier Report

Lab Reporting Batch : 54703
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2133-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2133M

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.032	0.5	mg/kg	B	

COPPER contamination found in the method blank did not qualify any samples.

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.66	3	mg/kg	B	

IRON contamination found in the method blank did not qualify any samples.

THALLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.11	0.5	mg/kg	B	

THALLIUM contamination found in the method blank did not qualify any samples.

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3411-40 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005

Lab Reporting Batch : 54703 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
ALPHA-BHC		17.5			15.0	-50.0	-15.0
ENDOSULFAN SULFATE		27.21			15.0	-50.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31114	05-4703-1
31115	05-4703-2
31116	05-4703-3
31117	05-4703-4
31118	05-4703-5
31119	05-4703-6
31120	05-4703-7
31121	05-4703-8
31122	05-4703-9
31132	05-4703-10

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3411-63 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005

Lab Reporting Batch : 54703 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
ENDRIN		16.8			15.0	-50.0	-15.0

Associated Samples	
Client Sample ID	Lab Sample ID
31133	05-4703-11
31134	05-4703-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3452- 2 **Analysis Method :** 8260B **Analysis Date :** 11/16/2005

Lab Reporting Batch : 54703 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
CHLOROMETHANE	0.263	-8.6	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31114	05-4703-1
31115	05-4703-2
31116	05-4703-3
31117	05-4703-4
31118	05-4703-5
31119	05-4703-6
31120	05-4703-7
31121	05-4703-8
31122	05-4703-9
31132	05-4703-10
31133	05-4703-11
31134	05-4703-12

Method Blank Outlier Report

Lab Reporting Batch : 54703
Analysis Method : 8260B
Preparation Type : 5035
Method Blank Lab Sample ID : 05G3452-MB-01

Lab ID: APCL
Analysis Date : 11/16/2005
Preparation Date : 11/16/2005
Preparation Batch : 05G3452

METHYLENE CHLORIDE	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	**0.002**	**0.005**	**mg/kg**	**J**	**Common Contaminant**

METHYLENE CHLORIDE was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31114	05-4703-1	0.92	0.002	J	mg/kg
31115	05-4703-2	0.99	0.002	J	mg/kg
31116	05-4703-3	0.94	0.002	J	mg/kg
31117	05-4703-4	0.95	0.002	J	mg/kg
31118	05-4703-5	1.05	0.002	J	mg/kg
31119	05-4703-6	0.93	0.002	J	mg/kg
31120	05-4703-7	1.05	0.003	J	mg/kg
31121	05-4703-8	1.04	0.002	J	mg/kg
31122	05-4703-9	0.98	0.002	J	mg/kg
31132	05-4703-10	0.86	0.001	J	mg/kg
31133	05-4703-11	0.98	0.002	J	mg/kg
31134	05-4703-12	1.09	0.002	J	mg/kg

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418-47 **Analysis Method :** 8270C **Analysis Date :** 11/15/2005

Lab Reporting Batch : 54703 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.429	42.5	0.05		25.0	-50.0	-25.0
BIS(2-CHLOROETHYL) ETHER	0.834	33.7			25.0	-50.0	-25.0
HEXACHLOROBENZENE	0.195	-25.6			25.0	-50.0	-25.0
N-NITROSO-DI-N-PROPYLAMINE	0.775	25.2			25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31115	05-4703-2
31116	05-4703-3
31117	05-4703-4
31119	05-4703-6
31122	05-4703-9
31132	05-4703-10
31133	05-4703-11
31134	05-4703-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418-64 **Analysis Method :** 8270C **Analysis Date :** 11/16/2005

Lab Reporting Batch : 54703 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.449	49.2	0.05		25.0	-50.0	-25.0
BIS(2-CHLOROETHYL) ETHER	0.835	33.8			25.0	-50.0	-25.0
HEXACHLOROBENZENE	0.187	-28.6			25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31114	05-4703-1
31118	05-4703-5
31120	05-4703-7
31121	05-4703-8

Matrix Spike / Matrix Spike Duplicate Recovery and RPD Outlier Report

Method Batch : 05M2133M **Analysis Method :** 6010B **Analysis Date :** 11/10/2005
Preparation Batch : 05M2133M **Preparation Type :** 3050B **Preparation Date :** 11/10/2005
Lab Reporting Batch : 54703 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Matrix	Analyte Name	Reported *		Project Limits (Percent)			
				Percent Recovery	RPD	Rejection Point**	Lower Limit	Upper Limit	RPD
31120MS	05-4703-7MS	SO	THALLIUM	68		30.00	75.00	125.00	20.00
31120MSD	05-4703-7MSD		THALLIUM	71		30.00	75.00	125.00	20.00

Associated Samples: All samples in Method Batch

Client Sample ID	Lab Sample ID
31114	05-4703-1
31115	05-4703-2
31116	05-4703-3
31117	05-4703-4
31118	05-4703-5
31119	05-4703-6
31120	05-4703-7
31121	05-4703-8
31122	05-4703-9
31132	05-4703-10
31133	05-4703-11
31134	05-4703-12

* Only those Percent Recovery and/or RPD values outside project limits are listed in this report.
** Metal are also assessed against an upper rejection point of 150 percent for waters and 200 percent for soils and sediments

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54703 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	CADMIUM	31121	RES	0.017	B	31122	RES	0.083	B	132.0	50	mg/kg
	SO	MOLYBDENUM		RES	0.26	U		RES	0.30		200.0	50	mg/kg
7471A	SO	MERCURY		RES	0.94			RES	0.47		66.7	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54703 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31114	05-4703-1	6010B	SO	CADMIUM	B	0.030	0.21	mg/kg
		8082		AROCLOR 1260	J	0.007	0.035	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.002	0.0049	mg/kg
31115	05-4703-2	8082		AROCLOR 1260	J	0.009	0.034	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.002	0.0051	mg/kg
31116	05-4703-3	6010B		ANTIMONY	B	0.60	5.3	mg/kg
		8082		AROCLOR 1260	J	0.006	0.035	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.002	0.0050	mg/kg
31117	05-4703-4	6010B		BERYLLIUM	B	0.089	0.22	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.002	0.0053	mg/kg
31118	05-4703-5			METHYLENE CHLORIDE	J	0.002	0.0063	mg/kg
31119	05-4703-6			METHYLENE CHLORIDE	J	0.002	0.0056	mg/kg
31120	05-4703-7	6010B		MOLYBDENUM	B	0.19	0.22	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.003	0.0058	mg/kg
31121	05-4703-8	6010B		CADMIUM	B	0.017	0.26	mg/kg
		8260B		BENZENE	J	0.003	0.0068	mg/
				METHYLENE CHLORIDE	J	0.002	0.0068	mg/kg
31122	05-4703-9	6010B		CADMIUM	B	0.083	0.27	mg/kg
		8260B		BENZENE	J	0.003	0.0065	mg/kg
				METHYLENE CHLORIDE	J	0.002	0.0065	mg/kg
31132	05-4703-10	6010B		BERYLLIUM	B	0.17	0.22	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.001	0.0048	mg/kg
31133	05-4703-11			METHYLENE CHLORIDE	J	0.002	0.0055	mg/kg
31134	05-4703-12	6010B		CADMIUM	B	0.13	0.28	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.002	0.0075	mg/kg

Enclosure II

EPA Level IV Data Validation Reports

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

CDM Federal
9444 Farnham Road, Suite 210
San Diego, CA 92123
ATTN: Mr. Mike Allen

December 23, 2005

SUBJECT: NAS Alameda Point Data Validation

Dear Mr. Allen,

Enclosed are the final validation reports for the fractions listed below. These SDG was received on December 16, 2005.

LDC Project # 14419:

SDG #	Fraction
05-4650	Volatiles (EPA Method SW 846 8260B) Semivolatiles (EPA Method SW 846 8270C) Pesticides (EPA Method SW 846 8081A) Polychlorinated Biphenyls (EPA Method SW 846 8082B) Metals (EPA Method SW 846 6010B/7471A)

The following deliverables are submitted under this report:

- Attachment I — Sample ID Cross Reference and Data Review Level
- Attachment II — CDM Database Qualification Summary
- Attachment III — Overall Data Qualification Summary
- Enclosure I — EPA Level III ADR Outliers

The data validation was performed in accordance with the U.S. EPA National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience. The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Initial Calibration
- Continuing Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Detection and Quantitation Limits
- Field QC Samples

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda Rauto
Operations Manager/Senior Chemist

14419cover.wpd

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31014	05-4650-1	N	3050B	6010B	3
03-Nov-2005	31014	05-4650-1	N	3550B	8081A	3
03-Nov-2005	31014	05-4650-1	N	3550B	8082	3
03-Nov-2005	31014	05-4650-1	N	3550B	8270C	3
03-Nov-2005	31014	05-4650-1	N	5035	8260B	3
03-Nov-2005	31014	05-4650-1	N	7471A	7471A	3
03-Nov-2005	31023	05-4650-10	N	3050B	6010B	3
03-Nov-2005	31023	05-4650-10	N	3550B	8081A	3
03-Nov-2005	31023	05-4650-10	N	3550B	8082	3
03-Nov-2005	31023	05-4650-10	N	3550B	8270C	3
03-Nov-2005	31023	05-4650-10	N	5035	8260B	3
03-Nov-2005	31023	05-4650-10	N	7471A	7471A	3
03-Nov-2005	31023DUP	05-4650-10MD	DUP	3050B	6010B	3
03-Nov-2005	31023DUP	05-4650-10MD	DUP	7471A	7471A	3
03-Nov-2005	31023MS	05-4650-10MS	MS	3050B	6010B	3
03-Nov-2005	31023MS	05-4650-10MS	MS	3550B	8081A	3
03-Nov-2005	31023MS	05-4650-10MS	MS	3550B	8082	3
03-Nov-2005	31023MS	05-4650-10MS	MS	3550B	8270C	3
03-Nov-2005	31023MS	05-4650-10MS	MS	5035	8260B	3
03-Nov-2005	31023MS	05-4650-10MS	MS	7471A	7471A	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	3050B	6010B	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	3550B	8081A	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	3550B	8082	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	3550B	8270C	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	5035	8260B	3
03-Nov-2005	31023MSD	05-4650-10MSD	MSD	7471A	7471A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31024	05-4650-11	N	3050B	6010B	3
03-Nov-2005	31024	05-4650-11	N	3550B	8081A	3
03-Nov-2005	31024	05-4650-11	N	3550B	8082	3
03-Nov-2005	31024	05-4650-11	N	3550B	8270C	3
03-Nov-2005	31024	05-4650-11	N	5035	8260B	3
03-Nov-2005	31024	05-4650-11	N	7471A	7471A	3
03-Nov-2005	31025	05-4650-12	N	3050B	6010B	3
03-Nov-2005	31025	05-4650-12	N	3550B	8081A	3
03-Nov-2005	31025	05-4650-12	N	3550B	8082	3
03-Nov-2005	31025	05-4650-12	N	3550B	8270C	3
03-Nov-2005	31025	05-4650-12	N	5035	8260B	3
03-Nov-2005	31025	05-4650-12	N	7471A	7471A	3
03-Nov-2005	31026	05-4650-13	N	3050B	6010B	3
03-Nov-2005	31026	05-4650-13	N	3550B	8081A	3
03-Nov-2005	31026	05-4650-13	N	3550B	8082	3
03-Nov-2005	31026	05-4650-13	N	3550B	8270C	3
03-Nov-2005	31026	05-4650-13	N	5035	8260B	3
03-Nov-2005	31026	05-4650-13	N	7471A	7471A	3
03-Nov-2005	31027	05-4650-14	N	3050B	6010B	3
03-Nov-2005	31027	05-4650-14	N	3550B	8081A	3
03-Nov-2005	31027	05-4650-14	N	3550B	8082	3
03-Nov-2005	31027	05-4650-14	N	3550B	8270C	3
03-Nov-2005	31027	05-4650-14	N	5035	8260B	3
03-Nov-2005	31027	05-4650-14	N	7471A	7471A	3
03-Nov-2005	31028	05-4650-15	N	3050B	6010B	3
03-Nov-2005	31028	05-4650-15	N	3550B	8081A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31028	05-4650-15	N	3550B	8082	3
03-Nov-2005	31028	05-4650-15	N	3550B	8270C	3
03-Nov-2005	31028	05-4650-15	N	5035	8260B	3
03-Nov-2005	31028	05-4650-15	N	7471A	7471A	3
03-Nov-2005	31015	05-4650-2	N	3050B	6010B	3
03-Nov-2005	31015	05-4650-2	N	3550B	8081A	3
03-Nov-2005	31015	05-4650-2	N	3550B	8082	3
03-Nov-2005	31015	05-4650-2	N	3550B	8270C	3
03-Nov-2005	31015	05-4650-2	N	5035	8260B	3
03-Nov-2005	31015	05-4650-2	N	7471A	7471A	3
03-Nov-2005	31016	05-4650-3	N	3050B	6010B	3
03-Nov-2005	31016	05-4650-3	N	3550B	8081A	3
03-Nov-2005	31016	05-4650-3	N	3550B	8082	3
03-Nov-2005	31016	05-4650-3	N	3550B	8270C	3
03-Nov-2005	31016	05-4650-3	N	5035	8260B	3
03-Nov-2005	31016	05-4650-3	N	7471A	7471A	3
03-Nov-2005	31017	05-4650-4	N	3050B	6010B	3
03-Nov-2005	31017	05-4650-4	N	3550B	8081A	3
03-Nov-2005	31017	05-4650-4	N	3550B	8082	3
03-Nov-2005	31017	05-4650-4	N	3550B	8270C	3
03-Nov-2005	31017	05-4650-4	N	5035	8260B	3
03-Nov-2005	31017	05-4650-4	N	7471A	7471A	3
03-Nov-2005	31018	05-4650-5	N	3050B	6010B	3
03-Nov-2005	31018	05-4650-5	N	3550B	8081A	3
03-Nov-2005	31018	05-4650-5	N	3550B	8082	3
03-Nov-2005	31018	05-4650-5	N	3550B	8270C	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31018	05-4650-5	N	5035	8260B	3
03-Nov-2005	31018	05-4650-5	N	7471A	7471A	3
03-Nov-2005	31019	05-4650-6	N	3050B	6010B	3
03-Nov-2005	31019	05-4650-6	N	3550B	8081A	3
03-Nov-2005	31019	05-4650-6	N	3550B	8082	3
03-Nov-2005	31019	05-4650-6	N	3550B	8270C	3
03-Nov-2005	31019	05-4650-6	N	5035	8260B	3
03-Nov-2005	31019	05-4650-6	N	7471A	7471A	3
03-Nov-2005	31020	05-4650-7	N	3050B	6010B	3
03-Nov-2005	31020	05-4650-7	N	3550B	8081A	3
03-Nov-2005	31020	05-4650-7	N	3550B	8082	3
03-Nov-2005	31020	05-4650-7	N	3550B	8270C	3
03-Nov-2005	31020	05-4650-7	N	5035	8260B	3
03-Nov-2005	31020	05-4650-7	N	7471A	7471A	3
03-Nov-2005	31021	05-4650-8	FD	3050B	6010B	3
03-Nov-2005	31021	05-4650-8	FD	3550B	8081A	3
03-Nov-2005	31021	05-4650-8	FD	3550B	8082	3
03-Nov-2005	31021	05-4650-8	FD	3550B	8270C	3
03-Nov-2005	31021	05-4650-8	FD	5035	8260B	3
03-Nov-2005	31021	05-4650-8	FD	7471A	7471A	3
03-Nov-2005	31022	05-4650-9	N	3050B	6010B	3
03-Nov-2005	31022	05-4650-9	N	3550B	8081A	3
03-Nov-2005	31022	05-4650-9	N	3550B	8082	3
03-Nov-2005	31022	05-4650-9	N	3550B	8270C	3
03-Nov-2005	31022	05-4650-9	N	5035	8260B	3
03-Nov-2005	31022	05-4650-9	N	7471A	7471A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54650

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54650	31014	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31014	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31014	6010B	7782492	U		SELENIUM	Present in method blank
54650	31014	6010B	7440280	U		THALLIUM	Present in method blank
54650	31014	7471A	7439976	U		MERCURY	Present in method blank
54650	31014	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31014	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31014	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54650	31014	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31014	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31014	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31014	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31014	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31014	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31015	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31015	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31015	6010B	7439987	U		MOLYBDENUM	Present in method blank
54650	31015	6010B	7782492	U		SELENIUM	Present in method blank
54650	31015	7471A	7439976	U		MERCURY	Present in method blank
54650	31015	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31015	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31015	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54650	31015	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31015	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31015	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31015	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31015	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31015	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31016	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31016	6010B	7782492	U		SELENIUM	Present in method blank
54650	31016	7471A	7439976	U		MERCURY	Present in method blank
54650	31016	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54650

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54650	31016	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31016	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31017	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31017	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31017	6010B	7782492	U		SELENIUM	Present in method blank
54650	31017	7471A	7439976	U		MERCURY	Present in method blank
54650	31017	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31017	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31017	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54650	31017	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31017	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31017	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31017	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31017	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31017	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31018	6010B	7782492	U		SELENIUM	Present in method blank
54650	31018	7471A	7439976	U		MERCURY	Present in method blank
54650	31018	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31018	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31018	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54650	31018	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31018	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31018	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31018	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31018	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31018	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31019	6010B	7782492	U		SELENIUM	Present in method blank
54650	31019	6010B	7440280	U		THALLIUM	Present in method blank
54650	31019	7471A	7439976	U		MERCURY	Present in method blank
54650	31019	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31019	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31019	8081A	309002		J	ALDRIN	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54650

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54650	31019	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31019	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31019	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31019	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31019	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31019	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31020	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31020	6010B	7782492	U		SELENIUM	Present in method blank
54650	31020	7471A	7439976	U		MERCURY	Present in method blank
54650	31020	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31020	8081A	50293		J	4,4'-DDT	Continuing calibration percent difference
54650	31020	8081A	309002		J	ALDRIN	Continuing calibration percent difference
54650	31020	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31020	8081A	319857		J	BETA-BHC	Continuing calibration percent difference
54650	31020	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54650	31020	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54650	31020	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31020	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31021	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31021	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31021	6010B	7782492	U		SELENIUM	Present in method blank
54650	31021	7471A	7439976	U		MERCURY	Present in method blank
54650	31021	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31021	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31021	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31021	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31022	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31022	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31022	6010B	7782492	U		SELENIUM	Present in method blank
54650	31022	7471A	7439976	U		MERCURY	Present in method blank
54650	31022	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31022	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference

CDM Federal Programs
Reason for Qualified Results
SDG Nos. : 54650

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54650	31022	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31022	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31022	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31023	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31023	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31023	6010B	7439987	U		MOLYBDENUM	Present in method blank
54650	31023	6010B	7782492	U		SELENIUM	Present in method blank
54650	31023	7471A	7439976	U		MERCURY	Present in method blank
54650	31023	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31023	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31023	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31023	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31023	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31023	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54650	31024	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31024	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31024	6010B	7782492	U		SELENIUM	Present in method blank
54650	31024	7471A	7439976	U		MERCURY	Present in method blank
54650	31024	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31024	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31024	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31024	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31024	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31025	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31025	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54650	31025	6010B	7782492	U		SELENIUM	Present in method blank
54650	31025	7471A	7439976	U		MERCURY	Present in method blank
54650	31025	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31025	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31025	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31025	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31025	8260B	67641		J	ACETONE	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54650

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54650	31026	6010B	7782492	U		SELENIUM	Present in method blank
54650	31026	7471A	7439976	U		MERCURY	Present in method blank
54650	31026	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31026	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31026	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31026	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31026	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31027	6010B	7782492	U		SELENIUM	Present in method blank
54650	31027	6010B	7440280	U		THALLIUM	Present in method blank
54650	31027	7471A	7439976	U		MERCURY	Present in method blank
54650	31027	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31027	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31027	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31027	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31027	8260B	67641		J	ACETONE	Continuing calibration percent difference
54650	31028	6010B	7440360	U		ANTIMONY	Present in method blank
54650	31028	6010B	7782492	U		SELENIUM	Present in method blank
54650	31028	7471A	7439976	U		MERCURY	Present in method blank
54650	31028	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54650	31028	8081A	72559		J	4,4'-DDE	Continuing calibration percent difference
54650	31028	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54650	31028	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54650	31028	8260B	67641		J	ACETONE	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
6010B	31014	SO	N							
				ANTIMONY	5.4	0.61B		U	mg/kg	
				BERYLLIUM	0.22	0.070B		J	mg/kg	
				CADMIUM	0.22	0.21B		J	mg/kg	
				SELENIUM	0.54	1.3		U	mg/kg	
				THALLIUM	0.54	0.58		U	mg/kg	
6010B	31015	SO	N							
				ANTIMONY	5.7	0.82B		U	mg/kg	
				BERYLLIUM	0.23	0.23B		J	mg/kg	
				MOLYBDENUM	0.23	0.097B		U	mg/kg	
				SELENIUM	0.57	1.2		U	mg/kg	
6010B	31016	SO	N							
				ANTIMONY	5.4	0.49B		U	mg/kg	
				CADMIUM	0.21	0.083B		J	mg/kg	
				SELENIUM	0.54	0.24B		U	mg/kg	
6010B	31017	SO	N							
				ANTIMONY	6.1	0.56B		U	mg/kg	
				BERYLLIUM	0.25	0.10B		J	mg/kg	
				SELENIUM	0.61	0.90		U	mg/kg	
6010B	31018	SO	N							
				SELENIUM	0.57	1.2		U	mg/kg	
6010B	31019	SO	N							
				CADMIUM	0.28	0.045B		J	mg/kg	
				SELENIUM	0.70	0.69B		U	mg/kg	
				THALLIUM	0.70	0.38B		U	mg/kg	
6010B	31020	SO	N							
				ANTIMONY	5.3	5.3U		UJ	mg/kg	
				ARSENIC	0.32	14.2		J	mg/kg	
				BERYLLIUM	0.21	0.0065B		J	mg/kg	
				NICKEL	0.32	60.5		J	mg/kg	
				SELENIUM	0.53	1.7		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
6010B	31021	SO	FD							
				ANTIMONY	5.8	0.30B		U	mg/kg	
				BERYLLIUM	0.23	0.21B		J	mg/kg	
				SELENIUM	0.58	1.3		U	mg/kg	
6010B	31022	SO	N							
				ANTIMONY	5.3	0.72B		U	mg/kg	
				BERYLLIUM	0.21	0.18B		J	mg/kg	
				SELENIUM	0.53	1.2		U	mg/kg	
6010B	31023	SO	N							
				ANTIMONY	5.2	0.82B		U	mg/kg	
				BERYLLIUM	0.21	0.051B		J	mg/kg	
				MOLYBDENUM	0.21	0.31		U	mg/kg	
				SELENIUM	0.52	1.3		U	mg/kg	
6010B	31024	SO	N							
				ANTIMONY	5.6	0.38B		U	mg/kg	
				BERYLLIUM	0.22	0.14B		J	mg/kg	
				SELENIUM	0.56	0.58		U	mg/kg	
6010B	31025	SO	N							
				ANTIMONY	5.4	0.58B		U	mg/kg	
				BERYLLIUM	0.22	0.065B		J	mg/kg	
				CADMIUM	0.22	0.030B		J	mg/kg	
				SELENIUM	0.54	0.85		U	mg/kg	
6010B	31026	SO	N							
				CADMIUM	0.23	0.18B		J	mg/kg	
				SELENIUM	0.58	0.66		U	mg/kg	
6010B	31027	SO	N							
				SELENIUM	0.54	0.46B		U	mg/kg	
				THALLIUM	0.54	1.0		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
6010B	31028	SO	N							
				ANTIMONY	5.3	1.1B		U	mg/kg	
				CADMIUM	0.21	0.14B		J	mg/kg	
				SELENIUM	0.53	1.5		U	mg/kg	
7471A	31014	SO	N							
				MERCURY	0.22	0.17B		U	mg/kg	
7471A	31015	SO	N							
				MERCURY	0.23	0.59		U	mg/kg	
7471A	31016	SO	N							
				MERCURY	0.21	0.17B		U	mg/kg	
7471A	31017	SO	N							
				MERCURY	0.25	0.15B		U	mg/kg	
7471A	31018	SO	N							
				MERCURY	0.23	0.36		U	mg/kg	
7471A	31019	SO	N							
				MERCURY	0.28	0.37		U	mg/kg	
7471A	31020	SO	N							
				MERCURY	0.21	0.48		UJ	mg/kg	
7471A	31021	SO	FD							
				MERCURY	0.23	0.11B		U	mg/kg	
7471A	31022	SO	N							
				MERCURY	0.21	0.14B		U	mg/kg	
7471A	31023	SO	N							
				MERCURY	0.21	0.18B		U	mg/kg	
7471A	31024	SO	N							
				MERCURY	0.22	0.11B		U	mg/kg	
7471A	31025	SO	N							
				MERCURY	0.22	0.79		U	mg/kg	
7471A	31026	SO	N							
				MERCURY	0.23	0.13B		U	mg/kg	

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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
7471A	31027	SO	N							
				MERCURY	0.22	0.31		U	mg/kg	
7471A	31028	SO	N							
				MERCURY	0.21	0.29		U	mg/kg	
8081A	31014	SO	N							
				4,4'-DDE	0.032	0.032U		UJ	mg/kg	
				4,4'-DDT	0.032	0.032U		UJ	mg/kg	
				ALDRIN	0.018	0.018U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				BETA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.054	0.054U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8081A	31015	SO	N							
				4,4'-DDE	0.0034	0.0034U		UJ	mg/kg	
				4,4'-DDT	0.0034	0.0034U		UJ	mg/kg	
				ALDRIN	0.0019	0.0019U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				BETA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0057	0.0057U		UJ	mg/kg	
				GAMMA-BHC	0.0019	0.0019U		UJ	mg/kg	
8081A	31016	SO	N							
				4,4'-DDD	0.0032	0.0032U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
8081A	31017	SO	N							
				4,4'-DDE	0.037	0.037U		UJ	mg/kg	
				4,4'-DDT	0.037	0.037U		UJ	mg/kg	
				ALDRIN	0.021	0.021U		UJ	mg/kg	
				ALPHA-BHC	0.021	0.021U		UJ	mg/kg	
				BETA-BHC	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.061	0.061U		UJ	mg/kg	
				GAMMA-BHC	0.021	0.021U		UJ	mg/kg	
8081A	31018	SO	N							
				4,4'-DDE	0.0034	0.0034U		UJ	mg/kg	
				4,4'-DDT	0.0034	0.0034U		UJ	mg/kg	
				ALDRIN	0.0020	0.0020U		UJ	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				BETA-BHC	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0057	0.0057U		UJ	mg/kg	
				GAMMA-BHC	0.0020	0.0020U		UJ	mg/kg	
8081A	31019	SO	N							
				4,4'-DDE	0.0042	0.0042U		UJ	mg/kg	
				4,4'-DDT	0.0042	0.0042U		UJ	mg/kg	
				ALDRIN	0.0024	0.0024U		UJ	mg/kg	
				ALPHA-BHC	0.0024	0.0024U		UJ	mg/kg	
				BETA-BHC	0.0024	0.0024U		UJ	mg/kg	
				ENDOSULFAN	0.0024	0.0024U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0070	0.0070U		UJ	mg/kg	
				GAMMA-BHC	0.0024	0.0024U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
8081A	31020	SO	N							
				4,4'-DDE	0.0032	0.0032U		UJ	mg/kg	
				4,4'-DDT	0.0032	0.0032U		UJ	mg/kg	
				ALDRIN	0.0018	0.0018U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				BETA-BHC	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0053	0.0053U		UJ	mg/kg	
				GAMMA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31021	SO	FD							
				4,4'-DDE	0.035	0.035U		UJ	mg/kg	
				ALPHA-BHC	0.020	0.020U		UJ	mg/kg	
				GAMMA-BHC	0.020	0.020U		UJ	mg/kg	
8081A	31022	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				4,4'-DDE	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8081A	31023	SO	N							
				4,4'-DDD	0.031	0.031U		UJ	mg/kg	
				4,4'-DDE	0.031	0.031U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8081A	31024	SO	N							
				4,4'-DDD	0.051	0.051U		UJ	mg/kg	
				4,4'-DDE	0.051	0.051U		UJ	mg/kg	
				ALPHA-BHC	0.029	0.029U		UJ	mg/kg	
				GAMMA-BHC	0.029	0.029U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
8081A	31025	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				4,4'-DDE	0.0033	0.0033U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				GAMMA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31026	SO	N							
				4,4'-DDD	0.0035	0.0035U		UJ	mg/kg	
				4,4'-DDE	0.0035	0.0035U		UJ	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				GAMMA-BHC	0.0020	0.0020U		UJ	mg/kg	
8081A	31027	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				4,4'-DDE	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8081A	31028	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				4,4'-DDE	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				GAMMA-BHC	0.018	0.018U		UJ	mg/kg	
8082	31024	SO	N							
				AROCLOR 1260	0.037	0.005J		J	mg/kg	
8260B	31014	SO	N							
				ACETONE	0.049	0.049U		UJ	mg/kg	
8260B	31015	SO	N							
				ACETONE	0.051	0.051U		UJ	mg/kg	
8260B	31016	SO	N							
				ACETONE	0.057	0.057U		UJ	mg/kg	
8260B	31017	SO	N							
				ACETONE	0.054	0.054U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54650										
8260B	31018	SO	N							
				ACETONE	0.048	0.048U		UJ	mg/kg	
8260B	31019	SO	N							
				ACETONE	0.071	0.071U		UJ	mg/kg	
				BENZENE	0.0071	0.001J		J	mg/kg	
8260B	31020	SO	N							
				ACETONE	0.049	0.049U		UJ	mg/kg	
8260B	31021	SO	FD							
				ACETONE	0.063	0.063U		UJ	mg/kg	
8260B	31022	SO	N							
				ACETONE	0.052	0.052U		UJ	mg/kg	
8260B	31023	SO	N							
				ACETONE	0.046	0.046U		UJ	mg/kg	
8260B	31024	SO	N							
				ACETONE	0.051	0.051U		UJ	mg/kg	
8260B	31025	SO	N							
				ACETONE	0.044	0.044U		UJ	mg/kg	
8260B	31026	SO	N							
				ACETONE	0.052	0.052U		UJ	mg/kg	
8260B	31027	SO	N							
				ACETONE	0.054	0.054U		UJ	mg/kg	
8260B	31028	SO	N							
				ACETONE	0.049	0.049U		UJ	mg/kg	
8270C	31023	SO	N							
				4-Nitroaniline	100	100U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4650

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054650 **Analysis Method :** 8081A **Analysis Date :** 11/08/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	24.823	15.0	-15.0
beta-BHC	20.680	15.0	-15.0
gamma-BHC	22.719	15.0	-15.0
Aldrin	18.214	15.0	-15.0
4,4'-DDE	23.390	15.0	-15.0
Endosulfan	23.243	15.0	-15.0
Endosulfan sulfate	42.053	15.0	-15.0
4,4'-DDT	17.059		

Associated Samples

Client Sample ID	Lab Sample ID
31014	05-04650-1
31015	05-04650-2
31017	05-04650-4
31018	05-04650-5
31019	05-04650-6
31020	05-04650-7

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054650 **Analysis Method :** 8081A **Analysis Date :** 11/08/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	20.760	15.0	-15.0
gamma-BHC	15.984	15.0	-15.0
4,4'-DDE	15.621	15.0	-15.0
4,4'-DDD	17.610	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31022	05-04650-9
31023	05-04650-10
31024	05-04650-11
31025	05-04650-12
31026	05-04650-13
31027	05-04650-14
31028	05-04650-15
31021	05-04650-08

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054650 **Analysis Method :** 8081A **Analysis Date :** 11/08/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	17.006	15.0	-15.0
4,4'-DDD	18.296	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31016	05-04650-2
	05-04650-3

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3366-11 **Analysis Method :** 8260B **Analysis Date :** 11/08/2005

Lab Reporting Batch : 54650 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
ACETONE		51.5	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31014	05-4650-1
31015	05-4650-2
31016	05-4650-3
31017	05-4650-4
31018	05-4650-5
31019	05-4650-6
31020	05-4650-7
31021	05-4650-8
31022	05-4650-9
31023	05-4650-10
31024	05-4650-11
31025	05-4650-12
31026	05-4650-13
31027	05-4650-14
31028	05-4650-15

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3393-35 **Analysis Method :** 8270C **Analysis Date :** 11/10/2005

Lab Reporting Batch : 54650 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.397	31.9	0.05		25.0	-50.0	-25.0

Associated Samples	
Client Sample ID	Lab Sample ID
31023	05-4650-10

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4650 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.633 ug/L	ICB/CCB
Selenium	10.251 ug/L	ICB/CCB
Thallium	4.226 ug/L	ICB/CCB
Molybdenum	2.139 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Antimony	0.61	31014	05-04650-1
Selenium	1.3	31014	05-04650-1
Thallium	0.58	31014	05-04650-1
Antimony	0.82	31015	05-04650-2
Selenium	1.2	31015	05-04650-2
Molybdenum	0.097	31015	05-04650-2
Antimony	0.49	31016	05-04650-3
Selenium	0.24	31016	05-04650-3
Antimony	0.56	31017	05-04650-4
Selenium	0.90	31017	05-04650-4
Selenium	1.2	31018	05-04650-5
Selenium	0.69	31019	05-04650-6
Thallium	0.38	31019	05-04650-6
Selenium	1.7	31020	05-04650-7
Antimony	0.30	31021	05-04650-8
Selenium	1.3	31021	05-04650-8
Antimony	0.72	31022	05-04650-9
Selenium	1.2	31022	05-04650-9
Antimony	0.82	31023	05-04650-10
Selenium	1.3	31023	05-04650-10
Molybdenum	0.31	31023	05-04650-10
Antimony	0.38	31024	05-04650-11
Selenium	0.58	31024	05-04650-11
Antimony	0.58	31025	05-04650-12
Selenium	0.85	31025	05-04650-12
Selenium	0.66	31026	05-04650-13
Selenium	0.46	31027	05-04650-14
Thallium	1.0	31027	05-04650-14
Antimony	1.1	31028	05-04650-15
Selenium	1.5	31028	05-04650-15

Method Blank Outlier Report

Lab Reporting Batch : 54650
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2117-MB-01

Lab ID: APCL
Analysis Date : 11/08/2005
Preparation Date : 11/07/2005
Preparation Batch : 05M2117L

SELENIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.31	0.5	mg/kg	B	

SELENIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31014	05-4650-1	1	1.3		mg/kg
31015	05-4650-2	1	1.2		mg/kg
31016	05-4650-3	1	0.24	B	mg/kg
31017	05-4650-4	1	0.90		mg/kg
31018	05-4650-5	1	1.2		mg/kg
31019	05-4650-6	1	0.69	B	mg/kg
31021	05-4650-8	1	1.3		mg/kg
31022	05-4650-9	1	1.2		mg/kg
31023	05-4650-10	1	1.3		mg/kg
31024	05-4650-11	1	0.58		mg/kg
31025	05-4650-12	1	0.85		mg/kg
31026	05-4650-13	1	0.66		mg/kg
31027	05-4650-14	1	0.46	B	mg/kg
31028	05-4650-15	1	1.5		mg/kg

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.093	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

VANADIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.058	0.5	mg/kg	B	

VANADIUM contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54650
Analysis Method : 7471A
Preparation Type : 7471A
Method Blank Lab Sample ID : 05M2122-MB-01

Lab ID: APCL
Analysis Date : 11/08/2005
Preparation Date : 11/08/2005
Preparation Batch : 05M2122H

MERCURY	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	24.5	0.2	mg/kg		

MERCURY was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31014	05-4650-1	1	0.17	B	mg/kg
31015	05-4650-2	1	0.59		mg/kg
31016	05-4650-3	1	0.17	B	mg/kg
31017	05-4650-4	1	0.15	B	mg/kg
31018	05-4650-5	1	0.36		mg/kg
31019	05-4650-6	1	0.37		mg/kg
31020	05-4650-7	1	0.48		mg/kg
31021	05-4650-8	1	0.11	B	mg/kg
31022	05-4650-9	1	0.14	B	mg/kg
31023	05-4650-10	1	0.18	B	mg/kg
31024	05-4650-11	1	0.11	B	mg/kg
31025	05-4650-12	1	0.79		mg/kg
31026	05-4650-13	1	0.13	B	mg/kg
31027	05-4650-14	1	0.31		mg/kg
31028	05-4650-15	1	0.29		mg/kg

Method Blank Outlier Report

Lab Reporting Batch : 54650
Analysis Method : 8270C
Preparation Type : 3550B
Method Blank Lab Sample ID : 05G3370-MB-01

Lab ID: APCL
Analysis Date : 11/08/2005
Preparation Date : 11/07/2005
Preparation Batch : 05G3370

BIS(2-CHLOROETHYL) ETHER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.04	0.5	mg/kg	J	

BIS(2-CHLOROETHYL) ETHER contamination found in the method blank did not qualify any samples.

Laboratory Control Sample / Laboratory Control Sample Duplicate Outlier Report

Method Batch : 05M2117L
Analysis Method : 6010B
Analysis Date : 11/08/2005
Preparation Batch : 05M2117L
Preparation Type : 3050B
Preparation Date : 11/07/2005
Lab Reporting Batch : 54650
Lab ID: APCL

			Reported Values		Project Limits (Percent)			
LCS Lab Sample ID	Matrix	Analyte Name	Percent Recovery	RPD	Rejection Point	Lower Limit	Upper Limit	RPD
05M2117-LSD-01	SO	BERYLLIUM	106	1	50.00	85.00	105.00	20.00

Associated Samples

Client Sample ID	Lab Sample ID
31014	05-4650-1
31015	05-4650-2
31016	05-4650-3
31017	05-4650-4
31018	05-4650-5
31019	05-4650-6
31020	05-4650-7
31021	05-4650-8
31022	05-4650-9
31023	05-4650-10
31024	05-4650-11
31025	05-4650-12
31026	05-4650-13
31027	05-4650-14
31028	05-4650-15

Scope of Data Qualification: The outlier in the LCS qualifies that analyte in all samples with the same Preparation Batch ID as the LCS

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54650 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31020	RES	5.3	U	31021	RES	0.30	B	200.0	50	mg/kg
	SO	ARSENIC		RES	14.2			RES	6.5		74.4	50	mg/kg
	SO	BERYLLIUM		RES	0.0065	B		RES	0.21	B	188.0	50	mg/kg
	SO	NICKEL		RES	60.5			RES	27.5		75.0	50	mg/kg
7471A	SO	MERCURY		RES	0.48			RES	0.11	B	125.4	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54650 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31014	05-4650-1	6010B	SO	ANTIMONY	B	0.61	5.4	mg/kg
				BERYLLIUM	B	0.070	0.22	mg/kg
				CADMIUM	B	0.21	0.22	mg/kg
		7471A		MERCURY	B	0.17	0.22	mg/kg
31015	05-4650-2	6010B		ANTIMONY	B	0.82	5.7	mg/kg
				MOLYBDENUM	B	0.097	0.23	mg/kg
31016	05-4650-3			ANTIMONY	B	0.49	5.4	mg/kg
				CADMIUM	B	0.083	0.21	mg/kg
				SELENIUM	B	0.24	0.54	mg/kg
		7471A		MERCURY	B	0.17	0.21	mg/kg
31017	05-4650-4	6010B		ANTIMONY	B	0.56	6.1	mg/kg
				BERYLLIUM	B	0.10	0.25	mg/kg
		7471A		MERCURY	B	0.15	0.25	mg/kg
31019	05-4650-6	6010B		CADMIUM	B	0.045	0.28	mg/kg
				SELENIUM	B	0.69	0.70	mg/kg
				THALLIUM	B	0.38	0.70	mg
		8260B		BENZENE	J	0.001	0.0071	mg/kg
31020	05-4650-7	6010B		BERYLLIUM	B	0.0065	0.21	mg/kg
31021	05-4650-8			ANTIMONY	B	0.30	5.8	mg/kg
				BERYLLIUM	B	0.21	0.23	mg/kg
		7471A		MERCURY	B	0.11	0.23	mg/kg
31022	05-4650-9	6010B		ANTIMONY	B	0.72	5.3	mg/kg
				BERYLLIUM	B	0.18	0.21	mg/kg
		7471A		MERCURY	B	0.14	0.21	mg/kg
31023	05-4650-10	6010B		ANTIMONY	B	0.82	5.2	mg/kg
				BERYLLIUM	B	0.051	0.21	mg/kg
		7471A		MERCURY	B	0.18	0.21	mg/kg
31024	05-4650-11	6010B		ANTIMONY	B	0.38	5.6	mg/kg
				BERYLLIUM	B	0.14	0.22	mg/kg
		7471A		MERCURY	B	0.11	0.22	mg/kg
		8082		AROCLOR 1260	J	0.005	0.037	mg/kg
31025	05-4650-12	6010B		ANTIMONY	B	0.58	5.4	mg/kg
				BERYLLIUM	B	0.065	0.22	mg/kg
				CADMIUM	B	0.030	0.22	mg/kg
31026	05-4650-13			CADMIUM	B	0.18	0.23	mg/kg
		7471A		MERCURY	B	0.13	0.23	mg/kg

Project Number and Name: **6218.086 - Alameda Pt**

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54650 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31027	05-4650-14	6010B	SO	SELENIUM	B	0.46	0.54	mg/kg
31028	05-4650-15			ANTIMONY	B	1.1	5.3	mg/kg
				CADMIUM	B	0.14	0.21	mg/kg

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31029	05-4651-1	N	3050B	6010B	3
03-Nov-2005	31029	05-4651-1	N	3550B	8081A	3
03-Nov-2005	31029	05-4651-1	N	3550B	8082	3
03-Nov-2005	31029	05-4651-1	N	3550B	8270C	3
03-Nov-2005	31029	05-4651-1	N	5035	8260B	3
03-Nov-2005	31029	05-4651-1	N	7471A	7471A	3
03-Nov-2005	31038	05-4651-10	N	3050B	6010B	3
03-Nov-2005	31038	05-4651-10	N	3550B	8081A	3
03-Nov-2005	31038	05-4651-10	N	3550B	8082	3
03-Nov-2005	31038	05-4651-10	N	3550B	8270C	3
03-Nov-2005	31038	05-4651-10	N	5035	8260B	3
03-Nov-2005	31038	05-4651-10	N	7471A	7471A	3
03-Nov-2005	31039	05-4651-11	N	3050B	6010B	3
03-Nov-2005	31039	05-4651-11	N	3550B	8081A	3
03-Nov-2005	31039	05-4651-11	N	3550B	8082	3
03-Nov-2005	31039	05-4651-11	N	3550B	8270C	3
03-Nov-2005	31039	05-4651-11	N	5035	8260B	3
03-Nov-2005	31039	05-4651-11	N	7471A	7471A	3
03-Nov-2005	31040	05-4651-12	N	3050B	6010B	3
03-Nov-2005	31040	05-4651-12	N	3550B	8081A	3
03-Nov-2005	31040	05-4651-12	N	3550B	8082	3
03-Nov-2005	31040	05-4651-12	N	3550B	8270C	3
03-Nov-2005	31040	05-4651-12	N	5035	8260B	3
03-Nov-2005	31040	05-4651-12	N	7471A	7471A	3
03-Nov-2005	31041	05-4651-13	N	3050B	6010B	3
03-Nov-2005	31041	05-4651-13	N	3550B	8081A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31041	05-4651-13	N	3550B	8082	3
03-Nov-2005	31041	05-4651-13	N	3550B	8270C	3
03-Nov-2005	31041	05-4651-13	N	5035	8260B	3
03-Nov-2005	31041	05-4651-13	N	7471A	7471A	3
03-Nov-2005	31042	05-4651-14	N	3050B	6010B	3
03-Nov-2005	31042	05-4651-14	N	3550B	8081A	3
03-Nov-2005	31042	05-4651-14	N	3550B	8082	3
03-Nov-2005	31042	05-4651-14	N	3550B	8270C	3
03-Nov-2005	31042	05-4651-14	N	5035	8260B	3
03-Nov-2005	31042	05-4651-14	N	7471A	7471A	3
03-Nov-2005	31042DUP	05-4651-14MD	DUP	3050B	6010B	3
03-Nov-2005	31042DUP	05-4651-14MD	DUP	7471A	7471A	3
03-Nov-2005	31042MS	05-4651-14MS	MS	3050B	6010B	3
03-Nov-2005	31042MS	05-4651-14MS	MS	3550B	8081A	3
03-Nov-2005	31042MS	05-4651-14MS	MS	3550B	8082	3
03-Nov-2005	31042MS	05-4651-14MS	MS	3550B	8270C	3
03-Nov-2005	31042MS	05-4651-14MS	MS	5035	8260B	3
03-Nov-2005	31042MS	05-4651-14MS	MS	7471A	7471A	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	3050B	6010B	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	3550B	8081A	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	3550B	8082	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	3550B	8270C	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	5035	8260B	3
03-Nov-2005	31042MSD	05-4651-14MSD	MSD	7471A	7471A	3
03-Nov-2005	31043	05-4651-15	N	3050B	6010B	3
03-Nov-2005	31043	05-4651-15	N	3550B	8081A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31043	05-4651-15	N	3550B	8082	3
03-Nov-2005	31043	05-4651-15	N	3550B	8270C	3
03-Nov-2005	31043	05-4651-15	N	5035	8260B	3
03-Nov-2005	31043	05-4651-15	N	7471A	7471A	3
03-Nov-2005	31044	05-4651-16	N	3050B	6010B	3
03-Nov-2005	31044	05-4651-16	N	3550B	8081A	3
03-Nov-2005	31044	05-4651-16	N	3550B	8082	3
03-Nov-2005	31044	05-4651-16	N	3550B	8270C	3
03-Nov-2005	31044	05-4651-16	N	5035	8260B	3
03-Nov-2005	31044	05-4651-16	N	7471A	7471A	3
03-Nov-2005	31045	05-4651-17	N	3050B	6010B	3
03-Nov-2005	31045	05-4651-17	N	3550B	8081A	3
03-Nov-2005	31045	05-4651-17	N	3550B	8082	3
03-Nov-2005	31045	05-4651-17	N	3550B	8270C	3
03-Nov-2005	31045	05-4651-17	N	5035	8260B	3
03-Nov-2005	31045	05-4651-17	N	7471A	7471A	3
03-Nov-2005	31046	05-4651-18	FD	3050B	6010B	3
03-Nov-2005	31046	05-4651-18	FD	3550B	8081A	3
03-Nov-2005	31046	05-4651-18	FD	3550B	8082	3
03-Nov-2005	31046	05-4651-18	FD	3550B	8270C	3
03-Nov-2005	31046	05-4651-18	FD	5035	8260B	3
03-Nov-2005	31046	05-4651-18	FD	7471A	7471A	3
03-Nov-2005	31202	05-4651-19	TB	5030B	8260B	3
03-Nov-2005	31030	05-4651-2	N	3050B	6010B	3
03-Nov-2005	31030	05-4651-2	N	3550B	8081A	3
03-Nov-2005	31030	05-4651-2	N	3550B	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31030	05-4651-2	N	3550B	8270C	3
03-Nov-2005	31030	05-4651-2	N	5035	8260B	3
03-Nov-2005	31030	05-4651-2	N	7471A	7471A	3
03-Nov-2005	31203	05-4651-20	TB	5030B	8260B	3
03-Nov-2005	31204	05-4651-21	TB	5030B	8260B	3
03-Nov-2005	31031	05-4651-3	N	3050B	6010B	3
03-Nov-2005	31031	05-4651-3	N	3550B	8081A	3
03-Nov-2005	31031	05-4651-3	N	3550B	8082	3
03-Nov-2005	31031	05-4651-3	N	3550B	8270C	3
03-Nov-2005	31031	05-4651-3	N	5035	8260B	3
03-Nov-2005	31031	05-4651-3	N	7471A	7471A	3
03-Nov-2005	31032	05-4651-4	N	3050B	6010B	3
03-Nov-2005	31032	05-4651-4	N	3550B	8081A	3
03-Nov-2005	31032	05-4651-4	N	3550B	8082	3
03-Nov-2005	31032	05-4651-4	N	3550B	8270C	3
03-Nov-2005	31032	05-4651-4	N	5035	8260B	3
03-Nov-2005	31032	05-4651-4	N	7471A	7471A	3
03-Nov-2005	31033	05-4651-5	N	3050B	6010B	3
03-Nov-2005	31033	05-4651-5	N	3550B	8081A	3
03-Nov-2005	31033	05-4651-5	N	3550B	8082	3
03-Nov-2005	31033	05-4651-5	N	3550B	8270C	3
03-Nov-2005	31033	05-4651-5	N	5035	8260B	3
03-Nov-2005	31033	05-4651-5	N	7471A	7471A	3
03-Nov-2005	31034	05-4651-6	N	3050B	6010B	3
03-Nov-2005	31034	05-4651-6	N	3550B	8081A	3
03-Nov-2005	31034	05-4651-6	N	3550B	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Nov-2005	31034	05-4651-6	N	3550B	8270C	3
03-Nov-2005	31034	05-4651-6	N	5035	8260B	3
03-Nov-2005	31034	05-4651-6	N	7471A	7471A	3
03-Nov-2005	31035	05-4651-7	N	3050B	6010B	3
03-Nov-2005	31035	05-4651-7	N	3550B	8081A	3
03-Nov-2005	31035	05-4651-7	N	3550B	8082	3
03-Nov-2005	31035	05-4651-7	N	3550B	8270C	3
03-Nov-2005	31035	05-4651-7	N	5035	8260B	3
03-Nov-2005	31035	05-4651-7	N	7471A	7471A	3
03-Nov-2005	31036	05-4651-8	FD	3050B	6010B	3
03-Nov-2005	31036	05-4651-8	FD	3550B	8081A	3
03-Nov-2005	31036	05-4651-8	FD	3550B	8082	3
03-Nov-2005	31036	05-4651-8	FD	3550B	8270C	3
03-Nov-2005	31036	05-4651-8	FD	5035	8260B	3
03-Nov-2005	31036	05-4651-8	FD	7471A	7471A	3
03-Nov-2005	31037	05-4651-9	N	3050B	6010B	3
03-Nov-2005	31037	05-4651-9	N	3550B	8081A	3
03-Nov-2005	31037	05-4651-9	N	3550B	8082	3
03-Nov-2005	31037	05-4651-9	N	3550B	8270C	3
03-Nov-2005	31037	05-4651-9	N	5035	8260B	3
03-Nov-2005	31037	05-4651-9	N	7471A	7471A	3
04-Nov-2005	31047	05-4666-1	N	3050B	6010B	3
04-Nov-2005	31047	05-4666-1	N	3550B	8081A	3
04-Nov-2005	31047	05-4666-1	N	3550B	8082	3
04-Nov-2005	31047	05-4666-1	N	3550B	8270C	3
04-Nov-2005	31047	05-4666-1	N	5035	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31047	05-4666-1	N	7471A	7471A	3
04-Nov-2005	31058	05-4666-10	N	3050B	6010B	3
04-Nov-2005	31058	05-4666-10	N	3550B	8081A	3
04-Nov-2005	31058	05-4666-10	N	3550B	8082	3
04-Nov-2005	31058	05-4666-10	N	3550B	8270C	3
04-Nov-2005	31058	05-4666-10	N	5035	8260B	3
04-Nov-2005	31058	05-4666-10	N	7471A	7471A	3
04-Nov-2005	31059	05-4666-11	N	3050B	6010B	3
04-Nov-2005	31059	05-4666-11	N	3550B	8081A	3
04-Nov-2005	31059	05-4666-11	N	3550B	8082	3
04-Nov-2005	31059	05-4666-11	N	3550B	8270C	3
04-Nov-2005	31059	05-4666-11	N	5035	8260B	3
04-Nov-2005	31059	05-4666-11	N	7471A	7471A	3
04-Nov-2005	31060	05-4666-12	N	3050B	6010B	3
04-Nov-2005	31060	05-4666-12	N	3550B	8081A	3
04-Nov-2005	31060	05-4666-12	N	3550B	8082	3
04-Nov-2005	31060	05-4666-12	N	3550B	8270C	3
04-Nov-2005	31060	05-4666-12	N	5035	8260B	3
04-Nov-2005	31060	05-4666-12	N	7471A	7471A	3
04-Nov-2005	31061	05-4666-13	N	3050B	6010B	3
04-Nov-2005	31061	05-4666-13	N	3550B	8081A	3
04-Nov-2005	31061	05-4666-13	N	3550B	8082	3
04-Nov-2005	31061	05-4666-13	N	3550B	8270C	3
04-Nov-2005	31061	05-4666-13	N	5035	8260B	3
04-Nov-2005	31061	05-4666-13	N	7471A	7471A	3
04-Nov-2005	31062	05-4666-14	N	3050B	6010B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31062	05-4666-14	N	3550B	8081A	3
04-Nov-2005	31062	05-4666-14	N	3550B	8082	3
04-Nov-2005	31062	05-4666-14	N	3550B	8270C	3
04-Nov-2005	31062	05-4666-14	N	5035	8260B	3
04-Nov-2005	31062	05-4666-14	N	7471A	7471A	3
04-Nov-2005	31062DUP	05-4666-14MD	DUP	3050B	6010B	3
04-Nov-2005	31062DUP	05-4666-14MD	DUP	7471A	7471A	3
04-Nov-2005	31062MS	05-4666-14MS	MS	3050B	6010B	3
04-Nov-2005	31062MS	05-4666-14MS	MS	3550B	8081A	3
04-Nov-2005	31062MS	05-4666-14MS	MS	3550B	8270C	3
04-Nov-2005	31062MS	05-4666-14MS	MS	5035	8260B	3
04-Nov-2005	31062MS	05-4666-14MS	MS	7471A	7471A	3
04-Nov-2005	31062MSD	05-4666-14MSD	MSD	3050B	6010B	3
04-Nov-2005	31062MSD	05-4666-14MSD	MSD	3550B	8081A	3
04-Nov-2005	31062MSD	05-4666-14MSD	MSD	3550B	8270C	3
04-Nov-2005	31062MSD	05-4666-14MSD	MSD	5035	8260B	3
04-Nov-2005	31062MSD	05-4666-14MSD	MSD	7471A	7471A	3
04-Nov-2005	31063	05-4666-15	N	3050B	6010B	3
04-Nov-2005	31063	05-4666-15	N	3550B	8081A	3
04-Nov-2005	31063	05-4666-15	N	3550B	8082	3
04-Nov-2005	31063	05-4666-15	N	3550B	8270C	3
04-Nov-2005	31063	05-4666-15	N	5035	8260B	3
04-Nov-2005	31063	05-4666-15	N	7471A	7471A	3
04-Nov-2005	31048	05-4666-2	N	3050B	6010B	3
04-Nov-2005	31048	05-4666-2	N	3550B	8081A	3
04-Nov-2005	31048	05-4666-2	N	3550B	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31048	05-4666-2	N	3550B	8270C	3
04-Nov-2005	31048	05-4666-2	N	5035	8260B	3
04-Nov-2005	31048	05-4666-2	N	7471A	7471A	3
04-Nov-2005	31049	05-4666-3	N	3050B	6010B	3
04-Nov-2005	31049	05-4666-3	N	3550B	8081A	3
04-Nov-2005	31049	05-4666-3	N	3550B	8082	3
04-Nov-2005	31049	05-4666-3	N	3550B	8270C	3
04-Nov-2005	31049	05-4666-3	N	5035	8260B	3
04-Nov-2005	31049	05-4666-3	N	7471A	7471A	3
04-Nov-2005	31052	05-4666-4	N	3050B	6010B	3
04-Nov-2005	31052	05-4666-4	N	3550B	8081A	3
04-Nov-2005	31052	05-4666-4	N	3550B	8082	3
04-Nov-2005	31052	05-4666-4	N	3550B	8270C	3
04-Nov-2005	31052	05-4666-4	N	5035	8260B	3
04-Nov-2005	31052	05-4666-4	N	7471A	7471A	3
04-Nov-2005	31053	05-4666-5	N	3050B	6010B	3
04-Nov-2005	31053	05-4666-5	N	3550B	8081A	3
04-Nov-2005	31053	05-4666-5	N	3550B	8082	3
04-Nov-2005	31053	05-4666-5	N	3550B	8270C	3
04-Nov-2005	31053	05-4666-5	N	5035	8260B	3
04-Nov-2005	31053	05-4666-5	N	7471A	7471A	3
04-Nov-2005	31054	05-4666-6	N	3050B	6010B	3
04-Nov-2005	31054	05-4666-6	N	3550B	8081A	3
04-Nov-2005	31054	05-4666-6	N	3550B	8082	3
04-Nov-2005	31054	05-4666-6	N	3550B	8270C	3
04-Nov-2005	31054	05-4666-6	N	5035	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31054	05-4666-6	N	7471A	7471A	3
04-Nov-2005	31055	05-4666-7	N	3050B	6010B	3
04-Nov-2005	31055	05-4666-7	N	3550B	8081A	3
04-Nov-2005	31055	05-4666-7	N	3550B	8082	3
04-Nov-2005	31055	05-4666-7	N	3550B	8270C	3
04-Nov-2005	31055	05-4666-7	N	5035	8260B	3
04-Nov-2005	31055	05-4666-7	N	7471A	7471A	3
04-Nov-2005	31056	05-4666-8	FD	3050B	6010B	3
04-Nov-2005	31056	05-4666-8	FD	3550B	8081A	3
04-Nov-2005	31056	05-4666-8	FD	3550B	8082	3
04-Nov-2005	31056	05-4666-8	FD	3550B	8270C	3
04-Nov-2005	31056	05-4666-8	FD	5035	8260B	3
04-Nov-2005	31056	05-4666-8	FD	7471A	7471A	3
04-Nov-2005	31057	05-4666-9	N	3050B	6010B	3
04-Nov-2005	31057	05-4666-9	N	3550B	8081A	3
04-Nov-2005	31057	05-4666-9	N	3550B	8082	3
04-Nov-2005	31057	05-4666-9	N	3550B	8270C	3
04-Nov-2005	31057	05-4666-9	N	5035	8260B	3
04-Nov-2005	31057	05-4666-9	N	7471A	7471A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54651,54666

Project No # : 14388

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54651	31029	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31029	6010B	7439987	U		MOLYBDENUM	Present in method blank
54651	31029	6010B	7782492	U		SELENIUM	Present in method blank
54651	31029	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31030	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31030	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31030	6010B	7782492	U		SELENIUM	Present in method blank
54651	31030	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31031	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31031	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31031	6010B	7782492	U		SELENIUM	Present in method blank
54651	31031	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31032	6010B	7782492	U		SELENIUM	Present in method blank
54651	31032	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31033	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31033	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31033	6010B	7782492	U		SELENIUM	Present in method blank
54651	31033	6010B	7440280	U		THALLIUM	Present in method blank
54651	31033	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31034	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31034	6010B	7782492	U		SELENIUM	Present in method blank
54651	31034	6010B	7440280	U		THALLIUM	Present in method blank
54651	31034	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31035	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31035	6010B	7782492	U		SELENIUM	Present in method blank
54651	31035	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31036	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31036	6010B	7782492	U		SELENIUM	Present in method blank
54651	31036	6010B	7440280	U		THALLIUM	Present in method blank
54651	31036	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54651	31037	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31037	6010B	7440417	J		BERYLLIUM	LCS spike recovery

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54651,54666

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54651	31037	6010B	7782492	U		SELENIUM	Present in method blank
54651	31037	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31038	6010B	7440280	U		THALLIUM	Present in method blank
54651	31038	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31039	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31039	6010B	7782492	U		SELENIUM	Present in method blank
54651	31039	6010B	7440280	U		THALLIUM	Present in method blank
54651	31039	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31040	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31040	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31040	6010B	7782492	U		SELENIUM	Present in method blank
54651	31040	8081A	72548	J		4,4'-DDD	Continuing calibration percent difference
54651	31041	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31041	6010B	7440280	U		THALLIUM	Present in method blank
54651	31041	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31042	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31042	6010B	7782492	U		SELENIUM	Present in method blank
54651	31042	6010B	7440280	U		THALLIUM	Present in method blank
54651	31042	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31043	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31043	6010B	7782492	U		SELENIUM	Present in method blank
54651	31043	6010B	7440280	U		THALLIUM	Present in method blank
54651	31043	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31044	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31044	6010B	7440417	J		BERYLLIUM	LCS spike recovery
54651	31044	6010B	7782492	U		SELENIUM	Present in method blank
54651	31044	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31045	6010B	7440360	U		ANTIMONY	Present in method blank
54651	31045	6010B	7782492	U		SELENIUM	Present in method blank
54651	31045	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54651	31046	6010B	7782492	U		SELENIUM	Present in method blank
54651	31046	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54651,54666

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54666	31047	6010B	7440280	U		THALLIUM	Present in method blank
54666	31047	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54666	31047	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31047	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31047	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31048	6010B	7440360	U		ANTIMONY	Present in method blank
54666	31048	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54666	31048	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31048	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31048	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31049	6010B	7440280	U		THALLIUM	Present in method blank
54666	31049	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54666	31049	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31049	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31049	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31052	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54666	31052	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31052	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31052	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31053	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54666	31053	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31053	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31053	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31054	6010B	7440280	U		THALLIUM	Present in method blank
54666	31054	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31054	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31054	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31055	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31055	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31055	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31056	6010B	7440360	U		ANTIMONY	Present in method blank
54666	31056	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54651,54666

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54666	31056	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31056	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31057	6010B	7440280	U		THALLIUM	Present in method blank
54666	31057	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31057	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31057	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31058	6010B	7440360	U		ANTIMONY	Present in method blank
54666	31058	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31058	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31058	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31058	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31058	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54666	31058	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54666	31059	6010B	7440360	U		ANTIMONY	Present in method blank
54666	31059	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31059	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31059	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31059	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31059	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54666	31059	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54666	31060	6010B	7440360	U		ANTIMONY	Present in method blank
54666	31060	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31060	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31060	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31060	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31060	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54666	31060	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54666	31061	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31061	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31061	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31061	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31061	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54651,54666

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54666	31061	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54666	31062	6010B	7440280	U		THALLIUM	Present in method blank
54666	31062	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31062	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31062	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31062	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31062	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54666	31062	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54666	31062	8270C	121142		J	2,4-DINITROTOLUENE	Matrix spike RPD
54666	31062	8270C	87865		J	PENTACHLOROPHENOL	Matrix spike RPD
54666	31063	6010B	7440280	U		THALLIUM	Present in method blank
54666	31063	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54666	31063	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54666	31063	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54666	31063	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54666	31063	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54666	31063	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
6010B	31029	SO	N							
				ANTIMONY	5.6	0.78B		U	mg/kg	
				CADMIUM	0.22	0.19B		J	mg/kg	
				MOLYBDENUM	0.22	0.15B		U	mg/kg	
				SELENIUM	0.56	1.2		U	mg/kg	
6010B	31030	SO	N							
				ANTIMONY	5.2	0.82B		U	mg/kg	
				BERYLLIUM	0.21	0.21		J	mg/kg	
				SELENIUM	0.52	1.3		U	mg/kg	
6010B	31031	SO	N							
				ANTIMONY	5.5	0.31B		U	mg/kg	
				BERYLLIUM	0.22	0.097B		J	mg/kg	
				SELENIUM	0.55	0.84		U	mg/kg	
6010B	31032	SO	N							
				CADMIUM	0.21	0.075B		J	mg/kg	
				SELENIUM	0.53	0.99		U	mg/kg	
6010B	31033	SO	N							
				ANTIMONY	5.5	0.71B		U	mg/kg	
				BERYLLIUM	0.22	0.081B		J	mg/kg	
				SELENIUM	0.55	1.4		U	mg/kg	
				THALLIUM	0.55	0.87		U	mg/kg	
6010B	31034	SO	N							
				ANTIMONY	5.6	0.70B		U	mg/kg	
				CADMIUM	0.23	0.16B		J	mg/kg	
				SELENIUM	0.56	1.7		U	mg/kg	
				THALLIUM	0.56	0.53B		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
6010B	31035	SO	N							
				ANTIMONY	5.5	0.74B		UJ	mg/kg	
				ARSENIC	0.33	9.7		J	mg/kg	
				BARIUM	1.1	157		J	mg/kg	
				BERYLLIUM	0.22	0.22U		UJ	mg/kg	
				CADMIUM	0.22	0.10B		J	mg/kg	
				CHROMIUM	0.55	29.9		J	mg/kg	
				COPPER	0.55	26.8		J	mg/kg	
				SELENIUM	0.55	0.82		U	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31036	SO	FD							
				BERYLLIUM	0.22	0.31		J	mg/kg	
				CADMIUM	0.22	0.026B		J	mg/kg	
				SELENIUM	0.55	0.55		U	mg/kg	
				THALLIUM	0.55	0.71		U	mg/kg	
6010B	31037	SO	N							
				ANTIMONY	5.4	0.63B		U	mg/kg	
				BERYLLIUM	0.21	0.13B		J	mg/kg	
				SELENIUM	0.54	0.74		U	mg/kg	
6010B	31038	SO	N							
				THALLIUM	0.54	0.23B		U	mg/kg	
6010B	31039	SO	N							
				BERYLLIUM	0.22	0.60		J	mg/kg	
				SELENIUM	0.54	0.53B		U	mg/kg	
				THALLIUM	0.54	0.58		U	mg/kg	
6010B	31040	SO	N							
				ANTIMONY	5.8	0.49B		U	mg/kg	
				BERYLLIUM	0.23	0.17B		J	mg/kg	
				SELENIUM	0.58	0.39B		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
6010B	31041	SO	N							
				ANTIMONY	5.7	0.27B		U	mg/kg	
				THALLIUM	0.57	0.17B		U	mg/kg	
6010B	31042	SO	N							
				BERYLLIUM	0.26	0.18B		J	mg/kg	
				CADMIUM	0.26	0.062B		J	mg/kg	
				SELENIUM	0.65	0.25B		U	mg/kg	
				THALLIUM	0.65	0.73		U	mg/kg	
6010B	31043	SO	N							
				ANTIMONY	5.4	0.75B		U	mg/kg	
				SELENIUM	0.54	0.94		U	mg/kg	
				THALLIUM	0.54	0.30B		U	mg/kg	
6010B	31044	SO	N							
				ANTIMONY	5.6	1.1B		U	mg/kg	
				BERYLLIUM	0.22	0.24		J	mg/kg	
				SELENIUM	0.56	2.3		U	mg/kg	
6010B	31045	SO	N							
				ANTIMONY	6.7	0.72B		UJ	mg/kg	
				ARSENIC	0.40	7.1		J	mg/kg	
				BARIUM	1.3	43.5		J	mg/kg	
				CADMIUM	0.27	0.089B		J	mg/kg	
				CHROMIUM	0.67	77.7		J	mg/kg	
				COPPER	0.67	41.0		J	mg/kg	
				LEAD	0.40	14.9		J	mg/kg	
				MOLYBDENUM	0.27	0.27U		UJ	mg/kg	
				SELENIUM	0.67	1.3		UJ	mg/kg	
				THALLIUM	0.67	0.67U		J	mg/kg	
6010B	31046	SO	FD							
				ANTIMONY	5.7	2.5B		J	mg/kg	
				SELENIUM	0.57	0.44B		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
7471A	31035	SO	N							
				MERCURY	0.22	0.33		J	mg/kg	
7471A	31045	SO	N							
				MERCURY	0.27	0.37		J	mg/kg	
8081A	31029	SO	N							
				4,4'-DDD	0.0034	0.0004J		J	mg/kg	
				4,4'-DDE	0.0034	0.0006J		J	mg/kg	
				4,4'-DDT	0.0034	0.002J		J	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
8081A	31030	SO	N							
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31031	SO	N							
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
8081A	31032	SO	N							
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31033	SO	N							
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
8081A	31034	SO	N							
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
8081A	31035	SO	N							
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
8081A	31036	SO	FD							
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
8081A	31037	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
8081A	31038	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	

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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
8081A	31039	SO	N							
				4,4'-DDD	0.0032	0.0032U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31040	SO	N							
				4,4'-DDD	0.0035	0.0007J		J	mg/kg	
				4,4'-DDE	0.0035	0.0005J		J	mg/kg	
				4,4'-DDT	0.0035	0.002J		J	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				DIELDRIN	0.0035	0.0005J		J	mg/kg	
8081A	31041	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				4,4'-DDE	0.0034	0.0001J		J	mg/kg	
				4,4'-DDT	0.0034	0.0002J		J	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				HEPTACHLOR	0.0019	0.0005J		J	mg/kg	
8081A	31042	SO	N							
				4,4'-DDD	0.0039	0.0039U		UJ	mg/kg	
				ALPHA-BHC	0.0022	0.0022U		UJ	mg/kg	
8081A	31043	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				4,4'-DDE	0.033	0.006J		J	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
8081A	31044	SO	N							
				4,4'-DDD	0.034	0.034U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
8081A	31045	SO	N							
				4,4'-DDD	0.0040	0.0040U		UJ	mg/kg	
				ALPHA-BHC	0.0023	0.0023U		UJ	mg/kg	
8081A	31046	SO	FD							
				4,4'-DDD	0.034	0.034U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54651										
8082	31043	SO	N							
				AROCLOR 1260	0.036	0.01J		J	mg/kg	
8260B	31033	SO	N							
				XYLENES	0.0085	0.0005J		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
6010B	31047	SO	N							
				ANTIMONY	5.7	2.2B		J	mg/kg	
				BERYLLIUM	0.23	0.15B		J	mg/kg	
				CADMIUM	0.23	0.21B		J	mg/kg	
				THALLIUM	0.57	0.54B		U	mg/kg	
6010B	31048	SO	N							
				ANTIMONY	6.1	0.90B		U	mg/kg	
				BERYLLIUM	0.24	0.058B		J	mg/kg	
6010B	31049	SO	N							
				THALLIUM	0.56	0.46B		U	mg/kg	
6010B	31053	SO	N							
				ANTIMONY	5.5	1.7B		J	mg/kg	
				BERYLLIUM	0.22	0.17B		J	mg/kg	
				CADMIUM	0.22	0.088B		J	mg/kg	
6010B	31054	SO	N							
				ANTIMONY	5.9	1.4B		J	mg/kg	
				BERYLLIUM	0.24	0.19B		J	mg/kg	
				THALLIUM	0.59	0.79		U	mg/kg	
6010B	31055	SO	N							
				ANTIMONY	5.5	5.5U		J	mg/kg	
				BARIUM	1.1	135		J	mg/kg	
				BERYLLIUM	0.22	0.16B		J	mg/kg	
				CADMIUM	0.22	0.17B		J	mg/kg	
				NICKEL	0.33	141		J	mg/kg	
				THALLIUM	0.55	0.99		J	mg/kg	
6010B	31056	SO	FD							
				ANTIMONY	5.5	0.32B		U	mg/kg	
				CADMIUM	0.22	0.11B		J	mg/kg	
6010B	31057	SO	N							
				CADMIUM	0.22	0.086B		J	mg/kg	
				THALLIUM	0.54	0.19B		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
6010B	31058	SO	N							
				ANTIMONY	5.3	1.1B		U	mg/kg	
6010B	31059	SO	N							
				ANTIMONY	5.6	0.60B		U	mg/kg	
6010B	31060	SO	N							
				ANTIMONY	5.5	0.62B		U	mg/kg	
6010B	31062	SO	N							
				CADMIUM	0.30	0.17B		J	mg/kg	
				THALLIUM	0.76	0.73B		U	mg/kg	
6010B	31063	SO	N							
				BERYLLIUM	0.25	0.12B		J	mg/kg	
				THALLIUM	0.63	0.30B		U	mg/kg	
8081A	31047	SO	N							
				4,4'-DDD	0.034	0.034U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.057	0.057U		UJ	mg/kg	
8081A	31048	SO	N							
				4,4'-DDD	0.036	0.036U		UJ	mg/kg	
				ALPHA-BHC	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.061	0.061U		UJ	mg/kg	
8081A	31049	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0056	0.0056U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
8081A	31052	SO	N							
				4,4'-DDD	0.034	0.034U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.057	0.057U		UJ	mg/kg	
8081A	31053	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.055	0.055U		UJ	mg/kg	
8081A	31054	SO	N							
				4,4'-DDD	0.035	0.005J		J	mg/kg	
				4,4'-DDE	0.035	0.03J		J	mg/kg	
				ALPHA-BHC	0.020	0.020U		UJ	mg/kg	
				ENDOSULFAN	0.020	0.020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.059	0.059U		UJ	mg/kg	
8081A	31055	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.055	0.055U		UJ	mg/kg	
8081A	31056	SO	FD							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.055	0.055U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
8081A	31057	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				4,4'-DDE	0.0033	0.0001J		J	mg/kg	
				4,4'-DDT	0.0033	0.0004J		J	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0054	0.0054U		UJ	mg/kg	
8081A	31058	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.053	0.053U		UJ	mg/kg	
8081A	31059	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0056	0.0056U		UJ	mg/kg	
8081A	31060	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0055	0.0055U		UJ	mg/kg	
8081A	31061	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN	0.0018	0.0018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0054	0.0054U		UJ	mg/kg	
8081A	31062	SO	N							
				4,4'-DDD	0.0046	0.0046U		UJ	mg/kg	
				ALPHA-BHC	0.0026	0.0026U		UJ	mg/kg	
				ENDOSULFAN	0.0026	0.0026U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0076	0.0076U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
8081A	31063	SO	N							
				4,4'-DDD	0.038	0.038U		UJ	mg/kg	
				ALPHA-BHC	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN	0.021	0.021U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.063	0.063U		UJ	mg/kg	
8082	31058	SO	N							
				AROCLOR 1016	0.035	0.035U		UJ	mg/kg	
				AROCLOR 1221	0.069	0.069U		UJ	mg/kg	
				AROCLOR 1232	0.035	0.035U		UJ	mg/kg	
8082	31059	SO	N							
				AROCLOR 1016	0.037	0.037U		UJ	mg/kg	
				AROCLOR 1221	0.074	0.074U		UJ	mg/kg	
				AROCLOR 1232	0.037	0.037U		UJ	mg/kg	
8082	31060	SO	N							
				AROCLOR 1016	0.036	0.036U		UJ	mg/kg	
				AROCLOR 1221	0.072	0.072U		UJ	mg/kg	
				AROCLOR 1232	0.036	0.036U		UJ	mg/kg	
8082	31061	SO	N							
				AROCLOR 1016	0.036	0.036U		UJ	mg/kg	
				AROCLOR 1221	0.072	0.072U		UJ	mg/kg	
				AROCLOR 1232	0.036	0.036U		UJ	mg/kg	
8082	31062	SO	N							
				AROCLOR 1016	0.050	0.050U		UJ	mg/kg	
				AROCLOR 1221	0.10	0.10U		UJ	mg/kg	
				AROCLOR 1232	0.050	0.050U		UJ	mg/kg	
8082	31063	SO	N							
				AROCLOR 1016	0.041	0.041U		UJ	mg/kg	
				AROCLOR 1221	0.083	0.083U		UJ	mg/kg	
				AROCLOR 1232	0.041	0.041U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54666										
8270C	31062	SO	N							
				2,4-DINITROTOLUENE	7.6	7.6U		UJ	mg/kg	
				PENTACHLOROPHENOL	38	38U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4651

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054651 **Analysis Method :** 8081A **Analysis Date :** 11/09/2005
Lab ID: APCL

Analyte Name	Reported CCV Results: Difference	CCV Project Limits: Lower Limit	CCV Project Limits: Upper Limit
alpha-BHC	16.595	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31029	05-04651-1
31030	05-04651-2
31031	05-04651-3
31032	05-04651-4
31033	05-04651-5
31034	05-04651-6
31035	05-04651-7
31036	05-04651-8

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54651 **Analysis Method :** 8081A **Analysis Date :** 11/09/2005

Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	18.097	15.0	-15.0
4,4'-DDD	15.314	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31037	05-04651-9
31038	05-04651-10
31039	05-04651-11
31040	05-04651-12
31041	05-04651-13
31042	05-04651-14
31043	05-04651-15
31044	05-04651-16
31045	05-04651-17
31046	05-04651-18

Method Blank Outlier Report

Lab Reporting Batch : 54651
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2118-MB-01

Lab ID: APCL
Analysis Date : 11/08/2005
Preparation Date : 11/07/2005
Preparation Batch : 05M2118L

COBALT	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.043	0.5	mg/kg	B	

COBALT contamination found in the method blank did not qualify any samples.

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.7	3	mg/kg	B	

IRON contamination found in the method blank did not qualify any samples.

SELENIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.29	0.5	mg/kg	B	

SELENIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31029	05-4651-1	1	1.2		mg/kg
31030	05-4651-2	1	1.3		mg/kg
31031	05-4651-3	1	0.84		mg/kg
31032	05-4651-4	1	0.99		mg/kg
31033	05-4651-5	1	1.4		mg/kg
31035	05-4651-7	1	0.82		mg/kg
31036	05-4651-8	1	0.55		mg/kg
31037	05-4651-9	1	0.74		mg/kg
31039	05-4651-11	1	0.53	B	mg/kg
31040	05-4651-12	1	0.39	B	mg/kg
31042	05-4651-14	1	0.25	B	mg/kg
31043	05-4651-15	1	0.94		mg/kg
31045	05-4651-17	1	1.3		mg/kg
31046	05-4651-18	1	0.44	B	mg/kg

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.056	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54651
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2118-MB-01

Lab ID: APCL
Analysis Date : 11/08/2005
Preparation Date : 11/07/2005
Preparation Batch : 05M2118L

THALLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.16	0.5	mg/kg	B	

THALLIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31034	05-4651-6	1	0.53	B	mg/kg
31036	05-4651-8	1	0.71		mg/kg
31038	05-4651-10	1	0.23	B	mg/kg
31039	05-4651-11	1	0.58		mg/kg
31041	05-4651-13	1	0.17	B	mg/kg
31042	05-4651-14	1	0.73		mg/kg
31043	05-4651-15	1	0.30	B	mg/kg

VANADIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.046	0.5	mg/kg	B	

VANADIUM contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54651	**Lab ID:** APCL
Analysis Method : 7471A	**Analysis Date :** 11/09/2005
Preparation Type : 7471A	**Preparation Date :** 11/09/2005
Method Blank Lab Sample ID : 05M2128-MB-01	**Preparation Batch :** 05M2128H

MERCURY	**Result**	**Reporting Limit**	**Units**	**Lab Qual**	**Comments**
Method Blank Result:	**0.0057**	**0.2**	**mg/kg**	**B**	

MERCURY contamination found in the method blank did not qualify any samples.

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4651 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.633 ug/L	ICB/CCB
Selenium	10.251 ug/L	ICB/CCB
Thallium	4.226 ug/L	ICB/CCB
Molybdenum	2.139 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Antimony	0.78 mg/Kg	31029	05-04651-1
Selenium	1.2 mg/Kg	31029	05-04651-1
Molybdenum	0.15 mg/Kg	31029	05-04651-1
Antimony	0.82 mg/Kg	31030	05-04651-2
Selenium	1.3 mg/Kg	31030	05-04651-2
Antimony	0.31 mg/Kg	31031	05-04651-3
Selenium	0.84 mg/Kg	31031	05-04651-3
Selenium	0.99 mg/Kg	31032	05-04651-4
Antimony	0.71 mg/Kg	31033	05-04651-5
Selenium	1.4 mg/Kg	31033	05-04651-5
Thallium	0.87 mg/Kg	31033	05-04651-5
Antimony	0.70 mg/Kg	31034	05-04651-6
Selenium	1.7 mg/Kg	31034	05-04651-6
Thallium	0.53 mg/Kg	31034	05-04651-6
Antimony	0.74 mg/Kg	31035	05-04651-7
Selenium	0.82 mg/Kg	31035	05-04651-7
Selenium	0.55 mg/Kg	31036	05-04651-8
Thallium	0.71 mg/Kg	31036	05-04651-8
Antimony	0.63 mg/Kg	31037	05-04651-9
Selenium	0.74 mg/Kg	31037	05-04651-9
Thallium	0.23 mg/Kg	31038	05-04651-10
Selenium	0.53 mg/Kg	31039	05-04651-11
Thallium	0.58 mg/Kg	31039	05-04651-11
Antimony	0.49 mg/Kg	31040	05-04651-12
Selenium	0.39 mg/Kg	31040	05-04651-12
Antimony	0.27 mg/Kg	31041	05-04651-13
Thallium	0.17 mg/Kg	31041	05-04651-13
Selenium	0.25 mg/Kg	31042	05-04651-14
Thallium	0.73 mg/Kg	31042	05-04651-14
Antimony	0.75 mg/Kg	31043	05-04651-15
Selenium	0.94 mg/Kg	31043	05-04651-15
Thallium	0.30 mg/Kg	31043	05-04651-15
Antimony	1.1 mg/Kg	31044	05-04651-16
Selenium	2.3 mg/Kg	31044	05-04651-16
Antimony	0.72 mg/Kg	31045	05-04651-17
Selenium	1.3 mg/Kg	31045	05-04651-17
Thallium	0.44 mg/Kg	31046	05-04651-18

Surrogate Recovery Outlier Report

Lab Report Batch: 54651 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Dilution	Matrix	Surrogate	Percent Recovery	Criteria (percent) Lower Limit	Upper Limit	Reject Point	Associated Target Analytes
31041	05-4651-13	8260B	0.83	SO	1,2-DICHLOROETHANE-D4	121	70.0	120.0	0.0	All Target
31043	05-4651-15	8260B	0.94	SO	1,2-DICHLOROETHANE-D4	121	70.0	120.0	0.0	All Target
31045	05-4651-17	8260B	0.87	SO	1,2-DICHLOROETHANE-D4	121	70.0	120.0	0.0	All Target
31046	05-4651-18	8260B	0.81	SO	1,2-DICHLOROETHANE-D4	123	70.0	120.0	0.0	All Target

Laboratory Control Sample / Laboratory Control Sample Duplicate Outlier Report

Method Batch : 05M2118L **Analysis Method :** 6010B **Analysis Date :** 11/08/2005

Preparation Batch : 05M2118L **Preparation Type :** 3050B **Preparation Date :** 11/07/2005

Lab Reporting Batch : 54651 **Lab ID:** APCL

			Reported Values		Project Limits (Percent)			
LCS Lab Sample ID	**Matrix**	**Analyte Name**	**Percent Recovery**	**RPD**	**Rejection Point**	**Lower Limit**	**Upper Limit**	**RPD**
05M2118-LCS-01	SO	BERYLLIUM	106	0	50.00	85.00	105.00	20.00
05M2118-LSD-01		BERYLLIUM	106	0	50.00	85.00	105.00	20.00

Associated Samples

Client Sample ID	**Lab Sample ID**
31029	05-4651-1
31030	05-4651-2
31031	05-4651-3
31032	05-4651-4
31033	05-4651-5
31034	05-4651-6
31035	05-4651-7
31036	05-4651-8
31037	05-4651-9
31038	05-4651-10
31039	05-4651-11
31040	05-4651-12
31041	05-4651-13
31042	05-4651-14
31043	05-4651-15
31044	05-4651-16
31045	05-4651-17
31046	05-4651-18

Scope of Data Qualification: The outlier in the LCS qualifies that analyte in all samples with the same Preparation Batch ID as the LCS

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54651 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31035	RES	0.74	B	31036	RES	5.5	U	200.0	50	mg/kg
	SO	ARSENIC		RES	9.7			RES	4.1		81.2	50	mg/kg
	SO	BARIUM		RES	157			RES	65.8		81.9	50	mg/kg
	SO	BERYLLIUM		RES	0.22	U		RES	0.31		200.0	50	mg/kg
	SO	CADMIUM		RES	0.10	B		RES	0.026	B	117.5	50	mg/kg
	SO	CHROMIUM		RES	29.9			RES	118		119.1	50	mg/kg
	SO	COPPER		RES	26.8			RES	15.3		54.6	50	mg/kg
	SO	NICKEL		RES	53.9			RES	309		140.6	50	mg/kg
	SO	THALLIUM		RES	0.55	U		RES	0.71		200.0	50	mg/kg
7471A	SO	MERCURY		RES	0.33			RES	1.2		113.7	50	mg/kg
6010B	SO	ANTIMONY	31045	RES	0.72	B	31046	RES	2.5	B	110.6	50	mg/kg
	SO	ARSENIC		RES	7.1			RES	36.5		134.9	50	mg/kg
	SO	BARIUM		RES	43.5			RES	479		166.7	50	mg/kg
	SO	CADMIUM		RES	0.089	B		RES	0.44		132.7	50	mg/kg
	SO	CHROMIUM		RES	77.7			RES	28.4		92.9	50	mg/kg
	SO	COPPER		RES	41.0			RES	22.3		59.1	50	mg/kg
	SO	LEAD		RES	14.9			RES	31.5		71.6	50	mg/kg
	SO	MOLYBDENUM		RES	0.27	U		RES	1.7		200.0	50	mg/kg
	SO	NICKEL		RES	62.8			RES	30.1		70.4	50	mg/kg
	SO	SELENIUM		RES	1.3			RES	0.44	B	98.9	50	mg/kg
	SO	THALLIUM		RES	0.67	U		RES	1.3		200.0	50	mg/kg
7471A	SO	MERCURY		RES	0.37			RES	1.1		99.3	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54651 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31029	05-4651-1	6010B	SO	ANTIMONY	B	0.78	5.6	mg/kg
				CADMIUM	B	0.19	0.22	mg/kg
				MOLYBDENUM	B	0.15	0.22	mg/kg
		8081A		4,4'-DDD	J	0.0004	0.0034	mg/kg
				4,4'-DDE	J	0.0006	0.0034	mg/kg
				4,4'-DDT	J	0.002	0.0034	mg/kg
31030	05-4651-2	6010B		ANTIMONY	B	0.82	5.2	mg/kg
31031	05-4651-3			ANTIMONY	B	0.31	5.5	mg/kg
				BERYLLIUM	B	0.097	0.22	mg/kg
31032	05-4651-4			CADMIUM	B	0.075	0.21	mg/kg
31033	05-4651-5			ANTIMONY	B	0.71	5.5	mg/kg
				BERYLLIUM	B	0.081	0.22	mg/kg
		8260B		XYLENES	J	0.0005	0.0085	mg/kg
31034	05-4651-6	6010B		ANTIMONY	B	0.70	5.6	mg/kg
				CADMIUM	B	0.16	0.23	mg/kg
				THALLIUM	B	0.53	0.56	mg/kg
31035	05-4651-7			ANTIMONY	B	0.74	5.5	mg/kg
				CADMIUM	B	0.10	0.22	mg/kg
31036	05-4651-8			CADMIUM	B	0.026	0.22	mg/kg
31037	05-4651-9			ANTIMONY	B	0.63	5.4	mg/kg
				BERYLLIUM	B	0.13	0.21	mg/kg
31038	05-4651-10			THALLIUM	B	0.23	0.54	mg/kg
31039	05-4651-11			SELENIUM	B	0.53	0.54	mg/kg
31040	05-4651-12			ANTIMONY	B	0.49	5.8	mg/kg
				BERYLLIUM	B	0.17	0.23	mg/kg
				SELENIUM	B	0.39	0.58	mg/kg
		8081A		4,4'-DDD	J	0.0007	0.0035	mg/kg
				4,4'-DDE	J	0.0005	0.0035	mg/kg
				4,4'-DDT	J	0.002	0.0035	mg/kg
				DIELDRIN	J	0.0005	0.0035	mg/kg
31041	05-4651-13	6010B		ANTIMONY	B	0.27	5.7	mg/kg
				THALLIUM	B	0.17	0.57	mg/kg
		8081A		4,4'-DDE	J	0.0001	0.0034	mg/kg
				4,4'-DDT	J	0.0002	0.0034	mg/kg
				HEPTACHLOR	J	0.0005	0.0019	mg/kg
31042	05-4651-14	6010B		BERYLLIUM	B	0.18	0.26	mg/kg

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54651 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31042	05-4651-14	6010B	SO	CADMIUM	B	0.062	0.26	mg/kg
				SELENIUM	B	0.25	0.65	mg/kg
31043	05-4651-15			ANTIMONY	B	0.75	5.4	mg/kg
				THALLIUM	B	0.30	0.54	mg/kg
		8081A		4,4'-DDE	J	0.006	0.033	mg/kg
		8082		AROCLOR 1260	J	0.01	0.036	mg/kg
31044	05-4651-16	6010B		ANTIMONY	B	1.1	5.6	mg/kg
31045	05-4651-17			ANTIMONY	B	0.72	6.7	mg/kg
				CADMIUM	B	0.089	0.27	mg/kg
31046	05-4651-18			ANTIMONY	B	2.5	5.7	mg/kg
				SELENIUM	B	0.44	0.57	mg/kg

Quality Control Outlier Reports

SDG 05-4666

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054666 **Analysis Method :** 8082 **Analysis Date :** 11/10/2005

Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Aroclor-1016*	17.87	15.0	-15.0

*Qualifiy Aroclor-1016, Aroclor-1221, and Aroclor-1232

Associated Samples

Client Sample ID	Lab Sample ID
31058	05-04666-10
31059	05-04666-11
31060	05-04666-12
31061	05-04666-13
31062	05-04666-14
31063	05-04666-15

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054666 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

Analyte Name	Reported CCV Results: Difference	CCV Project Limits: Lower Limit	CCV Project Limits: Upper Limit
alpha-BHC	16.015	15.0	-15.0
Endosulfan II	16.512	15.0	-15.0
4,4'-DDD	15.053	15.0	-15.0
Endosulfan sulfate	31.975	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31054	05-04666-6
31055	05-04666-7
31056	05-04666-8
31057	05-04666-9
31058	05-04666-10
31059	05-04666-11
31060	05-04666-12
31061	05-04666-13
31062	05-04666-14
31063	05-04666-15

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054666 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	17.574	15.0	-15.0
Endosulfan II	16.704	15.0	-15.0
4,4'-DDD	17.355	15.0	-15.0
Endosulfan sulfate	37.044	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31047	05-04666-1
31048	05-04666-2
31049	05-04666-3
31052	05-04666-4
31053	05-04666-5

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4666 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.208 ug/L	ICB/CCB
Thallium	3.284 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Thallium	0.54	31047	05-04666-1
Antimony	0.90	31048	05-04666-2
Thallium	0.46	31049	05-04666-3
Thallium	0.79	31054	05-04666-6
Antimony	0.32	31056	05-04666-8
Thallium	0.19	31057	05-04666-9
Antimony	1.1	31058	05-04666-10
Antimony	0.60	31059	05-04666-11
Antimony	0.62	31060	05-04666-12
Thallium	0.73	31062	05-04666-14
Thallium	0.30	31063	05-04666-15

Matrix Spike / Matrix Spike Duplicate Recovery and RPD Outlier Report

Method Batch : 05G3407 **Analysis Method :** 8270C **Analysis Date :** 11/11/2005

Preparation Batch : 05G3407 **Preparation Type :** 3550B **Preparation Date :** 11/10/2005

Lab Reporting Batch : 54666 **Lab ID:** APCL

				Reported *		Project Limits (Percent)			
Client Sample ID	**Lab Sample ID**	**Matrix**	**Analyte Name**	**Percent Recovery**	**RPD**	**Rejection Point****	**Lower Limit**	**Upper Limit**	**RPD**
31062MSD	05-4666-14MSD	SO	2,4-DINITROTOLUENE	0	200	0.00	50.00	120.00	25.00
			PENTACHLOROPHENOL	17	27	0.00	20.00	125.00	25.00

Associated Samples: Parent sample only	
Client Sample ID	**Lab Sample ID**
31062	05-4666-14

* Only those Percent Recovery and/or RPD values outside project limits are listed in this report.
** Metal are also assessed against an upper rejection point of 150 percent for waters and 200 percent for soils and sediments

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54666 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31055	RES	5.5	U	31056	RES	0.32	B	200.0	50	mg/kg
	SO	BARIUM		RES	135			RES	78.0		53.5	50	mg/kg
	SO	BERYLLIUM		RES	0.16	B		RES	0.22	U	200.0	50	mg/kg
	SO	NICKEL		RES	141			RES	73.8		62.6	50	mg/kg
	SO	THALLIUM		RES	0.99			RES	0.55	U	200.0	50	mg/kg

*Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.

Project Number and Name: ***6218.086 - Alameda Pt***

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54666 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31047	05-4666-1	6010B	SO	ANTIMONY	B	2.2	5.7	mg/kg
				BERYLLIUM	B	0.15	0.23	mg/kg
				CADMIUM	B	0.21	0.23	mg/kg
				THALLIUM	B	0.54	0.57	mg/kg
31048	05-4666-2			ANTIMONY	B	0.90	6.1	mg/kg
				BERYLLIUM	B	0.058	0.24	mg/kg
31049	05-4666-3			THALLIUM	B	0.46	0.56	mg/kg
31053	05-4666-5			ANTIMONY	B	1.7	5.5	mg/kg
				BERYLLIUM	B	0.17	0.22	mg/kg
				CADMIUM	B	0.088	0.22	mg/kg
31054	05-4666-6			ANTIMONY	B	1.4	5.9	mg/kg
				BERYLLIUM	B	0.19	0.24	mg/kg
		8081A		4,4'-DDD	J	0.005	0.035	mg/kg
				4,4'-DDE	J	0.03	0.035	mg/kg
31055	05-4666-7	6010B		BERYLLIUM	B	0.16	0.22	mg/kg
				CADMIUM	B	0.17	0.22	mg
31056	05-4666-8			ANTIMONY	B	0.32	5.5	mg/kg
				CADMIUM	B	0.11	0.22	mg/kg
31057	05-4666-9			CADMIUM	B	0.086	0.22	mg/kg
				THALLIUM	B	0.19	0.54	mg/kg
		8081A		4,4'-DDE	J	0.0001	0.0033	mg/kg
				4,4'-DDT	J	0.0004	0.0033	mg/kg
31058	05-4666-10	6010B		ANTIMONY	B	1.1	5.3	mg/kg
31059	05-4666-11			ANTIMONY	B	0.60	5.6	mg/kg
31060	05-4666-12			ANTIMONY	B	0.62	5.5	mg/kg
31062	05-4666-14			CADMIUM	B	0.17	0.30	mg/kg
				THALLIUM	B	0.73	0.76	mg/kg
31063	05-4666-15			BERYLLIUM	B	0.12	0.25	mg/kg
				THALLIUM	B	0.30	0.63	mg/kg

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

CDM Federal
9444 Farnham Road, Suite 210
San Diego, CA 92123
ATTN: Mr. Mike Allen

December 23, 2005

SUBJECT: NAS Alameda Point Data Validation

Dear Mr. Allen,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 13, 2005.

LDC Project # 14400:

SDG #	Fraction
05-4665, 05-4680	Volatiles (EPA Method SW 846 8260B) Semivolatiles (EPA Method SW 846 8270C) Pesticides (EPA Method SW 846 8081A) Polychlorinated Biphenyls (EPA Method SW 846 8082B) Metals (EPA Method SW 846 6010B/7471A)

The following deliverables are submitted under this report:

- Attachment I — Sample ID Cross Reference and Data Review Level
- Attachment II — CDM Database Qualification Summary
- Attachment III — Overall Data Qualification Summary
- Enclosure I — EPA Level III ADR Outliers

The data validation was performed in accordance with the U.S. EPA National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience. The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Initial Calibration
- Continuing Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Detection and Quantitation Limits
- Field QC Samples

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda Rauto
Operations Manager/Senior Chemist

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31050	05-4665-1	EB	3010A	6010B	3
04-Nov-2005	31050	05-4665-1	EB	3510C	8081A	3
04-Nov-2005	31050	05-4665-1	EB	3510C	8082	3
04-Nov-2005	31050	05-4665-1	EB	3510C	8270C	3
04-Nov-2005	31050	05-4665-1	EB	5030B	8260B	3
04-Nov-2005	31050	05-4665-1	EB	7470A	7470A	3
04-Nov-2005	31071	05-4665-10	N	3050B	6010B	3
04-Nov-2005	31071	05-4665-10	N	3550B	8081A	3
04-Nov-2005	31071	05-4665-10	N	3550B	8082	3
04-Nov-2005	31071	05-4665-10	N	3550B	8270C	3
04-Nov-2005	31071	05-4665-10	N	5035	8260B	3
04-Nov-2005	31071	05-4665-10	N	7471A	7471A	3
04-Nov-2005	31072	05-4665-11	N	3050B	6010B	3
04-Nov-2005	31072	05-4665-11	N	3550B	8081A	3
04-Nov-2005	31072	05-4665-11	N	3550B	8082	3
04-Nov-2005	31072	05-4665-11	N	3550B	8270C	3
04-Nov-2005	31072	05-4665-11	N	5035	8260B	3
04-Nov-2005	31072	05-4665-11	N	7471A	7471A	3
04-Nov-2005	31206	05-4665-12	TB	5030B	8260B	3
04-Nov-2005	31207	05-4665-13	TB	5030B	8260B	3
04-Nov-2005	31205	05-4665-14	TB	5030B	8260B	3
04-Nov-2005	31050MS	05-4665-1MS	MS	5030B	8260B	3
04-Nov-2005	31050MSD	05-4665-1MSD	MSD	5030B	8260B	3
04-Nov-2005	31051	05-4665-2	EB	3010A	6010B	3
04-Nov-2005	31051	05-4665-2	EB	3510C	8081A	3
04-Nov-2005	31051	05-4665-2	EB	3510C	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31051	05-4665-2	EB	3510C	8270C	3
04-Nov-2005	31051	05-4665-2	EB	5030B	8260B	3
04-Nov-2005	31051	05-4665-2	EB	7470A	7470A	3
04-Nov-2005	31064	05-4665-3	N	3050B	6010B	3
04-Nov-2005	31064	05-4665-3	N	3550B	8081A	3
04-Nov-2005	31064	05-4665-3	N	3550B	8082	3
04-Nov-2005	31064	05-4665-3	N	3550B	8270C	3
04-Nov-2005	31064	05-4665-3	N	5035	8260B	3
04-Nov-2005	31064	05-4665-3	N	7471A	7471A	3
04-Nov-2005	31064MS	05-4665-3MS	MS	5035	8260B	3
04-Nov-2005	31064MSD	05-4665-3MSD	MSD	5035	8260B	3
04-Nov-2005	31065	05-4665-4	N	3050B	6010B	3
04-Nov-2005	31065	05-4665-4	N	3550B	8081A	3
04-Nov-2005	31065	05-4665-4	N	3550B	8082	3
04-Nov-2005	31065	05-4665-4	N	3550B	8270C	3
04-Nov-2005	31065	05-4665-4	N	5035	8260B	3
04-Nov-2005	31065	05-4665-4	N	7471A	7471A	3
04-Nov-2005	31066	05-4665-5	N	3050B	6010B	3
04-Nov-2005	31066	05-4665-5	N	3550B	8081A	3
04-Nov-2005	31066	05-4665-5	N	3550B	8082	3
04-Nov-2005	31066	05-4665-5	N	3550B	8270C	3
04-Nov-2005	31066	05-4665-5	N	5035	8260B	3
04-Nov-2005	31066	05-4665-5	N	7471A	7471A	3
04-Nov-2005	31067	05-4665-6	FD	3050B	6010B	3
04-Nov-2005	31067	05-4665-6	FD	3550B	8081A	3
04-Nov-2005	31067	05-4665-6	FD	3550B	8082	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2005	31067	05-4665-6	FD	3550B	8270C	3
04-Nov-2005	31067	05-4665-6	FD	5035	8260B	3
04-Nov-2005	31067	05-4665-6	FD	7471A	7471A	3
04-Nov-2005	31068	05-4665-7	N	3050B	6010B	3
04-Nov-2005	31068	05-4665-7	N	3550B	8081A	3
04-Nov-2005	31068	05-4665-7	N	3550B	8082	3
04-Nov-2005	31068	05-4665-7	N	3550B	8270C	3
04-Nov-2005	31068	05-4665-7	N	5035	8260B	3
04-Nov-2005	31068	05-4665-7	N	7471A	7471A	3
04-Nov-2005	31069	05-4665-8	N	3050B	6010B	3
04-Nov-2005	31069	05-4665-8	N	3550B	8081A	3
04-Nov-2005	31069	05-4665-8	N	3550B	8082	3
04-Nov-2005	31069	05-4665-8	N	3550B	8270C	3
04-Nov-2005	31069	05-4665-8	N	5035	8260B	3
04-Nov-2005	31069	05-4665-8	N	7471A	7471A	3
04-Nov-2005	31070	05-4665-9	N	3050B	6010B	3
04-Nov-2005	31070	05-4665-9	N	3550B	8081A	3
04-Nov-2005	31070	05-4665-9	N	3550B	8082	3
04-Nov-2005	31070	05-4665-9	N	3550B	8270C	3
04-Nov-2005	31070	05-4665-9	N	5035	8260B	3
04-Nov-2005	31070	05-4665-9	N	7471A	7471A	3
06-Nov-2005	31076	05-4680-1	EB	3010A	6010B	3
06-Nov-2005	31076	05-4680-1	EB	3510C	8081A	3
06-Nov-2005	31076	05-4680-1	EB	3510C	8082	3
06-Nov-2005	31076	05-4680-1	EB	3510C	8270C	3
06-Nov-2005	31076	05-4680-1	EB	5030B	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
06-Nov-2005	31076	05-4680-1	EB	7470A	7470A	3
06-Nov-2005	31209	05-4680-13	TB	5030B	8260B	3
06-Nov-2005	31076MS	05-4680-1MS	MS	5030B	8260B	3
06-Nov-2005	31076MSD	05-4680-1MSD	MSD	5030B	8260B	3
06-Nov-2005	31077	05-4680-2	FB	3010A	6010B	3
06-Nov-2005	31077	05-4680-2	FB	3510C	8081A	3
06-Nov-2005	31077	05-4680-2	FB	3510C	8082	3
06-Nov-2005	31077	05-4680-2	FB	3510C	8270C	3
06-Nov-2005	31077	05-4680-2	FB	5030B	8260B	3
06-Nov-2005	31077	05-4680-2	FB	7470A	7470A	3
07-Nov-2005	31111	05-4680-10	FD	3050B	6010B	3
07-Nov-2005	31111	05-4680-10	FD	3550B	8081A	3
07-Nov-2005	31111	05-4680-10	FD	3550B	8082	3
07-Nov-2005	31111	05-4680-10	FD	3550B	8270C	3
07-Nov-2005	31111	05-4680-10	FD	5035	8260B	3
07-Nov-2005	31111	05-4680-10	FD	7471A	7471A	3
07-Nov-2005	31112	05-4680-11	N	3050B	6010B	3
07-Nov-2005	31112	05-4680-11	N	3550B	8081A	3
07-Nov-2005	31112	05-4680-11	N	3550B	8082	3
07-Nov-2005	31112	05-4680-11	N	3550B	8270C	3
07-Nov-2005	31112	05-4680-11	N	5035	8260B	3
07-Nov-2005	31112	05-4680-11	N	7471A	7471A	3
07-Nov-2005	31113	05-4680-12	N	3050B	6010B	3
07-Nov-2005	31113	05-4680-12	N	3550B	8081A	3
07-Nov-2005	31113	05-4680-12	N	3550B	8082	3
07-Nov-2005	31113	05-4680-12	N	3550B	8270C	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
07-Nov-2005	31113	05-4680-12	N	5035	8260B	3
07-Nov-2005	31113	05-4680-12	N	7471A	7471A	3
07-Nov-2005	31104	05-4680-3	N	3050B	6010B	3
07-Nov-2005	31104	05-4680-3	N	3550B	8081A	3
07-Nov-2005	31104	05-4680-3	N	3550B	8082	3
07-Nov-2005	31104	05-4680-3	N	3550B	8270C	3
07-Nov-2005	31104	05-4680-3	N	5035	8260B	3
07-Nov-2005	31104	05-4680-3	N	7471A	7471A	3
07-Nov-2005	31105	05-4680-4	N	3050B	6010B	3
07-Nov-2005	31105	05-4680-4	N	3550B	8081A	3
07-Nov-2005	31105	05-4680-4	N	3550B	8082	3
07-Nov-2005	31105	05-4680-4	N	3550B	8270C	3
07-Nov-2005	31105	05-4680-4	N	5035	8260B	3
07-Nov-2005	31105	05-4680-4	N	7471A	7471A	3
07-Nov-2005	31106	05-4680-5	N	3050B	6010B	3
07-Nov-2005	31106	05-4680-5	N	3550B	8081A	3
07-Nov-2005	31106	05-4680-5	N	3550B	8082	3
07-Nov-2005	31106	05-4680-5	N	3550B	8270C	3
07-Nov-2005	31106	05-4680-5	N	5035	8260B	3
07-Nov-2005	31106	05-4680-5	N	7471A	7471A	3
07-Nov-2005	31107	05-4680-6	N	3050B	6010B	3
07-Nov-2005	31107	05-4680-6	N	3550B	8081A	3
07-Nov-2005	31107	05-4680-6	N	3550B	8082	3
07-Nov-2005	31107	05-4680-6	N	3550B	8270C	3
07-Nov-2005	31107	05-4680-6	N	5035	8260B	3
07-Nov-2005	31107	05-4680-6	N	7471A	7471A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
07-Nov-2005	31108	05-4680-7	N	3050B	6010B	3
07-Nov-2005	31108	05-4680-7	N	3550B	8081A	3
07-Nov-2005	31108	05-4680-7	N	3550B	8082	3
07-Nov-2005	31108	05-4680-7	N	3550B	8270C	3
07-Nov-2005	31108	05-4680-7	N	5035	8260B	3
07-Nov-2005	31108	05-4680-7	N	7471A	7471A	3
07-Nov-2005	31109	05-4680-8	N	3050B	6010B	3
07-Nov-2005	31109	05-4680-8	N	3550B	8081A	3
07-Nov-2005	31109	05-4680-8	N	3550B	8082	3
07-Nov-2005	31109	05-4680-8	N	3550B	8270C	3
07-Nov-2005	31109	05-4680-8	N	5035	8260B	3
07-Nov-2005	31109	05-4680-8	N	7471A	7471A	3
07-Nov-2005	31109MS	05-4680-8MS	MS	3550B	8081A	3
07-Nov-2005	31109MS	05-4680-8MS	MS	3550B	8082	3
07-Nov-2005	31109MS	05-4680-8MS	MS	3550B	8270C	3
07-Nov-2005	31109MSD	05-4680-8MSD	MSD	3550B	8081A	3
07-Nov-2005	31109MSD	05-4680-8MSD	MSD	3550B	8082	3
07-Nov-2005	31109MSD	05-4680-8MSD	MSD	3550B	8270C	3
07-Nov-2005	31110	05-4680-9	N	3050B	6010B	3
07-Nov-2005	31110	05-4680-9	N	3550B	8081A	3
07-Nov-2005	31110	05-4680-9	N	3550B	8082	3
07-Nov-2005	31110	05-4680-9	N	3550B	8270C	3
07-Nov-2005	31110	05-4680-9	N	5035	8260B	3
07-Nov-2005	31110	05-4680-9	N	7471A	7471A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54665	31050	6010B	7440360	U		ANTIMONY	Present in method blank
54665	31050	6010B	7440393	U		BARIUM	Present in method blank
54665	31050	6010B	7440508	U		COPPER	Present in method blank
54665	31050	6010B	7440224	U		SILVER	Present in method blank
54665	31050	6010B	7440622	U		VANADIUM	Present in method blank
54665	31050	7470A	7439976	U		MERCURY	Present in method blank
54665	31050	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31050	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31051	6010B	7440393	U		BARIUM	Present in method blank
54665	31051	6010B	7440417	U		BERYLLIUM	Present in method blank
54665	31051	6010B	7440508	U		COPPER	Present in method blank
54665	31051	6010B	7439987	U		MOLYBDENUM	Present in method blank
54665	31051	6010B	7782492	U		SELENIUM	Present in method blank
54665	31051	6010B	7440280	U		THALLIUM	Present in method blank
54665	31051	6010B	7440622	U		VANADIUM	Present in method blank
54665	31051	7470A	7439976	U		MERCURY	Present in method blank
54665	31051	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31051	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31064	6010B	7440382	J		ARSENIC	Matrix spike recovery
54665	31064	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31064	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31064	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31064	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31064	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31064	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31064	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31065	6010B	7440360	U		ANTIMONY	Present in equipment blank
54665	31065	6010B.	7440382	J		ARSENIC	Matrix spike recovery
54665	31065	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31065	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31065	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31065	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference

CDM Federal Programs
Reason for Qualified Results
SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54665	31065	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31065	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31065	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31066	6010B	7440360	U		ANTIMONY	Present in equipment blank
54665	31066	6010B	7440382	J		ARSENIC	Matrix spike recovery
54665	31066	6010B	7440280	U		THALLIUM	Present in equipment blank
54665	31066	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31066	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31066	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31066	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31066	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31066	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31066	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31067	6010B	7440382	J		ARSENIC	Matrix spike recovery
54665	31067	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31067	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31067	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31067	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31067	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31067	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31067	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54665	31068	6010B	7440382	J		ARSENIC	Matrix spike recovery
54665	31068	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31068	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31068	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54665	31068	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54665	31068	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54665	31068	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31068	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31068	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31068	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31068	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54665	31068	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54665	31069	6010B	7440360	U		ANTIMONY	Present in equipment blank
54665	31069	6010B	7440382	J		ARSENIC	Matrix spike recovery
54665	31069	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31069	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31069	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54665	31069	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54665	31069	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54665	31069	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31069	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31069	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31069	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31069	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31069	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31070	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54665	31070	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54665	31070	6010B	7440280		J	THALLIUM	Matrix spike recovery
54665	31070	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31070	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31070	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54665	31070	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54665	31070	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54665	31070	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31070	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31070	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31070	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31070	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31070	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54665	31071	6010B	7440360	U		ANTIMONY	Present in equipment blank
54665	31071	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54665	31071	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54665	31071	6010B	7440280		J	THALLIUM	Matrix spike recovery

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54665	31071	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31071	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31071	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54665	31071	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54665	31071	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54665	31071	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31071	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31071	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31071	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31071	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31071	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54665	31072	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54665	31072	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54665	31072	6010B	7440280		J	THALLIUM	Matrix spike recovery
54665	31072	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54665	31072	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54665	31072	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54665	31072	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54665	31072	8081A	72208		J	ENDRIN	Continuing calibration percent difference
54665	31072	8081A	58899		J	GAMMA-BHC	Continuing calibration percent difference
54665	31072	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54665	31072	8260B	96184		J	1,2,3-TRICHLOROPROPANE	Continuing calibration percent difference
54665	31072	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54665	31072	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54665	31072	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31076	6010B	7782492	U		SELENIUM	Present in method blank
54680	31076	6010B	7440622	U		VANADIUM	Present in method blank
54680	31076	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31076	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54680	31077	6010B	7782492	U		SELENIUM	Present in method blank
54680	31077	6010B	7440224	U		SILVER	Present in method blank
54680	31077	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54680	31077	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54680	31104	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54680	31104	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54680	31104	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31104	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31104	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31104	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31104	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31104	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31105	6010B	7440417	U		BERYLLIUM	Present in method blank
54680	31105	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54680	31105	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54680	31105	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31105	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31105	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31105	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31105	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31105	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31106	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54680	31106	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54680	31106	6010B	7440280	J		THALLIUM	Matrix spike recovery
54680	31106	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31106	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31106	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31106	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31106	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31107	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54680	31107	6010B	7440020	J		NICKEL	Lab Duplicate RPD
54680	31107	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31107	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31107	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31107	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54680	31107	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31107	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31108	6010B	7440280	J		THALLIUM	Matrix spike recovery
54680	31108	6010B	7440280	U		THALLIUM	Present in method blank
54680	31108	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31108	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31108	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31108	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31108	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31109	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31109	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31109	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31109	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31109	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31109	8270C	121142		J	2,4-DINITROTOLUENE	Matrix spike RPD
54680	31109	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31109	8270C	621647		J	N-NITROSO-DI-N-PROPYLAMINE	Matrix spike RPD
54680	31110	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31110	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31110	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31110	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31110	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54680	31110	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31110	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54680	31110	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31111	6010B	7440417	U		BERYLLIUM	Present in method blank
54680	31111	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31111	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31111	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31111	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31111	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54680	31111	8260B	67641		J	ACETONE	Continuing calibration percent difference

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54665,54680

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54680	31111	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54680	31111	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31112	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31112	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31112	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31112	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31112	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54680	31112	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31112	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54680	31112	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference
54680	31113	6010B	7440280		J	THALLIUM	Matrix spike recovery
54680	31113	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54680	31113	8081A	57749		J	CHLORDANE (TECHNICAL)	Continuing calibration percent difference
54680	31113	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54680	31113	8260B	96128		J	1,2-DIBROMO-3-CHLOROPROPANE	Continuing calibration percent difference
54680	31113	8260B	67641		J	ACETONE	Continuing calibration percent difference
54680	31113	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54680	31113	8270C	118741		J	HEXACHLOROBENZENE	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
6010B	31050	AQ	EB							
				ANTIMONY	10	6.8B		U	ug/L	
				BARIUM	10	4.1B		U	ug/L	
				CHROMIUM	5	0.78B		J	ug/L	
				COPPER	10	1.9B		U	ug/L	
				NICKEL	5	2.3B		J	ug/L	
				SILVER	10	1.4B		U	ug/L	
				VANADIUM	10	0.94B		U	ug/L	
6010B	31051	AQ	EB							
				BARIUM	10	9.6B		U	ug/L	
				BERYLLIUM	2	0.078B		U	ug/L	
				CHROMIUM	5	4.9B		J	ug/L	
				COBALT	5	0.84B		J	ug/L	
				COPPER	10	3.3B		U	ug/L	
				MOLYBDENUM	5	1.5B		U	ug/L	
				SELENIUM	10	3.7B		U	ug/L	
				THALLIUM	10	3.5B		U	ug/L	
				VANADIUM	10	2.6B		U	ug/L	
6010B	31064	SO	N							
				ARSENIC	0.36	3.5		J	mg/kg	
6010B	31065	SO	N							
				ANTIMONY	5.8	0.51B		U	mg/kg	
				ARSENIC	0.35	4.9		J	mg/kg	
				CADMIUM	0.23	0.031B		J	mg/kg	
6010B	31066	SO	N							
				ANTIMONY	5.4	0.85B		U	mg/kg	
				ARSENIC	0.32	7.5		J	mg/kg	
				BERYLLIUM	0.22	0.084B		J	mg/kg	
				THALLIUM	0.54	0.65		U	mg/kg	
6010B	31067	SO	FD							
				ARSENIC	0.51	6.2		J	mg/kg	
				CADMIUM	0.34	0.080B		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
6010B	31068	SO	N							
				ANTIMONY	7.6	2.1B		J	mg/kg	
				ARSENIC	0.46	12.5		J	mg/kg	
				CADMIUM	0.30	0.30U		UJ	mg/kg	
				COPPER	0.76	70.9		J	mg/kg	
				LEAD	0.46	50.5		J	mg/kg	
				MOLYBDENUM	0.30	0.47		J	mg/kg	
				THALLIUM	0.76	0.76U		UJ	mg/kg	
6010B	31069	SO	N							
				ANTIMONY	5.5	0.81B		U	mg/kg	
				ARSENIC	0.33	8.2		J	mg/kg	
6010B	31070	SO	N							
				CADMIUM	0.23	0.22B		J	mg/kg	
				CHROMIUM	0.58	42.6		J	mg/kg	
				NICKEL	0.35	86.1		J	mg/kg	
				THALLIUM	0.58	0.58U		UJ	mg/kg	
6010B	31071	SO	N							
				ANTIMONY	5.5	0.18B		U	mg/kg	
				BERYLLIUM	0.22	0.17B		J	mg/kg	
				CADMIUM	0.22	0.20B		J	mg/kg	
				CHROMIUM	0.55	32.8		J	mg/kg	
				NICKEL	0.33	21.7		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31072	SO	N							
				CHROMIUM	0.55	124		J	mg/kg	
				NICKEL	0.33	286		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
7470A	31050	AQ	EB							
				MERCURY	0.5	0.061B		U	ug/L	
7470A	31051	AQ	EB							
				MERCURY	0.5	0.098B		U	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
7471A	31065	SO	N							
				MERCURY	0.23	0.17B		J	mg/kg	
7471A	31066	SO	N							
				MERCURY	0.22	0.18B		J	mg/kg	
8081A	31050	AQ	EB							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31051	AQ	EB							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31064	SO	N							
				4,4'-DDD	0.0036	0.0036U		UJ	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				GAMMA-BHC	0.0020	0.0020U		UJ	mg/kg	
8081A	31065	SO	N							
				4,4'-DDD	0.035	0.035U		UJ	mg/kg	
				ALPHA-BHC	0.020	0.020U		UJ	mg/kg	
				GAMMA-BHC	0.020	0.020U		UJ	mg/kg	
8081A	31066	SO	N							
				4,4'-DDD	0.0032	0.0032U		UJ	mg/kg	
				ALPHA-BHC	0.0018	0.0018U		UJ	mg/kg	
				GAMMA-BHC	0.0018	0.0018U		UJ	mg/kg	
8081A	31067	SO	FD							
				4,4'-DDD	0.0051	0.0051U		UJ	mg/kg	
				ALPHA-BHC	0.0029	0.0029U		UJ	mg/kg	
				GAMMA-BHC	0.0029	0.0029U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
8081A	31068	SO	N							
				4,4'-DDD	0.0046	0.0046U		UJ	mg/kg	
				ALPHA-BHC	0.0026	0.0026U		UJ	mg/kg	
				ENDOSULFAN	0.0026	0.0026U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0076	0.0076U		UJ	mg/kg	
				ENDRIN	0.0046	0.0046U		UJ	mg/kg	
				GAMMA-BHC	0.0026	0.0026U		UJ	mg/kg	
				TOXAPHENE	0.15	0.15U		UJ	mg/kg	
8081A	31069	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.055	0.055U		UJ	mg/kg	
				ENDRIN	0.033	0.033U		UJ	mg/kg	
				GAMMA-BHC	0.019	0.019U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	
8081A	31070	SO	N							
				4,4'-DDD	0.0035	0.0035U		UJ	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0058	0.0058U		UJ	mg/kg	
				ENDRIN	0.0035	0.0035U		UJ	mg/kg	
				GAMMA-BHC	0.0020	0.0020U		UJ	mg/kg	
				TOXAPHENE	0.12	0.12U		UJ	mg/kg	
8081A	31071	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				ALPHA-BHC	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN	0.019	0.019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.055	0.055U		UJ	mg/kg	
				ENDRIN	0.033	0.033U		UJ	mg/kg	
				GAMMA-BHC	0.019	0.019U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
8081A	31072	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0055	0.0055U		UJ	mg/kg	
				ENDRIN	0.0033	0.0033U		UJ	mg/kg	
				GAMMA-BHC	0.0019	0.0019U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8260B	31064	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0055	0.0055U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0055	0.0055U		UJ	mg/kg	
				CHLOROMETHANE	0.0055	0.0055U		UJ	mg/kg	
8260B	31065	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0047	0.0047U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0047	0.0047U		UJ	mg/kg	
				CHLOROMETHANE	0.0047	0.0047U		UJ	mg/kg	
8260B	31066	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0055	0.0055U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0055	0.0055U		UJ	mg/kg	
				CHLOROMETHANE	0.0055	0.0055U		UJ	mg/kg	
8260B	31067	SO	FD							
				1,2,3-TRICHLOROPROPANE	0.0083	0.0083U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0083	0.0083U		UJ	mg/kg	
				CHLOROMETHANE	0.0083	0.0083U		UJ	mg/kg	
8260B	31068	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0086	0.0086U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0086	0.0086U		UJ	mg/kg	
				CHLOROMETHANE	0.0086	0.0086U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
8260B	31069	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				CHLOROMETHANE	0.0053	0.0053U		UJ	mg/kg	
8260B	31070	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				CHLOROMETHANE	0.0053	0.0053U		UJ	mg/kg	
8260B	31071	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0053	0.0053U		UJ	mg/kg	
				CHLOROMETHANE	0.0053	0.0053U		UJ	mg/kg	
8260B	31072	SO	N							
				1,2,3-TRICHLOROPROPANE	0.0044	0.0044U		UJ	mg/kg	
				1,2-DIBROMO-3-CHLOROPROPANE	0.0044	0.0044U		UJ	mg/kg	
				CHLOROMETHANE	0.0044	0.0044U		UJ	mg/kg	
8270C	31050	AQ	EB							
				4-Nitroaniline	50	50U		UJ	ug/L	
8270C	31051	AQ	EB							
				4-Nitroaniline	50	50U		UJ	ug/L	
8270C	31064	SO	N							
				4-Nitroaniline	3.0	3.0U		UJ	mg/kg	
8270C	31065	SO	N							
				4-Nitroaniline	2.9	2.9U		UJ	mg/kg	
8270C	31066	SO	N							
				4-Nitroaniline	2.7	2.7U		UJ	mg/kg	
8270C	31067	SO	FD							
				HEXACHLOROBENZENE	0.85	0.85U		UJ	mg/kg	
8270C	31068	SO	N							
				HEXACHLOROBENZENE	0.76	0.76U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54665										
8270C	31069	SO	N							
				4-Nitroaniline	280	280U		UJ	mg/kg	
8270C	31070	SO	N							
				HEXACHLOROBENZENE	5.8	5.8U		UJ	mg/kg	
8270C	31071	SO	N							
				4-Nitroaniline	280	280U		UJ	mg/kg	
8270C	31072	SO	N							
				HEXACHLOROBENZENE	0.55	0.55U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
6010B	31076	AQ	EB							
				BERYLLIUM	2	0.078B		J	ug/L	
				SELENIUM	10	4.5B		U	ug/L	
				VANADIUM	10	1.6B		U	ug/L	
6010B	31077	AQ	FB							
				SELENIUM	10	4.6B		U	ug/L	
				SILVER	10	1.7B		U	ug/L	
6010B	31104	SO	N							
				BERYLLIUM	0.21	0.15B		J	mg/kg	
				CHROMIUM	0.53	33.7		J	mg/kg	
				NICKEL	0.32	44.2		J	mg/kg	
				THALLIUM	0.53	0.53U		UJ	mg/kg	
6010B	31105	SO	N							
				ANTIMONY	5.4	0.14B		J	mg/kg	
				BERYLLIUM	0.21	0.066B		U	mg/kg	
				CADMIUM	0.21	0.098B		J	mg/kg	
				CHROMIUM	0.54	27.4		J	mg/kg	
				NICKEL	0.32	30.6		J	mg/kg	
				THALLIUM	0.54	0.54U		UJ	mg/kg	
6010B	31106	SO	N							
				CADMIUM	0.22	0.16B		J	mg/kg	
				CHROMIUM	0.56	78.3		J	mg/kg	
				NICKEL	0.34	55.2		J	mg/kg	
				THALLIUM	0.56	1.5		J	mg/kg	
6010B	31107	SO	N							
				CHROMIUM	0.55	109		J	mg/kg	
				NICKEL	0.33	268		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31108	SO	N							
				THALLIUM	0.53	0.20B		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
6010B	31109	SO	N							
				CADMIUM	0.22	0.13B		J	mg/kg	
				THALLIUM	0.56	0.56U		UJ	mg/kg	
6010B	31110	SO	N							
				ANTIMONY	5.7	1.5B		J	mg/kg	
				ARSENIC	0.34	6.2		J	mg/kg	
				BERYLLIUM	0.23	0.22B		J	mg/kg	
				CADMIUM	0.23	0.071B		J	mg/kg	
				THALLIUM	0.57	0.57U		UJ	mg/kg	
6010B	31111	SO	FD							
				BERYLLIUM	0.22	0.068B		U	mg/kg	
				CADMIUM	0.22	0.042B		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31112	SO	N							
				CADMIUM	0.22	0.13B		J	mg/kg	
				THALLIUM	0.55	0.55U		UJ	mg/kg	
6010B	31113	SO	N							
				CADMIUM	0.21	0.20B		J	mg/kg	
				THALLIUM	0.53	0.53U		UJ	mg/kg	
7471A	31110	SO	N							
				MERCURY	0.23	0.21B		J	mg/kg	
7471A	31111	SO	FD							
				MERCURY	0.22	0.11B		J	mg/kg	
8081A	31076	AQ	EB							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31077	AQ	FB							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31104	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.53	0.53U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
8081A	31105	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.54	0.54U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	
8081A	31106	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.056	0.056U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8081A	31107	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.055	0.055U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8081A	31108	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.53	0.53U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	
8081A	31109	SO	N							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.056	0.056U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8081A	31110	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.057	0.057U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8081A	31111	SO	FD							
				4,4'-DDD	0.0033	0.0033U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.055	0.055U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
8081A	31112	SO	N							
				4,4'-DDD	0.033	0.033U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.55	0.55U		UJ	mg/kg	
				TOXAPHENE	1.1	1.1U		UJ	mg/kg	
8081A	31113	SO	N							
				4,4'-DDD	0.0032	0.0032U		UJ	mg/kg	
				CHLORDANE (TECHNICAL)	0.053	0.053U		UJ	mg/kg	
				TOXAPHENE	0.11	0.11U		UJ	mg/kg	
8260B	31077	AQ	FB							
				TETRACHLOROETHENE	0.5	0.4J		J	ug/L	
8260B	31104	SO	N							
				ACETONE	0.052	0.052U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0052	0.001J		J	mg/kg	
8260B	31105	SO	N							
				ACETONE	0.055	0.055U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0055	0.0009J		J	mg/kg	
8260B	31106	SO	N							
				ACETONE	0.050	0.050U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0050	0.0008J		J	mg/kg	
8260B	31107	SO	N							
				ACETONE	0.044	0.044U		UJ	mg/kg	
8260B	31108	SO	N							
				ACETONE	0.053	0.053U		UJ	mg/kg	
				METHYLENE CHLORIDE	0.0053	0.001J		J	mg/kg	
8260B	31109	SO	N							
				ACETONE	0.056	0.056U		UJ	mg/kg	
8260B	31110	SO	N							
				1,2-DIBROMO-3-CHLOROPROPANE	0.0051	0.0051U		UJ	mg/kg	
				ACETONE	0.051	0.051U		UJ	mg/kg	
				CHLOROMETHANE	0.0051	0.0051U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
8260B	31111	SO	FD							
				1,2-DIBROMO-3-CHLOROPROPANE	0.0048	0.0048U		UJ	mg/kg	
				ACETONE	0.048	0.048U		UJ	mg/kg	
				CHLOROMETHANE	0.0048	0.0048U		UJ	mg/kg	
8260B	31112	SO	N							
				1,2-DIBROMO-3-CHLOROPROPANE	0.0052	0.0052U		UJ	mg/kg	
				ACETONE	0.052	0.052U		UJ	mg/kg	
				CHLOROMETHANE	0.0052	0.0052U		UJ	mg/kg	
8260B	31113	SO	N							
				1,2-DIBROMO-3-CHLOROPROPANE	0.0048	0.0048U		UJ	mg/kg	
				ACETONE	0.048	0.048U		UJ	mg/kg	
				CHLOROMETHANE	0.0048	0.0048U		UJ	mg/kg	
8270C	31076	AQ	EB							
				4-Nitroaniline	50	50U		UJ	ug/L	
8270C	31077	AQ	FB							
				4-Nitroaniline	50	50U		UJ	ug/L	
8270C	31104	SO	N							
				HEXACHLOROBENZENE	5.3	5.3U		UJ	mg/kg	
8270C	31105	SO	N							
				HEXACHLOROBENZENE	5.4	5.4U		UJ	mg/kg	
8270C	31106	SO	N							
				HEXACHLOROBENZENE	0.56	0.56U		UJ	mg/kg	
8270C	31107	SO	N							
				HEXACHLOROBENZENE	0.55	0.55U		UJ	mg/kg	
8270C	31108	SO	N							
				HEXACHLOROBENZENE	16	16U		UJ	mg/kg	
8270C	31109	SO	N							
				2,4-DINITROTOLUENE	5.6	5.6U		UJ	mg/kg	
				HEXACHLOROBENZENE	5.6	5.6U		UJ	mg/kg	
				N-NITROSO-DI-N-PROPYLAMINE	5.6	5.6U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54680										
8270C	31110	SO	N							
				HEXACHLOROBENZENE	0.57	0.57U		UJ	mg/kg	
8270C	31111	SO	FD							
				HEXACHLOROBENZENE	0.55	0.55U		UJ	mg/kg	
8270C	31112	SO	N							
				HEXACHLOROBENZENE	5.5	5.5U		UJ	mg/kg	
8270C	31113	SO	N							
				HEXACHLOROBENZENE	5.3	5.3U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4665

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54665 **Analysis Method :** 8081A **Analysis Date :** 11/09/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	20.850	15.0	-15.0
gamma-BHC	16.389	15.0	-15.0
4,4'-DDD	24.86	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31064	05-04665-3
31065	05-04665-4
31066	05-04665-5
31067	05-04665-6

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54665 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Toxaphene	21.338	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31050	05-04665-1
31051	05-04665-2

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54665 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	18.011	15.0	-15.0
gamma-BHC	51.116	15.0	-15.0
Endrin	17.715	15.0	-15.0
4,4'-DDD	18.891	15.0	-15.0
Endosulfan	15.765	15.0	-15.0
Endosulfan sulfate	31.922	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31068	05-04665-7
31069	05-04665-8
31070	05-04665-9
31071	05-04665-10
31071	05-04665-11

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54665 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Toxaphene	15.150	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31068	05-04665-7
31069	05-04665-8
31070	05-04665-9
31071	05-04665-10
31072	05-04665-11

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3389- 2 **Analysis Method :** 8260B **Analysis Date :** 11/09/2005

Lab Reporting Batch : 54665 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1,2,3-TRICHLOROPROPANE	0.273	30.0	0.05		25.0	-50.0	-25.0
1,2-DIBROMO-3-CHLOROPROPANE	0.211	39.7			25.0	-50.0	-25.0
CHLOROMETHANE	0.108	-27.0			25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31064	05-4665-3
31065	05-4665-4
31066	05-4665-5
31067	05-4665-6
31068	05-4665-7
31069	05-4665-8
31070	05-4665-9
31071	05-4665-10
31072	05-4665-11

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418- 2 **Analysis Method :** 8270C **Analysis Date :** 11/14/2005

Lab Reporting Batch : 54665 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.379	25.9	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31050	05-4665-1
31051	05-4665-2

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3393-35 **Analysis Method :** 8270C **Analysis Date :** 11/10/2005

Lab Reporting Batch : 54665 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.397	31.9	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31064	05-4665-3
31065	05-4665-4
31066	05-4665-5
31069	05-4665-8
31071	05-4665-10

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3393- 2 **Analysis Method :** 8270C **Analysis Date :** 11/09/2005

Lab Reporting Batch : 54665 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
HEXACHLOROBENZENE	0.193	-26.3	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31068	05-4665-7
31070	05-4665-9

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3393-15 **Analysis Method :** 8270C **Analysis Date :** 11/10/2005

Lab Reporting Batch : 54665 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
HEXACHLOROBENZENE	0.196	-25.2	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31067	05-4665-6
31072	05-4665-11

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4665 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	4.998 ug/L	ICB/CCB
Barium	10.258 ug/L	ICB/CCB
Beryllium	0.113 ug/L	ICB/CCB
Copper	1.250 ug/L	ICB/CCB
Mercury	0.024 ug/L	ICB/CCB
Selenium	7.837 ug/L	ICB/CCB
Silver	2.544 ug/L	ICB/CCB
Thallium	4.647 ug/L	ICB/CCB
Vanadium	0.948 ug/L	ICB/CCB
Molybdenum	1.525 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Antimony	6.8 ug/L	31050	05-04665-1
Barium	4.1 ug/L	31050	05-04665-1
Copper	1.9 ug/L	31050	05-04665-1
Mercury	0.061 ug/L	31050	05-04665-1
Silver	1.4 ug/L	31050	05-04665-1
Vanadium	0.94 ug/L	31050	05-04665-1
Barium	9.6 ug/L	31051	05-04665-2
Beryllium	0.078 ug/L	31051	05-04665-2
Copper	3.3 ug/L	31051	05-04665-2
Mercury	0.098 ug/L	31051	05-04665-2
Selenium	3.7 ug/L	31051	05-04665-2
Thallium	3.5 ug/L	31051	05-04665-2
Vanadium	2.6 ug/L	31051	05-04665-2
Molybdenum	1.5 ug/L	31051	05-04665-2
Antimony	0.51 mg/Kg	31065	05-04665-4
Antimony	0.85 mg/Kg	31066	05-04665-5
Thallium	0.65 mg/Kg	31066	05-04665-5
Antimony	0.81 mg/Kg	31069	05-04665-8

Method Blank Outlier Report

Lab Reporting Batch : 54665
Analysis Method : 6010B
Preparation Type : 3010A
Method Blank Lab Sample ID : 05M2130-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2130L

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	2.8	10	ug/L	B	

SILVER was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31050	05-4665-1	1	1.4	B	ug/L

VANADIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.3	10	ug/L	B	

VANADIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31050	05-4665-1	1	0.94	B	ug/L
31051	05-4665-2	1	2.6	B	ug/L

Method Blank Outlier Report

Lab Reporting Batch : 54665
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2131-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2131L

NICKEL	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.060	0.3	mg/kg	B	

NICKEL contamination found in the method blank did not qualify any samples.

SELENIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.34	0.5	mg/kg	B	

SELENIUM contamination found in the method blank did not qualify any samples.

VANADIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.061	0.5	mg/kg	B	

VANADIUM contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54665
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2132-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2132M

BERYLLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.0082	0.2	mg/kg	B	

BERYLLIUM contamination found in the method blank did not qualify any samples.

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.092	0.5	mg/kg	B	

COPPER contamination found in the method blank did not qualify any samples.

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.16	3	mg/kg	B	

IRON contamination found in the method blank did not qualify any samples.

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.028	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

THALLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.12	0.5	mg/kg	B	

THALLIUM contamination found in the method blank did not qualify any samples.

Surrogate Recovery Outlier Report

Lab Report Batch: 54665 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Dilution	Matrix	Surrogate	Percent Recovery	Criteria (percent) Lower Limit	Upper Limit	Reject Point	Associated Target Analytes
31068	05-4665-7	8260B	1.13	SO	1,2-DICHLOROETHANE-D4	125	70.0	120.0	0.0	All Target
31069	05-4665-8	8260B	0.95	SO	1,2-DICHLOROETHANE-D4	121	70.0	120.0	0.0	All Target

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54665 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31068	RES	2.1	B	31067	RES	8.5	U	200.0	50	mg/kg
	SO	ARSENIC		RES	12.5			RES	6.2		67.4	50	mg/kg
	SO	CADMIUM		RES	0.30	U		RES	0.080	B	200.0	50	mg/kg
	SO	COPPER		RES	70.9			RES	34.1		70.1	50	mg/kg
	SO	LEAD		RES	50.5			RES	13.4		116.1	50	mg/kg
	SO	MOLYBDENUM		RES	0.47			RES	0.34	U	200.0	50	mg/kg
	SO	THALLIUM		RES	0.76	U		RES	1.4		200.0	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

eporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54665 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31050	05-4665-1	6010B	AQ	ANTIMONY	B	6.8	10	ug/L
				BARIUM	B	4.1	10	ug/L
				CHROMIUM	B	0.78	5	ug/L
				COPPER	B	1.9	10	ug/L
				NICKEL	B	2.3	5	ug/L
				SILVER	B	1.4	10	ug/L
				VANADIUM	B	0.94	10	ug/L
		7470A		MERCURY	B	0.061	0.5	ug/L
31051	05-4665-2	6010B		BARIUM	B	9.6	10	ug/L
				BERYLLIUM	B	0.078	2	ug/L
				CHROMIUM	B	4.9	5	ug/L
				COBALT	B	0.84	5	ug/L
				COPPER	B	3.3	10	ug/L
				MOLYBDENUM	B	1.5	5	ug/L
				SELENIUM	B	3.7	10	ug/L
				THALLIUM	B	3.5	10	ug/L
				VANADIUM	B	2.6	10	ug/L
		7470A		MERCURY	B	0.098	0.5	ug/L
31065	05-4665-4	6010B	SO	ANTIMONY	B	0.51	5.8	mg/kg
				CADMIUM	B	0.031	0.23	mg/kg
		7471A		MERCURY	B	0.17	0.23	mg/kg
31066	05-4665-5	6010B		ANTIMONY	B	0.85	5.4	mg/kg
				BERYLLIUM	B	0.084	0.22	mg/kg
		7471A		MERCURY	B	0.18	0.22	mg/kg
31067	05-4665-6	6010B		CADMIUM	B	0.080	0.34	mg/kg
31068	05-4665-7			ANTIMONY	B	2.1	7.6	mg/kg
31069	05-4665-8			ANTIMONY	B	0.81	5.5	mg/kg
31070	05-4665-9			CADMIUM	B	0.22	0.23	mg/kg
31071	05-4665-10			ANTIMONY	B	0.18	5.5	mg/kg
				BERYLLIUM	B	0.17	0.22	mg/kg
				CADMIUM	B	0.20	0.22	mg/kg

Quality Control Outlier Reports

SDG 05-4680

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54680 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005

Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Toxaphene	21.338	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31076	05-04680-1
31077	05-04680-2

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54680 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

Analyte Name	Reported CCV Results: Difference	CCV Project Limits: Lower Limit	CCV Project Limits: Upper Limit
4,4'-DDD	18.158	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31104	05-04680-3
31105	05-04680-4
31106	05-04680-5
31107	05-04680-6
31108	05-04680-7
31109	05-04680-8
31110	05-04680-9
31111	05-04680-10
31112	05-04680-11
31113	05-04680-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54680 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Chlordane (Column DB-608)	16.050	15.0	-15.0
Chlordane (Column DB-5MS)	33.536	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31104	05-04680-3
31105	05-04680-4
31106	05-04680-5
31107	05-04680-6
31108	05-04680-7
31109	05-04680-8
31110	05-04680-9
31111	05-04680-10
31112	05-04680-11
31113	05-04680-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54680 **Analysis Method :** 8081A **Analysis Date :** 11/10/2005

Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Toxaphene	15.150	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31104	05-04680-3
31105	05-04680-4
31106	05-04680-5
31107	05-04680-6
31108	05-04680-7
31109	05-04680-8
31110	05-04680-9
31111	05-04680-10
31112	05-04680-11
31113	05-04680-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3398- 2 **Analysis Method :** 8260B **Analysis Date :** 11/09/2005

Lab Reporting Batch : 54680 **Lab ID:** APCL

	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
Analyte Name	**Relative Response Factor**	**Percent Difference**	**Relative Response Factor**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**
1,2-DIBROMO-3-CHLOROPROPANE	0.193	27.8	0.05		25.0	-50.0	-25.0
ACETONE		77.6			25.0	-50.0	-25.0
CHLOROMETHANE	0.107	-27.7			25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31110	05-4680-9
31111	05-4680-10
31112	05-4680-11
31113	05-4680-12

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3399- 2 **Analysis Method :** 8260B **Analysis Date :** 11/09/2005

Lab Reporting Batch : 54680 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
ACETONE		32.2	0.05		25.0	-50.0	-25.0

Associated Samples	
Client Sample ID	Lab Sample ID
31104	05-4680-3
31105	05-4680-4
31106	05-4680-5
31107	05-4680-6
31108	05-4680-7
31109	05-4680-8

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418- 2 **Analysis Method :** 8270C **Analysis Date :** 11/14/2005

Lab Reporting Batch : 54680 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.379	25.9	0.05		25.0	-50.0	-25.0

Associated Samples	
Client Sample ID	Lab Sample ID
31076	05-4680-1
31077	05-4680-2

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3393-15 **Analysis Method :** 8270C **Analysis Date :** 11/10/2005

Lab Reporting Batch : 54680 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
HEXACHLOROBENZENE	0.196	-25.2	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31104	05-4680-3
31105	05-4680-4
31106	05-4680-5
31107	05-4680-6
31108	05-4680-7
31109	05-4680-8
31110	05-4680-9
31111	05-4680-10
31112	05-4680-11
31113	05-4680-12

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4680 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Selenium	7.837 ug/L	ICB/CCB
Silver	2.544 ug/L	ICB/CCB
Vanadium	0.948 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Selenium	4.5 ug/L	31076	05-04680-1
Vanadium	1.6 ug/L	31076	05-04680-1
Selenium	4.6 ug/L	31077	05-04680-2
Silver	1.7 ug/L	31077	05-04680-2

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4680 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Beryllium	0.312 ug/L	ICB/CCB
Thallium	4.096 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Beryllium	0.066 mg/Kg	31105	05-04680-4
Thallium	0.20 mg/Kg	31108	05-04680-7
Beryllium	0.068 mg/Kg	31111	05-04680-10

Method Blank Outlier Report

Lab Reporting Batch : 54680
Analysis Method : 6010B
Preparation Type : 3010A
Method Blank Lab Sample ID : 05M2130-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2130L

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	2.8	10	ug/L	B	

SILVER was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31077	05-4680-2	1	1.7	B	ug/L

VANADIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.3	10	ug/L	B	

VANADIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31076	05-4680-1	1	1.6	B	ug/L

Method Blank Outlier Report

Lab Reporting Batch : 54680
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2132-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2132M

BERYLLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.0082	0.2	mg/kg	B	

BERYLLIUM contamination found in the method blank did not qualify any samples.

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.092	0.5	mg/kg	B	

COPPER contamination found in the method blank did not qualify any samples.

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.16	3	mg/kg	B	

IRON contamination found in the method blank did not qualify any samples.

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.028	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

THALLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.12	0.5	mg/kg	B	

THALLIUM contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54680
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2133-MB-01

Lab ID: APCL
Analysis Date : 11/10/2005
Preparation Date : 11/10/2005
Preparation Batch : 05M2133M

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.032	0.5	mg/kg	B	

COPPER contamination found in the method blank did not qualify any samples.

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.66	3	mg/kg	B	

IRON contamination found in the method blank did not qualify any samples.

THALLIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.11	0.5	mg/kg	B	

THALLIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31108	05-4680-7	1	0.20	B	mg/kg

Surrogate Recovery Outlier Report

Lab Report Batch: 54680 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Dilution	Matrix	Surrogate	Percent Recovery	Criteria (percent) Lower Limit	Upper Limit	Reject Point	Associated Target Analytes
31110	05-4680-9	8260B	0.89	SO	1,2-DICHLOROETHANE-D4	123	70.0	120.0	0.0	All Target
31111	05-4680-10	8260B	0.88	SO	1,2-DICHLOROETHANE-D4	122	70.0	120.0	0.0	All Target
31112	05-4680-11	8260B	0.96	SO	1,2-DICHLOROETHANE-D4	124	70.0	120.0	0.0	All Target
31113	05-4680-12	8260B	0.91	SO	1,2-DICHLOROETHANE-D4	122	70.0	120.0	0.0	All Target

Matrix Spike / Matrix Spike Duplicate Recovery and RPD Outlier Report

Method Batch : 05G3393 **Analysis Method :** 8270C **Analysis Date :** 11/09/2005
Preparation Batch : 05G3393 **Preparation Type :** 3550B **Preparation Date :** 11/09/2005
Lab Reporting Batch : 54680 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Matrix	Analyte Name	Reported *		Project Limits (Percent)			
				Percent Recovery	RPD	Rejection Point**	Lower Limit	Upper Limit	RPD
31109MSD	05-4680-8MSD	SO	2,4-DINITROTOLUENE	0	200	0.00	50.00	120.00	25.00
			N-NITROSO-DI-N-PROPYLAMINE	0	200	0.00	25.00	120.00	25.00

Associated Samples: Parent sample only

Client Sample ID	Lab Sample ID
31109	05-4680-8

* Only those Percent Recovery and/or RPD values outside project limits are listed in this report.
** Metal are also assessed against an upper rejection point of 150 percent for waters and 200 percent for soils and sediments

Project Number and Name: 6218.086 - Alameda Pt

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54680 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31110	RES	1.5	B	31111	RES	5.5	U	200.0	50	mg/kg
	SO	ARSENIC		RES	6.2			RES	3.6		53.1	50	mg/kg
	SO	BERYLLIUM		RES	0.22	B		RES	0.068	B	105.6	50	mg/kg
	SO	CADMIUM		RES	0.071	B		RES	0.042	B	51.3	50	mg/kg
7471A	SO	MERCURY		RES	0.21	B		RES	0.11	B	62.5	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

eporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54680 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31076	05-4680-1	6010B	AQ	BERYLLIUM	B	0.078	2	ug/L
				SELENIUM	B	4.5	10	ug/L
31077	05-4680-2			SELENIUM	B	4.6	10	ug/L
		8260B		TETRACHLOROETHENE	J	0.4	0.5	ug/L
31104	05-4680-3	6010B	SO	BERYLLIUM	B	0.15	0.21	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.001	0.0052	mg/kg
31105	05-4680-4	6010B		ANTIMONY	B	0.14	5.4	mg/kg
				BERYLLIUM	B	0.066	0.21	mg/kg
				CADMIUM	B	0.098	0.21	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.0009	0.0055	mg/kg
31106	05-4680-5	6010B		CADMIUM	B	0.16	0.22	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.0008	0.0050	mg/kg
31108	05-4680-7			METHYLENE CHLORIDE	J	0.001	0.0053	mg/kg
31109	05-4680-8	6010B		CADMIUM	B	0.13	0.22	mg/kg
31110	05-4680-9			ANTIMONY	B	1.5	5.7	mg/kg
				BERYLLIUM	B	0.22	0.23	mg/kg
				CADMIUM	B	0.071	0.23	mg/kg
		7471A		MERCURY	B	0.21	0.23	mg/kg
31111	05-4680-10	6010B		BERYLLIUM	B	0.068	0.22	mg/kg
				CADMIUM	B	0.042	0.22	mg/kg
		7471A		MERCURY	B	0.11	0.22	mg/kg
31112	05-4680-11	6010B		CADMIUM	B	0.13	0.22	mg/kg
31113	05-4680-12			CADMIUM	B	0.20	0.21	mg/kg

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

CDM Federal
9444 Farnham Road, Suite 210
San Diego, CA 92123
ATTN: Mr. Mike Allen

December 27, 2005

SUBJECT: NAS Alameda Point Data Validation

Dear Mr. Allen,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 12, 2005.

LDC Project # 14397:

SDG #	Fraction
05-4668, 05-4723	Volatiles (EPA Method SW 846 8260B)
05-4724, 05-4742	Semivolatiles (EPA Method SW 846 8270C)
05-4743	Pesticides (EPA Method SW 846 8081A)
	Polychlorinated Biphenyls (EPA Method SW 846 8082B)
	Metals (EPA Method SW 846 6010B/7471A)

The following deliverables are submitted under this report:

- Attachment I — Sample ID Cross Reference and Data Review Level
- Attachment II — CDM Database Qualification Summary
- Attachment III — Overall Data Qualification Summary
- Enclosure I — EPA Level III ADR Outliers
- Enclosure II — EPA Level IV Manual Validation Reports

The data validation was performed in accordance with the U.S. EPA National Functional Guidelines (NFG) for Inorganic and Organic Review (EPA 2004 and 1999). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience. The following items were evaluated during the review:

- Holding Times
- Sample Preservation
- Initial Calibration
- Continuing Calibration
- Blanks
- Surrogates
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Detection and Quantitation Limits
- Field QC Samples

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda Rauto
Operations Manager/Senior Chemist

Attachment I

Sample ID Cross Reference and Data Review Level

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
05-Nov-2005	31073	05-4668-1	N	3050B	6010B	3
05-Nov-2005	31073	05-4668-1	N	3550B	8081A	3
05-Nov-2005	31073	05-4668-1	N	3550B	8082	3
05-Nov-2005	31073	05-4668-1	N	3550B	8270C	3
05-Nov-2005	31073	05-4668-1	N	5035	8260B	3
05-Nov-2005	31073	05-4668-1	N	7471A	7471A	3
05-Nov-2005	31073MS	05-4668-1MS	MS	5035	8260B	3
05-Nov-2005	31073MSD	05-4668-1MSD	MSD	5035	8260B	3
05-Nov-2005	31074	05-4668-2	N	3050B	6010B	3
05-Nov-2005	31074	05-4668-2	N	3550B	8081A	3
05-Nov-2005	31074	05-4668-2	N	3550B	8082	3
05-Nov-2005	31074	05-4668-2	N	3550B	8270C	3
05-Nov-2005	31074	05-4668-2	N	5035	8260B	3
05-Nov-2005	31074	05-4668-2	N	7471A	7471A	3
05-Nov-2005	31075	05-4668-3	N	3050B	6010B	3
05-Nov-2005	31075	05-4668-3	N	3550B	8081A	3
05-Nov-2005	31075	05-4668-3	N	3550B	8082	3
05-Nov-2005	31075	05-4668-3	N	3550B	8270C	3
05-Nov-2005	31075	05-4668-3	N	5035	8260B	3
05-Nov-2005	31075	05-4668-3	N	7471A	7471A	3
05-Nov-2005	31208	05-4668-4	TB	5030B	8260B	3
08-Nov-2005	31127	05-4724-1	N	3010A	6010B	3
08-Nov-2005	31127	05-4724-1	N	3510C	8081A	3
08-Nov-2005	31127	05-4724-1	N	3510C	8082	3
08-Nov-2005	31127	05-4724-1	N	3510C	8270C	3
08-Nov-2005	31127	05-4724-1	N	5030B	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
08-Nov-2005	31127	05-4724-1	N	7470A	7470A	3
09-Nov-2005	31135	05-4723-1	N	3050B	6010B	3
09-Nov-2005	31135	05-4723-1	N	3550B	8081A	3
09-Nov-2005	31135	05-4723-1	N	3550B	8082	3
09-Nov-2005	31135	05-4723-1	N	3550B	8270C	3
09-Nov-2005	31135	05-4723-1	N	5035	8260B	3
09-Nov-2005	31135	05-4723-1	N	7471A	7471A	3
09-Nov-2005	31144	05-4723-10	N	3050B	6010B	3
09-Nov-2005	31144	05-4723-10	N	3550B	8081A	3
09-Nov-2005	31144	05-4723-10	N	3550B	8082	3
09-Nov-2005	31144	05-4723-10	N	3550B	8270C	3
09-Nov-2005	31144	05-4723-10	N	5035	8260B	3
09-Nov-2005	31144	05-4723-10	N	7471A	7471A	3
09-Nov-2005	31145	05-4723-11	N	3050B	6010B	3
09-Nov-2005	31145	05-4723-11	N	3550B	8081A	3
09-Nov-2005	31145	05-4723-11	N	3550B	8082	3
09-Nov-2005	31145	05-4723-11	N	3550B	8270C	3
09-Nov-2005	31145	05-4723-11	N	5035	8260B	3
09-Nov-2005	31145	05-4723-11	N	7471A	7471A	3
09-Nov-2005	31145MS	05-4723-11MS	MS	3550B	8081A	3
09-Nov-2005	31145MS	05-4723-11MS	MS	3550B	8082	3
09-Nov-2005	31145MS	05-4723-11MS	MS	3550B	8270C	3
09-Nov-2005	31145MSD	05-4723-11MSD	MSD	3550B	8081A	3
09-Nov-2005	31145MSD	05-4723-11MSD	MSD	3550B	8082	3
09-Nov-2005	31145MSD	05-4723-11MSD	MSD	3550B	8270C	3
09-Nov-2005	31151	05-4723-12	TB	5030B	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
09-Nov-2005	31136	05-4723-2	N	3050B	6010B	3
09-Nov-2005	31136	05-4723-2	N	3550B	8081A	3
09-Nov-2005	31136	05-4723-2	N	3550B	8082	3
09-Nov-2005	31136	05-4723-2	N	3550B	8270C	3
09-Nov-2005	31136	05-4723-2	N	5035	8260B	3
09-Nov-2005	31136	05-4723-2	N	7471A	7471A	3
09-Nov-2005	31137	05-4723-3	N	3050B	6010B	3
09-Nov-2005	31137	05-4723-3	N	3550B	8081A	3
09-Nov-2005	31137	05-4723-3	N	3550B	8082	3
09-Nov-2005	31137	05-4723-3	N	3550B	8270C	3
09-Nov-2005	31137	05-4723-3	N	5035	8260B	3
09-Nov-2005	31137	05-4723-3	N	7471A	7471A	3
09-Nov-2005	31138	05-4723-4	N	3050B	6010B	3
09-Nov-2005	31138	05-4723-4	N	3550B	8081A	3
09-Nov-2005	31138	05-4723-4	N	3550B	8082	3
09-Nov-2005	31138	05-4723-4	N	3550B	8270C	3
09-Nov-2005	31138	05-4723-4	N	5035	8260B	3
09-Nov-2005	31138	05-4723-4	N	7471A	7471A	3
09-Nov-2005	31139	05-4723-5	N	3050B	6010B	3
09-Nov-2005	31139	05-4723-5	N	3550B	8081A	3
09-Nov-2005	31139	05-4723-5	N	3550B	8082	3
09-Nov-2005	31139	05-4723-5	N	3550B	8270C	3
09-Nov-2005	31139	05-4723-5	N	5035	8260B	3
09-Nov-2005	31139	05-4723-5	N	7471A	7471A	3
09-Nov-2005	31140	05-4723-6	N	3050B	6010B	3
09-Nov-2005	31140	05-4723-6	N	3550B	8081A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
09-Nov-2005	31140	05-4723-6	N	3550B	8082	3
09-Nov-2005	31140	05-4723-6	N	3550B	8270C	3
09-Nov-2005	31140	05-4723-6	N	5035	8260B	3
09-Nov-2005	31140	05-4723-6	N	7471A	7471A	3
09-Nov-2005	31141	05-4723-7	N	3050B	6010B	3
09-Nov-2005	31141	05-4723-7	N	3550B	8081A	3
09-Nov-2005	31141	05-4723-7	N	3550B	8082	3
09-Nov-2005	31141	05-4723-7	N	3550B	8270C	3
09-Nov-2005	31141	05-4723-7	N	5035	8260B	3
09-Nov-2005	31141	05-4723-7	N	7471A	7471A	3
09-Nov-2005	31141MS	05-4723-7MS	MS	5035	8260B	3
09-Nov-2005	31141MSD	05-4723-7MSD	MSD	5035	8260B	3
09-Nov-2005	31142	05-4723-8	N	3050B	6010B	3
09-Nov-2005	31142	05-4723-8	N	3550B	8081A	3
09-Nov-2005	31142	05-4723-8	N	3550B	8082	3
09-Nov-2005	31142	05-4723-8	N	3550B	8270C	3
09-Nov-2005	31142	05-4723-8	N	5035	8260B	3
09-Nov-2005	31142	05-4723-8	N	7471A	7471A	3
09-Nov-2005	31142DUP	05-4723-8MD	DUP	3050B	6010B	3
09-Nov-2005	31142DUP	05-4723-8MD	DUP	7471A	7471A	3
09-Nov-2005	31142MS	05-4723-8MS	MS	3050B	6010B	3
09-Nov-2005	31142MS	05-4723-8MS	MS	7471A	7471A	3
09-Nov-2005	31142MSD	05-4723-8MSD	MSD	3050B	6010B	3
09-Nov-2005	31142MSD	05-4723-8MSD	MSD	7471A	7471A	3
09-Nov-2005	31143	05-4723-9	FD	3050B	6010B	3
09-Nov-2005	31143	05-4723-9	FD	3550B	8081A	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
09-Nov-2005	31143	05-4723-9	FD	3550B	8082	3
09-Nov-2005	31143	05-4723-9	FD	3550B	8270C	3
09-Nov-2005	31143	05-4723-9	FD	5035	8260B	3
09-Nov-2005	31143	05-4723-9	FD	7471A	7471A	3
09-Nov-2005	31146	05-4724-2	N	3010A	6010B	3
09-Nov-2005	31146	05-4724-2	N	3510C	8081A	3
09-Nov-2005	31146	05-4724-2	N	3510C	8082	3
09-Nov-2005	31146	05-4724-2	N	3510C	8270C	3
09-Nov-2005	31146	05-4724-2	N	7470A	7470A	3
09-Nov-2005	31147	05-4724-3	N	3010A	6010B	3
09-Nov-2005	31147	05-4724-3	N	3510C	8081A	3
09-Nov-2005	31147	05-4724-3	N	3510C	8082	3
09-Nov-2005	31147	05-4724-3	N	3510C	8270C	3
09-Nov-2005	31147	05-4724-3	N	7470A	7470A	3
09-Nov-2005	31148	05-4724-4	N	3010A	6010B	3
09-Nov-2005	31148	05-4724-4	N	3510C	8081A	3
09-Nov-2005	31148	05-4724-4	N	3510C	8082	3
09-Nov-2005	31148	05-4724-4	N	3510C	8270C	3
09-Nov-2005	31148	05-4724-4	N	5030B	8260B	3
09-Nov-2005	31148	05-4724-4	N	7470A	7470A	3
09-Nov-2005	31148	05-4724-4DL	N	3510C	8270C	3
09-Nov-2005	31149	05-4724-5	FD	3010A	6010B	3
09-Nov-2005	31149	05-4724-5	FD	3510C	8081A	3
09-Nov-2005	31149	05-4724-5	FD	3510C	8082	3
09-Nov-2005	31149	05-4724-5	FD	3510C	8270C	3
09-Nov-2005	31149	05-4724-5	FD	5030B	8260B	3

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
09-Nov-2005	31149	05-4724-5	FD	7470A	7470A	3
09-Nov-2005	31149	05-4724-5DL	FD	3510C	8270C	3
09-Nov-2005	31150	05-4724-6	TB	5030B	8260B	3
09-Nov-2005	31164	05-4743-4	N	3010A	6010B	4
09-Nov-2005	31164	05-4743-4	N	3510C	8081A	4
09-Nov-2005	31164	05-4743-4	N	3510C	8082	4
09-Nov-2005	31164	05-4743-4	N	3510C	8270C	4
09-Nov-2005	31164	05-4743-4	N	5030B	8260B	4
09-Nov-2005	31164	05-4743-4	N	7470A	7470A	4
09-Nov-2005	31164	05-4743-4DL	N	3510C	8270C	4
09-Nov-2005	31167	05-4743-7	N	3010A	6010B	4
09-Nov-2005	31167	05-4743-7	N	3510C	8270C	4
09-Nov-2005	31167	05-4743-7	N	5030B	8260B	4
09-Nov-2005	31167	05-4743-7	N	7470A	7470A	4
10-Nov-2005	31153	05-4742-1	TB	5030B	8260B	4
10-Nov-2005	31169	05-4742-10	N	3010A	6010B	4
10-Nov-2005	31169	05-4742-10	N	3510C	8081A	4
10-Nov-2005	31169	05-4742-10	N	3510C	8082	4
10-Nov-2005	31169	05-4742-10	N	3510C	8270C	4
10-Nov-2005	31169	05-4742-10	N	5030B	8260B	4
10-Nov-2005	31169	05-4742-10	N	7470A	7470A	4
10-Nov-2005	31169	05-4742-10DL	N	3510C	8270C	4
10-Nov-2005	31170	05-4742-11	N	5030B	8260B	4
10-Nov-2005	31171	05-4742-12	N	5030B	8260B	4
10-Nov-2005	31172	05-4742-13	N	3010A	6010B	4
10-Nov-2005	31172	05-4742-13	N	3510C	8081A	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
10-Nov-2005	31172	05-4742-13	N	3510C	8082	4
10-Nov-2005	31172	05-4742-13	N	3510C	8270C	4
10-Nov-2005	31172	05-4742-13	N	5030B	8260B	4
10-Nov-2005	31172	05-4742-13	N	7470A	7470A	4
10-Nov-2005	31153MS	05-4742-1MS	MS	5030B	8260B	4
10-Nov-2005	31153MSD	05-4742-1MSD	MSD	5030B	8260B	4
10-Nov-2005	31154	05-4742-2	TB	5030B	8260B	4
10-Nov-2005	31155	05-4742-3	EB	3010A	6010B	4
10-Nov-2005	31155	05-4742-3	EB	3510C	8081A	4
10-Nov-2005	31155	05-4742-3	EB	3510C	8082	4
10-Nov-2005	31155	05-4742-3	EB	3510C	8270C	4
10-Nov-2005	31155	05-4742-3	EB	5030B	8260B	4
10-Nov-2005	31155	05-4742-3	EB	7470A	7470A	4
10-Nov-2005	31156	05-4742-4	N	3050B	6010B	4
10-Nov-2005	31156	05-4742-4	N	3550B	8081A	4
10-Nov-2005	31156	05-4742-4	N	3550B	8082	4
10-Nov-2005	31156	05-4742-4	N	3550B	8270C	4
10-Nov-2005	31156	05-4742-4	N	5035	8260B	4
10-Nov-2005	31156	05-4742-4	N	7471A	7471A	4
10-Nov-2005	31157	05-4742-5	N	3050B	6010B	4
10-Nov-2005	31157	05-4742-5	N	3550B	8081A	4
10-Nov-2005	31157	05-4742-5	N	3550B	8082	4
10-Nov-2005	31157	05-4742-5	N	3550B	8270C	4
10-Nov-2005	31157	05-4742-5	N	5035	8260B	4
10-Nov-2005	31157	05-4742-5	N	7471A	7471A	4
10-Nov-2005	31158	05-4742-6	N	3050B	6010B	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
10-Nov-2005	31158	05-4742-6	N	3550B	8081A	4
10-Nov-2005	31158	05-4742-6	N	3550B	8082	4
10-Nov-2005	31158	05-4742-6	N	3550B	8270C	4
10-Nov-2005	31158	05-4742-6	N	5035	8260B	4
10-Nov-2005	31158	05-4742-6	N	7471A	7471A	4
10-Nov-2005	31159	05-4742-7	N	3050B	6010B	4
10-Nov-2005	31159	05-4742-7	N	3550B	8081A	4
10-Nov-2005	31159	05-4742-7	N	3550B	8082	4
10-Nov-2005	31159	05-4742-7	N	3550B	8270C	4
10-Nov-2005	31159	05-4742-7	N	5035	8260B	4
10-Nov-2005	31159	05-4742-7	N	7471A	7471A	4
10-Nov-2005	31160	05-4742-8	N	3050B	6010B	4
10-Nov-2005	31160	05-4742-8	N	3550B	8081A	4
10-Nov-2005	31160	05-4742-8	N	3550B	8082	4
10-Nov-2005	31160	05-4742-8	N	3550B	8270C	4
10-Nov-2005	31160	05-4742-8	N	5035	8260B	4
10-Nov-2005	31160	05-4742-8	N	7471A	7471A	4
10-Nov-2005	31161	05-4742-9	N	3050B	6010B	4
10-Nov-2005	31161	05-4742-9	N	3550B	8081A	4
10-Nov-2005	31161	05-4742-9	N	3550B	8082	4
10-Nov-2005	31161	05-4742-9	N	3550B	8270C	4
10-Nov-2005	31161	05-4742-9	N	5035	8260B	4
10-Nov-2005	31161	05-4742-9	N	7471A	7471A	4
10-Nov-2005	31152	05-4743-1	TB	5030B	8260B	4
10-Nov-2005	31162	05-4743-2	N	5030B	8260B	4
10-Nov-2005	31162MS	05-4743-2MS	MS	5030B	8260B	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
10-Nov-2005	31162MSD	05-4743-2MSD	MSD	5030B	8260B	4
10-Nov-2005	31163	05-4743-3	N	3010A	6010B	4
10-Nov-2005	31163	05-4743-3	N	3510C	8081A	4
10-Nov-2005	31163	05-4743-3	N	3510C	8082	4
10-Nov-2005	31163	05-4743-3	N	5030B	8260B	4
10-Nov-2005	31163	05-4743-3	N	7470A	7470A	4
10-Nov-2005	31165	05-4743-5	N	3010A	6010B	4
10-Nov-2005	31165	05-4743-5	N	3510C	8081A	4
10-Nov-2005	31165	05-4743-5	N	3510C	8082	4
10-Nov-2005	31165	05-4743-5	N	3510C	8270C	4
10-Nov-2005	31165	05-4743-5	N	5030B	8260B	4
10-Nov-2005	31165	05-4743-5	N	7470A	7470A	4
10-Nov-2005	31166	05-4743-6	N	5030B	8260B	4
10-Nov-2005	31168	05-4743-8	EB	3010A	6010B	4
10-Nov-2005	31168	05-4743-8	EB	3510C	8081A	4
10-Nov-2005	31168	05-4743-8	EB	3510C	8082	4
10-Nov-2005	31168	05-4743-8	EB	3510C	8270C	4
10-Nov-2005	31168	05-4743-8	EB	5030B	8260B	4
10-Nov-2005	31168	05-4743-8	EB	7470A	7470A	4
10-Nov-2005	31168DUP	05-4743-8MD	DUP	7470A	7470A	4
10-Nov-2005	31168MS	05-4743-8MS	MS	7470A	7470A	4
10-Nov-2005	31168MSD	05-4743-8MSD	MSD	7470A	7470A	4
10-Nov-2005	31173	05-4743-9	N	3010A	6010B	4
10-Nov-2005	31173	05-4743-9	N	5030B	8260B	4
10-Nov-2005	31173	05-4743-9	N	7470A	7470A	4

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment II

CDM Database Qualification Summary

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54668,54723,54724,54742,54743

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54668	31073	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54668	31073	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54668	31073	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54668	31073	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54668	31073	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54668	31073	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54668	31073	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54668	31073	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54668	31074	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54668	31074	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54668	31074	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54668	31074	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54668	31074	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54668	31074	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54668	31074	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54668	31074	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54668	31075	6010B	7440360	U		ANTIMONY	Present in method blank
54668	31075	8081A	72548		J	4,4'-DDD	Continuing calibration percent difference
54668	31075	8081A	319846		J	ALPHA-BHC	Continuing calibration percent difference
54668	31075	8081A	115297		J	ENDOSULFAN	Continuing calibration percent difference
54668	31075	8081A	1031078		J	ENDOSULFAN SULFATE	Continuing calibration percent difference
54668	31075	8082	12674112		J	AROCLOR 1016	Continuing calibration percent difference
54668	31075	8082	11104282		J	AROCLOR 1221	Continuing calibration percent difference
54668	31075	8082	11141165		J	AROCLOR 1232	Continuing calibration percent difference
54668	31075	8260B	74873		J	CHLOROMETHANE	Continuing calibration percent difference
54723	31135	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31135	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31135	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31136	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31136	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31136	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31137	6010B	7440360	U		ANTIMONY	Present in method blank

Reason for Qualified Results

SDG Nos. : 54668,54723,54724,54742,54743

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54723	31137	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31137	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31138	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31138	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31138	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31138	8260B	75092	U		METHYLENE CHLORIDE	Present in method blank
54723	31139	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31139	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31140	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31140	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31141	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31141	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31141	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31142	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31142	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31142	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31142DUP	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31142DUP	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31143	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31143	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31144	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31144	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31144	6010B	7440508	J		COPPER	Lab Duplicate RPD
54723	31145	6010B	7440360	U		ANTIMONY	Present in method blank
54723	31145	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54723	31145	6010B	7440508	J		COPPER	Lab Duplicate RPD
54724	31127	6010B	7440439	U		CADMIUM	Present in method blank
54724	31127	6010B	7439921	U		LEAD	Present in method blank
54724	31127	6010B	7439987	U		MOLYBDENUM	Present in method blank
54724	31127	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54724	31146	6010B	7440382	U		ARSENIC	Present in method blank
54724	31146	6010B	7440439	U		CADMIUM	Present in method blank

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54668,54723,54724,54742,54743

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54724	31146	6010B	7439921	U		LEAD	Present in method blank
54724	31146	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54724	31147	6010B	7440439	U		CADMIUM	Present in method blank
54724	31147	6010B	7439921	U		LEAD	Present in method blank
54724	31147	6010B	7439987	U		MOLYBDENUM	Present in method blank
54724	31147	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54724	31148	6010B	7440439	U		CADMIUM	Present in method blank
54724	31148	6010B	7439921	U		LEAD	Present in method blank
54724	31148	6010B	7439987	U		MOLYBDENUM	Present in method blank
54724	31148	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54724	31149	6010B	7440439	U		CADMIUM	Present in method blank
54724	31149	6010B	7439987	U		MOLYBDENUM	Present in method blank
54724	31149	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54742	31155	6010B	7440382	U		ARSENIC	Present in method blank
54742	31155	6010B	7440439	U		CADMIUM	Present in method blank
54742	31155	6010B	7440508	U		COPPER	Present in method blank
54742	31155	6010B	7439987	U		MOLYBDENUM	Present in method blank
54742	31155	6010B	7440666	U		ZINC	Present in method blank
54742	31155	7470A	7439976	U		MERCURY	Present in method blank
54742	31155	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54742	31155	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54742	31156	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31156	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31156	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31156	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31156	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31157	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31157	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31157	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31157	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31157	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31158	6010B	7440360	U		ANTIMONY	Present in method blank

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54668,54723,54724,54742,54743

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54742	31158	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31158	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31158	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31158	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31159	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31159	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31159	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31159	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31159	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31160	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31160	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31160	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31160	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31160	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31161	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31161	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31161	6010B	7440473	J		CHROMIUM	Lab Duplicate RPD
54742	31161	6010B	7440508	J		COPPER	Lab Duplicate RPD
54742	31161	8260B	67641		J	ACETONE	Continuing calibration percent difference
54742	31169	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31169	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31169	6010B	7440473	U		CHROMIUM	Present in equipment blank
54742	31169	6010B	7440508	U		COPPER	Present in equipment blank
54742	31169	6010B	7439921	U		LEAD	Present in equipment blank
54742	31169	6010B	7439987	U		MOLYBDENUM	Present in equipment blank
54742	31169	6010B	7440020	U		NICKEL	Present in equipment blank
54742	31169	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54742	31172	6010B	7440360	U		ANTIMONY	Present in method blank
54742	31172	6010B	7440439	U		CADMIUM	Present in equipment blank
54742	31172	6010B	7440473	U		CHROMIUM	Present in equipment blank
54742	31172	6010B	7439921	U		LEAD	Present in equipment blank
54742	31172	6010B	7439987	U		MOLYBDENUM	Present in equipment blank

CDM Federal Programs

Reason for Qualified Results

SDG Nos. : 54668,54723,54724,54742,54743

Sample Del Group (SDG)	Sample ID	Test Method	CAS No.	Detected Qualifier	Non Detected Qualifier	Analyte Name	Reason
54742	31172	8081A	8001352		J	TOXAPHENE	Continuing calibration percent difference
54742	31172	8270C	100016		J	4-Nitroaniline	Continuing calibration percent difference
54743	31152	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31152	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54743	31162	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31162	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54743	31163	6010B	7440439	U		CADMIUM	Present in equipment blank
54743	31163	6010B	7440508	U		COPPER	Present in equipment blank
54743	31163	6010B	7439921	U		LEAD	Present in equipment blank
54743	31163	6010B	7440666	U		ZINC	Present in equipment blank
54743	31163	7470A	7439976	U		MERCURY	Present in equipment blank
54743	31163	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31163	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54743	31165	6010B	7440382	U		ARSENIC	Present in equipment blank
54743	31165	6010B	7440439	U		CADMIUM	Present in equipment blank
54743	31165	6010B	7439921	U		LEAD	Present in equipment blank
54743	31165	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31165	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54743	31166	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31166	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference
54743	31167	6010B	7439987	U		MOLYBDENUM	Present in method blank
54743	31168	6010B	7440382	U		ARSENIC	Present in method blank
54743	31168	6010B	7440508	U		COPPER	Present in method blank
54743	31168	6010B	7440666	U		ZINC	Present in method blank
54743	31173	6010B	7440439	U		CADMIUM	Present in equipment blank
54743	31173	6010B	7439921	U		LEAD	Present in equipment blank
54743	31173	8260B	120821		J	1,2,4-TRICHLOROBENZENE	Continuing calibration percent difference
54743	31173	8260B	75718		J	DICHLORODIFLUOROMETHANE	Continuing calibration percent difference

Attachment III

Overall Data Qualification Summary

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54668										
6010B	31073	SO	N							
				BERYLLIUM	0.21	0.19B		J	mg/kg	
6010B	31074	SO	N							
				ANTIMONY	5.8	2.3B		J	mg/kg	
6010B	31075	SO	N							
				ANTIMONY	5.6	0.36B		U	mg/kg	
				CADMIUM	0.22	0.033B		J	mg/kg	
7471A	31073	SO	N							
				MERCURY	0.21	0.19B		J	mg/kg	
7471A	31075	SO	N							
				MERCURY	0.22	0.21B		J	mg/kg	
8081A	31073	SO	N							
				4,4'-DDD	0.032	0.032U		UJ	mg/kg	
				ALPHA-BHC	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN	0.018	0.018U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.053	0.053U		UJ	mg/kg	
8081A	31074	SO	N							
				4,4'-DDD	0.0035	0.0035U		UJ	mg/kg	
				ALPHA-BHC	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN	0.0020	0.0020U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0058	0.0058U		UJ	mg/kg	
8081A	31075	SO	N							
				4,4'-DDD	0.0034	0.0034U		UJ	mg/kg	
				ALPHA-BHC	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN	0.0019	0.0019U		UJ	mg/kg	
				ENDOSULFAN SULFATE	0.0056	0.0056U		UJ	mg/kg	
8082	31073	SO	N							
				AROCLOR 1016	0.035	0.035U		UJ	mg/kg	
				AROCLOR 1221	0.070	0.070U		UJ	mg/kg	
				AROCLOR 1232	0.035	0.035U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54668										
8082	31074	SO	N							
				AROCLOR 1016	0.038	0.038U		UJ	mg/kg	
				AROCLOR 1221	0.076	0.076U		UJ	mg/kg	
				AROCLOR 1232	0.038	0.038U		UJ	mg/kg	
8082	31075	SO	N							
				AROCLOR 1016	0.037	0.037U		UJ	mg/kg	
				AROCLOR 1221	0.074	0.074U		UJ	mg/kg	
				AROCLOR 1232	0.037	0.037U		UJ	mg/kg	
8260B	31073	SO	N							
				CHLOROMETHANE	0.0045	0.0045U		UJ	mg/kg	
8260B	31074	SO	N							
				CHLOROMETHANE	0.0051	0.0051U		UJ	mg/kg	
8260B	31075	SO	N							
				CHLOROMETHANE	0.0053	0.0053U		UJ	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54723										
6010B	31135	SO	N							
				ANTIMONY	5.2	1.1B		U	mg/kg	
				BERYLLIUM	0.21	0.022B		J	mg/kg	
				CHROMIUM	0.52	34.6		J	mg/kg	
				COPPER	0.52	56.5		J	mg/kg	
6010B	31136	SO	N							
				ANTIMONY	5.3	0.91B		U	mg/kg	
				CHROMIUM	0.53	30.7		J	mg/kg	
				COPPER	0.53	47.7		J	mg/kg	
6010B	31137	SO	N							
				ANTIMONY	5.4	0.97B		U	mg/kg	
				CHROMIUM	0.54	32.3		J	mg/kg	
				COPPER	0.54	26.8		J	mg/kg	
				THALLIUM	0.54	0.48B		J	mg/kg	
6010B	31138	SO	N							
				ANTIMONY	5.4	1.1B		U	mg/kg	
				CHROMIUM	0.54	39.2		J	mg/kg	
				COPPER	0.54	40.4		J	mg/kg	
				THALLIUM	0.54	0.52B		J	mg/kg	
6010B	31139	SO	N							
				CHROMIUM	0.55	115		J	mg/kg	
				COPPER	0.55	33.1		J	mg/kg	
6010B	31140	SO	N							
				BERYLLIUM	0.22	0.19B		J	mg/kg	
				CHROMIUM	0.54	47.1		J	mg/kg	
				COPPER	0.54	74.0		J	mg/kg	
6010B	31141	SO	N							
				ANTIMONY	5.3	0.60B		U	mg/kg	
				CHROMIUM	0.53	38.9		J	mg/kg	
				COPPER	0.53	28.4		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54723										
6010B	31142	SO	N							
				ANTIMONY	5.5	0.33B		UJ	mg/kg	
				ARSENIC	0.33	6.2		J	mg/kg	
				CHROMIUM	0.55	33.8		J	mg/kg	
				COPPER	0.55	16.5		J	mg/kg	
				LEAD	0.33	19.8		J	mg/kg	
				ZINC	0.55	93.5		J	mg/kg	
6010B	31143	SO	FD							
				CHROMIUM	0.56	26.8		J	mg/kg	
				COPPER	0.56	9.0		J	mg/kg	
6010B	31144	SO	N							
				ANTIMONY	5.3	0.88B		U	mg/kg	
				CHROMIUM	0.53	9.8		J	mg/kg	
				COPPER	0.53	22.5		J	mg/kg	
6010B	31145	SO	N							
				ANTIMONY	6.6	0.74B		U	mg/kg	
				CHROMIUM	0.66	38.7		J	mg/kg	
				COPPER	0.66	39.8		J	mg/kg	
				THALLIUM	0.66	0.49B		J	mg/kg	
7471A	31140	SO	N							
				MERCURY	0.22	0.16B		J	mg/kg	
7471A	31142	SO	N							
				MERCURY	0.22	0.15B		J	mg/kg	
7471A	31143	SO	FD							
				MERCURY	0.22	0.10B		J	mg/kg	
8081A	31138	SO	N							
				4,4'-DDE	0.0032	0.0002J		J	mg/kg	
8082	31144	SO	N							
				AROCLOR 1260	0.035	0.008J		J	mg/kg	
8260B	31138	SO	N							
				METHYLENE CHLORIDE	0.0053	0.0009J		U	mg/kg	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54724										
6010B	31127	AQ	N							
				ANTIMONY	10	7.0B		J	ug/L	
				CADMIUM	2	0.64B		U	ug/L	
				COBALT	5	1.3B		J	ug/L	
				LEAD	5	7.5		U	ug/L	
				MOLYBDENUM	5	6.6		U	ug/L	
6010B	31146	AQ	N							
				ANTIMONY	10	8.1B		J	ug/L	
				ARSENIC	5	14.0		U	ug/L	
				CADMIUM	2	0.81B		U	ug/L	
				LEAD	5	6.2		U	ug/L	
				NICKEL	5	1.3B		J	ug/L	
6010B	31147	AQ	N							
				CADMIUM	2	0.72B		U	ug/L	
				CHROMIUM	5	4.1B		J	ug/L	
				COBALT	5	0.99B		J	ug/L	
				LEAD	5	5.5		U	ug/L	
				MOLYBDENUM	5	4.2B		U	ug/L	
				NICKEL	5	1.7B		J	ug/L	
6010B	31148	AQ	N							
				ANTIMONY	10	8.9B		J	ug/L	
				BERYLLIUM	2	0.078B		J	ug/L	
				CADMIUM	2	0.89B		U	ug/L	
				COBALT	5	1.5B		J	ug/L	
				LEAD	5	8.1		UJ	ug/L	
				MOLYBDENUM	5	5.9		U	ug/L	
				NICKEL	5	0.71B		J	ug/L	
				VANADIUM	10	6.7B		J	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54724										
6010B	31149	AQ	FD							
				ANTIMONY	10	6.8B		J	ug/L	
				CADMIUM	2	0.82B		U	ug/L	
				COBALT	5	1.7B		J	ug/L	
				MOLYBDENUM	5	6.6		U	ug/L	
				NICKEL	5	1.7B		J	ug/L	
				VANADIUM	10	6.9B		J	ug/L	
8081A	31127	AQ	N							
				TOXAPHENE	10	10U		UJ	ug/L	
8081A	31146	AQ	N							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31147	AQ	N							
				TOXAPHENE	1	1U		UJ	ug/L	
8081A	31148	AQ	N							
				TOXAPHENE	10	10U		UJ	ug/L	
8081A	31149	AQ	FD							
				TOXAPHENE	10	10U		UJ	ug/L	
8260B	31148	AQ	N							
				1,3,5-TRIMETHYLBENZENE	5	4J		J	ug/L	
				BENZENE	5	137		J	ug/L	
				TOLUENE	5	40		J	ug/L	
8260B	31149	AQ	FD							
				STYRENE	5	4J		J	ug/L	
8270C	31127	AQ	N							
				ANTHRACENE	10	2J		J	ug/L	
				BIS(2-ETHYLHEXYL) PHTHALATE	10	2J		J	ug/L	
				FLUORANTHENE	10	5J		J	ug/L	
				FLUORENE	10	3J		J	ug/L	
				PYRENE	10	5J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54724										
8270C	31146	AQ	N							
				BIS(2-ETHYLHEXYL) PHTHALATE	10	7J		J	ug/L	
				METHYLNAPHTHALENE (TOTAL)	10	4J		J	ug/L	
				PHENANTHRENE	10	3J		J	ug/L	
8270C	31147	AQ	N							
				ACENAPHTHENE	10	5J		J	ug/L	
				FLUORANTHENE	10	2J		J	ug/L	
				NAPHTHALENE	10	2J		J	ug/L	
				PHENANTHRENE	10	4J		J	ug/L	
				PYRENE	10	3J		J	ug/L	
8270C	31148	AQ	N							
				ACENAPHTHENE	500	100		J	ug/L	
				BENZO(A)ANTHRACENE	10	2J		J	ug/L	
				BENZO(A)PYRENE	10	3J		J	ug/L	
				BENZO(B)FLUORANTHENE	10	2J		J	ug/L	
				BENZO(G,H,I)PERYLENE	10	1J		J	ug/L	
				CHRYSENE	10	4J		J	ug/L	
				DIBENZOFURAN	10	6J		J	ug/L	
8270C	31149	AQ	FD							
				ACENAPHTHENE	500	130		J	ug/L	
				BENZO(A)ANTHRACENE	10	2J		J	ug/L	
				BENZO(A)PYRENE	10	2J		J	ug/L	
				BENZO(B)FLUORANTHENE	10	2J		J	ug/L	
				BENZO(G,H,I)PERYLENE	10	2J		J	ug/L	
				CHRYSENE	10	3J		J	ug/L	
				DIBENZOFURAN	10	6J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54742										
6010B	31155	AQ	EB							
				ARSENIC	5	5.0		U	ug/L	
				BARIUM	10	1.3B		J	ug/L	
				CADMIUM	2	3.1		U	ug/L	
				CHROMIUM	5	2.0B		J	ug/L	
				COPPER	10	3.1B		U	ug/L	
				MOLYBDENUM	5	1.6B		U	ug/L	
				NICKEL	5	0.80B		J	ug/L	
				ZINC	10	9.6B		U	ug/L	
6010B	31156	SO	N							
				ANTIMONY	5.5	0.46B		U	mg/kg	
				CADMIUM	0.22	0.52		U	mg/kg	
				CHROMIUM	0.55	65.0		J	mg/kg	
				COPPER	0.55	118		J	mg/kg	
6010B	31157	SO	N							
				ANTIMONY	5.6	0.56B		U	mg/kg	
				BERYLLIUM	0.22	0.080B		J	mg/kg	
				CADMIUM	0.22	0.64		U	mg/kg	
				CHROMIUM	0.56	123		J	mg/kg	
				COPPER	0.56	86.5		J	mg/kg	
6010B	31158	SO	N							
				ANTIMONY	5.4	0.31B		U	mg/kg	
				CADMIUM	0.21	0.35		U	mg/kg	
				CHROMIUM	0.54	19.3		J	mg/kg	
				COPPER	0.54	37.1		J	mg/kg	
6010B	31159	SO	N							
				ANTIMONY	5.2	1.5B		U	mg/kg	
				CADMIUM	0.21	0.56		U	mg/kg	
				CHROMIUM	0.52	11.9		J	mg/kg	
				COPPER	0.52	13.4		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54742										
6010B	31160	SO	N							
				ANTIMONY	5.3	0.92B		U	mg/kg	
				CADMIUM	0.21	0.48		U	mg/kg	
				CHROMIUM	0.53	55.3		J	mg/kg	
				COPPER	0.53	72.2		J	mg/kg	
6010B	31161	SO	N							
				ANTIMONY	5.4	0.81B		U	mg/kg	
				CADMIUM	0.22	0.49		U	mg/kg	
				CHROMIUM	0.54	28.3		J	mg/kg	
				COPPER	0.54	44.9		J	mg/kg	
6010B	31169	AQ	N							
				ANTIMONY	10	12.2		U	ug/L	
				CADMIUM	2	2.2		U	ug/L	
				CHROMIUM	5	7.8		U	ug/L	
				COBALT	5	1.5B		J	ug/L	
				COPPER	10	0.95B		U	ug/L	
				LEAD	5	16.6		U	ug/L	
				MOLYBDENUM	5	4.4B		U	ug/L	
				NICKEL	5	0.82B		U	ug/L	
				VANADIUM	10	1.4B		J	ug/L	
6010B	31172	AQ	N							
				ANTIMONY	10	6.7B		U	ug/L	
				CADMIUM	2	2.6		U	ug/L	
				CHROMIUM	5	6.1		U	ug/L	
				COBALT	5	0.99B		J	ug/L	
				LEAD	5	20.1		U	ug/L	
				MOLYBDENUM	5	5.1		U	ug/L	
				VANADIUM	10	1.6B		J	ug/L	
7470A	31155	AQ	EB							
				MERCURY	0.5	0.18B		U	ug/L	
7471A	31160	SO	N							
				MERCURY	0.21	0.18B		J	mg/kg	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54742										
7471A	31161	SO	N							
				MERCURY	0.22	0.21B		J	mg/kg	
8081A	31155	AQ	EB							
				TOXAPHENE	10	10U		UJ	ug/L	
8081A	31172	AQ	N							
				TOXAPHENE	10	10U		UJ	ug/L	
8260B	31155	AQ	EB							
				TETRACHLOROETHENE	0.5	0.4J		J	ug/L	
8260B	31156	SO	N							
				ACETONE	0.051	0.051U		UJ	mg/kg	
8260B	31157	SO	N							
				ACETONE	0.046	0.046U		UJ	mg/kg	
8260B	31158	SO	N							
				ACETONE	0.041	0.041U		UJ	mg/kg	
8260B	31159	SO	N							
				ACETONE	0.050	0.050U		UJ	mg/kg	
8260B	31160	SO	N							
				ACETONE	0.063	0.063U		UJ	mg/kg	
				XYLENES	0.013	0.003J		J	mg/kg	
8260B	31161	SO	N							
				ACETONE	0.043	0.043U		UJ	mg/kg	
8260B	31170	AQ	N							
				1,2,4-TRIMETHYLBENZENE	0.5	0.4J		J	ug/L	
				ETHYLBENZENE	0.5	0.4J		J	ug/L	
8270C	31155	AQ	EB							
				4-Nitroaniline	50	50U		UJ	ug/L	

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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54742										
8270C	31169	AQ	N							
				4-Nitroaniline	50	50U		UJ	ug/L	
				ACENAPHTHYLENE	10	4J		J	ug/L	
				ANTHRACENE	10	2J		J	ug/L	
				BENZO(A)PYRENE	10	2J		J	ug/L	
				BIS(2-ETHYLHEXYL) PHTHALATE	10	2J		J	ug/L	
				PHENANTHRENE	10	5J		J	ug/L	
8270C	31172	AQ	N							
				4-Nitroaniline	50	50U		UJ	ug/L	
				NAPHTHALENE	10	3J		J	ug/L	
				PYRENE	10	2J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
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Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54743										
6010B	31163	AQ	N							
				ANTIMONY	10	9.1B		J	ug/L	
				CADMIUM	2	46.6		U	ug/L	
				COBALT	5	2.1B		J	ug/L	
				COPPER	10	6.2B		U	ug/L	
				LEAD	5	214		U	ug/L	
				VANADIUM	10	8.2B		J	ug/L	
				ZINC	10	11.7		U	ug/L	
6010B	31164	AQ	N							
				ANTIMONY	10	7.9B		J	ug/L	
				BERYLLIUM	2	0.087B		J	ug/L	
				VANADIUM	10	3.9B		J	ug/L	
6010B	31165	AQ	N							
				ARSENIC	5	11.8		U	ug/L	
				CADMIUM	2	6.3		U	ug/L	
				COBALT	5	2.2B		J	ug/L	
				LEAD	5	33.7		U	ug/L	
6010B	31167	AQ	N							
				BERYLLIUM	2	0.088B		J	ug/L	
				COBALT	5	1.8B		J	ug/L	
				IRON	50	49.4B		J	ug/L	
				MOLYBDENUM	5	8.1		U	ug/L	
				NICKEL	5	0.67B		J	ug/L	
				VANADIUM	10	7.0B		J	ug/L	
6010B	31168	AQ	EB							
				ARSENIC	5	4.4B		U	ug/L	
				BARIUM	10	0.82B		J	ug/L	
				CHROMIUM	5	1.0B		J	ug/L	
				COPPER	10	4.0B		U	ug/L	
				IRON	50	21.3B		J	ug/L	
				NICKEL	5	0.74B		J	ug/L	
				ZINC	10	10.9		U	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54743										
6010B	31173	AQ	N							
				ANTIMONY	10	8.5B		J	ug/L	
				CADMIUM	2	33.7		U	ug/L	
				LEAD	5	213		U	ug/L	
7470A	31163	AQ	N							
				MERCURY	0.5	0.035B		U	ug/L	
7470A	31168	AQ	EB							
				MERCURY	0.5	0.28B		J	ug/L	
8260B	31152	AQ	TB							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
8260B	31162	AQ	N							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
8260B	31163	AQ	N							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				ACETONE	50	16J		J	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
				ETHYLBENZENE	0.5	0.3J		J	ug/L	
8260B	31165	AQ	N							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
				ETHYLBENZENE	0.5	0.4J		J	ug/L	
8260B	31166	AQ	N							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				ACETONE	50	3J		J	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
				TOLUENE	0.5	0.3J		J	ug/L	
8260B	31167	AQ	N							
				ETHYLBENZENE	0.5	0.4J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54743										
8260B	31168	AQ	EB							
				CHLOROFORM	0.5	0.4J		J	ug/L	
8260B	31173	AQ	N							
				1,2,4-TRICHLOROBENZENE	0.5	0.5U		UJ	ug/L	
				ACETONE	50	3J		J	ug/L	
				DICHLORODIFLUOROMETHANE	1	1U		UJ	ug/L	
8270C	31164	AQ	N							
				ACENAPHTHYLENE	10	2J		J	ug/L	
				ANTHRACENE	10	4J		J	ug/L	
				BENZO(A)PYRENE	10	1J		J	ug/L	
				BIS(2-ETHYLHEXYL) PHTHALATE	10	3J		J	ug/L	
				FLUORENE	10	5J		J	ug/L	
				PYRENE	10	7J		J	ug/L	
8270C	31165	AQ	N							
				ACENAPHTHYLENE	10	2J		J	ug/L	
				ANTHRACENE	10	6J		J	ug/L	
				BENZO(A)ANTHRACENE	10	8J		J	ug/L	
				BENZO(K)FLUORANTHENE	10	4J		J	ug/L	
				BIS(2-ETHYLHEXYL) PHTHALATE	10	3J		J	ug/L	
				CHRYSENE	10	8J		J	ug/L	
				FLUORENE	10	4J		J	ug/L	
				INDENO(1,2,3-CD)PYRENE	10	8J		J	ug/L	
				METHYLNAPHTHALENE (TOTAL)	10	5J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Overall Qualified Results

Analytical Method	Field Sample ID	Matrix	Sample Type	Analyte	RL	Lab Result	Unc / Error	Overall Qualifier	Units	Reason Code
SDG: 54743										
8270C	31167	AQ	N							
				ACENAPHTHENE	10	8J		J	ug/L	
				ANTHRACENE	10	3J		J	ug/L	
				BENZO(A)ANTHRACENE	10	2J		J	ug/L	
				BENZO(A)PYRENE	10	4J		J	ug/L	
				BENZO(G,H,I)PERYLENE	10	3J		J	ug/L	
				BIS(2-ETHYLHEXYL) PHTHALATE	10	4J		J	ug/L	
				CHRYSENE	10	2J		J	ug/L	
				METHYLNAPHTHALENE (TOTAL)	10	3J		J	ug/L	
				NAPHTHALENE	10	6J		J	ug/L	
				PYRENE	10	7J		J	ug/L	

N = Normal Sample *TB = Trip Blank*
FD = Field Duplicate *FB = Field Blank*

Enclosure I

EPA Level III ADR Outliers

Quality Control Outlier Reports

SDG 05-4668

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3365- 2 **Analysis Method :** 8260B **Analysis Date :** 11/08/2005

Lab Reporting Batch : 54668 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
CHLOROMETHANE	0.104	-29.7	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31073	05-4668-1
31074	05-4668-2
31075	05-4668-3

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54668 **Analysis Method :** 8081A **Analysis Date :** 11/11/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
alpha-BHC	18.797	15.0	-15.0
4,4'-DDD	21.115	15.0	-15.0
Endosulfan	17.494	15.0	-15.0
Endosulfan sulfate	36.484	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31073	05-04668-1
31074	05-04668-2
31075	05-04668-3

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 054668 **Analysis Method :** 8082 **Analysis Date :** 11/10/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Aroclor-1016*	17.87	15.0	-15.0

*Qualifiy Aroclor-1016, Aroclor-1221, and Aroclor-1232

Associated Samples

Client Sample ID	Lab Sample ID
31073	05-04668-1
31074	05-04668-2
31075	05-04668-3

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4668 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.208 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Antimony	0.36 mg/Kg	31075	05-4668-3

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54668 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31073	05-4668-1	6010B	SO	BERYLLIUM	B	0.19	0.21	mg/kg
		7471A		MERCURY	B	0.19	0.21	mg/kg
31074	05-4668-2	6010B		ANTIMONY	B	2.3	5.8	mg/kg
31075	05-4668-3			ANTIMONY	B	0.36	5.6	mg/kg
				CADMIUM	B	0.033	0.22	mg/kg
		7471A		MERCURY	B	0.21	0.22	mg/kg

Quality Control Outlier Reports

SDG 05-4723

Method Blank Outlier Report

Lab Reporting Batch : 54723
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2146-MB-01

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Batch : 05M2146L

ARSENIC	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.34	0.3	mg/kg		

ARSENIC contamination found in the method blank did not qualify any samples.

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.053	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

ZINC	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.16	0.5	mg/kg	B	

ZINC contamination found in the method blank did not qualify any samples.

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4723 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.993 ug/L	ICB/CCB

Associated Samples

Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Antimony	1.1 mg/Kg	31135	05-04723-1
Antimony	0.91 mg/Kg	31136	05-04723-2
Antimony	0.97 mg/Kg	31137	05-04723-3
Antimony	1.1 mg/Kg	31138	05-04723-4
Antimony	0.60 mg/Kg	31141	05-04723-7
Antimony	0.33 mg/Kg	31142	05-04723-8
Antimony	0.88 mg/Kg	31144	05-04723-10
Antimony	0.74 mg/Kg	31145	05-04723-11

Method Blank Outlier Report

Lab Reporting Batch : 54723
Analysis Method : 8260B
Preparation Type : 5035
Method Blank Lab Sample ID : 05G3422-MB-01

Lab ID: APCL
Analysis Date : 11/11/2005
Preparation Date : 11/11/2005
Preparation Batch : 05G3422

METHYLENE CHLORIDE	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	**0.002**	**0.005**	**mg/kg**	**J**	**Common Contaminant**

METHYLENE CHLORIDE was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31138	05-4723-4	0.98	0.0009	J	mg/kg

Laboratory Duplicate RPD Outlier Report

Method Batch : 05M2146L **Analysis Method :** 6010B **Analysis Date :** 11/14/2005

Lab Reporting Batch : 54723 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Matrix	Analyte Name	Reported RPD	Project Limit RPD
31142DUP	05-4723-8MD	SO	CHROMIUM	22	20.00
			COPPER	36	20.00

Associated Samples: All samples in Method Batch

Client Sample ID	Lab Sample ID
31135	05-4723-1
31136	05-4723-2
31137	05-4723-3
31138	05-4723-4
31139	05-4723-5
31140	05-4723-6
31141	05-4723-7
31142	05-4723-8
31143	05-4723-9
31144	05-4723-10
31145	05-4723-11

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54723 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	SO	ANTIMONY	31142	RES	0.33	B	31143	RES	5.6	U	200.0	50	mg/kg
	SO	ARSENIC		RES	6.2			RES	2.8		75.6	50	mg/kg
	SO	COPPER		RES	16.5			RES	9.0		58.8	50	mg/kg
	SO	LEAD		RES	19.8			RES	6.2		104.6	50	mg/kg
	SO	ZINC		RES	93.5			RES	53.7		54.1	50	mg/kg

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

Project Number and Name: ***6218.086 - Alameda Pt***

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54723 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31135	05-4723-1	6010B	SO	ANTIMONY	B	1.1	5.2	mg/kg
				BERYLLIUM	B	0.022	0.21	mg/kg
31136	05-4723-2			ANTIMONY	B	0.91	5.3	mg/kg
31137	05-4723-3			ANTIMONY	B	0.97	5.4	mg/kg
				THALLIUM	B	0.48	0.54	mg/kg
31138	05-4723-4			ANTIMONY	B	1.1	5.4	mg/kg
				THALLIUM	B	0.52	0.54	mg/kg
		8081A		4,4'-DDE	J	0.0002	0.0032	mg/kg
		8260B		METHYLENE CHLORIDE	J	0.0009	0.0053	mg/kg
31140	05-4723-6	6010B		BERYLLIUM	B	0.19	0.22	mg/kg
		7471A		MERCURY	B	0.16	0.22	mg/kg
31141	05-4723-7	6010B		ANTIMONY	B	0.60	5.3	mg/kg
31142	05-4723-8			ANTIMONY	B	0.33	5.5	mg/kg
		7471A		MERCURY	B	0.15	0.22	mg/kg
31143	05-4723-9			MERCURY	B	0.10	0.22	mg/kg
31144	05-4723-10	6010B		ANTIMONY	B	0.88	5.3	mg/kg
		8082		AROCLOR 1260	J	0.008	0.035	mg/kg
31145	05-4723-11	6010B		ANTIMONY	B	0.74	6.6	mg/kg
				THALLIUM	B	0.49	0.66	mg/kg

Quality Control Outlier Reports

SDG 05-4724

Method Blank Outlier Report

Lab Reporting Batch : 54724
Analysis Method : 6010B
Preparation Type : 3010A
Method Blank Lab Sample ID : 05M2145-MB-01

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Batch : 05M2145L

CADMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.62	2	ug/L	B	

CADMIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31127	05-4724-1	1	0.64	B	ug/L
31146	05-4724-2	1	0.81	B	ug/L
31147	05-4724-3	1	0.72	B	ug/L
31148	05-4724-4	1	0.89	B	ug/L
31149	05-4724-5	1	0.82	B	ug/L

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.94	10	ug/L	B	

COPPER contamination found in the method blank did not qualify any samples.

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.9	10	ug/L	B	

SILVER contamination found in the method blank did not qualify any samples.

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4724 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Arsenic	4.655 ug/L	ICB/CCB
Cadmium	0.611 ug/L	ICB/CCB
Lead	2.496 ug/L	ICB/CCB
Molybdenum	1.727 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Cadmium	0.64	31127	05-04724-1
Lead	7.5	31127	05-04724-1
Molybdenum	6.6	31127	05-04724-1
Arsenic	14.0	31146	05-04724-2
Cadmium	0.81	31146	05-04724-2
Lead	6.2	31146	05-04724-2
Cadmium	0.72	31147	05-04724-3
Lead	5.5	31147	05-04724-3
Molybdenum	4.2	31147	05-04724-3
Cadmium	0.89	31148	05-04724-4
Lead	8.1	31148	05-04724-4
Molybdenum	5.9	31148	05-04724-4
Cadmium	0.82	31149	05-04724-5
Molybdenum	6.6	31149	05-04724-5

QC Outlier Report: Field Duplicates (Non-qualified Outliers)

Lab Report Batch: 54724 **Lab ID:** APCL

			Field Sample				Field Sample Duplicate						
Analysis Method	Matrix	Analyte Name	Client Sample ID	Ana Type	Result	Lab Qualifier	Client Sample Duplicate ID	Ana Type	Result	Lab Qualifier	RPD Dup* (%)	RPD Criteria (%)	Result Units
6010B	AQ	ANTIMONY	31148	RES	8.9	B	31149	RES	6.8	B	26.8	25	ug/L
	AQ	BERYLLIUM		RES	0.078	B		RES	2	U	200.0	25	ug/L
	AQ	LEAD		RES	8.1			RES	13.3		48.6	25	ug/L
	AQ	NICKEL		RES	0.71	B		RES	1.7	B	82.2	25	ug/L
8260B	AQ	BENZENE		RES	137			RES	89		42.5	25	ug/L
	AQ	TOLUENE		RES	40			RES	31		25.4	25	ug/L
8270C	AQ	ACENAPHTHENE		DL1	100			DL1	130		26.1	25	ug/L
	AQ	BENZO(A)PYRENE		RES	3	J		RES	2	J	40.0	25	ug/L
	AQ	BENZO(G,H,I)PERYLENE		RES	1	J		RES	2	J	66.7	25	ug/L
	AQ	CHRYSENE		RES	4	J		RES	3	J	28.6	25	ug/L

**Note: Outlier report also includes analytes detected in one sample but not in the related sample, i.e., analyte was detected in the field sample but not in the field duplicate sample, or vice versa. In this case, RPD value assigned to the field duplicate sample is 200.*

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Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 54724 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005
Lab ID: APCL

	Reported CCV Results	CCV Project Limits	
Analyte Name	**Difference**	**Lower Limit**	**Upper Limit**
Toxaphene	21.338	15.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31127	05-04724-1
31148	05-04724-4
31149	05-04724-5
31146	05-04724-2
31147	05-04724-3

Quality Control Outlier Reports

SDG 05-4742

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4742 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Antimony	5.993 ug/L	ICB/CCB
Arsenic	0.34 mg/Kg	PB
Arsenic	7.702 ug/L	ICB/CCB
Cadmium	0.62 ug/L	PB
Cadmium	0.611 ug/L	ICB/CCB
Copper	0.94 ug/L	PB
Copper	1.191 ug/L	ICB/CCB
Lead	4.133 ug/L	ICB/CCB
Mercury	0.058 ug/L	ICB/CCB
Zinc	0.16 mg/Kg	PB
Zinc	6.058 ug/L	ICB/CCB
Molybdenum	1.838 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Arsenic	5.0 ug/L	31155	05-04742-3
Cadmium	3.1 ug/L	31155	05-04742-3
Copper	3.1 ug/L	31155	05-04742-3
Mercury	0.18 ug/L	31155	05-04742-3
Zinc	9.6 ug/L	31155	05-04742-3
Molybdenum	1.6 ug/L	31155	05-04742-3
Antimony	0.46 mg/Kg	31156	05-04742-4
Antimony	0.56 mg/Kg	31157	05-04742-5
Antimony	0.31 mg/Kg	31158	05-04742-6
Antimony	1.5 mg/Kg	31159	05-04742-7
Antimony	0.92 mg/Kg	31160	05-04742-8
Antimony	0.81 mg/Kg	31161	05-04742-9
Antimony	12.2 ug/L	31169	05-04742-10
Cadmium	2.2 ug/L	31169	05-04742-10
Copper	0.95 ug/L	31169	05-04742-10
Lead	16.6 ug/L	31169	05-04742-10
Molybdenum	4.4 ug/L	31169	05-04742-10
Antimony	6.7 ug/L	31172	05-04742-13
Cadmium	2.6 ug/L	31172	05-04742-13
Lead	20.1 ug/L	31172	05-04742-13
Molybdenum	5.1 ug/L	31172	05-04742-13

Method Blank Outlier Report

Lab Reporting Batch : 54742
Analysis Method : 6010B
Preparation Type : 3010A
Method Blank Lab Sample ID : 05M2145-MB-01

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Batch : 05M2145L

CADMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.62	2	ug/L	B	

CADMIUM was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31155	05-4742-3	1	3.1		ug/L
31169	05-4742-10	1	2.2		ug/L
31172	05-4742-13	1	2.6		ug/L

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.94	10	ug/L	B	

COPPER was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31155	05-4742-3	1	3.1	B	ug/L
31169	05-4742-10	1	0.95	B	ug/L

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.9	10	ug/L	B	

SILVER contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54742
Analysis Method : 6010B
Preparation Type : 3050B
Method Blank Lab Sample ID : 05M2146-MB-01

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Batch : 05M2146L

ARSENIC	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.34	0.3	mg/kg		

ARSENIC contamination found in the method blank did not qualify any samples.

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.053	0.5	mg/kg	B	

SILVER contamination found in the method blank did not qualify any samples.

ZINC	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.16	0.5	mg/kg	B	

ZINC contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch : 54742	**Lab ID:** APCL
Analysis Method : 8260B	**Analysis Date :** 11/11/2005
Preparation Type : 5035	**Preparation Date :** 11/11/2005
Method Blank Lab Sample ID : 05G3422-MB-01	**Preparation Batch :** 05G3422

METHYLENE CHLORIDE	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.002	0.005	mg/kg	J	Common Contaminant

METHYLENE CHLORIDE contamination found in the method blank did not qualify any samples.

Method Blank Outlier Report

Lab Reporting Batch :	54742	**Lab ID:**	APCL
Analysis Method :	8260B	**Analysis Date :**	11/18/2005
Preparation Type :	5030B	**Preparation Date :**	11/18/2005
Method Blank Lab Sample ID :	05G3474-MB-01	**Preparation Batch :**	05G3474

METHYLENE CHLORIDE	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.4	1	ug/L	J	Common Contaminant

METHYLENE CHLORIDE contamination found in the method blank did not qualify any samples.

Surrogate Recovery Outlier Report

Lab Report Batch: 54742

Lab ID: APCL

Client Sample ID	Lab Sample ID	Analysis Method	Dilution	Matrix	Surrogate	Percent Recovery	Criteria (percent) Lower Limit	Upper Limit	Reject Point	Associated Target Analytes
31169	05-4742-10	8081A	1	AQ	2,4,5,6-TETRACHLORO-META-XYLENE	334	30.0	150.0	0.0	All Target

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54742 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31155	05-4742-3	6010B	AQ	BARIUM	B	1.3	10	ug/L
				CHROMIUM	B	2.0	5	ug/L
				COPPER	B	3.1	10	ug/L
				MOLYBDENUM	B	1.6	5	ug/L
				NICKEL	B	0.80	5	ug/L
				ZINC	B	9.6	10	ug/L
		7470A		MERCURY	B	0.18	0.5	ug/L
		8260B		TETRACHLOROETHENE	J	0.4	0.5	ug/L
31156	05-4742-4	6010B	SO	ANTIMONY	B	0.46	5.5	mg/kg
31157	05-4742-5			ANTIMONY	B	0.56	5.6	mg/kg
				BERYLLIUM	B	0.080	0.22	mg/kg
31158	05-4742-6			ANTIMONY	B	0.31	5.4	mg/kg
31159	05-4742-7			ANTIMONY	B	1.5	5.2	mg/kg
31160	05-4742-8			ANTIMONY	B	0.92	5.3	mg/kg
		7471A		MERCURY	B	0.18	0.21	mg/kg
		8260B		XYLENES	J	0.003	0.013	mg/kg
[illegible]61	05-4742-9	6010B		ANTIMONY	B	0.81	5.4	mg/kg
		7471A		MERCURY	B	0.21	0.22	mg/kg
31169	05-4742-10	6010B	AQ	COBALT	B	1.5	5	ug/L
				COPPER	B	0.95	10	ug/L
				MOLYBDENUM	B	4.4	5	ug/L
				NICKEL	B	0.82	5	ug/L
				VANADIUM	B	1.4	10	ug/L
		8270C		ACENAPHTHYLENE	J	4	10	ug/L
				ANTHRACENE	J	2	10	ug/L
				BENZO(A)PYRENE	J	2	10	ug/L
				BIS(2-ETHYLHEXYL) PHTHALATE	J	2	10	ug/L
				PHENANTHRENE	J	5	10	ug/L
31170	05-4742-11	8260B		1,2,4-TRIMETHYLBENZENE	J	0.4	0.5	ug/L
				ETHYLBENZENE	J	0.4	0.5	ug/L
31172	05-4742-13	6010B		ANTIMONY	B	6.7	10	ug/L
				COBALT	B	0.99	5	ug/L
				VANADIUM	B	1.6	10	ug/L
		8270C		NAPHTHALENE	J	3	10	ug/L
				PYRENE	J	2	10	ug/L

QC Outlier Report: Equipment Blank

Lab Reporting Batch : 54742
Method/Preparation Batch : 05M2145L / 05M2145L
Client Sample ID : 31155
Lab Sample ID : 05-4742-3

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Type : 3010A

Analysis Method : 6010B

ARSENIC	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	5.0	5	ug/L		

ARSENIC contamination found in the equipment blank did not qualify any samples.

BARIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	1.3	10	ug/L	B	

BARIUM contamination found in the equipment blank did not qualify any samples.

CADMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	3.1	2	ug/L		

CADMIUM was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	2.2		ug/L
31172	05-4742-13	1	2.6		ug/L

CHROMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	2.0	5	ug/L	B	

CHROMIUM was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	7.8		ug/L
31172	05-4742-13	1	6.1		ug/L

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	3.1	10	ug/L	B	

COPPER was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	0.95	B	ug/L

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	264	50	ug/L		

QC Outlier Report: Equipment Blank

Lab Reporting Batch : 54742
Method/Preparation Batch : 05M2145L / 05M2145L
Client Sample ID : 31155
Lab Sample ID : 05-4742-3

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Type : 3010A

Analysis Method : 6010B

IRON contamination found in the equipment blank did not qualify any samples.

LEAD	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	27.9	5	ug/L		

LEAD was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	16.6		ug/L
31172	05-4742-13	1	20.1		ug/L

MOLYBDENUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	1.6	5	ug/L	B	

MOLYBDENUM was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	4.4	B	ug/L
31172	05-4742-13	1	5.1		ug/L

NICKEL	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.80	5	ug/L	B	

NICKEL was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31169	05-4742-10	1	0.82	B	ug/L

ZINC	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	9.6	10	ug/L	B	

ZINC contamination found in the equipment blank did not qualify any samples.

MERCURY	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.18	0.5	ug/L	B	

MERCURY contamination found in the equipment blank did not qualify any samples.

QC Outlier Report: Equipment Blank

Lab Reporting Batch : 54742
Method/Preparation Batch : 05G3472 / 05G3472
Client Sample ID : 31155
Lab Sample ID : 05-4742-3

Lab ID: APCL
Analysis Date : 11/17/2005
Preparation Date : 11/17/2005
Preparation Type : 5030B

Analysis Method : 8260B

TETRACHLOROETHENE	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.4	0.5	ug/L	J	

TETRACHLOROETHENE contamination found in the equipment blank did not qualify any samples.

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3411-61 **Analysis Method :** 8081A **Analysis Date :** 11/16/2005

Lab Reporting Batch : 54742 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
TOXAPHENE		21.338			15.0	-50.0	-15.0

Associated Samples

Client Sample ID	Lab Sample ID
31155	05-4742-3
31172	05-4742-13

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3422- 2 **Analysis Method :** 8260B **Analysis Date :** 11/11/2005

Lab Reporting Batch : 54742 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
ACETONE		38.2	0.05		25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31156	05-4742-4
31157	05-4742-5
31158	05-4742-6
31159	05-4742-7
31160	05-4742-8
31161	05-4742-9

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418- 2 **Analysis Method :** 8270C **Analysis Date :** 11/14/2005

Lab Reporting Batch : 54742 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.379	25.9	0.05		25.0	-50.0	-25.0

Associated Samples	
Client Sample ID	Lab Sample ID
31155	05-4742-3
31172	05-4742-13

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3418-15 **Analysis Method :** 8270C **Analysis Date :** 11/15/2005

Lab Reporting Batch : 54742 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4-Nitroaniline	0.378	25.6	0.05		25.0	-50.0	-25.0

Associated Samples	
Client Sample ID	Lab Sample ID
31169	05-4742-10

Quality Control Outlier Reports

SDG 05-4743

Continuing Calibration (CCV) Outlier Report (Organics)

Analysis Batch : 05G3471- 2 **Analysis Method :** 8260B **Analysis Date :** 11/18/2005

Lab Reporting Batch : 54743 **Lab ID:** APCL

Analyte Name	Reported CCV Results		CCV Project Limits				
				Positive %D		Negative %D	
	Relative Response Factor	Percent Difference	Relative Response Factor	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1,2,4-TRICHLOROBENZENE	0.783	35.8	0.05		25.0	-50.0	-25.0
DICHLORODIFLUOROMETHANE	0.347	31.4			25.0	-50.0	-25.0

Associated Samples

Client Sample ID	Lab Sample ID
31152	05-4743-1
31162	05-4743-2
31163	05-4743-3
31165	05-4743-5
31166	05-4743-6
31173	05-4743-9

Method Blank Contamination Outlier Report (Inorganics)

Analysis Batch : 05-4743 **Analysis Method :** 6010B

Lab ID: APCL

Analyte Name	Concentration	Blank ID
Arsenic	4.655 ug/L	ICB/CCB
Copper	0.94 ug/L	PB
Copper	1.191 ug/L	ICB/CCB
Mercury	0.046 ug/L	ICB/CCB
Zinc	3.193 ug/L	ICB/CCB
Molybdenum	1.727 ug/L	ICB/CCB

		Associated Samples	
Analyte Name	Sample Concentration	Client Sample ID	Lab Sample ID
Mercury	0.035 ug/L	31163	05-04743-3
Zinc	11.7 ug/L	31163	05-04743-3
Arsenic	11.8 ug/L	31165	05-04743-5
Molybdenum	8.1 ug/L	31167	05-04743-7
Arsenic	4.4 ug/L	31168	05-04743-8
Copper	4.0 ug/L	31168	05-04743-8
Zinc	10.9 ug/L	31168	05-04743-8

Method Blank Outlier Report

Lab Reporting Batch : 54743
Analysis Method : 6010B
Preparation Type : 3010A
Method Blank Lab Sample ID : 05M2145-MB-01

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Batch : 05M2145L

CADMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.62	2	ug/L	B	

CADMIUM contamination found in the method blank did not qualify any samples.

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	0.94	10	ug/L	B	

COPPER was qualified due to method blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Units
31168	05-4743-8	1	4.0	B	ug/L

SILVER	Result	Reporting Limit	Units	Lab Qual	Comments
Method Blank Result:	1.9	10	ug/L	B	

SILVER contamination found in the method blank did not qualify any samples.

QC Outlier Report: Equipment Blank

Lab Reporting Batch : 54743
Method/Preparation Batch : 05M2145L / 05M2145L
Client Sample ID : 31168
Lab Sample ID : 05-4743-8

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Type : 3010A

Analysis Method : 6010B

ARSENIC	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	4.4	5	ug/L	B	

ARSENIC was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31165	05-4743-5	1	11.8		ug/L

BARIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.82	10	ug/L	B	

BARIUM contamination found in the equipment blank did not qualify any samples.

CADMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	11.6	2	ug/L		

CADMIUM was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31163	05-4743-3	1	46.6		ug/L
31165	05-4743-5	1	6.3		ug/L
31173	05-4743-9	1	33.7		ug/L

CHROMIUM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	1.0	5	ug/L	B	

CHROMIUM contamination found in the equipment blank did not qualify any samples.

COPPER	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	4.0	10	ug/L	B	

COPPER was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31163	05-4743-3	1	6.2	B	ug/L

IRON	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	21.3	50	ug/L	B	

QC Outlier Report: Equipment Blank

Lab Reporting Batch : 54743
Method/Preparation Batch : 05M2145L / 05M2145L
Client Sample ID : 31168
Lab Sample ID : 05-4743-8

Lab ID: APCL
Analysis Date : 11/14/2005
Preparation Date : 11/14/2005
Preparation Type : 3010A

Analysis Method : 6010B

IRON contamination found in the equipment blank did not qualify any samples.

LEAD	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	71.0	5	ug/L		

LEAD was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31163	05-4743-3	1	214		ug/L
31165	05-4743-5	1	33.7		ug/L
31173	05-4743-9	1	213		ug/L

NICKEL	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.74	5	ug/L	B	

NICKEL contamination found in the equipment blank did not qualify any samples.

ZINC	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	10.9	10	ug/L		

ZINC was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31163	05-4743-3	1	11.7		ug/L

MERCURY	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.28	0.5	ug/L	B	

MERCURY was qualified due to equipment blank contamination in the following associated samples:

Client Sample ID	Lab Sample ID	Dilution	Result	Lab Qual	Result Unit
31163	05-4743-3	1	0.035	B	ug/L

CHLOROFORM	Result	Reporting Limit	Units	Lab Qual	Comments
Equipment Blank Result:	0.4	0.5	ug/L	J	

CHLOROFORM contamination found in the equipment blank did not qualify any samples.

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54743 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31163	05-4743-3	6010B	AQ	ANTIMONY	B	9.1	10	ug/L
				COBALT	B	2.1	5	ug/L
				COPPER	B	6.2	10	ug/L
				VANADIUM	B	8.2	10	ug/L
		7470A		MERCURY	B	0.035	0.5	ug/L
		8260B		ACETONE	J	16	50	ug/L
				ETHYLBENZENE	J	0.3	0.5	ug/L
31164	05-4743-4	6010B		ANTIMONY	B	7.9	10	ug/L
				BERYLLIUM	B	0.087	2	ug/L
				VANADIUM	B	3.9	10	ug/L
		8270C		ACENAPHTHYLENE	J	2	10	ug/L
				ANTHRACENE	J	4	10	ug/L
				BENZO(A)PYRENE	J	1	10	ug/L
				BIS(2-ETHYLHEXYL) PHTHALATE	J	3	10	ug/L
				FLUORENE	J	5	10	ug/L
				PYRENE	J	7	10	ug/L
65	05-4743-5	6010B		COBALT	B	2.2	5	ug/L
		8260B		ETHYLBENZENE	J	0.4	0.5	ug/L
		8270C		ACENAPHTHYLENE	J	2	10	ug/L
				ANTHRACENE	J	6	10	ug/L
				BENZO(A)ANTHRACENE	J	8	10	ug/L
				BENZO(K)FLUORANTHENE	J	4	10	ug/L
				BIS(2-ETHYLHEXYL) PHTHALATE	J	3	10	ug/L
				CHRYSENE	J	8	10	ug/L
				FLUORENE	J	4	10	ug/L
				INDENO(1,2,3-CD)PYRENE	J	8	10	ug/L
				METHYLNAPHTHALENE (TOTAL)	J	5	10	ug/L
31166	05-4743-6	8260B		ACETONE	J	3	50	ug/L
				TOLUENE	J	0.3	0.5	ug/L
31167	05-4743-7	6010B		BERYLLIUM	B	0.088	2	ug/L
				COBALT	B	1.8	5	ug/L
				IRON	B	49.4	50	ug/L
				NICKEL	B	0.67	5	ug/L
				VANADIUM	B	7.0	10	ug/L
		8260B		ETHYLBENZENE	J	0.4	0.5	ug/L
		8270C		ACENAPHTHENE	J	8	10	ug/L

Reporting Limits Outlier Report (detected results reported below the reporting limit)

Lab Report Batch: 54743 **Lab ID:** APCL

Client Sample ID	Lab Sample ID	Analysis Method	Matrix	Analyte Name	Lab Qualifier	Result	EDD Reporting Limit	Units
31167	05-4743-7	8270C	AQ	ANTHRACENE	J	3	10	ug/L
				BENZO(A)ANTHRACENE	J	2	10	ug/L
				BENZO(A)PYRENE	J	4	10	ug/L
				BENZO(G,H,I)PERYLENE	J	3	10	ug/L
				BIS(2-ETHYLHEXYL) PHTHALATE	J	4	10	ug/L
				CHRYSENE	J	2	10	ug/L
				METHYLNAPHTHALENE (TOTAL)	J	3	10	ug/L
				NAPHTHALENE	J	6	10	ug/L
				PYRENE	J	7	10	ug/L
31168	05-4743-8	6010B		ARSENIC	B	4.4	5	ug/L
				BARIUM	B	0.82	10	ug/L
				CHROMIUM	B	1.0	5	ug/L
				COPPER	B	4.0	10	ug/L
				IRON	B	21.3	50	ug/L
				NICKEL	B	0.74	5	ug/L
		7470A		MERCURY	B	0.28	0.5	ug/
		8260B		CHLOROFORM	J	0.4	0.5	ug
31173	05-4743-9	6010B		ANTIMONY	B	8.5	10	ug/L
		8260B		ACETONE	J	3	50	ug/L

APPENDIX G

ANALYTICAL RESULTS

APPENDIX G

Analytical Results for Soil Samples

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31001 / 3101 / 1-Nov-05 / 0 to 2 FT		31002 / 3101 / 1-Nov-05 / 2 to 4 FT		31003 / 3101 / 1-Nov-05 / 4 to 6 FT		31144 / 3102 / 9-Nov-05 / 0 to 2 FT		31145 / 3102 / 9-Nov-05 / 2 to 4 FT		31004 / 3103 / 2-Nov-05 / 0 to 2 FT		31005 / 3103 / 2-Nov-05 / 2 to 4 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
67-64-1	ACETONE	8260B	mg/kg	0.044	U	0.05	U	0.05	U	0.053	U	0.064	U	0.044	U	0.054	U
71-43-2	BENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-69-4	CFC-11	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-71-8	CFC-12	8260B	mg/kg	0.0044	UJ	0.005	UJ	0.005	UJ	0.0053	U	0.0064	U	0.0044	U	0.0054	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
108-88-3	TOLUENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	UJ	0.0054	UJ
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	UJ
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0044	U	0.005	U	0.005	U	0.0053	U	0.0064	U	0.0044	U	0.0054	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.0089	U	0.0099	U	0.01	U	0.011	U	0.013	U	0.0088	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31006 / 3103 / 2-Nov-05 / 4.5 to 6.5 FT		31007 / 3104 / 2-Nov-05 / 0 to 2 FT		31008 / 3104 / 2-Nov-05 / 2 to 4 FT		31009 / 3104 / 2-Nov-05 / 4 to 6 FT		31010 / 3105 / 2-Nov-05 / 0 to 2 FT		31011 / 3105 / 2-Nov-05 / 2 to 4 FT		31012 / 3105 / 2-Nov-05 / 4 to 6 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
67-64-1	ACETONE	8260B	mg/kg	0.045	U	0.046	U	0.047	U	0.061	U	0.047	U	0.047	U	0.053	U
71-43-2	BENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-69-4	CFC-11	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-71-8	CFC-12	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
108-88-3	TOLUENE	8260B	mg/kg	0.0045	UJ	0.0046	UJ	0.0047	UJ	0.0061	UJ	0.0047	UJ	0.0047	UJ	0.0053	UJ
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0045	UJ	0.0046	UJ	0.0047	UJ	0.0061	UJ	0.0047	UJ	0.0047	UJ	0.0053	UJ
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0045	U	0.0046	U	0.0047	U	0.0061	U	0.0047	U	0.0047	U	0.0053	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.0091	U	0.0007	J	0.0095	U	0.012	U	0.0094	U	0.0094	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31013 / 3105 / 2-Nov-05 / 4 to 6 FT		31014 / 3106 / 3-Nov-05 / 0 to 2 FT		31015 / 3106 / 3-Nov-05 / 2 to 4 FT		31016 / 3106 / 3-Nov-05 / 4 to 6 FT		31017 / 3107 / 3-Nov-05 / 0 to 2 FT		31018 / 3107 / 3-Nov-05 / 2 to 4 FT		31019 / 3107 / 3-Nov-05 / 4 to 6 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
67-64-1	ACETONE	8260B	mg/kg	0.054	U	0.049	UJ	0.051	UJ	0.057	UJ	0.054	UJ	0.048	UJ	0.071	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.001	J
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-69-4	CFC-11	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-71-8	CFC-12	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
108-88-3	TOLUENE	8260B	mg/kg	0.0054	UJ	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	UJ	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0054	U	0.0049	U	0.0051	U	0.0057	U	0.0054	U	0.0048	U	0.0071	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.0097	U	0.01	U	0.011	U	0.011	U	0.0095	U	0.014	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31020 / 3108 / 3-Nov-05 / 0 to 2 FT		31021 / 3108 / 3-Nov-05 / 0 to 2 FT		31022 / 3108 / 3-Nov-05 / 2 to 4 FT		31023 / 3108 / 3-Nov-05 / 4 to 7 FT		31024 / 3109 / 3-Nov-05 / 0 to 2 FT		31025 / 3109 / 3-Nov-05 / 2 to 4 FT		31026 / 3109 / 3-Nov-05 / 4 to 6 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
67-64-1	ACETONE	8260B	mg/kg	0.049	UJ	0.063	UJ	0.052	UJ	0.046	UJ	0.051	UJ	0.044	UJ	0.052	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-69-4	CFC-11	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-71-8	CFC-12	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
108-88-3	TOLUENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0049	U	0.0063	U	0.0052	U	0.0046	U	0.0051	U	0.0044	U	0.0052	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.0098	U	0.013	U	0.01	U	0.0092	U	0.01	U	0.0088	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31027 / 3110 / 3-Nov-05 / 0 to 2 FT		31028 / 3110 / 3-Nov-05 / 3 to 4 FT		31029 / 3110 / 3-Nov-05 / 4.5 to 6.5 FT		31030 / 3111 / 3-Nov-05 / 0 to 2 FT		31031 / 3111 / 3-Nov-05 / 2 to 4 FT		31032 / 3111 / 3-Nov-05 / 4 to 6 FT		31033 / 3112 / 3-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
67-64-1	ACETONE	8260B	mg/kg	0.054	UJ	0.049	U	0.055	U	0.072	U	0.055	U	0.05	U	0.045	U
71-43-2	BENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-69-4	CFC-11	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-71-8	CFC-12	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
108-88-3	TOLUENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0054	U	0.0049	U	0.0055	U	0.0072	U	0.0055	U	0.005	U	0.0045	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.0099	U	0.011	U	0.014	U	0.011	U	0.01	U	0.0091	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31034 / 3112 / 3-Nov-05 / 2 to 4 FT		31035 / 3112 / 3-Nov-05 / 4.5 to 6.5 FT		31036 / 3112 / 3-Nov-05 / 4.5 to 6.5 FT		31037 / 3113 / 3-Nov-05 / 0 to 2 FT		31038 / 3113 / 3-Nov-05 / 2 to 4 FT		31039 / 3113 / 3-Nov-05 / 4 to 6 FT		31040 / 3114 / 3-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
67-64-1	ACETONE	8260B	mg/kg	0.045	U	0.05	U	0.045	U	0.05	U	0.046	U	0.046	U	0.051	U
71-43-2	BENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-69-4	CFC-11	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-71-8	CFC-12	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
108-88-3	TOLUENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0045	U	0.005	U	0.0045	U	0.005	U	0.0046	U	0.0046	U	0.0051	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.009	U	0.01	U	0.009	U	0.01	U	0.0091	U	0.0093	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31041 / 3114 / 3-Nov-05 / 2 to 4 FT		31042 / 3114 / 3-Nov-05 / 4 to 7 FT		31043 / 3115 / 3-Nov-05 / 0 to 2 FT		31044 / 3115 / 3-Nov-05 / 2 to 4 FT		31045 / 3115 / 3-Nov-05 / 4 to 6 FT		31046 / 3115 / 3-Nov-05 / 4 to 6 FT		31047 / 3116 / 4-Nov-05 / 0 to 2 FT	
(Group Code)	**(Group Description)**																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
67-64-1	ACETONE	8260B	mg/kg	0.047	U	0.064	U	0.051	U	0.051	U	0.058	U	0.046	U	0.05	U
71-43-2	BENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-69-4	CFC-11	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-71-8	CFC-12	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
108-88-3	TOLUENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0047	U	0.0064	U	0.0051	U	0.0051	U	0.0058	U	0.0046	U	0.005	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.0095	U	0.013	U	0.01	U	0.01	U	0.012	U	0.0093	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31048 / 3116 / 4-Nov-05 / 2 to 4 FT		31049 / 3116 / 4-Nov-05 / 4 to 6 FT		31052 / 3117 / 4-Nov-05 / 0 to 2 FT		31053 / 3117 / 4-Nov-05 / 2 to 4 FT		31054 / 3117 / 4-Nov-05 / 4 to 6 FT		31055 / 3118 / 4-Nov-05 / 0 to 2 FT		31056 / 3118 / 4-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
67-64-1	ACETONE	8260B	mg/kg	0.056	U	0.047	U	0.05	U	0.055	U	0.054	U	0.056	U	0.051	U
71-43-2	BENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-69-4	CFC-11	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-71-8	CFC-12	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
108-88-3	TOLUENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0056	U	0.0047	U	0.005	U	0.0055	U	0.0054	U	0.0056	U	0.0051	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.0094	U	0.0099	U	0.011	U	0.011	U	0.011	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31057 / 3118 / 4-Nov-05 / 2 to 4 FT		31058 / 3119 / 4-Nov-05 / 0 to 2 FT		31059 / 3119 / 4-Nov-05 / 2 to 4 FT		31060 / 3120 / 4-Nov-05 / 0 to 2 FT		31061 / 3120 / 4-Nov-05 / 2 to 4 FT		31062 / 3120 / 4-Nov-05 / 4 to 6_5 FT		31063 / 3121 / 4-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
67-64-1	ACETONE	8260B	mg/kg	0.051	U	0.052	U	0.049	U	0.049	U	0.049	U	0.069	U	0.057	U
71-43-2	BENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0 0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-69-4	CFC-11	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-71-8	CFC-12	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
108-88-3	TOLUENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0051	U	0.0052	U	0.0049	U	0.0049	U	0.0049	U	0.0069	U	0.0057	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.01	U	0.0098	U	0.0097	U	0.0099	U	0.014	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31064 / 3121 / 4-Nov-05 / 2 to 4 FT		31065 / 3121 / 4-Nov-05 / 4 to 6 FT		31066 / 3122 / 4-Nov-05 / 0 to 2 FT		31067 / 3122 / 4-Nov-05 / 2 to 4 FT		31068 / 3122 / 4-Nov-05 / 2 to 4 FT		31069 / 3123 / 4-Nov-05 / 0 to 2 FT		31070 / 3123 / 4-Nov-05 / 2 to 4 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0055	UJ	0.0047	UJ	0.0055	UJ	0.0083	UJ	0.0086	UJ	0.0053	UJ	0.0053	UJ
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0055	UJ	0.0047	UJ	0.0055	UJ	0.0083	UJ	0.0086	UJ	0.0053	UJ	0.0053	UJ
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
67-64-1	ACETONE	8260B	mg/kg	0.055	U	0.047	U	0.055	U	0.083	U	0.086	U	0.053	U	0.053	U
71-43-2	BENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-69-4	CFC-11	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-71-8	CFC-12	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0055	UJ	0.0047	UJ	0.0055	UJ	0.0083	UJ	0.0086	UJ	0.0053	UJ	0.0053	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
108-88-3	TOLUENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0055	U	0.0047	U	0.0055	U	0.0083	U	0.0086	U	0.0053	U	0.0053	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.0094	U	0.011	U	0.017	U	0.017	U	0.011	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31071 / 3124 / 4-Nov-05 / 0 to 2 FT		31072 / 3124 / 4-Nov-05 / 2 to 4 FT		31073 / 3125 / 5-Nov-05 / 0 to 2 FT		31074 / 3125 / 5-Nov-05 / 2 to 4 FT		31075 / 3125 / 5-Nov-05 / 4 to 6 FT		31078 / 3126 / 6-Nov-05 / 0 to 2 FT		31079 / 3126 / 6-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0053	UJ	0.0044	UJ	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0053	UJ	0.0044	UJ	0.0045	U	0.0051	U	0.0053	U	0.0053	UJ	0.0051	UJ
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
67-64-1	ACETONE	8260B	mg/kg	0.053	U	0.044	U	0.045	U	0.051	U	0.053	U	0.053	UJ	0.051	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-69-4	CFC-11	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-71-8	CFC-12	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0053	UJ	0.0044	UJ	0.0045	UJ	0.0051	UJ	0.0053	UJ	0.0053	UJ	0.0051	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
108-88-3	TOLUENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0053	U	0.0044	U	0.0045	U	0.0051	U	0.0053	U	0.0053	U	0.0051	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.0088	U	0.0089	U	0.01	U	0.011	U	0.011	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31080 / 3126 / 6-Nov-05 / 2 to 4 FT		31081 / 3127 / 6-Nov-05 / 0 to 2 FT		31082 / 3127 / 6-Nov-05 / 2 to 4 FT		31083 / 3128 / 6-Nov-05 / 0 to 2 FT		31084 / 3129 / 6-Nov-05 / 0 to 2 FT		31085 / 3130 / 6-Nov-05 / 0 to 2 FT		31086 / 3130 / 6-Nov-05 / 2 to 4 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0051	UJ	0.0043	UJ	0.0045	UJ	0.0051	UJ	0.0055	UJ	0.0056	UJ	0.0067	UJ
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
67-64-1	ACETONE	8260B	mg/kg	0.051	UJ	0.043	UJ	0.045	U	0.051	UJ	0.055	UJ	0.056	UJ	0.067	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-69-4	CFC-11	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-71-8	CFC-12	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0051	UJ	0.0043	UJ	0.0045	UJ	0.0051	UJ	0.0055	UJ	0.0056	UJ	0.0067	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
108-88-3	TOLUENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	UJ	0.0051	U	0.0055	U	0.0056	U	0.0067	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0051	U	0.0043	U	0.0045	U	0.0051	U	0.0055	U	0.0056	U	0.0067	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.0087	U	0.0091	U	0.01	U	0.011	U	0.011	U	0.013	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31156 / 3131 / 10-Nov-05 / 0 to 2 FT		31157 / 3131 / 10-Nov-05 / 2 to 4 FT		31087 / 3132 / 6-Nov-05 / 0 to 2 FT		31088 / 3132 / 6-Nov-05 / 2 to 4 FT		31089 / 3132 / 6-Nov-05 / 2 to 4 FT		31090 / 3132 / 6-Nov-05 / 5 to 7 FT		31091 / 3133 / 6-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	UJ	0.0058	UJ	0.0055	UJ	0.0049	UJ	0.0056	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
67-64-1	ACETONE	8260B	mg/kg	0.051	UJ	0.046	UJ	0.058	UJ	0.058	UJ	0.055	UJ	0.049	UJ	0.056	U
71-43-2	BENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-69-4	CFC-11	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-71-8	CFC-12	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	UJ	0.0058	UJ	0.0055	UJ	0.0049	UJ	0.0056	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
108-88-3	TOLUENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0051	U	0.0046	U	0.0058	U	0.0058	U	0.0055	U	0.0049	U	0.0056	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.0093	U	0.012	U	0.012	U	0.011	U	0.0098	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31092 / 3133 / 6-Nov-05 / 2 to 4 FT		31093 / 3133 / 6-Nov-05 / 5 to 7 FT		31094 / 3134 / 6-Nov-05 / 0 to 2 FT		31095 / 3134 / 6-Nov-05 / 2 to 4 FT		31096 / 3134 / 6-Nov-05 / 4.5 to 6.5 FT		31158 / 3135 / 10-Nov-05 / 0 to 2 FT		31159 / 3135 / 10-Nov-05 / 2 to 4 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
67-64-1	ACETONE	8260B	mg/kg	0.054	U	0.05	U	0.055	U	0.06	U	0.055	U	0.041	UJ	0.05	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-69-4	CFC-11	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-71-8	CFC-12	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0054	U	0.005	U	0.002	U	0.006	U	0.0055	U	0.0041	U	0.005	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
108-88-3	TOLUENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0054	U	0.005	U	0.0055	U	0.006	U	0.0055	U	0.0041	U	0.005	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.01	U	0.011	U	0.012	U	0.011	U	0.0082	U	0.0099	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31097 / 3136 / 7-Nov-05 / 0 to 2 FT		31098 / 3136 / 7-Nov-05 / 2 to 4 FT		31099 / 3136 / 7-Nov-05 / 4 to 6 FT		31100 / 3136 / 7-Nov-05 / 4 to 6 FT		31160 / 3137 / 10-Nov-05 / 0 to 2 FT		31161 / 3137 / 10-Nov-05 / 2 to 4 FT		31101 / 3138 / 7-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
67-64-1	ACETONE	8260B	mg/kg	0.051	U	0.049	U	0.054	U	0.055	U	0.063	UJ	0.043	UJ	0.065	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-69-4	CFC-11	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-71-8	CFC-12	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
67-66-3	CHLOROFORM	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
108-88-3	TOLUENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0051	U	0.0049	U	0.0054	U	0.0055	U	0.0063	U	0.0043	U	0.0065	UJ
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.0099	U	0.011	U	0.011	U	0.003	J	0.0087	U	0.013	UJ

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31102 / 3138 / 7-Nov-05 / 2 to 4 FT		31103 / 3138 / 7-Nov-05 / 4 to 6 FT		31104 / 3139 / 7-Nov-05 / 0 to 2 FT		31105 / 3139 / 7-Nov-05 / 2 to 4 FT		31106 / 3140 / 7-Nov-05 / 0 to 2 FT		31107 / 3140 / 7-Nov-05 / 2 to 4 FT		31108 / 3141 / 7-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
67-64-1	ACETONE	8260B	mg/kg	0.053	U	0.051	U	0.052	UJ	0.055	UJ	0.05	UJ	0.044	UJ	0.053	UJ
71-43-2	BENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-69-4	CFC-11	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-71-8	CFC-12	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.001	U	0.0051	U	0.001	J	0.0009	J	0.0008	J	0.0044	U	0.001	J
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
108-88-3	TOLUENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0053	U	0.0051	U	0.0052	U	0.0055	U	0.005	U	0.0044	U	0.0053	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.01	U	0.01	U	0.011	U	0.01	U	0.0089	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID	31109		31110		31111		31112		31113		31114		31115	
			Location ID	3141		3141		3141		3142		3142		3143		3143	
			Sample Date	7-Nov-05		7-Nov-05		7-Nov-05		7-Nov-05		7-Nov-05		8-Nov-05		8-Nov-05	
			Unit \\ Depth	2 to 4 FT		4 to 6 FT		4 to 6 FT		0 to 2 FT		2 to 4 FT		0 to 2 FT		2 to 4 FT	
(Group Code)	**(Group Description)**																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0051	UJ	0.0048	UJ	0.0052	UJ	0.0048	UJ	0.0049	U	0.0051	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
67-64-1	ACETONE	8260B	mg/kg	0.056	UJ	0.051	UJ	0.048	UJ	0.052	UJ	0.048	UJ	0.049	U	0.051	U
71-43-2	BENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-69-4	CFC-11	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-71-8	CFC-12	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0056	U	0.0051	UJ	0.0048	UJ	0.0052	UJ	0.0048	UJ	0.0049	UJ	0.0051	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.002	U	0.002	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
108-88-3	TOLUENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0056	U	0.0051	U	0.0048	U	0.0052	U	0.0048	U	0.0049	U	0.0051	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.011	U	0.01	U	0.0096	U	0.01	U	0.0097	U	0.0098	U	0.01	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31116 / 3144 / 8-Nov-05 / 0 to 2 FT		31117 / 3144 / 8-Nov-05 / 2 to 4 FT		31118 / 3144 / 8-Nov-05 / 4 to 6 FT		31119 / 3145 / 8-Nov-05 / 2 to 4 FT		31120 / 3145 / 8-Nov-05 / 0 to 2 FT		31121 / 3145 / 8-Nov-05 / 4 to 6 FT		31122 / 3145 / 8-Nov-05 / 4 to 6 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
67-64-1	ACETONE	8260B	mg/kg	0.05	U	0.053	U	0.063	U	0.056	U	0.058	U	0.068	U	0.065	U
71-43-2	BENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.003	J	0.003	J
108-86-1	BROMOBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-69-4	CFC-11	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-71-8	CFC-12	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.005	UJ	0.0053	UJ	0.0063	UJ	0.0056	UJ	0.0058	UJ	0.0068	UJ	0.0065	UJ
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.002	U	0.002	U	0.002	U	0.002	U	0.003	U	0.002	U	0.002	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
108-88-3	TOLUENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.005	U	0.0053	U	0.0063	U	0.0056	U	0.0058	U	0.0068	U	0.0065	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.011	U	0.013	U	0.011	U	0.012	U	0.014	U	0.013	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31132 / 3146 / 8-Nov-05 / 0 to 2 FT		31133 / 3146 / 8-Nov-05 / 2 to 4 FT		31134 / 3146 / 8-Nov-05 / 4 to 6 FT		31135 / 3147 / 9-Nov-05 / 0 to 2 FT		31136 / 3147 / 9-Nov-05 / 2 to 4 FT		31137 / 3148 / 9-Nov-05 / 0 to 2 FT		31138 / 3148 / 9-Nov-05 / 2 to 4 FT	
(Group Code)	(Group Description)																
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
67-64-1	ACETONE	8260B	mg/kg	0.048	U	0.055	U	0.075	U	0.056	U	0.05	U	0.043	U	0.053	U
71-43-2	BENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-69-4	CFC-11	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-71-8	CFC-12	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0048	UJ	0.0055	UJ	0.0075	UJ	0.0056	U	0.005	U	0.0043	U	0.0053	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.001	U	0.002	U	0.002	U	0.0056	U	0.005	U	0.0043	U	0.0009	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
108-88-3	TOLUENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0048	U	0.0055	U	0.0075	U	0.0056	U	0.005	U	0.0043	U	0.0053	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.0095	U	0.011		0.015	U	0.011	U	0.01	U	0.0087	U	0.011	U

Appendix G
Soil Sample Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31139 3149 9-Nov-05 0 to 2 FT		31140 3149 9-Nov-05 2 to 4 FT		31141 3150 9-Nov-05 0 to 2 FT		31142 3150 9-Nov-05 2 to 4 FT		31143 3150 9-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**												
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-34-3	1,1-DICHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
106-93-4	1,2-DIBROMOETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
95-50-1	1,2-DICHLOROBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
107-06-2	1,2-DICHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
78-87-5	1,2-DICHLOROPROPANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
142-28-9	1,3-DICHLOROPROPANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
106-46-7	1,4-DICHLOROBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
135-98-8	2-PHENYLBUTANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
67-64-1	ACETONE	8260B	mg/kg	0.052	U	0.048	U	0.046	U	0.05	U	0.051	U
71-43-2	BENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
108-86-1	BROMOBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-69-4	CFC-11	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-71-8	CFC-12	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
108-90-7	CHLOROBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
124-48-1	CHLORODIBROMOMETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-00-3	CHLOROETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
67-66-3	CHLOROFORM	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
74-87-3	CHLOROMETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-09-2	DICHLOROMETHANE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
100-41-4	ETHYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
541-73-1	M-DICHLOROBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
104-51-8	N-BUTYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
103-65-1	PROPYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
100-42-5	STYRENE (MONOMER)	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
98-06-6	TERT-BUTYLBENZENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
127-18-4	TETRACHLOROETHENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
108-88-3	TOLUENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
79-01-6	TRICHLOROETHYLENE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
75-01-4	VINYL CHLORIDE	8260B	mg/kg	0.0052	U	0.0048	U	0.0046	U	0.005	U	0.0051	U
1330-20-7	XYLENES (TOTAL)	8260B	mg/kg	0.01	U	0.0095	U	0.0092	U	0.01	U	0.01	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31001 3101 1-Nov-05 0 to 2 FT		31002 3101 1-Nov-05 2 to 4 FT		31003 3101 1-Nov-05 4 to 6 FT		31144 3102 9-Nov-05 0 to 2 FT		31145 3102 9-Nov-05 2 to 4 FT		31004 3103 2-Nov-05 0 to 2 FT		31005 3103 2-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
88-74-4	2-NITROANILINE	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	110	U	12	U	110	U	110	U	13	U	41	U	10	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
99-09-2	3-NITROANILINE	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
62-53-3	ANILINE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
65-85-0	BENZOIC ACID	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	110	U	12	U	110	U	110	U	13	U	41	U	10	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
86-74-8	CARBAZOLE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
98-95-3	NITROBENZENE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
108-95-2	PHENOL	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U
100-01-6	P-NITROANILINE	8270C	mg/kg	270	U	31	U	290	U	260	U	33	U	100	U	26	U
110-86-1	PYRIDINE	8270C	mg/kg	55	U	6.1	U	57	U	53	U	6.6	U	21	U	5.2	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31006 3103 2-Nov-05 4.5 to 6.5 FT		31007 3104 2-Nov-05 0 to 2 FT		31008 3104 2-Nov-05 2 to 4 FT		31009 3104 2-Nov-05 4 to 6 FT		31010 3105 2-Nov-05 0 to 2 FT		31011 3105 2-Nov-05 2 to 4 FT		31012 3105 2-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
88-74-4	2-NITROANILINE	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1.1	U	110	U	11	U	52	U	1000	U	110	U	1	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
99-09-2	3-NITROANILINE	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
62-53-3	ANILINE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
65-85-0	BENZOIC ACID	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1.1	U	110	U	11	U	52	U	1000	U	110	U	1	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
108-95-2	PHENOL	8270C	mg/kg	0.2	J	53	U	5.5	U	26	U	520	U	53	U	0.52	U
100-01-6	P-NITROANILINE	8270C	mg/kg	2.7	U	260	U	28	U	130	U	2600	U	270	U	2.6	U
110-86-1	PYRIDINE	8270C	mg/kg	0.54	U	53	U	5.5	U	26	U	520	U	53	U	0.52	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31013 / 3105 / 2-Nov-05 / 4 to 6 FT		31014 / 3106 / 3-Nov-05 / 0 to 2 FT		31015 / 3106 / 3-Nov-05 / 2 to 4 FT		31016 / 3106 / 3-Nov-05 / 4 to 6 FT		31017 / 3107 / 3-Nov-05 / 0 to 2 FT		31018 / 3107 / 3-Nov-05 / 2 to 4 FT		31019 / 3107 / 3-Nov-05 / 4 to 6 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
88-74-4	2-NITROANILINE	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1	U	11	U	11	U	21	U	25	U	23	U	14	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
99-09-2	3-NITROANILINE	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
62-53-3	ANILINE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
65-85-0	BENZOIC ACID	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1	U	11	U	11	U	21	U	25	U	23	U	14	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
108-95-2	PHENOL	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U
100-01-6	P-NITROANILINE	8270C	mg/kg	2.6	U	27	U	28	U	54	U	61	U	57	U	35	U
110-86-1	PYRIDINE	8270C	mg/kg	0.52	U	5.4	U	5.7	U	11	U	12	U	11	U	7	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31020 3108 3-Nov-05 0 to 2 FT		31021 3108 3-Nov-05 0 to 2 FT		31022 3108 3-Nov-05 2 to 4 FT		31023 3108 3-Nov-05 4 to 7 FT		31024 3109 3-Nov-05 0 to 2 FT		31025 3109 3-Nov-05 2 to 4 FT		31026 3109 3-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
88-74-4	2-NITROANILINE	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	21	U	23	U	21	U	42	U	170	U	11	U	12	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
99-09-2	3-NITROANILINE	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
62-53-3	ANILINE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
65-85-0	BENZOIC ACID	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	21	U	23	U	21	U	42	U	170	U	11	U	12	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
86-74-8	CARBAZOLE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
98-95-3	NITROBENZENE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	53	U	58	U	53	U	100	U	420	U	27	U	29	U
108-95-2	PHENOL	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U
100-01-6	P-NITROANILINE	8270C	mg/kg	53	U	58	U	53	U	100	UJ	420	U	27	U	29	U
110-86-1	PYRIDINE	8270C	mg/kg	11	U	12	U	11	U	21	U	84	U	5.4	U	5.8	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31027		31028		31029		31030		31031		31032		31033	
			Location ID	3110		3110		3110		3111		3111		3111		3112	
			Sample Date	3-Nov-05		3-Nov-05		3-Nov-05		3-Nov-05		3-Nov-05		3-Nov-05		3-Nov-05	
			Unit \\ Depth	0 to 2 FT		3 to 4 FT		4.5 to 6.5 FT		0 to 2 FT		2 to 4 FT		4 to 6 FT		0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
88-74-4	2-NITROANILINE	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	43	U	110	U	110	U	1	U	1.1	U	11	U	1.1	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
99-09-2	3-NITROANILINE	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
62-53-3	ANILINE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
65-85-0	BENZOIC ACID	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	43	U	110	U	110	U	1	U	1.1	U	11	U	1.1	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
86-74-8	CARBAZOLE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
98-95-3	NITROBENZENE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
108-95-2	PHENOL	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U
100-01-6	P-NITROANILINE	8270C	mg/kg	110	U	270	U	280	U	2.6	U	2.8	U	26	U	2.7	U
110-86-1	PYRIDINE	8270C	mg/kg	22	U	53	U	56	U	0.52	U	0.55	U	5.3	U	0.55	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31034 3112 3-Nov-05 2 to 4 FT		31035 3112 3-Nov-05 4.5 to 6.5 FT		31036 3112 3-Nov-05 4.5 to 6.5 FT		31037 3113 3-Nov-05 0 to 2 FT		31038 3113 3-Nov-05 2 to 4 FT		31039 3113 3-Nov-05 4 to 6 FT		31040 3114 3-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
88-74-4	2-NITROANILINE	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	11	U	110	U	110	U	110	U	1.1	U	1.1	U	120	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
99-09-2	3-NITROANILINE	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
62-53-3	ANILINE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
65-85-0	BENZOIC ACID	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	11	U	110	U	110	U	110	U	1.1	U	1.1	U	120	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
86-74-8	CARBAZOLE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
98-95-3	NITROBENZENE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
108-95-2	PHENOL	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U
100-01-6	P-NITROANILINE	8270C	mg/kg	28	U	270	U	280	U	270	U	2.7	U	2.7	U	290	U
110-86-1	PYRIDINE	8270C	mg/kg	5.6	U	55	U	55	U	54	U	0.54	U	0.54	U	58	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31041 3114 3-Nov-05 2 to 4 FT		31042 3114 3-Nov-05 4 to 7 FT		31043 3115 3-Nov-05 0 to 2 FT		31044 3115 3-Nov-05 2 to 4 FT		31045 3115 3-Nov-05 4 to 6 FT		31046 3115 3-Nov-05 4 to 6 FT		31047 3116 4-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
88-74-4	2-NITROANILINE	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1.1	U	1.3	U	1100	U	11	U	1.3	U	110	U	57	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
99-09-2	3-NITROANILINE	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
62-53-3	ANILINE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
65-85-0	BENZOIC ACID	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1.1	U	1.3	U	1100	U	11	U	1.3	U	110	U	57	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
108-95-2	PHENOL	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U
100-01-6	P-NITROANILINE	8270C	mg/kg	2.8	U	3.3	U	2700	U	28	U	3.3	U	290	U	140	U
110-86-1	PYRIDINE	8270C	mg/kg	0.57	U	0.65	U	540	U	5.6	U	0.67	U	57	U	29	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31048 / 3116 / 4-Nov-05 / 2 to 4 FT		31049 / 3116 / 4-Nov-05 / 4 to 6 FT		31052 / 3117 / 4-Nov-05 / 0 to 2 FT		31053 / 3117 / 4-Nov-05 / 2 to 4 FT		31054 / 3117 / 4-Nov-05 / 4 to 6 FT		31055 / 3118 / 4-Nov-05 / 0 to 2 FT		31056 / 3118 / 4-Nov-05 / 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
88-74-4	2-NITROANILINE	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	61	U	1.1	U	57	U	11	U	59	U	55	U	55	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
99-09-2	3-NITROANILINE	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
62-53-3	ANILINE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
65-85-0	BENZOIC ACID	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	61	U	1.1	U	57	U	11	U	59	U	55	U	55	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
86-74-8	CARBAZOLE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
98-95-3	NITROBENZENE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
108-95-2	PHENOL	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U
100-01-6	P-NITROANILINE	8270C	mg/kg	150	U	2.8	U	140	U	28	U	150	U	140	U	140	U
110-86-1	PYRIDINE	8270C	mg/kg	30	U	0.56	U	28	U	5.5	U	30	U	28	U	27	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31057 / 3118 / 4-Nov-05 / 2 to 4 FT		31058 / 3119 / 4-Nov-05 / 0 to 2 FT		31059 / 3119 / 4-Nov-05 / 2 to 4 FT		31060 / 3120 / 4-Nov-05 / 0 to 2 FT		31061 / 3120 / 4-Nov-05 / 2 to 4 FT		31062 / 3120 / 4-Nov-05 / 4 to 6_5 FT		31063 / 3121 / 4-Nov-05 / 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	UJ	13	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
88-74-4	2-NITROANILINE	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	54	U	53	U	1.1	U	1.1	U	1.1	U	15	U	25	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
99-09-2	3-NITROANILINE	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
62-53-3	ANILINE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
65-85-0	BENZOIC ACID	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	54	U	53	U	1.1	U	1.1	U	1.1	U	15	U	25	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
86-74-8	CARBAZOLE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
98-95-3	NITROBENZENE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	UJ	63	U
108-95-2	PHENOL	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U
100-01-6	P-NITROANILINE	8270C	mg/kg	140	U	130	U	2.8	U	2.7	U	2.7	U	38	U	63	U
110-86-1	PYRIDINE	8270C	mg/kg	27	U	26	U	0.56	U	0.55	U	0.54	U	7.6	U	13	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31064 3121 4-Nov-05 2 to 4 FT		31065 3121 4-Nov-05 4 to 6 FT		31066 3122 4-Nov-05 0 to 2 FT		31067 3122 4-Nov-05 2 to 4 FT		31068 3122 4-Nov-05 2 to 4 FT		31069 3123 4-Nov-05 0 to 2 FT		31070 3123 4-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
88-74-4	2-NITROANILINE	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1.2	U	1.2	U	1.1	U	1.7	U	1.5	U	110	U	12	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
99-09-2	3-NITROANILINE	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
62-53-3	ANILINE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
65-85-0	BENZOIC ACID	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1.2	U	1.2	U	1.1	U	1.7	U	1.5	U	110	U	12	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	UJ	0.76	UJ	55	U	5.8	UJ
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	3	U	2.9	U	2.7	U	4.3	U	3.8	U	280	U	29	U
108-95-2	PHENOL	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U
100-01-6	P-NITROANILINE	8270C	mg/kg	3	UJ	2.9	UJ	2.7	UJ	4.3	U	3.8	U	280	UJ	29	U
110-86-1	PYRIDINE	8270C	mg/kg	0.6	U	0.58	U	0.54	U	0.85	U	0.76	U	55	U	5.8	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31071 / 3124 / 4-Nov-05 / 0 to 2 FT		31072 / 3124 / 4-Nov-05 / 2 to 4 FT		31073 / 3125 / 5-Nov-05 / 0 to 2 FT		31074 / 3125 / 5-Nov-05 / 2 to 4 FT		31075 / 3125 / 5-Nov-05 / 4 to 6 FT		31078 / 3126 / 6-Nov-05 / 0 to 2 FT		31079 / 3126 / 6-Nov-05 / 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
88-74-4	2-NITROANILINE	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	110	U	1.1	U	53	U	1.2	U	11	U	11	U	110	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
99-09-2	3-NITROANILINE	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
62-53-3	ANILINE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
65-85-0	BENZOIC ACID	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	110	U	1.1	U	53	U	1.2	U	11	U	11	U	110	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
86-74-8	CARBAZOLE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	55	U	0.55	UJ	27	U	0.58	U	5.6	U	5.6	U	54	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
98-95-3	NITROBENZENE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	280	U	2.8	U	130	U	2.9	U	28	U	28	U	270	U
108-95-2	PHENOL	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U
100-01-6	P-NITROANILINE	8270C	mg/kg	280	UJ	2.8	U	130	U	2.9	U	28	U	28	U	270	U
110-86-1	PYRIDINE	8270C	mg/kg	55	U	0.55	U	27	U	0.58	U	5.6	U	5.6	U	54	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31080 3126 6-Nov-05 2 to 4 FT		31081 3127 6-Nov-05 0 to 2 FT		31082 3127 6-Nov-05 2 to 4 FT		31083 3128 6-Nov-05 0 to 2 FT		31084 3129 6-Nov-05 0 to 2 FT		31085 3130 6-Nov-05 0 to 2 FT		31086 3130 6-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	UJ	56	U	27	U	54	U	0.54	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
88-74-4	2-NITROANILINE	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1.1	U	110	U	11	U	110	U	55	U	110	U	1.1	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
99-09-2	3-NITROANILINE	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
62-53-3	ANILINE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
65-85-0	BENZOIC ACID	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1.1	U	110	U	11	U	110	U	55	U	110	U	1.1	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	2.8	U	280	U	28	UJ	280	U	140	U	270	U	2.7	U
108-95-2	PHENOL	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U
100-01-6	P-NITROANILINE	8270C	mg/kg	2.8	U	280	U	28	U	280	U	140	U	270	U	2.7	U
110-86-1	PYRIDINE	8270C	mg/kg	0.55	U	56	U	5.5	U	56	U	27	U	54	U	0.54	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31156 / 3131 / 10-Nov-05 / 0 to 2 FT		31157 / 3131 / 10-Nov-05 / 2 to 4 FT		31087 / 3132 / 6-Nov-05 / 0 to 2 FT		31088 / 3132 / 6-Nov-05 / 2 to 4 FT		31089 / 3132 / 6-Nov-05 / 2 to 4 FT		31090 / 3132 / 6-Nov-05 / 5 to 7 FT		31091 / 3133 / 6-Nov-05 / 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
88-74-4	2-NITROANILINE	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	11	U	1.1	U	110	U	11	U	120	U	1.1	U	57	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
99-09-2	3-NITROANILINE	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
62-53-3	ANILINE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
65-85-0	BENZOIC ACID	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	11	U	1.1	U	110	U	11	U	120	U	1.1	U	57	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
86-74-8	CARBAZOLE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
98-95-3	NITROBENZENE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
108-95-2	PHENOL	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U
100-01-6	P-NITROANILINE	8270C	mg/kg	27	U	2.8	U	280	U	28	U	300	U	2.8	U	140	U
110-86-1	PYRIDINE	8270C	mg/kg	5.5	U	0.56	U	57	U	5.6	U	60	U	0.55	U	29	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31092 3133 6-Nov-05 2 to 4 FT		31093 3133 6-Nov-05 5 to 7 FT		31094 3134 6-Nov-05 0 to 2 FT		31095 3134 6-Nov-05 2 to 4 FT		31096 3134 6-Nov-05 4.5 to 6.5 FT		31158 3135 10-Nov-05 0 to 2 FT		31159 3135 10-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
88-74-4	2-NITROANILINE	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	11	U	11	U	1.1	U	25	U	1.1	U	11	U	100	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
99-09-2	3-NITROANILINE	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
62-53-3	ANILINE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
65-85-0	BENZOIC ACID	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	11	U	11	U	1.1	U	25	U	1.1	U	11	U	100	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
86-74-8	CARBAZOLE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
98-95-3	NITROBENZENE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
108-95-2	PHENOL	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.3	U	5.4	U	52	U
100-01-6	P-NITROANILINE	8270C	mg/kg	27	U	28	U	2.8	U	62	U	2.8	U	27	U	260	U
110-86-1	PYRIDINE	8270C	mg/kg	5.4	U	5.5	U	0.57	U	12	U	0.56	U	5.4	U	52	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31097 / 3136 / 7-Nov-05 / 0 to 2 FT		31098 / 3136 / 7-Nov-05 / 2 to 4 FT		31099 / 3136 / 7-Nov-05 / 4 to 6 FT		31100 / 3136 / 7-Nov-05 / 4 to 6 FT		31160 / 3137 / 10-Nov-05 / 0 to 2 FT		31161 / 3137 / 10-Nov-05 / 2 to 4 FT		31101 / 3138 / 7-Nov-05 / 0 to 2 FT	
(Group Code)	(Group Description)																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
95-48-7	2-METHYLPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
88-74-4	2-NITROANILINE	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	110	U	1.1	U	1.1	U	1.2	U	11	U	1.1	U	110	UJ
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
108-39-4	3-METHYLPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
99-09-2	3-NITROANILINE	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
106-44-5	4-METHYLPHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
62-53-3	ANILINE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
65-85-0	BENZOIC ACID	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	110	U	1.1	U	1.1	U	1.2	U	11	U	1.1	U	110	UJ
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
86-74-8	CARBAZOLE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
132-64-9	DIBENZOFURAN	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
98-95-3	NITROBENZENE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
108-95-2	PHENOL	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ
100-01-6	P-NITROANILINE	8270C	mg/kg	270	U	2.8	U	2.9	U	2.9	U	26	U	2.7	U	260	UJ
110-86-1	PYRIDINE	8270C	mg/kg	55	U	0.56	U	0.57	U	0.58	U	5.3	U	0.54	U	53	UJ

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31102 3138 7-Nov-05 2 to 4 FT		31103 3138 7-Nov-05 4 to 6 FT		31104 3139 7-Nov-05 0 to 2 FT		31105 3139 7-Nov-05 2 to 4 FT		31106 3140 7-Nov-05 0 to 2 FT		31107 3140 7-Nov-05 2 to 4 FT		31108 3141 7-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
88-74-4	2-NITROANILINE	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	1.1	U	1.2	U	11	U	11	U	1.1	U	1.1	U	32	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
99-09-2	3-NITROANILINE	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
62-53-3	ANILINE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
65-85-0	BENZOIC ACID	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	1.1	U	1.2	U	11	U	11	U	1.1	U	1.1	U	32	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
86-74-8	CARBAZOLE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	0.55	U	0.6	U	5.3	UJ	5.4	UJ	0.56	UJ	0.55	UJ	16	UJ
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
98-95-3	NITROBENZENE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
108-95-2	PHENOL	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U
100-01-6	P-NITROANILINE	8270C	mg/kg	2.7	U	3	U	27	U	27	U	2.8	U	2.8	U	79	U
110-86-1	PYRIDINE	8270C	mg/kg	0.55	U	0.6	U	5.3	U	5.4	U	0.56	U	0.55	U	16	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31109		31110		31111		31112		31113		31114		31115	
			Location ID	3141		3141		3141		3142		3142		3143		3143	
			Sample Date	7-Nov-05		7-Nov-05		7-Nov-05		7-Nov-05		7-Nov-05		8-Nov-05		8-Nov-05	
			Unit \\ Depth	2 to 4 FT		4 to 6 FT		4 to 6 FT		0 to 2 FT		2 to 4 FT		0 to 2 FT		2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	5.6	UJ	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
88-74-4	2-NITROANILINE	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	11	U	1.1	U	1.1	U	11	U	11	U	5.3	U	1	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
99-09-2	3-NITROANILINE	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
62-53-3	ANILINE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
65-85-0	BENZOIC ACID	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	11	U	1.1	U	1.1	U	11	U	11	U	5.3	U	1	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	UJ	0.52	UJ
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
86-74-8	CARBAZOLE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	5.6	UJ	0.57	UJ	0.55	UJ	5.5	UJ	5.3	UJ	2.7	UJ	0.52	UJ
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
98-95-3	NITROBENZENE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	5.6	UJ	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	UJ
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	U	2.6	U
108-95-2	PHENOL	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U
100-01-6	P-NITROANILINE	8270C	mg/kg	28	U	2.9	U	2.7	U	27	U	27	U	13	UJ	2.6	UJ
110-86-1	PYRIDINE	8270C	mg/kg	5.6	U	0.57	U	0.55	U	5.5	U	5.3	U	2.7	U	0.52	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31116 3144 8-Nov-05 0 to 2 FT		31117 3144 8-Nov-05 2 to 4 FT		31118 3144 8-Nov-05 4 to 6 FT		31119 3145 8-Nov-05 2 to 4 FT		31120 3145 8-Nov-05 0 to 2 FT		31121 3145 8-Nov-05 4 to 6 FT		31122 3145 8-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
88-74-4	2-NITROANILINE	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	53	U	11	U	12	U	3.6	U	110	U	1.3	U	130	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
99-09-2	3-NITROANILINE	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
62-53-3	ANILINE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
65-85-0	BENZOIC ACID	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	53	U	11	U	12	U	3.6	U	110	U	1.3	U	130	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	27	UJ	5.6	UJ	6	UJ	1.8	UJ	56	UJ	0.65	UJ	66	UJ
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
86-74-8	CARBAZOLE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	27	UJ	5.6	UJ	6	UJ	1.8	UJ	56	UJ	0.65	UJ	66	UJ
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
98-95-3	NITROBENZENE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	27	UJ	5.6	UJ	6	U	1.8	UJ	56	U	0.65	U	66	UJ
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	130	U	28	U	30	U	9	U	280	U	3.3	U	330	U
108-95-2	PHENOL	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U
100-01-6	P-NITROANILINE	8270C	mg/kg	130	UJ	28	UJ	30	UJ	9	UJ	280	UJ	3.3	UJ	330	UJ
110-86-1	PYRIDINE	8270C	mg/kg	27	U	5.6	U	6	U	1.8	U	56	U	0.65	U	66	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31132 / 3146 / 8-Nov-05 / 0 to 2 FT		31133 / 3146 / 8-Nov-05 / 2 to 4 FT		31134 / 3146 / 8-Nov-05 / 4 to 6 FT		31135 / 3147 / 9-Nov-05 / 0 to 2 FT		31136 / 3147 / 9-Nov-05 / 2 to 4 FT		31137 / 3148 / 9-Nov-05 / 0 to 2 FT		31138 / 3148 / 9-Nov-05 / 2 to 4 FT	
(Group Code)	**(Group Description)**																
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
88-74-4	2-NITROANILINE	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	3.3	U	1.1	U	1.4	U	100	U	11	U	110	U	110	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
99-09-2	3-NITROANILINE	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
62-53-3	ANILINE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
65-85-0	BENZOIC ACID	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	3.3	U	1.1	U	1.4	U	100	U	11	U	110	U	110	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	1.7	UJ	0.56	UJ	0.69	UJ	52	U	5.3	U	54	U	54	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
86-74-8	CARBAZOLE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	1.7	UJ	0.56	UJ	0.69	UJ	52	U	5.3	U	54	U	54	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
98-95-3	NITROBENZENE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	1.7	UJ	0.56	UJ	0.69	UJ	52	U	5.3	U	54	U	54	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	8.3	U	2.8	U	3.5	U	260	U	26	U	270	U	270	U
108-95-2	PHENOL	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U
100-01-6	P-NITROANILINE	8270C	mg/kg	8.3	UJ	2.8	UJ	3.5	UJ	260	U	26	U	270	U	270	U
	PYRIDINE	8270C	mg/kg	1.7	U	0.56	U	0.69	U	52	U	5.3	U	54	U	54	U

Appendix G
Soil Sample Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31139 / 3149 / 9-Nov-05 / 0 to 2 FT		31140 / 3149 / 9-Nov-05 / 2 to 4 FT		31141 / 3150 / 9-Nov-05 / 0 to 2 FT		31142 / 3150 / 9-Nov-05 / 2 to 4 FT		31143 / 3150 / 9-Nov-05 / 2 to 4 FT	
(Group Code)	**(Group Description)**												
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
120-83-2	2,4-DICHLOROPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
51-28-5	2,4-DINITROPHENOL	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
121-14-2	2,4-DINITROTOLUENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
606-20-2	2,6-DINITROTOLUENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
95-57-8	2-CHLOROPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
95-48-7	2-METHYLPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
88-74-4	2-NITROANILINE	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	mg/kg	11	U	110	U	110	U	110	U	11	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
108-39-4	3-METHYLPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
99-09-2	3-NITROANILINE	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
106-44-5	4-METHYLPHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
62-53-3	ANILINE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
65-85-0	BENZOIC ACID	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
100-51-6	BENZYL ALCOHOL	8270C	mg/kg	11	U	110	U	110	U	110	U	11	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
86-74-8	CARBAZOLE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
132-64-9	DIBENZOFURAN	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
84-66-2	DIETHYL PHTHALATE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
131-11-3	DIMETHYL PHTHALATE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
118-74-1	HEXACHLOROBENZENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
67-72-1	HEXACHLOROETHANE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
62-75-9	METHANAMINE, N-METHYL-N-NITROSO	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
1321-94-4	METHYLNAPHTHALENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
98-95-3	NITROBENZENE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
87-86-5	PENTACHLOROPHENOL	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
108-95-2	PHENOL	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U
100-01-6	P-NITROANILINE	8270C	mg/kg	28	U	270	U	260	U	280	U	28	U
	PYRIDINE	8270C	mg/kg	5.5	U	54	U	53	U	55	U	5.6	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31001 3101 1-Nov-05 0 to 2 FT		31002 3101 1-Nov-05 2 to 4 FT		31003 3101 1-Nov-05 4 to 6 FT		31144 3102 9-Nov-05 0 to 2 FT		31145 3102 9-Nov-05 2 to 4 FT		31004 3103 2-Nov-05 0 to 2 FT	
(Group Code (Group Description)															
72-54-8	4,4-DDD	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
72-55-9	4,4-DDE	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
50-29-3	4,4-DDT	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
309-00-2	ALDRIN	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
319-85-7	BETA-BHC	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	1.2	U	1.1	U	1.1	U	0.13	U	1	U
57-74-9	CHLORDANE	8081A	mg/kg	0.55	U	0.61	U	0.57	U	0.53	U	0.066	U	0.51	U
60-57-1	DIELDRIN	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.055	U	0.061	U	0.057	U	0.053	U	0.0066	U	0.051	U
72-20-8	ENDRIN	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.033	U	0.037	U	0.034	U	0.032	U	0.004	U	0.031	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U
58-89-9	LINDANE	8081A	mg/kg	0.019	U	0.021	U	0.019	U	0.018	U	0.0022	U	0.017	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31005 3103 2-Nov-05 2 to 4 FT		31006 3103 2-Nov-05 4.5 to 6.5 FT		31007 3104 2-Nov-05 0 to 2 FT		31008 3104 2-Nov-05 2 to 4 FT		31009 3104 2-Nov-05 4 to 6 FT		31010 3105 2-Nov-05 0 to 2 FT		31011 3105 2-Nov-05 2 to 4 FT		31012 3105 2-Nov-05 4 to 6 FT		31013 3105 2-Nov-05 4 to 6 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0031	U	0.0032	U	0.032	UJ	0.033	U	0.039	U	0.031	UJ	0.032	U	0.0031	U	0.0031	U
72-55-9	4,4-DDE	8081A	mg/kg	0.0031	U	0.0032	U	0.032	UJ	0.033	U	0.039	U	0.031	UJ	0.032	U	0.0031	U	0.0031	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0031	U	0.0032	U	0.032	UJ	0.033	U	0.039	U	0.031	UJ	0.032	U	0.0031	U	0.0031	U
309-00-2	ALDRIN	8081A	mg/kg	0.0018	U	0.0018	U	0.018	UJ	0.019	U	0.022	U	0.018	UJ	0.018	U	0.0018	U	0.0018	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0018	U	0.0018	U	0.018	UJ	0.019	U	0.022	U	0.018	UJ	0.018	U	0.0018	U	0.0018	U
319-85-7	BETA-BHC	8081A	mg/kg	0.0018	U	0.0018	U	0.018	UJ	0.019	U	0.022	U	0.018	UJ	0.018	U	0.0018	U	0.0018	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.1	U	0.11	U	1.1	U	1.1	U	1.3	U	1	U	1.1	U	0.1	U	0.1	U
57-74-9	CHLORDANE	8081A	mg/kg	0.052	U	0.054	U	0.53	U	0.55	U	0.65	U	0.52	U	0.53	U	0.052	U	0.052	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0031	U	0.0032	U	0.032	U	0.033	U	0.039	U	0.031	U	0.032	U	0.0031	U	0.0031	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0018	U	0.0018	U	0.018	UJ	0.019	U	0.022	U	0.018	UJ	0.018	U	0.0018	U	0.0018	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0052	U	0.0054	U	0.053	UJ	0.055	U	0.065	U	0.052	UJ	0.053	U	0.0052	U	0.0052	U
72-20-8	ENDRIN	8081A	mg/kg	0.0031	U	0.0032	U	0.032	U	0.033	U	0.039	U	0.031	U	0.032	U	0.0031	U	0.0031	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0031	U	0.0032	U	0.032	U	0.033	U	0.039	U	0.031	U	0.032	U	0.0031	U	0.0031	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0018	U	0.0018	U	0.018	U	0.019	U	0.022	U	0.018	U	0.018	U	0.0018	U	0.0018	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0018	U	0.0018	U	0.018	U	0.019	U	0.022	U	0.018	U	0.018	U	0.0018	U	0.0018	U
58-89-9	LINDANE	8081A	mg/kg	0.0018	U	0.0018	U	0.018	UJ	0.019	U	0.022	U	0.018	UJ	0.018	U	0.0018	U	0.0018	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31014 3106 3-Nov-05 0 to 2 FT		31015 3106 3-Nov-05 2 to 4 FT		31016 3106 3-Nov-05 4 to 6 FT		31017 3107 3-Nov-05 0 to 2 FT		31018 3107 3-Nov-05 2 to 4 FT		31019 3107 3-Nov-05 4 to 6 FT		31020 3108 3-Nov-05 0 to 2 FT		31021 3108 3-Nov-05 0 to 2 FT		31022 3108 3-Nov-05 2 to 4 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.032	U	0.0034	U	0.0032	UJ	0.037	U	0.0034	U	0.0042	U	0.0032	U	0.035	UJ	0.032	UJ
72-55-9	4,4-DDE	8081A	mg/kg	0.032	UJ	0.0034	UJ	0.0032	U	0.037	UJ	0.0034	UJ	0.0042	UJ	0.0032	UJ	0.035	UJ	0.032	UJ
50-29-3	4,4-DDT	8081A	mg/kg	0.032	UJ	0.0034	UJ	0.0032	U	0.037	UJ	0.0034	UJ	0.0042	UJ	0.0032	UJ	0.035	U	0.032	U
309-00-2	ALDRIN	8081A	mg/kg	0.018	UJ	0.0019	UJ	0.0018	U	0.021	UJ	0.002	UJ	0.0024	UJ	0.0018	UJ	0.02	U	0.018	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.018	UJ	0.0019	UJ	0.0018	UJ	0.021	UJ	0.002	UJ	0.0024	UJ	0.0018	UJ	0.02	UJ	0.018	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.018	UJ	0.0019	UJ	0.0018	U	0.021	UJ	0.002	UJ	0.0024	UJ	0.0018	UJ	0.02	U	0.018	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	0.11	U	0.11	U	1.2	U	0.11	U	0.14	U	0.11	U	1.2	U	1.1	U
57-74-9	CHLORDANE	8081A	mg/kg	0.54	U	0.057	U	0.054	U	0.61	U	0.057	U	0.07	U	0.053	U	0.58	U	0.53	U
60-57-1	DIELDRIN	8081A	mg/kg	0.032	U	0.0034	U	0.0032	U	0.037	U	0.0034	U	0.0042	U	0.0032	U	0.035	U	0.032	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.018	UJ	0.0019	UJ	0.0018	U	0.021	UJ	0.002	UJ	0.0024	UJ	0.0018	UJ	0.02	U	0.018	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.054	UJ	0.0057	UJ	0.0054	U	0.061	UJ	0.0057	UJ	0.007	UJ	0.0053	UJ	0.058	U	0.053	U
72-20-8	ENDRIN	8081A	mg/kg	0.032	U	0.0034	U	0.0032	U	0.037	U	0.0034	U	0.0042	U	0.0032	U	0.035	U	0.032	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.032	U	0.0034	U	0.0032	U	0.037	U	0.0034	U	0.0042	U	0.0032	U	0.035	U	0.032	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.018	U	0.0019	U	0.0018	U	0.021	U	0.002	U	0.0024	U	0.0018	U	0.02	U	0.018	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.018	U	0.0019	U	0.0018	U	0.021	U	0.002	U	0.0024	U	0.0018	U	0.02	U	0.018	U
58-89-9	LINDANE	8081A	mg/kg	0.018	UJ	0.0019	UJ	0.0018	U	0.021	UJ	0.002	UJ	0.0024	UJ	0.0018	UJ	0.02	UJ	0.018	UJ

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31023 / 3108 / 3-Nov-05 / 4 to 7 FT		31024 / 3109 / 3-Nov-05 / 0 to 2 FT		31025 / 3109 / 3-Nov-05 / 2 to 4 FT		31026 / 3109 / 3-Nov-05 / 4 to 6 FT		31027 / 3110 / 3-Nov-05 / 0 to 2 FT		31028 / 3110 / 3-Nov-05 / 3 to 4 FT		31029 / 3110 / 3-Nov-05 / 4.5 to 6.5 FT		31030 / 3111 / 3-Nov-05 / 0 to 2 FT		31031 / 3111 / 3-Nov-05 / 2 to 4 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.031	UJ	0.051	UJ	0.0033	UJ	0.0035	UJ	0.032	UJ	0.032	UJ	0.0004	J	0.0031	U	0.0033	U
72-55-9	4,4-DDE	8081A	mg/kg	0.031	UJ	0.051	UJ	0.0033	UJ	0.0035	UJ	0.032	UJ	0.032	UJ	0.0006	J	0.0031	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.031	U	0.051	U	0.0033	U	0.0035	U	0.032	U	0.032	U	0.002	J	0.0031	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.018	U	0.029	U	0.0018	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0018	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.018	UJ	0.029	UJ	0.0018	UJ	0.002	UJ	0.018	UJ	0.018	UJ	0.0019	UJ	0.0018	UJ	0.0019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.018	U	0.029	U	0.0018	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0018	U	0.0019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1	U	1.7	U	0.11	U	0.12	U	1.1	U	1.1	U	0.11	U	0.1	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.52	U	0.84	U	0.054	U	0.058	U	0.54	U	0.53	U	0.056	U	0.052	U	0.055	U
60-57-1	DIELDRIN	8081A	mg/kg	0.031	U	0.051	U	0.0033	U	0.0035	U	0.032	U	0.032	U	0.0034	U	0.0031	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.018	U	0.029	U	0.0018	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0018	U	0.0019	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.052	U	0.084	U	0.0054	U	0.0058	U	0.054	U	0.053	U	0.0056	U	0.0052	U	0.0055	U
72-20-8	ENDRIN	8081A	mg/kg	0.031	U	0.051	U	0.0033	U	0.0035	U	0.032	U	0.032	U	0.0034	U	0.0031	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.031	U	0.051	U	0.0033	U	0.0035	U	0.032	U	0.032	U	0.0034	U	0.0031	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.018	U	0.029	U	0.0018	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0018	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.018	U	0.029	U	0.0018	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0018	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.018	UJ	0.029	UJ	0.0018	UJ	0.002	UJ	0.018	UJ	0.018	UJ	0.0019	U	0.0018	U	0.0019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31032 / 3111 / 3-Nov-05 / 4 to 6 FT		31033 / 3112 / 3-Nov-05 / 0 to 2 FT		31034 / 3112 / 3-Nov-05 / 2 to 4 FT		31035 / 3112 / 3-Nov-05 / 4.5 to 6.5 FT		31036 / 3112 / 3-Nov-05 / 4.5 to 6.5 FT		31037 / 3113 / 3-Nov-05 / 0 to 2 FT		31038 / 3113 / 3-Nov-05 / 2 to 4 FT		31039 / 3113 / 3-Nov-05 / 4 to 6 FT		31040 / 3114 / 3-Nov-05 / 0 to 2 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	UJ	0.0033	UJ	0.0032	UJ	0.0007	
72-55-9	4,4-DDE	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	U	0.0033	U	0.0032	U	0.0005	J
50-29-3	4,4-DDT	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	U	0.0033	U	0.0032	U	0.002	J
309-00-2	ALDRIN	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0018	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.0019	UJ	0.018	UJ	0.0018	UJ	0.0018	UJ	0.002	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.11	U	0.11	U	1.1	U	1.1	U	0.11	U	1.1	U	0.11	U	0.11	U	0.12	U
57-74-9	CHLORDANE	8081A	mg/kg	0.053	U	0.055	U	0.56	U	0.55	U	0.055	U	0.54	U	0.054	U	0.054	U	0.058	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	U	0.0033	U	0.0032	U	0.0005	J
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0053	U	0.0055	U	0.056	U	0.055	U	0.0055	U	0.054	U	0.0054	U	0.0054	U	0.0058	U
72-20-8	ENDRIN	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	U	0.0033	U	0.0032	U	0.0035	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0032	U	0.0033	U	0.034	U	0.033	U	0.0033	U	0.032	U	0.0033	U	0.0032	U	0.0035	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U
58-89-9	LINDANE	8081A	mg/kg	0.0018	U	0.0019	U	0.019	U	0.019	U	0.0019	U	0.018	U	0.0018	U	0.0018	U	0.002	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31041 / 3114 / 3-Nov-05 / 2 to 4 FT		31042 / 3114 / 3-Nov-05 / 4 to 7 FT		31043 / 3115 / 3-Nov-05 / 0 to 2 FT		31044 / 3115 / 3-Nov-05 / 2 to 4 FT		31045 / 3115 / 3-Nov-05 / 4 to 6 FT		31046 / 3115 / 3-Nov-05 / 4 to 6 FT		31047 / 3116 / 4-Nov-05 / 0 to 2 FT		31048 / 3116 / 4-Nov-05 / 2 to 4 FT		31049 / 3116 / 4-Nov-05 / 4 to 6 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0034	UJ	0.0039	UJ	0.033	J	0.034	UJ	0.004	UJ	0.034	UJ	0.034	UJ	0.036	UJ	0.0034	UJ
72-55-9	4,4-DDE	8081A	mg/kg	0.0001	J	0.0039	U	0.006	J	0.034	U	0.004	U	0.034	U	0.034	U	0.036	U	0.0034	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0002	J	0.0039	U	0.033	U	0.034	U	0.004	U	0.034	U	0.034	U	0.036	U	0.0034	U
309-00-2	ALDRIN	8081A	mg/kg	0.0019	U	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	U	0.021	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0019	UJ	0.0022	UJ	0.019	UJ	0.019	UJ	0.0023	UJ	0.019	UJ	0.019	UJ	0.021	UJ	0.0019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.0019	U	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	U	0.021	U	0.0019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.11	U	0.13	U	1.1	U	1.1	U	0.13	U	1.1	U	1.1	U	1.2	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.057	U	0.065	U	0.54	U	0.56	U	0.067	U	0.57	U	0.57	U	0.61	U	0.056	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0034	U	0.0039	U	0.033	U	0.034	U	0.004	U	0.034	U	0.034	U	0.036	U	0.0034	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0019	U	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	UJ	0.021	UJ	0.0019	UJ
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0057	U	0.0065	U	0.054	U	0.056	U	0.0067	U	0.057	U	0.057	UJ	0.061	UJ	0.0056	UJ
72-20-8	ENDRIN	8081A	mg/kg	0.0034	U	0.0039	U	0.033	U	0.034	U	0.004	U	0.034	U	0.034	U	0.036	U	0.0034	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0034	U	0.0039	U	0.033	U	0.034	U	0.004	U	0.034	U	0.034	U	0.036	U	0.0034	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0005	J	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	U	0.021	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0019	U	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	U	0.021	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.0019	U	0.0022	U	0.019	U	0.019	U	0.0023	U	0.019	U	0.019	U	0.021	U	0.0019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31052 3117 4-Nov-05 0 to 2 FT		31053 3117 4-Nov-05 2 to 4 FT		31054 3117 4-Nov-05 4 to 6 FT		31055 3118 4-Nov-05 0 to 2 FT		31056 3118 4-Nov-05 0 to 2 FT		31057 3118 4-Nov-05 2 to 4 FT		31058 3119 4-Nov-05 0 to 2 FT		31059 3119 4-Nov-05 2 to 4 FT		31060 3120 4-Nov-05 0 to 2 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.034	UJ	0.033	J	0.005	J	0.033	UJ	0.033	UJ	0.0033	UJ	0.032	UJ	0.0034	UJ	0.0033	UJ
72-55-9	4,4-DDE	8081A	mg/kg	0.034	U	0.033	U	0.03	J	0.033	U	0.033	U	0.0001	J	0.032	U	0.0034	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.034	U	0.033	U	0.035	U	0.033	U	0.033	U	0.0004	J	0.032	U	0.0034	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.019	U	0.019	U	0.02	U	0.019	U	0.019	U	0.0018	U	0.018	U	0.0019	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.019	UJ	0.019	UJ	0.02	UJ	0.019	UJ	0.019	UJ	0.0018	UJ	0.018	UJ	0.0019	UJ	0.0019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.019	U	0.019	U	0.02	U	0.019	U	0.019	U	0.0018	U	0.018	U	0.0019	U	0.0019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	1.1	U	1.2	U	1.1	U	1.1	U	0.11	U	1.1	U	0.11	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.57	U	0.55	U	0.59	U	0.55	U	0.55	U	0.054	U	0.53	U	0.056	U	0.055	U
60-57-1	DIELDRIN	8081A	mg/kg	0.034	U	0.033	U	0.035	U	0.033	U	0.033	U	0.0033	U	0.032	U	0.0034	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.019	UJ	0.019	UJ	0.02	UJ	0.019	UJ	0.019	UJ	0.0018	UJ	0.018	UJ	0.0019	UJ	0.0019	UJ
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.057	UJ	0.055	UJ	0.059	UJ	0.055	UJ	0.055	UJ	0.0054	UJ	0.053	UJ	0.0056	UJ	0.0055	UJ
72-20-8	ENDRIN	8081A	mg/kg	0.034	U	0.033	U	0.035	U	0.033	U	0.033	U	0.0033	U	0.032	U	0.0034	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.034	U	0.033	U	0.035	U	0.033	U	0.033	U	0.0033	U	0.032	U	0.0034	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.019	U	0.019	U	0.02	U	0.019	U	0.019	U	0.0018	U	0.018	U	0.0019	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.019	U	0.019	U	0.02	U	0.019	U	0.019	U	0.0018	U	0.018	U	0.0019	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.019	U	0.019	U	0.02	U	0.019	U	0.019	U	0.0018	U	0.018	U	0.0019	U	0.0019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31061 3120 4-Nov-05 2 to 4 FT		31062 3120 4-Nov-05 4 to 6_5 FT		31063 3121 4-Nov-05 0 to 2 FT		31064 3121 4-Nov-05 2 to 4 FT		31065 3121 4-Nov-05 4 to 6 FT		31066 3122 4-Nov-05 0 to 2 FT		31067 3122 4-Nov-05 2 to 4 FT		31068 3122 4-Nov-05 2 to 4 FT		31069 3123 4-Nov-05 0 to 2 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0033	UJ	0.0046	UJ	0.038	UJ	0.0036	UJ	0.035	UJ	0.0032	UJ	0.0051	UJ	0.0046	UJ	0.033	UJ
72-55-9	4,4-DDE	8081A	mg/kg	0.0033	U	0.0046	U	0.038	U	0.0036	U	0.035	U	0.0032	U	0.0051	U	0.0046	U	0.033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0033	U	0.0046	U	0.038	U	0.0036	U	0.035	U	0.0032	U	0.0051	U	0.0046	U	0.033	U
309-00-2	ALDRIN	8081A	mg/kg	0.0018	U	0.0026	U	0.021	U	0.002	U	0.02	U	0.0018	U	0.0029	U	0.0026	U	0.019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0018	UJ	0.0026	UJ	0.021	UJ	0.002	UJ	0.02	UJ	0.0018	UJ	0.0029	UJ	0.0026	UJ	0.019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.0018	U	0.0026	U	0.021	U	0.002	U	0.02	U	0.0018	U	0.0029	U	0.0026	U	0.019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.11	U	0.15	U	1.3	U	0.12	U	1.2	U	0.11	U	0.17	U	0.15	UJ	1.1	UJ
57-74-9	CHLORDANE	8081A	mg/kg	0.054	U	0.076	U	0.63	U	0.06	U	0.58	U	0.054	U	0.085	U	0.076	U	0.55	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0033	U	0.0046	U	0.038	U	0.0036	U	0.035	U	0.0032	U	0.0051	U	0.0046	U	0.033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0018	UJ	0.0026	UJ	0.021	UJ	0.002	U	0.02	U	0.0018	U	0.0029	U	0.0026		0.019	UJ
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0054	UJ	0.0076	UJ	0.063	UJ	0.006	U	0.058	U	0.0054	U	0.0085	U	0.0076	UJ	0.055	UJ
72-20-8	ENDRIN	8081A	mg/kg	0.0033	U	0.0046	U	0.038	U	0.0036	U	0.035	U	0.0032	U	0.0051	U	0.0046	UJ	0.033	UJ
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0033	U	0.0046	U	0.038	U	0.0036	U	0.035	U	0.0032	U	0.0051	U	0.0046	U	0.033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0018	U	0.0026	U	0.021	U	0.002	U	0.02	U	0.0018	U	0.0029	U	0.0026	U	0.019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0018	U	0.0026	U	0.021	U	0.002	U	0.02	U	0.0018	U	0.0029	U	0.0026	U	0.019	U
58-89-9	LINDANE	8081A	mg/kg	0.0018	U	0.0026	U	0.021	U	0.002	UJ	0.02	UJ	0.0018	UJ	0.0029	UJ	0.0026	UJ	0.019	UJ

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31070 3123 4-Nov-05 2 to 4 FT		31071 3124 4-Nov-05 0 to 2 FT		31072 3124 4-Nov-05 2 to 4 FT		31073 3125 5-Nov-05 0 to 2 FT		31074 3125 5-Nov-05 2 to 4 FT		31075 3125 5-Nov-05 4 to 6 FT		31078 3126 6-Nov-05 0 to 2 FT		31079 3126 6-Nov-05 0 to 2 FT		31080 3126 6-Nov-05 2 to 4 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0035	UJ	0.033	UJ	0.0033	UJ	0.032	UJ	0.0035	UJ	0.0034	UJ	0.033	U	0.033	U	0.0033	U
72-55-9	4,4-DDE	8081A	mg/kg	0.0035	U	0.033	U	0.0033	U	0.032	U	0.0035	U	0.0034	U	0.033	U	0.033	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0035	U	0.033	U	0.0033	U	0.032	U	0.0035	U	0.0034	U	0.033	U	0.033	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.002	U	0.019	U	0.0019	U	0.018	U	0.002	U	0.0019	U	0.019	U	0.019	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.002	UJ	0.019	UJ	0.0019	UJ	0.018	UJ	0.002	UJ	0.0019	UJ	0.019		0.019	UJ	0.0019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.002	U	0.019	U	0.0019	U	0.018	U	0.002	U	0.0019	U	0.019	UJ	0.019	UJ	0.0019	UJ
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.12	UJ	1.1	UJ	0.11	UJ	1.1	U	0.12	U	0.11	U	1.1	U	1.1	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.058	U	0.55	U	0.055	U	0.53	U	0.058	U	0.056	U	0.56	U	0.54	U	0.055	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0035	U	0.033	U	0.0033	U	0.032	U	0.0035	U	0.0034	U	0.033	U	0.033	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.002	UJ	0.019	UJ	0.0019	UJ	0.018	UJ	0.002	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.0019	UJ
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0058	UJ	0.055	UJ	0.0055	UJ	0.053	UJ	0.0058	UJ	0.0056	UJ	0.056	UJ	0.054	UJ	0.0055	UJ
72-20-8	ENDRIN	8081A	mg/kg	0.0035	UJ	0.033	UJ	0.0033	UJ	0.032	U	0.0035	U	0.0034	U	0.033	U	0.033	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0035	U	0.033	U	0.0033	U	0.032	U	0.0035	U	0.0034	U	0.033	U	0.033	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.002	U	0.019	U	0.0019	U	0.018	U	0.002	U	0.0019	U	0.019	U	0.019	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.002	U	0.019	U	0.0019	U	0.018	U	0.002	U	0.0019	U	0.019	U	0.019	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.002	UJ	0.019	UJ	0.0019	UJ	0.018	U	0.002	U	0.0019	U	0.019	UJ	0.019	UJ	0.0019	UJ

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31081 3127 6-Nov-05 0 to 2 FT		31082 3127 6-Nov-05 2 to 4 FT		31083 3128 6-Nov-05 0 to 2 FT		31084 3129 6-Nov-05 0 to 2 FT		31085 3130 6-Nov-05 0 to 2 FT		31086 3130 6-Nov-05 2 to 4 FT		31156 3131 10-Nov-05 0 to 2 FT		31157 3131 10-Nov-05 2 to 4 FT		31087 3132 6-Nov-05 0 to 2 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
72-55-9	4,4-DDE	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
50-29-3	4,4-DDT	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
309-00-2	ALDRIN	8081A	mg/kg	0.019	U	0.0019	U	0.019	U	0.019	U	0.018	U	0.0018	U	0.0019	U	0.0019	U	0.019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.019	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.018	UJ	0.0018	UJ	0.0019	U	0.0019	U	0.019	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.019	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.018	UJ	0.0018	UJ	0.0019	U	0.0019	U	0.019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	0.11	U	1.1	U	1.1	U	1.1	U	0.11	U	0.11	U	0.11	U	1.1	UJ
57-74-9	CHLORDANE	8081A	mg/kg	0.56	U	0.055	U	0.56	U	0.55	U	0.54	U	0.054	U	0.055	U	0.056	U	0.57	U
60-57-1	DIELDRIN	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.019	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.018	UJ	0.0018	UJ	0.0019	U	0.0019	U	0.019	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.056	UJ	0.0055	UJ	0.056	UJ	0.055	UJ	0.054	UJ	0.0054	UJ	0.0055	U	0.0056	U	0.057	U
72-20-8	ENDRIN	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.033	U	0.0033	U	0.034	U	0.033	U	0.032	U	0.0033	U	0.0033	U	0.0034	U	0.034	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.019	U	0.0019	U	0.019	U	0.019	U	0.018	U	0.0018	U	0.0019	U	0.0019	U	0.019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.019	U	0.0019	U	0.019	U	0.019	U	0.018	U	0.0018	U	0.0019	U	0.0019	U	0.019	U
58-89-9	LINDANE	8081A	mg/kg	0.019	UJ	0.0019	UJ	0.019	UJ	0.019	UJ	0.018	UJ	0.0018	UJ	0.0019	U	0.0019	U	0.019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31088 3132 6-Nov-05 2 to 4 FT		31089 3132 6-Nov-05 2 to 4 FT		31090 3132 6-Nov-05 5 to 7 FT		31091 3133 6-Nov-05 0 to 2 FT		31092 3133 6-Nov-05 2 to 4 FT		31093 3133 6-Nov-05 5 to 7 FT		31094 3134 6-Nov-05 0 to 2 FT		31095 3134 6-Nov-05 2 to 4 FT		31096 3134 6-Nov-05 4.5 to 6.5 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
72-55-9	4,4-DDE	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0019	UJ	0.02	UJ	0.0019	UJ	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
319-85-7	BETA-BHC	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.11	UJ	1.2	UJ	0.11	UJ	1.1	U	0.11	U	0.11	U	0.11	U	1.2	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.056	U	0.6	U	0.055	U	0.57	U	0.054	U	0.055	U	0.057	U	0.62	U	0.056	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0056	U	0.06	U	0.0055	U	0.057	U	0.0054	U	0.0055	U	0.0057	U	0.062	U	0.0056	U
72-20-8	ENDRIN	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0033	U	0.036	U	0.0033	U	0.034	U	0.0033	U	0.0033	U	0.0034	U	0.037	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.0019	U	0.02	U	0.0019	U	0.019	U	0.0018	U	0.0019	U	0.0019	U	0.021	U	0.0019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31158 3135 10-Nov-05 0 to 2 FT		31159 3135 10-Nov-05 2 to 4 FT		31097 3136 7-Nov-05 0 to 2 FT		31098 3136 7-Nov-05 2 to 4 FT		31099 3136 7-Nov-05 4 to 6 FT		31100 3136 7-Nov-05 4 to 6 FT		31160 3137 10-Nov-05 0 to 2 FT		31161 3137 10-Nov-05 2 to 4 FT	
(Group Code (Group Description)																			
72-54-8	4,4-DDD	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
72-55-9	4,4-DDE	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
319-85-7	BETA-BHC	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	0.1	U	1.1	U	0.11	U	0.11	U	0.12	U	0.11	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.54	U	0.052	U	0.55	U	0.056	U	0.057	U	0.058	U	0.053	U	0.054	U
60-57-1	DIELDRIN	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.054	U	0.0052	U	0.055	U	0.0056	U	0.0057	U	0.0058	U	0.0053	U	0.0054	U
72-20-8	ENDRIN	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.032	U	0.0031	U	0.033	U	0.0034	U	0.0034	U	0.0035	U	0.0032	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U
58-89-9	LINDANE	8081A	mg/kg	0.018	U	0.0018	U	0.019	U	0.0019	U	0.0019	U	0.002	U	0.0018	U	0.0018	U

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Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31101 3138 7-Nov-05 0 to 2 FT		31102 3138 7-Nov-05 2 to 4 FT		31103 3138 7-Nov-05 4 to 6 FT		31104 3139 7-Nov-05 0 to 2 FT		31105 3139 7-Nov-05 2 to 4 FT		31106 3140 7-Nov-05 0 to 2 FT		31107 3140 7-Nov-05 2 to 4 FT		31108 3141 7-Nov-05 0 to 2 FT		31109 3141 7-Nov-05 2 to 4 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.032	UJ	0.0033	U	0.0036	U	0.032	UJ	0.032	UJ	0.0034	UJ	0.0033	UJ	0.032	UJ	0.0033	UJ
72-55-9	4,4-DDE	8081A	mg/kg	0.004	UJ	0.0033	U	0.0036	U	0.032	U	0.032	U	0.0034	U	0.0033	U	0.032	U	0.0033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.032	UJ	0.0033	U	0.0036	U	0.032	U	0.032	U	0.0034	U	0.0033	U	0.032	U	0.0033	U
309-00-2	ALDRIN	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
319-85-7	BETA-BHC	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	UJ	0.11	U	0.12	U	1.1	UJ	1.1	UJ	0.11	UJ	0.11	UJ	1.1	UJ	0.11	UJ
57-74-9	CHLORDANE	8081A	mg/kg	0.53	UJ	0.055	U	0.06	U	0.53	UJ	0.54	UJ	0.056		0.055	UJ	0.53	UJ	0.056	UJ
60-57-1	DIELDRIN	8081A	mg/kg	0.032	UJ	0.0033	U	0.0036	U	0.032	U	0.032	U	0.0034	U	0.0033	U	0.032	U	0.0033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.053	UJ	0.0055	U	0.006	U	0.053	U	0.054	U	0.0056	U	0.0055	U	0.053	U	0.0056	U
72-20-8	ENDRIN	8081A	mg/kg	0.032	UJ	0.0033	U	0.0036	U	0.032	U	0.032	U	0.0034	U	0.0033	U	0.032	U	0.0033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.032	UJ	0.0033	U	0.0036	U	0.032	U	0.032	U	0.0034	U	0.0033	U	0.032	U	0.0033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U
58-89-9	LINDANE	8081A	mg/kg	0.018	UJ	0.0019	U	0.002	U	0.018	U	0.018	U	0.0019	U	0.0019	U	0.018	U	0.0019	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31110 3141 7-Nov-05 4 to 6 FT		31111 3141 7-Nov-05 4 to 6 FT		31112 3142 7-Nov-05 0 to 2 FT		31113 3142 7-Nov-05 2 to 4 FT		31114 3143 8-Nov-05 0 to 2 FT		31115 3143 8-Nov-05 2 to 4 FT		31116 3144 8-Nov-05 0 to 2 FT		31117 3144 8-Nov-05 2 to 4 FT		31118 3144 8-Nov-05 4 to 6 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.0034	UJ	0.0033	UJ	0.033	UJ	0.0032	UJ	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
72-55-9	4,4-DDE	8081A	mg/kg	0.0034	U	0.0033	U	0.033	U	0.0032	U	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
50-29-3	4,4-DDT	8081A	mg/kg	0.0034	U	0.0033	U	0.033	U	0.0032	U	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
309-00-2	ALDRIN	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	UJ	0.0018	UJ	0.018	UJ	0.019	UJ	0.02	UJ
319-85-7	BETA-BHC	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	0.11	UJ	0.11	UJ	1.1	UJ	0.11	UJ	1.1	U	0.1	U	1.1	U	1.1	U	1.2	U
57-74-9	CHLORDANE	8081A	mg/kg	0.057	UJ	0.055	UJ	0.55	UJ	0.053	UJ	0.53	U	0.052	U	0.53	U	0.56	U	0.6	U
60-57-1	DIELDRIN	8081A	mg/kg	0.0034	U	0.0033	U	0.033	U	0.0032	U	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.0057	U	0.0055	U	0.055	U	0.0053	U	0.053	UJ	0.0052	UJ	0.053	UJ	0.056	UJ	0.06	UJ
72-20-8	ENDRIN	8081A	mg/kg	0.0034	U	0.0033	U	0.033	U	0.0032	U	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.0034	U	0.0033	U	0.033	U	0.0032	U	0.032	U	0.0031	U	0.032	U	0.033	U	0.036	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U
58-89-9	LINDANE	8081A	mg/kg	0.0019	U	0.0019	U	0.019	U	0.0018	U	0.018	U	0.0018	U	0.018	U	0.019	U	0.02	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31119 3145 8-Nov-05 2 to 4 FT		31120 3145 8-Nov-05 0 to 2 FT		31121 3145 8-Nov-05 4 to 6 FT		31122 3145 8-Nov-05 4 to 6 FT		31132 3146 8-Nov-05 0 to 2 FT		31133 3146 8-Nov-05 2 to 4 FT		31134 3146 8-Nov-05 4 to 6 FT		31135 3147 9-Nov-05 0 to 2 FT		31136 3147 9-Nov-05 2 to 4 FT	
(Group Code (Group Description)																					
72-54-8	4,4-DDD	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	U	0.0041	U	0.031	U	0.0032	U
72-55-9	4,4-DDE	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	U	0.0041	U	0.031	U	0.0032	U
50-29-3	4,4-DDT	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	U	0.0041	U	0.031	U	0.0032	U
309-00-2	ALDRIN	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.02	UJ	0.019	UJ	0.022	UJ	0.0023	UJ	0.0019	UJ	0.0019	U	0.0023	U	0.018	U	0.0018	U
319-85-7	BETA-BHC	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.2	U	1.1	U	1.3	U	0.13	U	0.11	U	0.11	U	0.14	U	1	U	0.11	U
57-74-9	CHLORDANE	8081A	mg/kg	0.6	U	0.56	U	0.65	U	0.066	U	0.055	U	0.056	U	0.069	U	0.52	U	0.053	U
60-57-1	DIELDRIN	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	U	0.0041	U	0.031	U	0.0032	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.06	UJ	0.056	UJ	0.065	UJ	0.0066	UJ	0.0055	UJ	0.0056	U	0.0069	U	0.052	U	0.0053	U
72-20-8	ENDRIN	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	UJ	0.0041	UJ	0.031	U	0.0032	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.036	U	0.033	U	0.039	U	0.004	U	0.0033	U	0.0033	U	0.0041	U	0.031	U	0.0032	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U
58-89-9	LINDANE	8081A	mg/kg	0.02	U	0.019	U	0.022	U	0.0023	U	0.0019	U	0.0019	U	0.0023	U	0.018	U	0.0018	U

Appendix G
Soil Sample Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31137 3148 9-Nov-05 0 to 2 FT		31138 3148 9-Nov-05 2 to 4 FT		31139 3149 9-Nov-05 0 to 2 FT		31140 3149 9-Nov-05 2 to 4 FT		31141 3150 9-Nov-05 0 to 2 FT		31142 3150 9-Nov-05 2 to 4 FT		31143 3150 9-Nov-05 2 to 4 FT	
(Group Code (Group Description)																	
72-54-8	4,4-DDD	8081A	mg/kg	0.032	U	0.0032	U	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
72-55-9	4,4-DDE	8081A	mg/kg	0.032	U	0.0002	J	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
50-29-3	4,4-DDT	8081A	mg/kg	0.032	U	0.0032	U	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
309-00-2	ALDRIN	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
319-84-6	ALPHA-BHC	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
319-85-7	BETA-BHC	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
8001-35-2	CAMPHECHLOR	8081A	mg/kg	1.1	U	0.11	U	0.11	U	1.1	U	1.1	U	1.1	U	1.1	U
57-74-9	CHLORDANE	8081A	mg/kg	0.54	U	0.054	U	0.055	U	0.54	U	0.53	U	0.55	U	0.56	U
60-57-1	DIELDRIN	8081A	mg/kg	0.032	U	0.0032	U	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
115-29-7	ENDOSULFAN	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
1031-07-8	ENDOSULFAN SULFATE	8081A	mg/kg	0.054	U	0.0054	U	0.0055	U	0.054	U	0.053	U	0.055	U	0.056	U
72-20-8	ENDRIN	8081A	mg/kg	0.032	U	0.0032	U	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
7421-93-4	ENDRIN ALDEHYDE	8081A	mg/kg	0.032	U	0.0032	U	0.0033	U	0.033	U	0.032	U	0.033	U	0.033	U
76-44-8	HEPTACHLOR	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U
58-89-9	LINDANE	8081A	mg/kg	0.018	U	0.0018	U	0.0019	U	0.018	U	0.018	U	0.019	U	0.019	U

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Soil Sample Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31001 3101 1-Nov-05 0 to 2 FT		31002 3101 1-Nov-05 2 to 4 FT		31003 3101 1-Nov-05 4 to 6 FT		31144 3102 9-Nov-05 0 to 2 FT		31145 3102 9-Nov-05 2 to 4 FT		31004 3103 2-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.035	U	0.043	U	0.034	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.072	U	0.081	U	0.076	U	0.07	U	0.087	U	0.068	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.035	U	0.043	U	0.034	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.035	U	0.043	U	0.034	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.035	U	0.043	U	0.034	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.035	U	0.043	U	0.034	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.04	U	0.038	U	0.008	J	0.043	U	0.034	U

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Soil Sample Results
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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31005 3103 2-Nov-05 2 to 4 FT		31006 3103 2-Nov-05 4.5 to 6.5 FT		31007 3104 2-Nov-05 0 to 2 FT		31008 3104 2-Nov-05 2 to 4 FT		31009 3104 2-Nov-05 4 to 6 FT		31010 3105 2-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.034	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.069	U	0.071	U	0.07	U	0.073	U	0.085	U	0.068	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.034	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.034	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.034	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.034	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.034	U	0.035	U	0.035	U	0.036	U	0.043	U	0.02	J

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Soil Sample Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31011 3105 2-Nov-05 2 to 4 FT		31012 3105 2-Nov-05 4 to 6 FT		31013 3105 2-Nov-05 4 to 6 FT		31014 3106 3-Nov-05 0 to 2 FT		31015 3106 3-Nov-05 2 to 4 FT		31016 3106 3-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.07	U	0.069	U	0.069	U	0.071	U	0.075	U	0.071	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.035	U	0.035	U	0.036	U	0.037	U	0.035	U

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Soil Sample Results
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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31017 3107 3-Nov-05 0 to 2 FT		31018 3107 3-Nov-05 2 to 4 FT		31019 3107 3-Nov-05 4 to 6 FT		31020 3108 3-Nov-05 0 to 2 FT		31021 3108 3-Nov-05 0 to 2 FT		31022 3108 3-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.081	U	0.076	U	0.092	U	0.07	U	0.076	U	0.07	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.041	U	0.038	U	0.046	U	0.035	U	0.038	U	0.035	U

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Soil Sample Results
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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31023 3108 3-Nov-05 4 to 7 FT		31024 3109 3-Nov-05 0 to 2 FT		31025 3109 3-Nov-05 2 to 4 FT		31026 3109 3-Nov-05 4 to 6 FT		31027 3110 3-Nov-05 0 to 2 FT		31028 3110 3-Nov-05 3 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.039	U	0.036	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.069	U	0.074	U	0.072	U	0.077	U	0.071	U	0.07	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.039	U	0.036	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.039	U	0.036	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.039	U	0.036	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.039	U	0.036	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.005	J	0.036	U	0.039	U	0.036	U	0.035	U

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Soil Sample Results
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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31029 3110 3-Nov-05 4.5 to 6.5 FT		31030 3111 3-Nov-05 0 to 2 FT		31031 3111 3-Nov-05 2 to 4 FT		31032 3111 3-Nov-05 4 to 6 FT		31033 3112 3-Nov-05 0 to 2 FT		31034 3112 3-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.074	U	0.069	U	0.073	U	0.07	U	0.073	U	0.075	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.037	U	0.034	U	0.036	U	0.035	U	0.036	U	0.037	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31035 3112 3-Nov-05 4.5 to 6.5 FT		31036 3112 3-Nov-05 4.5 to 6.5 FT		31037 3113 3-Nov-05 0 to 2 FT		31038 3113 3-Nov-05 2 to 4 FT		31039 3113 3-Nov-05 4 to 6 FT		31040 3114 3-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.072	U	0.073	U	0.071	U	0.072	U	0.071	U	0.076	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.036	U	0.036	U	0.038	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31041 3114 3-Nov-05 2 to 4 FT		31042 3114 3-Nov-05 4 to 7 FT		31043 3115 3-Nov-05 0 to 2 FT		31044 3115 3-Nov-05 2 to 4 FT		31045 3115 3-Nov-05 4 to 6 FT		31046 3115 3-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.038	U	0.043	U	0.036	U	0.037	U	0.044	U	0.038	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.075	U	0.086	U	0.072	U	0.074	U	0.088	U	0.075	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.038	U	0.043	U	0.036	U	0.037	U	0.044	U	0.038	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.038	U	0.043	U	0.036	U	0.037	U	0.044	U	0.038	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.038	U	0.043	U	0.036	U	0.037	U	0.044	U	0.038	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.038	U	0.043	U	0.036	U	0.037	U	0.044	U	0.038	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.038	U	0.043	U	0.01	J	0.037	U	0.044	U	0.038	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31047 3116 4-Nov-05 0 to 2 FT		31048 3116 4-Nov-05 2 to 4 FT		31049 3116 4-Nov-05 4 to 6 FT		31052 3117 4-Nov-05 0 to 2 FT		31053 3117 4-Nov-05 2 to 4 FT		31054 3117 4-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.076	U	0.08	U	0.074	U	0.075	U	0.073	U	0.078	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.038	U	0.04	U	0.037	U	0.038	U	0.037	U	0.039	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31055 3118 4-Nov-05 0 to 2 FT		31056 3118 4-Nov-05 0 to 2 FT		31057 3118 4-Nov-05 2 to 4 FT		31058 3119 4-Nov-05 0 to 2 FT		31059 3119 4-Nov-05 2 to 4 FT		31060 3120 4-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	UJ	0.036	UJ
11104-28-2	AROCLOR 1221	8082	mg/kg	0.073	U	0.072	U	0.072	U	0.069	UJ	0.074	UJ	0.072	UJ
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	UJ	0.036	UJ
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	U	0.036	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	U	0.036	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	U	0.036	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.036	U	0.036	U	0.035	UJ	0.037	U	0.036	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31061 3120 4-Nov-05 2 to 4 FT		31062 3120 4-Nov-05 4 to 6_5 FT		31063 3121 4-Nov-05 0 to 2 FT		31064 3121 4-Nov-05 2 to 4 FT		31065 3121 4-Nov-05 4 to 6 FT		31066 3122 4-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	UJ	0.05	UJ	0.041	UJ	0.04	U	0.038	U	0.036	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.072	UJ	0.1	UJ	0.083	UJ	0.079	U	0.076	U	0.071	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	UJ	0.05	UJ	0.041	UJ	0.04	U	0.038	U	0.036	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.05	U	0.041	U	0.04	U	0.038	U	0.036	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.05	U	0.041	U	0.04	U	0.038	U	0.036	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.05	U	0.041	U	0.04	U	0.038	U	0.036	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.05	U	0.041	U	0.04	U	0.038	U	0.036	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31067 3122 4-Nov-05 2 to 4 FT		31068 3122 4-Nov-05 2 to 4 FT		31069 3123 4-Nov-05 0 to 2 FT		31070 3123 4-Nov-05 2 to 4 FT		31071 3124 4-Nov-05 0 to 2 FT		31072 3124 4-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.11	U	0.1	U	0.073	U	0.076	U	0.073	U	0.073	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.056	U	0.05	U	0.036	U	0.038	U	0.036	U	0.037	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31073 3125 5-Nov-05 0 to 2 FT		31074 3125 5-Nov-05 2 to 4 FT		31075 3125 5-Nov-05 4 to 6 FT		31078 3126 6-Nov-05 0 to 2 FT		31079 3126 6-Nov-05 0 to 2 FT		31080 3126 6-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	UJ	0.038	UJ	0.037	UJ	0.037	U	0.036	U	0.036	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.07	UJ	0.076	UJ	0.074	UJ	0.073	U	0.072	U	0.073	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	UJ	0.038	UJ	0.037	UJ	0.037	U	0.036	U	0.036	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.038	U	0.037	U	0.037	U	0.036	U	0.036	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.038	U	0.037	U	0.037	U	0.036	U	0.036	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.038	U	0.037	U	0.037	U	0.036	U	0.036	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.038	U	0.037	U	0.037	UJ	0.005	J	0.036	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31081 3127 6-Nov-05 0 to 2 FT		31082 3127 6-Nov-05 2 to 4 FT		31083 3128 6-Nov-05 0 to 2 FT		31084 3129 6-Nov-05 0 to 2 FT		31085 3130 6-Nov-05 0 to 2 FT		31086 3130 6-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.073	U	0.073	U	0.074	U	0.072	U	0.071	U	0.072	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.037	U	0.037	U	0.037	U	0.036	U	0.036	U	0.036	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31156 3131 10-Nov-05 0 to 2 FT		31157 3131 10-Nov-05 2 to 4 FT		31087 3132 6-Nov-05 0 to 2 FT		31088 3132 6-Nov-05 2 to 4 FT		31089 3132 6-Nov-05 2 to 4 FT		31090 3132 6-Nov-05 5 to 7 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.072	U	0.074	U	0.075	U	0.074	U	0.079	U	0.073	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.037	U	0.038	U	0.037	U	0.04	U	0.036	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31091 3133 6-Nov-05 0 to 2 FT		31092 3133 6-Nov-05 2 to 4 FT		31093 3133 6-Nov-05 5 to 7 FT		31094 3134 6-Nov-05 0 to 2 FT		31095 3134 6-Nov-05 2 to 4 FT		31096 3134 6-Nov-05 4.5 to 6.5 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.076	U	0.072	U	0.073	U	0.075	U	0.081	U	0.073	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.038	U	0.036	U	0.036	U	0.037	U	0.041	U	0.037	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31158 3135 10-Nov-05 0 to 2 FT		31159 3135 10-Nov-05 2 to 4 FT		31097 3136 7-Nov-05 0 to 2 FT		31098 3136 7-Nov-05 2 to 4 FT		31099 3136 7-Nov-05 4 to 6 FT		31100 3136 7-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.035	U	0.036	U	0.037	U	0.038	U	0.038	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.071	U	0.069	U	0.072	U	0.074	U	0.075	U	0.076	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.035	U	0.036	U	0.037	U	0.038	U	0.038	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.035	U	0.036	U	0.037	U	0.038	U	0.038	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.035	U	0.036	U	0.037	U	0.038	U	0.038	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.035	U	0.036	U	0.037	U	0.038	U	0.038	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.035	U	0.01	U	0.037	U	0.038	U	0.038	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31160 3137 10-Nov-05 0 to 2 FT		31161 3137 10-Nov-05 2 to 4 FT		31101 3138 7-Nov-05 0 to 2 FT		31102 3138 7-Nov-05 2 to 4 FT		31103 3138 7-Nov-05 4 to 6 FT		31104 3139 7-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.036	U	0.047	UJ	0.036	U	0.039	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.07	U	0.072	U	0.07	UJ	0.072	U	0.079	U	0.071	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.036	U	0.035	UJ	0.036	U	0.039	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.036	U	0.035	UJ	0.036	U	0.039	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.036	U	0.035	UJ	0.036	U	0.039	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.036	U	0.035	UJ	0.036	U	0.039	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.036	U	0.009	UJ	0.036	U	0.039	U	0.035	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31105 3139 7-Nov-05 2 to 4 FT		31106 3140 7-Nov-05 0 to 2 FT		31107 3140 7-Nov-05 2 to 4 FT		31108 3141 7-Nov-05 0 to 2 FT		31109 3141 7-Nov-05 2 to 4 FT		31110 3141 7-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.071	U	0.074	U	0.073	U	0.07	U	0.074	U	0.075	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.037	U	0.037	U	0.035	U	0.037	U	0.038	U

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31111 3141 7-Nov-05 4 to 6 FT		31112 3142 7-Nov-05 0 to 2 FT		31113 3142 7-Nov-05 2 to 4 FT		31114 3143 8-Nov-05 0 to 2 FT		31115 3143 8-Nov-05 2 to 4 FT		31116 3144 8-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.035	U	0.034	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.072	U	0.072	U	0.07	U	0.07	U	0.068	U	0.07	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.035	U	0.034	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.035	U	0.034	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.035	U	0.034	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.035	U	0.034	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.036	U	0.035	U	0.007	J	0.009	J	0.006	J

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CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31117 3144 8-Nov-05 2 to 4 FT		31118 3144 8-Nov-05 4 to 6 FT		31119 3145 8-Nov-05 2 to 4 FT		31120 3145 8-Nov-05 0 to 2 FT		31121 3145 8-Nov-05 4 to 6 FT		31122 3145 8-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.074	U	0.079	U	0.079	U	0.073	U	0.086	U	0.088	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.037	U	0.04	U	0.04	U	0.037	U	0.043	U	0.044	U

Appendix G
Soil Sample Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31132 3146 8-Nov-05 0 to 2 FT		31133 3146 8-Nov-05 2 to 4 FT		31134 3146 8-Nov-05 4 to 6 FT		31135 3147 9-Nov-05 0 to 2 FT		31136 3147 9-Nov-05 2 to 4 FT		31137 3148 9-Nov-05 0 to 2 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.073	U	0.074	U	0.091	U	0.069	U	0.07	U	0.071	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.036	U	0.037	U	0.046	U	0.035	U	0.035	U	0.035	U

Appendix G
Soil Sample Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31138 3148 9-Nov-05 2 to 4 FT		31139 3149 9-Nov-05 0 to 2 FT		31140 3149 9-Nov-05 2 to 4 FT		31141 3150 9-Nov-05 0 to 2 FT		31142 3150 9-Nov-05 2 to 4 FT		31143 3150 9-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U
11104-28-2	AROCLOR 1221	8082	mg/kg	0.071	U	0.073	U	0.072	U	0.07	U	0.073	U	0.073	U
11141-16-5	AROCLOR 1232	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U
53469-21-9	AROCLOR 1242	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U
12672-29-6	AROCLOR 1248	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U
11097-69-1	AROCLOR 1254	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U
11096-82-5	AROCLOR 1260	8082	mg/kg	0.035	U	0.037	U	0.036	U	0.035	U	0.037	U	0.037	U

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31001 3101 1-Nov-05 0 to 2 FT		31002 3101 1-Nov-05 2 to 4 FT		31003 3101 1-Nov-05 4 to 6 FT		31144 3102 9-Nov-05 0 to 2 FT		31145 3102 9-Nov-05 2 to 4 FT		31004 3103 2-Nov-05 0 to 2 FT		31005 3103 2-Nov-05 2 to 4 FT		31006 3103 2-Nov-05 4.5 to 6.5 FT		31007 3104 2-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	3.2	J	6.1	U	1.2	J	0.88	U	0.74	U	5.1	U	5.2	U	1.7	J	0.3	J
7440-38-2	ARSENIC	6010B	mg/kg	26.8		5		14.7		7.7		17.4		8.2		29.8		23.8		9.5	
7440-39-3	BARIUM	6010B	mg/kg	179		95.9		140		254		88.9		301		164		94.1		240	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.14	J	0.24	U	0.0095	U	0.24		0.26	U	0.33		0.3		0.21	U	0.21	
7440-43-9	CADMIUM	6010B	mg/kg	0.62		0.12	J	0.28		0.51		0.76		0.44		0.5		0.32		0.39	
7440-47-3	CHROMIUM	6010B	mg/kg	20	J	106	J	73.1	J	9.8	J	38.7	J	26.8	J	25.2	J	63.2	J	19.2	J
7440-48-4	COBALT	6010B	mg/kg	12.8		20.5		15.5		10.9		17		13.6		12.9		16.9		10.6	
7440-50-8	COPPER	6010B	mg/kg	30.6		32		31.3		22.5	J	39.8	J	51.4		27.2		35.6		30.8	
7439-89-6	IRON	6010B	mg/kg	45000		30400		43100		44300		48400		41000		42400		37000		30800	
7439-92-1	LEAD	6010B	mg/kg	107		33.1		55.9		18.8		31.2		22.9		94.8		60.2		39.5	
7439-97-6	MERCURY	7471A	mg/kg	1.2		1.4		0.68		0.35		0.48		0.17	J	0.46		0.64		0.2	J
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.24	U	2.5		0.21	U	0.26	U	0.21	U	0.21	U	0.21	U	0.21	U
7440-02-0	NICKEL	6010B	mg/kg	17.1	J	200	J	111	J	15.7		35.1		24.3	J	24.5	J	105	J	22.6	J
7782-49-2	SELENIUM	6010B	mg/kg	3	J	3.1	J	1.3	J	0.53	U	0.66	U	2.1	J	1.3	J	1.4	J	1.9	J
7440-22-4	SILVER	6010B	mg/kg	0.55	U	0.61	U	0.57	U	0.53	U	0.66	U	0.51	U	0.52	U	0.54	U	0.53	U
7440-28-0	THALLIUM	6010B	mg/kg	2.3		0.26	U	0.85	U	1.9		0.49	J	2.1		3.7		1	U	1.5	
7440-62-2	VANADIUM	6010B	mg/kg	44.6		50		42.3		44		74.4		47.2		42.2		56.1		42.2	
7440-66-6	ZINC	6010B	mg/kg	194		87.3		127		120		182		115		189		161		108	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31008 3104 2-Nov-05 2 to 4 FT		31009 3104 2-Nov-05 4 to 6 FT		31010 3105 2-Nov-05 0 to 2 FT		31011 3105 2-Nov-05 2 to 4 FT		31012 3105 2-Nov-05 4 to 6 FT		31013 3105 2-Nov-05 4 to 6 FT		31014 3106 3-Nov-05 0 to 2 FT		31015 3106 3-Nov-05 2 to 4 FT		31016 3106 3-Nov-05 4 to 6 FT	
(Group Code)	**(Group Description)**																				
7440-36-0	ANTIMONY	6010B	mg/kg	0.28	J	0.6	J	5.2	U	5.3	U	5.2	U	5.2	U	0.61	U	0.82	U	0.49	U
7440-38-2	ARSENIC	6010B	mg/kg	8.1		9.8		7.9		18.8		9.7	J	2	J	4.6		42.4		6.8	
7440-39-3	BARIUM	6010B	mg/kg	231		101		378		311		90.3	J	47	J	114		360		67.6	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.34		0.066	J	0.4		0.26		0.33	J	0.21	UJ	0.07	J	0.23	J	0.21	U
7440-43-9	CADMIUM	6010B	mg/kg	0.11	J	0.14	J	0.37		0.65		0.066	J	0.21	UJ	0.21	J	0.41		0.083	J
7440-47-3	CHROMIUM	6010B	mg/kg	62.4	J	69.4	J	28.9	J	24.3	J	73.1	J	30.3	J	11.8		24.6		79.3	
7440-48-4	COBALT	6010B	mg/kg	19.6		12.2		16		12.4		15.3	J	4.7	J	8.6		16.2		15.5	
7440-50-8	COPPER	6010B	mg/kg	52		41.9		59.4		26.7		27.8	J	4.9	J	21.9		24.5		28.3	
7439-89-6	IRON	6010B	mg/kg	30400		29400		42700		43000		25300	J	8000	J	27800		43400		26300	
7439-92-1	LEAD	6010B	mg/kg	14.8		41.5		21.1		96.7		8.9	J	1.9	J	6.9		16.5		18.5	
7439-97-6	MERCURY	7471A	mg/kg	0.88		0.78		0.13	J	0.32		0.22	J	0.041	J	0.17	U	0.59	U	0.17	U
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.26	U	0.21	U	0.21	U	0.21	U	0.21	U	0.22	U	0.097	U	0.21	U
7440-02-0	NICKEL	6010B	mg/kg	109	J	67.7	J	24.7	J	17.8	J	69.1		23.6	J	21		41.6		101	
7782-49-2	SELENIUM	6010B	mg/kg	2.7	J	1.4	J	2.8	J	2.2	J	0.88	J	0.71	J	1.3	U	1.2	U	0.24	U
7440-22-4	SILVER	6010B	mg/kg	0.55	U	0.65	U	0.52	U	0.53	U	0.52	U	0.52	U	0.54	U	0.57	U	0.54	U
7440-28-0	THALLIUM	6010B	mg/kg	1.6		0.35	U	2.8		2.7		0.67	UJ	0.52	UJ	0.58	U	2.8		1.2	
7440-62-2	VANADIUM	6010B	mg/kg	51.1		49.9		50.7		46.6		52.6	J	19.3	J	30.9		44.5		51.5	
7440-66-6	ZINC	6010B	mg/kg	82.3		86.6		106		175		86.3	J	15.6	J	76.4		142		78.9	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31017 3107 3-Nov-05 0 to 2 FT		31018 3107 3-Nov-05 2 to 4 FT		31019 3107 3-Nov-05 4 to 6 FT		31020 3108 3-Nov-05 0 to 2 FT		31021 3108 3-Nov-05 0 to 2 FT		31022 3108 3-Nov-05 2 to 4 FT		31023 3108 3-Nov-05 4 to 7 FT		31024 3109 3-Nov-05 0 to 2 FT		31025 3109 3-Nov-05 2 to 4 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	0.56	U	5.7	U	7	U	5.3	UJ	0.3	UJ	0.72	U	0.82	U	0.38	U	0.58	U
7440-38-2	ARSENIC	6010B	mg/kg	4.5		10.7		10.7		14.2	J	6.5	J	9.1		11.4		6.8		7.4	
7440-39-3	BARIUM	6010B	mg/kg	90.6		181		79.9		261		211		204		188		355		89.1	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.1	J	0.23	U	0.28	U	0.0065	J	0.21	J	0.18	J	0.051	J	0.14	J	0.065	J
7440-43-9	CADMIUM	6010B	mg/kg	0.32		0.36		0.045	J	0.35		0.24		0.26		0.44		0.37		0.03	J
7440-47-3	CHROMIUM	6010B	mg/kg	31.6		64.7		80		35.1		28.6		22.7		34		54.1		64.5	
7440-48-4	COBALT	6010B	mg/kg	10.7		17.1		10.8		14.4		10.5		9.4		11.5		15.4		15	
7440-50-8	COPPER	6010B	mg/kg	17.5		32.4		51.7		26.6		40.5		39.6		33.2		66		23.1	
7439-89-6	IRON	6010B	mg/kg	15300		30400		35800		40700		31000		26600		30500		47900		24000	
7439-92-1	LEAD	6010B	mg/kg	36.7		39.7		40.3		17.7		13		11.7		26.2		13.3		11.2	
7439-97-6	MERCURY	7471A	mg/kg	0.15	U	0.36	U	0.37	U	0.48	UJ	0.11	UJ	0.14	U	0.18	U	0.11	U	0.79	U
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.25	U	0.23	U	0.28	U	0.21	U	0.23	U	0.21	U	0.31	U	0.22	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	36.3		113		60.1		60.5	J	27.5	J	18.9		30.8		32.5		152	
7782-49-2	SELENIUM	6010B	mg/kg	0.9	U	1.2	U	0.69	U	1.7	U	1.3	UJ	1.2	U	1.3	U	0.58	U	0.85	U
7440-22-4	SILVER	6010B	mg/kg	0.61	U	0.57	U	0.7	U	0.53	U	0.58	UJ	0.53	U	0.52	U	0.56	U	0.54	U
7440-28-0	THALLIUM	6010B	mg/kg	0.61	U	0.57	U	0.38	U	2.3		1.5		1.3		1.1		2.2		0.54	U
7440-62-2	VANADIUM	6010B	mg/kg	31.2		43.3		62.1		48.8		41.5		37.7		46.4		76.9		33.4	
7440-66-6	ZINC	6010B	mg/kg	92.8		100		96.7		113		87.7		80.9		123		113		60.6	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31026 3109 3-Nov-05 4 to 6 FT		31027 3110 3-Nov-05 0 to 2 FT		31028 3110 3-Nov-05 3 to 4 FT		31029 3110 3-Nov-05 4.5 to 6.5 FT		31030 3111 3-Nov-05 0 to 2 FT		31031 3111 3-Nov-05 2 to 4 FT		31032 3111 3-Nov-05 4 to 6 FT		31033 3112 3-Nov-05 0 to 2 FT		31034 3112 3-Nov-05 2 to 4 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.8	U	5.4	U	1.1	U	0.78	U	0.82	U	0.31	U	5.3	U	0.71	U	0.7	U
7440-38-2	ARSENIC	6010B	mg/kg	2.9		13.2		6.7		10.1		7.2		5.9		9		11.1		11.5	
7440-39-3	BARIUM	6010B	mg/kg	31.3		174		162		146		180		172		189		145		93.6	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.23	U	0.22	U	0.21	U	0.22	U	0.21	J	0.097	J	0.21	U	0.081	J	0.23	U
7440-43-9	CADMIUM	6010B	mg/kg	0.18	J	0.32		0.14	J	0.19	J	0.26		0.32		0.075	J	0.24		0.16	J
7440-47-3	CHROMIUM	6010B	mg/kg	43.8		38.9		49.7		35.4		26.5		14.6		22.5		12.7		54.9	
7440-48-4	COBALT	6010B	mg/kg	9		13.4		14.5		10.9		12.3		12.2		12.4		8.5		17.9	
7440-50-8	COPPER	6010B	mg/kg	19.5		33.9		28.7		29.6		28.5		25.3		22.2		23.1		50.1	
7439-89-6	IRON	6010B	mg/kg	14100		29900		27500		26300		40500		43700		21400		21700		31300	
7439-92-1	LEAD	6010B	mg/kg	36.9		35.8		18.2		22.9		14.1		8.2		15.8		25.5		14	
7439-97-6	MERCURY	7471A	mg/kg	0.13	U	0.31	U	0.29	U	0.44		0.54		0.72		0.32		0.51		0.63	
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.23	U	0.22	U	0.21	U	0.15	U	0.21	U	0.22	U	0.21	U	0.22	U	0.23	U
7440-02-0	NICKEL	6010B	mg/kg	45.5		55		91		45.1		42.9		12.8		41.9		19		107	
7782-49-2	SELENIUM	6010B	mg/kg	0.66	U	0.46	U	1.5	U	1.2	U	1.3	U	0.84	U	0.99	U	1.4	U	1.7	U
7440-22-4	SILVER	6010B	mg/kg	0.58	U	0.54	U	0.53	U	0.56	U	0.52	U	0.55	U	0.53	U	0.55	U	0.56	U
7440-28-0	THALLIUM	6010B	mg/kg	0.58	U	1	U	0.53	U	0.56	U	1.5		1.8		0.53	U	0.87	U	0.53	U
7440-62-2	VANADIUM	6010B	mg/kg	33.5		44.2		38.4		41.6		41.7		47.1		24.3		28.9		55.4	
7440-66-6	ZINC	6010B	mg/kg	59		117		75.8		86		102		112		66.2		75.7		95	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31035 3112 3-Nov-05 4.5 to 6.5 FT		31036 3112 3-Nov-05 4.5 to 6.5 FT		31037 3113 3-Nov-05 0 to 2 FT		31038 3113 3-Nov-05 2 to 4 FT		31039 3113 3-Nov-05 4 to 6 FT		31040 3114 3-Nov-05 0 to 2 FT		31041 3114 3-Nov-05 2 to 4 FT		31042 3114 3-Nov-05 4 to 7 FT		31043 3115 3-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	0.74	UJ	5.5	UJ	0.63	U	5.4	U	5.4	U	0.49	U	0.27	U	6.5		0.75	U
7440-38-2	ARSENIC	6010B	mg/kg	9.7	J	4.1	J	9.4		4.9		3		8.7		5.7		6.1		15.5	
7440-39-3	BARIUM	6010B	mg/kg	157	J	65.8	J	287		57.7		43.4		170		127		84.2		167	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.22	UJ	0.31	J	0.13	J	0.22	U	0.6	J	0.17	J	0.23	U	0.18	J	0.22	U
7440-43-9	CADMIUM	6010B	mg/kg	0.1	J	0.026	J	0.44		0.22	U	0.22	U	0.28		0.23	U	0.062	J	0.69	
7440-47-3	CHROMIUM	6010B	mg/kg	29.9	J	118	J	44.1		140		91.6		50.7		139		113		31.2	
7440-48-4	COBALT	6010B	mg/kg	13.1		20.4		17.2		28.3		19.2		16		28		20.1		9.8	
7440-50-8	COPPER	6010B	mg/kg	26.8	J	15.3	J	56		27.8		10		49		29.9		23.2		25	
7439-89-6	IRON	6010B	mg/kg	22600		24100		41900		30100		20500		44200		29600		27900		22400	
7439-92-1	LEAD	6010B	mg/kg	12.5		18.6		22.6		8.5		6.8		24.5		25.1		16.6		168	
7439-97-6	MERCURY	7471A	mg/kg	0.33	J	1.2	J	0.28		1		2.1		0.66		1.2		1		0.38	
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.22	U	0.21	U	0.22	U	0.22	U	0.23	U	0.23	U	0.26	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	53.9	J	309	J	41.4		357		317		88.2		378		272		44.6	
7782-49-2	SELENIUM	6010B	mg/kg	0.82	UJ	0.55	U	0.74	U	0.54	U	0.53	U	0.39	U	0.57	U	0.25	U	0.94	U
7440-22-4	SILVER	6010B	mg/kg	0.55	U	0.55	U	0.54	U	0.54	U	0.54	U	0.58	U	0.57	U	0.65	U	0.54	U
7440-28-0	THALLIUM	6010B	mg/kg	0.55	UJ	0.71	UJ	1.6		0.23	U	0.58	U	1.3		0.17	U	0.73	U	0.3	U
7440-62-2	VANADIUM	6010B	mg/kg	26.7		30.3		60		53.6		23.7		54.4		40.2		35.4		35.5	
7440-66-6	ZINC	6010B	mg/kg	72.5		55.9		116		67.6		39.9		123		79		73.2		138	

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Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31044 3115 3-Nov-05 2 to 4 FT		31045 3115 3-Nov-05 4 to 6 FT		31046 3115 3-Nov-05 4 to 6 FT		31047 3116 4-Nov-05 0 to 2 FT		31048 3116 4-Nov-05 2 to 4 FT		31049 3116 4-Nov-05 4 to 6 FT		31052 3117 4-Nov-05 0 to 2 FT		31053 3117 4-Nov-05 2 to 4 FT		31054 3117 4-Nov-05 4 to 6 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	1.1	U	0.72	UJ	2.5	J	2.2	J	0.9	U	5.6	U	5.7	U	1.7	J	1.4	J
7440-38-2	ARSENIC	6010B	mg/kg	26.3		7.1	J	36.5	J	11.5		6.3		2.9		11.5		5.4		9.4	
7440-39-3	BARIUM	6010B	mg/kg	464		43.5	J	479	J	107		134		49.4		340		149		240	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.24	J	0.27	U	0.23	U	0.15	J	0.058	J	0.45		0.37		0.17	J	0.19	J
7440-43-9	CADMIUM	6010B	mg/kg	0.52		0.089	J	0.44	J	0.21	J	0.24		0.22	U	0.47		0.088	J	0.27	
7440-47-3	CHROMIUM	6010B	mg/kg	11.4		77.7	J	28.4	J	123		79.2		55		41.3		78.5		95.7	
7440-48-4	COBALT	6010B	mg/kg	14.9		12.3		13.1		20.4		17.6		11.6		16.3		17.3		21.7	
7440-50-8	COPPER	6010B	mg/kg	23.4		41	J	22.3	J	57		28.6		11.5		63.5		40.2		54.3	
7439-89-6	IRON	6010B	mg/kg	46600		37700		33000		40800		33600		20400		48300		26000		46400	
7439-92-1	LEAD	6010B	mg/kg	17.4		14.9	J	31.5	J	16.7		14.5		7		24.5		11.6		28.7	
7439-97-6	MERCURY	7471A	mg/kg	0.82		0.37	J	1.1	J	0.49		0.87		1.4		0.28		0.76		0.48	
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.27	UJ	1.7	J	0.23	U	0.24	U	0.22	U	0.23	U	0.22	U	0.54	
7440-02-0	NICKEL	6010B	mg/kg	20.3		62.8	J	30.1	J	226		166		131		41.7		157		164	
7782-49-2	SELENIUM	6010B	mg/kg	2.3	U	1.3	UJ	0.44	UJ	0.57	U	0.61	U	0.56	U	0.57	U	0.55	U	0.59	U
7440-22-4	SILVER	6010B	mg/kg	0.56	U	0.67	U	0.57	U	0.57	U	0.61	U	0.56	U	0.57	U	0.55	U	0.59	U
7440-28-0	THALLIUM	6010B	mg/kg	2.8		0.67	UJ	1.3	J	0.54	U	1.8		0.46	U	1.7		0.99		0.79	U
7440-62-2	VANADIUM	6010B	mg/kg	42.8		63.5		40.2		58.5		45.5		26.7		65.7		46		68.4	
7440-66-6	ZINC	6010B	mg/kg	144		106		138		95.4		90.3		44.9		123		63.7		111	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31055 3118 4-Nov-05 0 to 2 FT		31056 3118 4-Nov-05 0 to 2 FT		31057 3118 4-Nov-05 2 to 4 FT		31058 3119 4-Nov-05 0 to 2 FT		31059 3119 4-Nov-05 2 to 4 FT		31060 3120 4-Nov-05 0 to 2 FT		31061 3120 4-Nov-05 2 to 4 FT		31062 3120 4-Nov-05 4 to 6_5 FT		31063 3121 4-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.5	UJ	0.32	UJ	5.4	U	1.1	U	0.6	U	0.62	U	5.4	U	7.6	U	6.3	U
7440-38-2	ARSENIC	6010B	mg/kg	6.9		6.8		14.4		10.8		2.3		14.1		4.9		8.1		11.2	
7440-39-3	BARIUM	6010B	mg/kg	135	J	78	J	84.6		107		66		318		72.8		108		183	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.16	J	0.22	UJ	0.22	U	0.21	U	0.37		0.37		0.44		0.3	U	0.12	J
7440-43-9	CADMIUM	6010B	mg/kg	0.17	J	0.11	J	0.086	J	0.45		0.22	U	0.28		0.22	U	0.17	J	0.25	
7440-47-3	CHROMIUM	6010B	mg/kg	63.8		48.4		45.3		31.9		132		49.7		59		94.8		51.9	
7440-48-4	COBALT	6010B	mg/kg	18.6		11.3		14.7		9.6		21.8		20.5		13.3		15.2		14.2	
7440-50-8	COPPER	6010B	mg/kg	35.8		21.5		34.5		22.1		13.1		76.2		12.1		42.5		48	
7439-89-6	IRON	6010B	mg/kg	31000		21100		29600		20300		23800		49600		20900		36200		32300	
7439-92-1	LEAD	6010B	mg/kg	13.4		13		15.5		86.9		11.5		20.5		9.1		37.1		15.1	
7439-97-6	MERCURY	7471A	mg/kg	0.75		0.51		0.46		0.4		2		0.23		0.89		0.32		0.51	
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.22	U	0.22	U	0.21	U	0.22	U	0.22	U	0.22	U	0.3	U	0.25	U
7440-02-0	NICKEL	6010B	mg/kg	141	J	73.8	J	81		35.8		350		39.9		127		97.2		65.6	
7782-49-2	SELENIUM	6010B	mg/kg	0.55	UJ	0.55	UJ	0.54	U	0.53	U	0.56	U	0.55	U	0.54	U	0.76	U	0.63	U
7440-22-4	SILVER	6010B	mg/kg	0.55	UJ	0.55	UJ	0.54	U	0.53	U	0.56	U	0.55	U	0.54	U	0.76	U	0.63	U
7440-28-0	THALLIUM	6010B	mg/kg	0.99	J	0.55	UJ	0.19	U	0.53	U	1.6		2.6		0.54	U	0.73	U	0.3	U
7440-62-2	VANADIUM	6010B	mg/kg	55.9		38.7		53		34.2		30.9		82.2		32.1		67.2		56	
7440-66-6	ZINC	6010B	mg/kg	70.2		53.8		89.9		107		48.4		138		45.2		117		104	

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Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31064 3121 4-Nov-05 2 to 4 FT		31065 3121 4-Nov-05 4 to 6 FT		31066 3122 4-Nov-05 0 to 2 FT		31067 3122 4-Nov-05 2 to 4 FT		31068 3122 4-Nov-05 2 to 4 FT		31069 3123 4-Nov-05 0 to 2 FT		31070 3123 4-Nov-05 2 to 4 FT		31071 3124 4-Nov-05 0 to 2 FT		31072 3124 4-Nov-05 2 to 4 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	6	U	0.51	U	0.85	U	8.5	UJ	2.1	J	0.81	U	5.8	U	0.18	U	5.5	U
7440-38-2	ARSENIC	6010B	mg/kg	3.5	J	4.9	J	7.5	J	6.2	J	12.5	J	8.2	J	6.1		14.3		4.6	
7440-39-3	BARIUM	6010B	mg/kg	61.6		48.9		407		102		110		190		84.5		188		66	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.3		0.23	U	0.084	J	0.34	U	0.3	U	0.46		0.3		0.17	J	0.44	
7440-43-9	CADMIUM	6010B	mg/kg	0.24		0.031	J	0.47		0.08	J	0.3	UJ	0.31		0.22	J	0.2	J	0.22	U
7440-47-3	CHROMIUM	6010B	mg/kg	92.6		49.8		80.7		91.6		94.1		90		42.6	J	32.8	J	124	J
7440-48-4	COBALT	6010B	mg/kg	16.5		5.5		22.2		11.8		12.8		26.2		13.7		12.2		20.4	
7440-50-8	COPPER	6010B	mg/kg	11.1		18.4		75.6		34.1	J	70.9	J	50.5		22.9		34.7		11.5	
7439-89-6	IRON	6010B	mg/kg	21700		18900		44600		39700		44000		46400		20800		45000		23500	
7439-92-1	LEAD	6010B	mg/kg	7.1		18.1		12.8		13.4		50.5	J	19.7		29.4		10.9		6.5	
7439-97-6	MERCURY	7471A	mg/kg																		
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.24	U	0.23	U	0.22	U	0.34	UJ	0.47	J	0.22	U	0.23	U	1.9		0.22	U
7440-02-0	NICKEL	6010B	mg/kg	200		33		64.2		77.2		78		263		86.1	J	21.7	J	286	J
7782-49-2	SELENIUM	6010B	mg/kg	0.6	U	0.58	U	0.54	U	0.85	UJ	0.76	U	0.55	U	0.58	U	0.55	UJ	0.55	U
7440-22-4	SILVER	6010B	mg/kg	0.6	U	0.58	U	0.54	U	0.85	UJ	0.76	U	0.55	U	0.58	U	0.55	UJ	0.55	U
7440-28-0	THALLIUM	6010B	mg/kg	1.3		0.58	U	0.65	U	1.4	J	0.76	UJ	2.6		0.58	UJ	0.55	UJ	0.55	UJ
7440-62-2	VANADIUM	6010B	mg/kg	34.5		34.5		86.7		72.1		74.2		53.2		36.4		50.1		34.6	
7440-66-6	ZINC	6010B	mg/kg	42.9		37.7		93.3		87.1		114		119		91.7		112		39.7	

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Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31073 3125 5-Nov-05 0 to 2 FT		31074 3125 5-Nov-05 2 to 4 FT		31075 3125 5-Nov-05 4 to 6 FT		31078 3126 6-Nov-05 0 to 2 FT		31079 3126 6-Nov-05 0 to 2 FT		31080 3126 6-Nov-05 2 to 4 FT		31081 3127 6-Nov-05 0 to 2 FT		31082 3127 6-Nov-05 2 to 4 FT		31083 3128 6-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.3	U	2.3	J	0.36	U	5.6	UJ	2.7	J	1.5	J	0.73	U	0.78	U	1.3	J
7440-38-2	ARSENIC	6010B	mg/kg	10.8		6.9		3.5		10.2	J	13.4	J	42.1	J	11.5	J	3.6	J	10.3	J
7440-39-3	BARIUM	6010B	mg/kg	476		176		55.7		161		141		37.2		127		63.9		163	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.19	J	0.23	U	0.66		0.13	J	0.22	UJ	0.18	J	0.22	U	0.64		0.077	J
7440-43-9	CADMIUM	6010B	mg/kg	0.54		1.5		0.033		0.26	J	0.53	J	0.097	J	0.7		0.043	J	0.23	
7440-47-3	CHROMIUM	6010B	mg/kg	79.1		35.8		24.9		45.5		34.6		3		29		32.3		67.7	
7440-48-4	COBALT	6010B	mg/kg	28.2		10.2		8.8		14.3		10.6		6.1		8.7		7.4		12.4	
7440-50-8	COPPER	6010B	mg/kg	106		29.4		9.6		41.6		26.6		3.6		26.3		10.1		38.1	
7439-89-6	IRON	6010B	mg/kg	52700		44400		18400		39500		26400		27700		26400		18700		27700	
7439-92-1	LEAD	6010B	mg/kg	14.7		79.3		8.8		17.6	J	114	J	8.8		167		8		54	
7439-97-6	MERCURY	7471A	mg/kg	0.19	J	0.92		0.21	J	0.55	U	0.33	U	0.67	U	0.22	U	1.1	U	1.3	U
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.21	U	0.23	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	56.3		41.6		33.5		72.3	J	34.4	J	2.4		31.1		34.4		60.3	
7782-49-2	SELENIUM	6010B	mg/kg	0.53	U	0.58	U	0.56	U	0.56	U	0.54	U	0.55	U	2		0.55	U	0.6	U
7440-22-4	SILVER	6010B	mg/kg	0.53	U	0.58	U	0.56	U	0.56	U	0.54	U	0.55	U	0.56	U	0.55	U	0.56	U
7440-28-0	THALLIUM	6010B	mg/kg	2.4		0.58	U	0.56	U	0.82	UJ	1.6	J	2.6		2.2		0.26	U	0.44	U
7440-62-2	VANADIUM	6010B	mg/kg	91.1		28.2		26.2		51.7		38.6		22.6		36.9		28.4		47.7	
7440-66-6	ZINC	6010B	mg/kg	120		901		41.9		98.1		129		89.3		153		41.6		101	

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Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31084 3129 6-Nov-05 0 to 2 FT		31085 3130 6-Nov-05 0 to 2 FT		31086 3130 6-Nov-05 2 to 4 FT		31156 3131 10-Nov-05 0 to 2 FT		31157 3131 10-Nov-05 2 to 4 FT		31087 3132 6-Nov-05 0 to 2 FT		31088 3132 6-Nov-05 2 to 4 FT		31089 3132 6-Nov-05 2 to 4 FT		31090 3132 6-Nov-05 5 to 7 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	0.93	U	1.4	J	0.32	U	0.46	U	0.56	U	0.94	U	5.6	UJ	0.69	UJ	0.81	U
7440-38-2	ARSENIC	6010B	mg/kg	8.1	J	16.7	J	3.2	J	18.4		8.3		8.1	J	3.4	J	2.4	J	4.5	J
7440-39-3	BARIUM	6010B	mg/kg	148		345		51.8		361		459		234		56.3		56		57	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.22	U	0.36		0.55		0.35		0.08	J	0.23		0.096	J	0.22	J	0.074	J
7440-43-9	CADMIUM	6010B	mg/kg	0.42		0.4		0.063	J	0.52	U	0.64	U	0.32		0.096	J	0.092	J	0.22	U
7440-47-3	CHROMIUM	6010B	mg/kg	35.9		21.8		60.5		65	J	123	J	23.4		39.4		44.5		25.1	
7440-48-4	COBALT	6010B	mg/kg	13.7		13.4		13.3		23.5		28.6		14.9		10.8		10.1		7.7	
7440-50-8	COPPER	6010B	mg/kg	29.4		53.6		17		118	J	86.5	J	41.5		33.2		20.5		10.4	
7439-89-6	IRON	6010B	mg/kg	31600		45600		21700		53300		50100		43400		23700		17800		17800	
7439-92-1	LEAD	6010B	mg/kg	18.4		23.5		7.1		18.7		14.3		17.6		11.7		12.9		9.2	
7439-97-6	MERCURY	7471A	mg/kg	0.2	U	0.46	U	2	U					0.38	U	1	U	1.1	U	1.1	U
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.23	U	0.22	U	0.24	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	43.7		21.3		152		50.7		219		32.8		68.7		78.2		31.3	
7782-49-2	SELENIUM	6010B	mg/kg	0.55	U	0.54	U	0.54	U	0.55	U	0.56	U	0.57	U	0.56	U	0.6	U	0.55	U
7440-22-4	SILVER	6010B	mg/kg	0.55	U	0.54	U	0.54	U	0.55	U	0.56	U	0.57	U	0.56	U	0.6	U	0.55	U
7440-28-0	THALLIUM	6010B	mg/kg	0.41	U	1.1	U	0.54	U	3.3		0.94		1.8		0.56	U	0.6	U	0.55	U
7440-62-2	VANADIUM	6010B	mg/kg	42.3		50.8		40.1		98		102		42		52		31.8		26.7	
7440-66-6	ZINC	6010B	mg/kg	107		131		41.1		133		121		112		56.4		49.1		43	

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Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31091 3133 6-Nov-05 0 to 2 FT		31092 3133 6-Nov-05 2 to 4 FT		31093 3133 6-Nov-05 5 to 7 FT		31094 3134 6-Nov-05 0 to 2 FT		31095 3134 6-Nov-05 2 to 4 FT		31096 3134 6-Nov-05 4.5 to 6.5 FT		31158 3135 10-Nov-05 0 to 2 FT		31159 3135 10-Nov-05 2 to 4 FT		31097 3136 7-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.7	U	5.4	U	5.5	U	5.7	U	6.2	U	5.6	U	0.31	U	1.5	U	5.5	U
7440-38-2	ARSENIC	6010B	mg/kg	4.6	U	13.6	U	4.4	U	12	U	4.7	U	7.7	U	6.7		30.8		13.9	U
7440-39-3	BARIUM	6010B	mg/kg	46.9	U	265	U	79.3	U	209	U	53	U	136	U	231		186		303	U
7440-41-7	BERYLLIUM	6010B	mg/kg	0.38	U	0.56	U	0.5	U	0.23	U	0.18	U	0.22	U	0.24		0.21	U	0.22	U
7440-43-9	CADMIUM	6010B	mg/kg	0.21	U	0.16	U	0.22	U	0.26	U	0.14	U	0.22	U	0.35	U	0.56	U	0.15	U
7440-47-3	CHROMIUM	6010B	mg/kg	176	U	27	U	25.4	U	67.8	U	197	U	73.8	U	19.3	J	11.9	J	45	U
7440-48-4	COBALT	6010B	mg/kg	21.8	U	15.3	U	6.6	U	14.9	U	27.6	U	10.9	U	11.8		11.6		14.8	U
7440-50-8	COPPER	6010B	mg/kg	10.5	U	44.7	U	8.9	U	44.6	U	14.1	U	32.2	U	37.1	J	13.4	J	54	U
7439-89-6	IRON	6010B	mg/kg	21700	U	56600	U	16900	U	42500	U	25600	U	26400	U	51700		47100		41800	U
7439-92-1	LEAD	6010B	mg/kg	7.6	U	13.5	U	8.2	U	22.5	U	11.2	U	13.9	U	11.4		69.4		17.4	U
7439-97-6	MERCURY	7471A	mg/kg	2	U	0.47	U	1.9	U	0.23	U	1.5	U	0.36	U					0.24	U
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.23	U	0.22	U	0.22	U	0.23	U	0.25	U	0.56	U	0.21	U	0.21	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	389	U	22.9	U	34.3	U	46.5	U	474	U	63.1	U	18.4		13.3		44.7	U
7782-49-2	SELENIUM	6010B	mg/kg	0.57	U	0.54	U	0.55	U	0.57	U	0.62	U	0.56	U	0.54	U	0.52	U	0.55	U
7440-22-4	SILVER	6010B	mg/kg	0.57	U	0.54	U	0.55	U	0.57	U	0.62	U	0.56	U	0.54	U	0.52	U	0.55	U
7440-28-0	THALLIUM	6010B	mg/kg	0.57	U	1.2	U	0.55	U	0.57	U	0.62	U	0.56	U	2.4		2.7		0.55	U
7440-62-2	VANADIUM	6010B	mg/kg	26.1	U	64.1	U	23.1	U	71.6	U	31	U	47.3	U	51		45.7		63	U
7440-66-6	ZINC	6010B	mg/kg	39.1	U	133	U	38	U	90.9	U	47.7	U	74.6	U	105		150		98.9	U

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31098 3136 7-Nov-05 2 to 4 FT		31099 3136 7-Nov-05 4 to 6 FT		31100 3136 7-Nov-05 4 to 6 FT		31160 3137 10-Nov-05 0 to 2 FT		31161 3137 10-Nov-05 2 to 4 FT		31101 3138 7-Nov-05 0 to 2 FT		31102 3138 7-Nov-05 2 to 4 FT		31103 3138 7-Nov-05 4 to 6 FT		31104 3139 7-Nov-05 0 to 2 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.6	U	5.7	U	0.36	U	0.92	U	0.81	U	5.3	UJ	5.5	U	6	U	5.3	U
7440-38-2	ARSENIC	6010B	mg/kg	9.6	U	3.5	U	4.2	U	9		11.8		7.3	UJ	11.1	U	15.9	U	13.4	
7440-39-3	BARIUM	6010B	mg/kg	51.6	U	70	U	81.4	U	312		225		111	UJ	269	U	187	U	233	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.048	U	0.53	U	0.54	U	0.22		0.26		0.21	UJ	0.22	U	0.24	U	0.15	J
7440-43-9	CADMIUM	6010B	mg/kg	0.22	U	0.023	U	0.23	U	0.48	U	0.49	U	0.28	UJ	0.045	U	0.24	U	0.22	
7440-47-3	CHROMIUM	6010B	mg/kg	117	U	22.7	U	42.5	U	55.3	J	28.3	J	32.2	UJ	46.7	U	59.1	U	33.7	J
7440-48-4	COBALT	6010B	mg/kg	19.1	U	10.5	U	11.7	U	17.5		12.7		9.5	UJ	19.8	U	14.3	U	13.7	
7440-50-8	COPPER	6010B	mg/kg	42.7	U	10.8	U	10.3	U	72.2	J	44.9	J	28.6	UJ	37.8	U	27.2	U	38	
7439-89-6	IRON	6010B	mg/kg	26000	U	18100	U	18300	U	59100		50200		19600	UJ	28900	U	25800	U	40100	
7439-92-1	LEAD	6010B	mg/kg	8.4	U	8.9	U	8.6	U	14.6		19.7		89	UJ	17.6	U	11.4	U	20	
7439-97-6	MERCURY	7471A	mg/kg	1.1	U	0.57	U	1.2	U					0.3	UJ	0.33	U	0.24	U		
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.23	U	0.23	U	0.21	U	0.22	U	0.49	UJ	0.22	U	0.24	U	0.21	UJ
7440-02-0	NICKEL	6010B	mg/kg	244	U	55.7	U	89.5	U	35.1		29.6		34	UJ	72.6	U	67.1	U	44.2	J
7782-49-2	SELENIUM	6010B	mg/kg	0.56	U	0.57	U	0.58	U	0.53	U	0.54	U	0.53	UJ	0.55	U	0.6	U	0.53	U
7440-22-4	SILVER	6010B	mg/kg	0.56	U	0.57	U	0.58	U	0.53	U	0.54	U	0.53	UJ	0.55	U	0.6	U	0.53	U
7440-28-0	THALLIUM	6010B	mg/kg	0.56	U	0.57	U	0.58	U	1.4		1.4		0.53	UJ	0.55	U	0.6	U	0.53	UJ
7440-62-2	VANADIUM	6010B	mg/kg	48.5	U	25.2	U	29.3	U	71.9		56.2		39.5	UJ	41.4	U	47.1	U	49.3	
7440-66-6	ZINC	6010B	mg/kg	54.7	U	42.8	U	41.1	U	125		120		84.4	UJ	86.3	U	71.9	U	121	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31105 3139 7-Nov-05 2 to 4 FT		31106 3140 7-Nov-05 0 to 2 FT		31107 3140 7-Nov-05 2 to 4 FT		31108 3141 7-Nov-05 0 to 2 FT		31109 3141 7-Nov-05 2 to 4 FT		31110 3141 7-Nov-05 4 to 6 FT		31111 3141 7-Nov-05 4 to 6 FT		31112 3142 7-Nov-05 0 to 2 FT		31113 3142 7-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																				
7440-36-0	ANTIMONY	6010B	mg/kg	0.14	J	5.6	U	5.5	U	5.3	U	5.6	U	1.5	J	5.5	UJ	5.5	U	5.3	U
7440-38-2	ARSENIC	6010B	mg/kg	12.5		11.9		3.7		15.3		6.2		6.2	J	3.6	J	12.5		3.9	
7440-39-3	BARIUM	6010B	mg/kg	219		440		43		222		184		30.9		41.3		180		49.2	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.066	U	0.25		0.31		0.21		0.44		0.22	J	0.068	UJ	0.22	U	0.35	
7440-43-9	CADMIUM	6010B	mg/kg	0.098	J	0.16	J	0.22	U	0.34		0.13	J	0.071	J	0.042	J	0.13	J	0.2	J
7440-47-3	CHROMIUM	6010B	mg/kg	27.4	J	78.3	J	109	J	23.7		146		32.3		40.5		73.2		130	
7440-48-4	COBALT	6010B	mg/kg	11.9		22.1		16.9		13.3		23.2		10.5		9.5		18.2		21.1	
7440-50-8	COPPER	6010B	mg/kg	40.9		102		10.1		49.4		23.8		12.9		12.5		40.1		10.6	
7439-89-6	IRON	6010B	mg/kg	39500		67000		20200		52600		28100		12700		13800		32100		21900	
7439-92-1	LEAD	6010B	mg/kg	14.3		13		6.3		22.3		11		13.9		9.4		15.3		6.1	
7439-97-6	MERCURY	7471A	mg/kg																		
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.21	U	0.22	U	0.22	U	0.21	U	0.22	U	0.23	U	0.22	U	0.22	U	0.21	U
7440-02-0	NICKEL	6010B	mg/kg	30.6	J	55.2	J	268	J	21.1		344		34.5		31.9		98.7		356	
7782-49-2	SELENIUM	6010B	mg/kg	0.54	U	0.56	U	0.55	U	0.53	U	0.56	U	0.57	U	0.55	U	0.55	U	0.53	U
7440-22-4	SILVER	6010B	mg/kg	0.54	U	0.56	U	0.55	U	0.53	U	0.56	U	0.57	U	0.55	U	0.55	U	0.53	U
7440-28-0	THALLIUM	6010B	mg/kg	0.54	UJ	1.5	J	0.55	UJ	0.2	UJ	0.56	UJ	0.57	UJ	0.55	UJ	0.55	UJ	0.53	UJ
7440-62-2	VANADIUM	6010B	mg/kg	48.9		104		25.7		58.3		39.4		20.9		27.6		63.3		25.3	
7440-66-6	ZINC	6010B	mg/kg	93.1		109		37.1		165		58		33.1		34.7		87.1		39.7	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31114 3143 8-Nov-05 0 to 2 FT		31115 3143 8-Nov-05 2 to 4 FT		31116 3144 8-Nov-05 0 to 2 FT		31117 3144 8-Nov-05 2 to 4 FT		31118 3144 8-Nov-05 4 to 6 FT		31119 3145 8-Nov-05 2 to 4 FT		31120 3145 8-Nov-05 0 to 2 FT		31121 3145 8-Nov-05 4 to 6 FT		31122 3145 8-Nov-05 4 to 6 FT	
(Group Code) (Group Description)																					
7440-36-0	ANTIMONY	6010B	mg/kg	5.3	U	5.2	U	0.6	J	5.6	U	6	U	6	U	5.6	U	6.5	U	6.6	U
7440-38-2	ARSENIC	6010B	mg/kg	3.7		2.8		32.6		5		8.3		13.2		7.6		13.9		13.8	
7440-39-3	BARIUM	6010B	mg/kg	79.7		36.7		139		74.5		237		133		118		118		105	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.27		0.21	U	0.21	U	0.089	J	0.24	U	0.24	U	0.22	U	0.26	U	0.27	U
7440-43-9	CADMIUM	6010B	mg/kg	0.03	J	0.92		0.67		0.22	U	0.39		0.4		0.28		0.017	J	0.083	J
7440-47-3	CHROMIUM	6010B	mg/kg	25.7		40.4		18.1		152		58.9		54.1		35.7		99.4		98.2	
7440-48-4	COBALT	6010B	mg/kg	9.1	J	6.4	J	10.3	J	23.5	J	17.5	J	12.8	J	10.2	J	13.2	J	14.6	J
7440-50-8	COPPER	6010B	mg/kg	11.6		7.3		22.2		13.7		32.4		35.1		28		48.5		47.6	
7439-89-6	IRON	6010B	mg/kg	18500	J	10500	J	47200	J	25400	J	30000	J	30800	J	20800	J	52000	J	49200	J
7439-92-1	LEAD	6010B	mg/kg	9.8	J	10.6	J	110	J	10	J	30.8	J	36.9	J	88.1	J	42.7	J	42.1	J
7439-97-6	MERCURY	7471A	mg/kg	0.98		0.6		0.77		1.6		0.65		0.75		1		0.94	J	0.47	J
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.21	U	0.21	U	0.79	U	0.22	U	0.24	U	0.24	U	0.19	U	0.26	UJ	0.3	UJ
7440-02-0	NICKEL	6010B	mg/kg	34.5	J	33.5	J	11.9	J	364	J	65.3	J	67.4	J	40.6	J	81.9	J	80.7	J
7782-49-2	SELENIUM	6010B	mg/kg	0.53	U	0.52	U	0.53	U	0.56	U	0.6	U	0.6	U	0.56	U	0.65	U	0.66	
7440-22-4	SILVER	6010B	mg/kg	0.53	U	0.52	U	0.53	U	0.56	U	0.6	U	0.6	U	0.56	U	0.65	U	0.66	U
7440-28-0	THALLIUM	6010B	mg/kg	0.53	UJ	0.52	UJ	0.67	UJ	0.56	UJ	0.6	UJ	0.6	UJ	0.56	UJ	0.65	UJ	0.66	UJ
7440-62-2	VANADIUM	6010B	mg/kg	21.9		27		40.8		33.2		66.9		55.2		45		74.9		74	
7440-66-6	ZINC	6010B	mg/kg	46.1		27.5		176		47.3		105		128		79.9		104		105	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31132 3146 8-Nov-05 0 to 2 FT		31133 3146 8-Nov-05 2 to 4 FT		31134 3146 8-Nov-05 4 to 6 FT		31135 3147 9-Nov-05 0 to 2 FT		31136 3147 9-Nov-05 2 to 4 FT		31137 3148 9-Nov-05 0 to 2 FT		31138 3148 9-Nov-05 2 to 4 FT		31139 3149 9-Nov-05 0 to 2 FT		31140 3149 9-Nov-05 2 to 4 FT	
(Group Code)	**(Group Description)**																				
7440-36-0	ANTIMONY	6010B	mg/kg	5.5	U	5.6	U	6.9	U	1.1	U	0.91	U	0.97	U	1.1	U	5.5	U	5.4	U
7440-38-2	ARSENIC	6010B	mg/kg	10.6		4.3		11.5		27.2		17.4		7.5		23.7		6.3		11.6	
7440-39-3	BARIUM	6010B	mg/kg	257		48.2		127		187		250		160		117		129		291	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.17	J	0.42		0.28	U	0.022	J	0.45		0.21	U	0.22	U	0.22	U	0.19	J
7440-43-9	CADMIUM	6010B	mg/kg	0.23		0.22	U	0.13	J	0.88		0.67		0.4		0.48		0.28		0.36	
7440-47-3	CHROMIUM	6010B	mg/kg	36.9		134		109		34.6	J	30.7	J	32.3	J	39.2	J	115	J	47.1	J
7440-48-4	COBALT	6010B	mg/kg	14.6	J	19.6	J	13.7	J	15.3		13.9		12.1		15.4		24.6		11.5	
7440-50-8	COPPER	6010B	mg/kg	51		9.7		55.5		56.5	J	47.7	J	26.8	J	40.4	J	33.1	J	74	J
7439-89-6	IRON	6010B	mg/kg	44400	J	21800	J	34500	J	49400		53300		28500		44400		33000		45800	
7439-92-1	LEAD	6010B	mg/kg	19.9	J	6.1	J	24.7	J	139		55.2		32.6		29.9		19.3		16.6	
7439-97-6	MERCURY	7471A	mg/kg	0.34		2.4		0.86		0.84		0.44		0.36		0.63		0.71		0.16	J
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.22	U	0.22	U	0.46	U	0.21	U	0.21	U	0.21	U	0.22	U	0.22	U	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	33.5	J	297	J	81.1	J	29.6		25		43.5		51.9		246		31.9	
7782-49-2	SELENIUM	6010B	mg/kg	0.55	U	0.56	U	0.69	U	0.52	U	0.53	U	0.54	U	0.54	U	0.55	U	0.54	U
7440-22-4	SILVER	6010B	mg/kg	0.55	U	0.56	U	0.69	U	0.52	U	0.53	U	0.54	U	0.54	U	0.55	U	0.54	U
7440-28-0	THALLIUM	6010B	mg/kg	0.55	UJ	0.56	UJ	0.69	UJ	2.9		2.6		0.48	J	0.52	J	0.55	U	1.6	
7440-62-2	VANADIUM	6010B	mg/kg	56.2		27		79.8		72.8		72.3		46.3		63.6		54.6		77.4	
7440-66-6	ZINC	6010B	mg/kg	120		38.7		118		228		188		100		142		76		86.8	

Appendix G
Soil Sample Results
Inorganic Analysis

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31141 3150 9-Nov-05 0 to 2 FT		31142 3150 9-Nov-05 2 to 4 FT		31143 3150 9-Nov-05 2 to 4 FT	
(Group Code) (Group Description)									
7440-36-0	ANTIMONY	6010B	mg/kg	0.6	U	0.33	UJ	5.6	UJ
7440-38-2	ARSENIC	6010B	mg/kg	8.6		6.2	J	2.8	J
7440-39-3	BARIUM	6010B	mg/kg	150		55		34.9	
7440-41-7	BERYLLIUM	6010B	mg/kg	0.21	U	0.22	U	0.22	U
7440-43-9	CADMIUM	6010B	mg/kg	0.51		0.33		0.27	
7440-47-3	CHROMIUM	6010B	mg/kg	38.9	J	33.8	J	26.8	J
7440-48-4	COBALT	6010B	mg/kg	10.3		6.6		4.6	
7440-50-8	COPPER	6010B	mg/kg	28.4	J	16.5	J	9	J
7439-89-6	IRON	6010B	mg/kg	19900		15900		10800	
7439-92-1	LEAD	6010B	mg/kg	93.3		19.8	J	6.2	J
7439-97-6	MERCURY	7471A	mg/kg	0.21		0.15	J	0.1	J
7439-98-7	MOLYBDENUM	6010B	mg/kg	0.21	U	0.22	UJ	0.22	U
7440-02-0	NICKEL	6010B	mg/kg	33.9		31.9		25.8	
7782-49-2	SELENIUM	6010B	mg/kg	0.53	U	0.55	U	0.56	U
7440-22-4	SILVER	6010B	mg/kg	0.53	U	0.55	U	0.56	U
7440-28-0	THALLIUM	6010B	mg/kg	0.53	U	0.55	U	0.56	U
7440-62-2	VANADIUM	6010B	mg/kg	41.1		31.7		20.4	
7440-66-6	ZINC	6010B	mg/kg	95.5		93.5	J	53.7	J

APPENDIX G

Analytical Results for Groundwater Samples

Appendix G
Groundwater Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31171 / 3119 / 10-Nov-05 / 7 to 12 FT		31172 / 3119 / 10-Nov-05 / 11 to 16 FT		31123 / 3141 / 38664 / 15 to 20 FT		31125 / 3142 / 38664 / 14 to 19 FT		31126 / 3142 / 8-Nov-05 / 18 to 23 FT		31127 / 3143 / 38664 / 12 to 17 FT		31167 / 3144 / 9-Nov-05 / 15 to 20 FT		31165 / 3145 / 10-Nov-05 / 13 to 18 FT		31166 / 3145 / 10-Nov-05 / 9 to 14 FT	
(Group Code)	**(Group Description)**																				
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-34-3	1,1-DICHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	UJ	0.5	UJ
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	9		22	J	2.5	U	0.5	U	0.5	U	0.5	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
106-93-4	1,2-DIBROMOETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
95-50-1	1,2-DICHLOROBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
107-06-2	1,2-DICHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	3	J	25	U	2.5	U	0.5	U	0.5	U	0.5	U
78-87-5	1,2-DICHLOROPROPANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	4	J	25	U	2.5	U	0.5	U	0.5	U	0.5	U
142-28-9	1,3-DICHLOROPROPANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
106-46-7	1,4-DICHLOROBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
135-98-8	2-PHENYLBUTANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
67-64-1	ACETONE	8260B	µg/L	50	U	50	U	250	U	500	U	2500	U	250	U	50	U	50	U	3	J
71-43-2	BENZENE	8260B	µg/L	0.7		3		11		92		480		5.1		0.7		0.8		6.5	
108-86-1	BROMOBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-69-4	CFC-11	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-71-8	CFC-12	8260B	µg/L	1	U	1		5	U	10	U	50	U	5	U	1	U	1	UJ	1	UJ
108-90-7	CHLOROBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
124-48-1	CHLORODIBROMOMETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-00-3	CHLOROETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
67-66-3	CHLOROFORM	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
74-87-3	CHLOROMETHANE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-09-2	DICHLOROMETHANE	8260B	µg/L	1	U	1	U	5	U	10	U	50	U	5	U	1	U	1	U	1	U

Appendix G
Groundwater Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31171 / 3119 / 10-Nov-05 / 7 to 12 FT		31172 / 3119 / 10-Nov-05 / 11 to 16 FT		31123 / 3141 / 38664 / 15 to 20 FT		31125 / 3142 / 38664 / 14 to 19 FT		31126 / 3142 / 8-Nov-05 / 18 to 23 FT		31127 / 3143 / 38664 / 12 to 17 FT		31167 / 3144 / 9-Nov-05 / 15 to 20 FT		31165 / 3145 / 10-Nov-05 / 13 to 18 FT		31166 / 3145 / 10-Nov-05 / 9 to 14 FT	
(Group Code)	**(Group Description)**																				
100-41-4	ETHYLBENZENE	8260B	µg/L	0.5	U	0.7		3		35		60		3		0.4	J	0.4	J	1.4	
541-73-1	M-DICHLOROBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
104-51-8	N-BUTYLBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
103-65-1	PROPYLBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
100-42-5	STYRENE (MONOMER)	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	130		2.5	U	0.5	U	0.5	U	0.5	U
98-06-6	TERT-BUTYLBENZENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
127-18-4	TETRACHLOROETHENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
108-88-3	TOLUENE	8260B	µg/L	0.5	U	0.5	U	4		23		110		2.5	U	0.5	U	0.5	U	0.3	J
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
79-01-6	TRICHLOROETHYLENE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
75-01-4	VINYL CHLORIDE	8260B	µg/L	0.5	U	0.5	U	2.5	U	5	U	25	U	2.5	U	0.5	U	0.5	U	0.5	U
1330-20-7	XYLENES (TOTAL)	8260B	µg/L	0.5	U	0.5	U	5.7		70		240		2.5	U	0.5	U	0.5	U	0.5	

Appendix G
Groundwater Results
Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31148 / 3146 / 38665 / 9.5 to 14.5 FT		31149 / 3146 / 9-Nov-05 / 9.5 to 14.5 FT		31164 / 3147 / 9-Nov-05 / 9 to 14 FT		31162 / 3148 / 38666 / 6 to 11 FT		31163 / 3148 / 38666 / 10 to 15 FT		31169 / 3149 / 38666 / 9 to 14 FT		31170 / 3149 / 38666 / 5 to 10 FT		31173 / 3150 / 38666 / 9 to 14 FT	
(Group Code)	**(Group Description)**																		
630-20-6	1,1,1,2-TETRACHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
71-55-6	1,1,1-TRICHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
79-00-5	1,1,2-TRICHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-34-3	1,1-DICHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-35-4	1,1-DICHLOROETHYLENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
96-18-4	1,2,3-TRICHLOROPROPANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
120-82-1	1,2,4-TRICHLOROBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	UJ	0.5	UJ	13	U	0.5	U	0.5	UJ
95-63-6	1,2,4-TRIMETHYLBENZENE	8260B	µg/L	9		10		2.5	U	0.5	U	0.5	U	13	U	0.4	J	0.5	U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
106-93-4	1,2-DIBROMOETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
95-50-1	1,2-DICHLOROBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
107-06-2	1,2-DICHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
78-87-5	1,2-DICHLOROPROPANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
108-67-8	1,3,5-TRIMETHYLBENZENE	8260B	µg/L	4	J	5	J	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
142-28-9	1,3-DICHLOROPROPANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
106-46-7	1,4-DICHLOROBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
135-98-8	2-PHENYLBUTANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
67-64-1	ACETONE	8260B	µg/L	500	U	500	U	250	U	50	U	16	J	1300	U	50	U	3	J
71-43-2	BENZENE	8260B	µg/L	137	J	89		17		0.5	U	0.8		89		1.4		0.9	
108-86-1	BROMOBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-69-4	CFC-11	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-71-8	CFC-12	8260B	µg/L	10	U	10	U	5	U	1	UJ	1	UJ	25	U	1	U	1	UJ
108-90-7	CHLOROBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
124-48-1	CHLORODIBROMOMETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-00-3	CHLOROETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
67-66-3	CHLOROFORM	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
74-87-3	CHLOROMETHANE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
156-59-2	CIS-1,2-DICHLOROETHENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-09-2	DICHLOROMETHANE	8260B	µg/L	10	U	10	U	5	U	1	U	1	U	25	U	1	U	1	U

Appendix G
Groundwater Results
Volatile Organic Compounds

			Sample ID	31148		31149		31164		31162		31163		31169		31170		31173	
			Location ID	3146		3146		3147		3148		3148		3149		3149		3150	
			Sample Date	38665		9-Nov-05		9-Nov-05		38666		38666		38666		38666		38666	
CAS Number	Chemical Name	Analytic Method	Unit \\ Depth	9.5 to 14.5 FT		9.5 to 14.5 FT		9 to 14 FT		6 to 11 FT		10 to 15 FT		9 to 14 FT		5 to 10 FT		9 to 14 FT	
(Group Code)	**(Group Description)**																		
100-41-4	ETHYLBENZENE	8260B	µg/L	52		42		3		0.5	U	0.3	J	38		0.4	J	0.5	U
541-73-1	M-DICHLOROBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
104-51-8	N-BUTYLBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
103-65-1	PROPYLBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
100-42-5	STYRENE (MONOMER)	8260B	µg/L	5	J	4	J	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
98-06-6	TERT-BUTYLBENZENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
127-18-4	TETRACHLOROETHENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
108-88-3	TOLUENE	8260B	µg/L	40	J	31		2.5	U	0.5	U	0.5	U	13	U	0.7		0.5	U
156-60-5	TRANS-1,2-DICHLOROETHENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
79-01-6	TRICHLOROETHYLENE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
75-01-4	VINYL CHLORIDE	8260B	µg/L	5	U	5	U	2.5	U	0.5	U	0.5	U	13	U	0.5	U	0.5	U
1330-20-7	XYLENES (TOTAL)	8260B	µg/L	50		43		2.5	U	0.5	U	0.5	U	26		1.3		0.5	U

Appendix G
Groundwater Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31172 3119 10-Nov-05 11 to 16 FT		31123 3141 8-Nov-05 15 to 20 FT		31125 3142 8-Nov-05 14 to 19 FT		31126 3142 8-Nov-05 18 to 23 FT		31127 3143 8-Nov-05 12 to 17 FT		31167 3144 9-Nov-05 15 to 20 FT		31165 3145 10-Nov-05 13 to 18 FT		31148 3146 9-Nov-05 9.5 to 14.5 FT	
(Group Code)	**(Group Description)**																		
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
120-83-2	2,4-DICHLOROPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
51-28-5	2,4-DINITROPHENOL	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
121-14-2	2,4-DINITROTOLUENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
606-20-2	2,6-DINITROTOLUENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
95-57-8	2-CHLOROPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
95-48-7	2-METHYLPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
88-74-4	2-NITROANILINE	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	µg/L	20	U	20	U	1000	U	20	U	20	U	20	U	20	U	20	U
108-39-4	3-METHYLPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
99-09-2	3-NITROANILINE	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-(	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
106-44-5	4-METHYLPHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
83-32-9	ACENAPHTHENE	8270C	µg/L	10	U	3	J	500	U	20		10	U	8	J	16		100	J
208-96-8	ACENAPHTHYLENE	8270C	µg/L	10	U	5	J	500	U	217	J	10	U	10	U	2	J	91	
62-53-3	ANILINE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
120-12-7	ANTHRACENE	8270C	µg/L	10	U	2	J	500	U	10	J	2	J	3	J	6	J	12	
56-55-3	BENZO(A)ANTHRACENE	8270C	µg/L	10	U	5	J	500	U	10	U	10	U	2	J	8	J	2	J
50-32-8	BENZO(A)PYRENE	8270C	µg/L	10	U	6	J	500	U	10	U	10	U	4	J	12		3	J
205-99-2	BENZO[B]FLUORANTHENE	8270C	µg/L	10	U	5	J	500	U	10	U	10	U	10	U	11		2	J
191-24-2	BENZO[G,H,I]PERYLENE	8270C	µg/L	10	U	6	J	500	U	10	U	10	U	3	J	14		1	J
207-08-9	BENZO[K]FLUORANTHENE	8270C	µg/L	10	U	2	J	500	U	10	U	10	U	10	U	4	J	10	U
65-85-0	BENZOIC ACID	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
100-51-6	BENZYL ALCOHOL	8270C	µg/L	20	U	20	U	1000	U	20	U	20	U	20	U	20	U	20	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U

Appendix G
Groundwater Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31172 3119 10-Nov-05 11 to 16 FT		31123 3141 8-Nov-05 15 to 20 FT		31125 3142 8-Nov-05 14 to 19 FT		31126 3142 8-Nov-05 18 to 23 FT		31127 3143 8-Nov-05 12 to 17 FT		31167 3144 9-Nov-05 15 to 20 FT		31165 3145 10-Nov-05 13 to 18 FT		31148 3146 9-Nov-05 9.5 to 14.5 FT	
(Group Code)	**(Group Description)**																		
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	µg/L	10	U	10	U	500	U	10	U	2	J	4	J	3	J	10	U
86-74-8	CARBAZOLE	8270C	µg/L	10	U	10	U	500	U	150		10	U	11	U	11	U	43	
218-01-9	CHRYSENE	8270C	µg/L	10	U	6	J	500	U	10	U	10	U	2	J	8	J	4	J
53-70-3	DIBENZ(A,H)ANTHRACENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
132-64-9	DIBENZOFURAN	8270C	µg/L	10	U	10	U	500	U	6	J	10	U	10	U	10	U	6	J
84-66-2	DIETHYL PHTHALATE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
131-11-3	DIMETHYL PHTHALATE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
206-44-0	FLUORANTHENE	8270C	µg/L	10	U	11		500	U	11		5	J	10	J	41		18	
86-73-7	FLUORENE	8270C	µg/L	10	U	2	J	500	U	44		3	J	10	U	4	J	43	
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
118-74-1	HEXACHLOROBENZENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
67-72-1	HEXACHLOROETHANE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
193-39-5	INDENO[1,2,3-CD]PYRENE	8270C	µg/L	10	U	3	J	500	U	10	U	10	U	10	U	8	J	10	U
62-75-9	METHANAMINE, N-METHYL-N-NITROS(	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
1321-94-4	METHYLNAPHTHALENE	8270C	µg/L	10	U	5	J	110	J	218	J	25		10		5	J	180	
91-20-3	NAPHTHALENE	8270C	µg/L	3	J	52		1700		4910		93		6	J	20		2300	
98-95-3	NITROBENZENE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
87-86-5	PENTACHLOROPHENOL	8270C	µg/L	50	U	50	U	2500	U	50	U	50	U	50	U	50	U	50	U
85-01-8	PHENANTHRENE	8270C	µg/L	10	U	7	J	74	J	88		18		15		26		92	
108-95-2	PHENOL	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U
100-01-6	P-NITROANILINE	8270C	µg/L	50	UJ	50	UJ	2500	UJ	50	UJ	50	U	50	U	50	U	50	U
129-00-0	PYRENE	8270C	µg/L	2	J	21		500	U	11		5	J	7	J	42		18	
110-86-1	PYRIDINE	8270C	µg/L	10	U	10	U	500	U	10	U	10	U	10	U	10	U	10	U

Appendix G
Groundwater Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID / Location ID / Sample Date / Unit \\ Depth	31149 / 3146 / 9-Nov-05 / 9.5 to 14.5 FT		31164 / 3147 / 9-Nov-05 / 9 to 14 FT		31169 / 3149 / 10-Nov-05 / 9 to 14 FT		31129 / M25-01 / 8-Nov-05 / 14.95 to 14.95 FT		31146 / M25-06 / 9-Nov-05 / 14.75 to 14.75 FT		31147 / M25-07 / 9-Nov-05 / 14.75 to 14.75 FT		31131 / M25-09 / 8-Nov-05 / 14.75 to 14.75 FT		31130 / PW-12 / 8-Nov-05 / 14.5 to 14.5 FT	
(Group Code)	**(Group Description)**																		
108-60-1	2,2-OXYBIS(1-CHLOROPROPANE)	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
95-95-4	2,4,5-TRICHLOROPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
88-06-2	2,4,6-TRICHLOROPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
120-83-2	2,4-DICHLOROPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
105-67-9	2,4-DIMETHYLPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
51-28-5	2,4-DINITROPHENOL	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
121-14-2	2,4-DINITROTOLUENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
606-20-2	2,6-DINITROTOLUENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
95-57-8	2-CHLOROPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
95-48-7	2-METHYLPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
88-74-4	2-NITROANILINE	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
91-94-1	3,3-DICHLOROBENZIDINE	8270C	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
108-39-4	3-METHYLPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
99-09-2	3-NITROANILINE	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
78-59-1	3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-(	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
106-44-5	4-METHYLPHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
83-32-9	ACENAPHTHENE	8270C	µg/L	130	J	46		34		76	J	10	U	5	J	15		13	
208-96-8	ACENAPHTHYLENE	8270C	µg/L	75		2	J	4	J	64	J	10	U	10	U	2	J	8	J
62-53-3	ANILINE	8270C	µg/L	10	U	10	U	10		10	U	10	U	10	U	10	U	10	U
120-12-7	ANTHRACENE	8270C	µg/L	10	J	4	J	2	J	6	J	10	U	10	U	10	U	10	U
56-55-3	BENZO(A)ANTHRACENE	8270C	µg/L	2	J	10	U	10	U	10	U	10	U	10	U	10	U	10	U
50-32-8	BENZO(A)PYRENE	8270C	µg/L	2	J	1	J	2	J	10	U	10	U	10	U	10	U	10	U
205-99-2	BENZO[B]FLUORANTHENE	8270C	µg/L	2	J	10	U	10	U	10	U	10	U	10	U	10	U	10	U
191-24-2	BENZO[G,H,I]PERYLENE	8270C	µg/L	2	J	10	U	10	U	10	U	10	U	10	U	10	U	10	U
207-08-9	BENZO[K]FLUORANTHENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
65-85-0	BENZOIC ACID	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
100-51-6	BENZYL ALCOHOL	8270C	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
85-68-7	BENZYL BUTYL PHTHALATE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Appendix G
Groundwater Results
Semi-Volatile Organic Compounds

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31149 3146 9-Nov-05 9.5 to 14.5 FT		31164 3147 9-Nov-05 9 to 14 FT		31169 3149 10-Nov-05 9 to 14 FT		31129 M25-01 8-Nov-05 14.95 to 14.95 FT		31146 M25-06 9-Nov-05 14.75 to 14.75 FT		31147 M25-07 9-Nov-05 14.75 to 14.75 FT		31131 M25-09 8-Nov-05 14.75 to 14.75 FT		31130 PW-12 8-Nov-05 14.5 to 14.5 FT	
(Group Code)	**(Group Description)**																		
111-44-4	BIS(2-CHLOROETHYL)ETHER	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8270C	µg/L	10	U	3	J	2	J	10	U	7	J	10	U	10	U	10	U
86-74-8	CARBAZOLE	8270C	µg/L	37		15		10	U	60		10	U	10	U	10	U	10	U
218-01-9	CHRYSENE	8270C	µg/L	3	J	10	U	10	U	10	U	10	U	10	U	10	U	10	U
53-70-3	DIBENZ(A,H)ANTHRACENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
132-64-9	DIBENZOFURAN	8270C	µg/L	6	J	10	U	10	U	5	J	10	U	10	U	10	U	10	U
84-66-2	DIETHYL PHTHALATE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
131-11-3	DIMETHYL PHTHALATE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
117-84-0	DI-N-OCTYLPHTHALATE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
206-44-0	FLUORANTHENE	8270C	µg/L	17		10		15		6	J	10	U	2	J	2	J	3	J
86-73-7	FLUORENE	8270C	µg/L	37		5	J	10	U	31		10	U	10	U	2	J	10	U
87-68-3	HEXACHLORO-1,3-BUTADIENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
118-74-1	HEXACHLOROBENZENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
67-72-1	HEXACHLOROETHANE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
193-39-5	INDENO[1,2,3-CD]PYRENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
62-75-9	METHANAMINE, N-METHYL-N-NITROS(	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1321-94-4	METHYLNAPHTHALENE	8270C	µg/L	160		22		16		170		4	J	10	U	10	U	6	J
91-20-3	NAPHTHALENE	8270C	µg/L	2500		170		180		2490		21		2	J	27		2	J
98-95-3	NITROBENZENE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
621-64-7	N-NITROSODINPROPYLAMINE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
86-30-6	N-NITROSODIPHENYLAMINE	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
87-86-5	PENTACHLOROPHENOL	8270C	µg/L	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
85-01-8	PHENANTHRENE	8270C	µg/L	82		18		5	J	64		3	J	4	J	10	U	3	J
108-95-2	PHENOL	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
100-01-6	P-NITROANILINE	8270C	µg/L	50	U	50	U	50	UJ	50	UJ	50	U	50	U	50	UJ	50	UJ
129-00-0	PYRENE	8270C	µg/L	16		7	J	15		5	J	10	U	3	J	2	J	3	J
110-86-1	PYRIDINE	8270C	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Appendix G
Groundwater Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31172 3119 10-Nov-05 11 to 16 FT		31123 3141 8-Nov-05 15 to 20 FT		31125 3142 8-Nov-05 14 to 19 FT		31126 3142 8-Nov-05 18 to 23 FT		31127 3143 8-Nov-05 12 to 17 FT		31165 3145 10-Nov-05 13 to 18 FT	
(Group Code)	**(Group Description)**														
72-54-8	4,4-DDD	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
72-55-9	4,4-DDE	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
50-29-3	4,4-DDT	8081A	µg/L	0.5	U	0.05	U	0.05	U	0.5	U	0.5	U	0.05	U
309-00-2	ALDRIN	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
319-84-6	ALPHA-BHC	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
319-85-7	BETA-BHC	8081A	µg/L	0.5	U	0.05	U	0.05	U	0.5	U	0.5	U	0.05	U
8001-35-2	CAMPHECHLOR	8081A	µg/L	10	UJ	1	U	1	U	10	U	10	UJ	1	U
57-74-9	CHLORDANE	8081A	µg/L	1	U	0.1	U	0.1	U	1	U	1	U	0.1	U
60-57-1	DIELDRIN	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
115-29-7	ENDOSULFAN	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
1031-07-8	ENDOSULFAN SULFATE	8081A	µg/L	1	U	0.1	U	0.1	U	1	U	1	U	0.1	U
72-20-8	ENDRIN	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
7421-93-4	ENDRIN ALDEHYDE	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
76-44-8	HEPTACHLOR	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	µg/L	0.1	U	0.01	U	0.01	U	0.1	U	0.1	U	0.01	U
58-89-9	LINDANE	8081A	µg/L	0.2	U	0.02	U	0.02	U	0.2	U	0.2	U	0.02	U

Appendix G
Groundwater Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31148 3146 9-Nov-05 9.5 to 14.5 FT		31149 3146 9-Nov-05 9.5 to 14.5 FT		31164 3147 9-Nov-05 9 to 14 FT		31163 3148 10-Nov-05 10 to 15 FT		31169 3149 10-Nov-05 9 to 14 FT		31129 M25-01 8-Nov-05 14.95 to 14.95 FT	
(Group Code)	**(Group Description)**														
72-54-8	4,4-DDD	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
72-55-9	4,4-DDE	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
50-29-3	4,4-DDT	8081A	µg/L	0.5	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
309-00-2	ALDRIN	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
319-84-6	ALPHA-BHC	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
319-85-7	BETA-BHC	8081A	µg/L	0.5	U	0.5	U	0.05	U	0.05	U	0.05	U	0.05	U
8001-35-2	CAMPHECHLOR	8081A	µg/L	10	UJ	10	UJ	1	U	1	U	1	U	1	U
57-74-9	CHLORDANE	8081A	µg/L	1	U	1	U	0.1	U	0.1	U	0.1	U	0.1	U
60-57-1	DIELDRIN	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
115-29-7	ENDOSULFAN	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
1031-07-8	ENDOSULFAN SULFATE	8081A	µg/L	1	U	1	U	0.1	U	0.1	U	0.1	U	0.1	U
72-20-8	ENDRIN	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
7421-93-4	ENDRIN ALDEHYDE	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
76-44-8	HEPTACHLOR	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	µg/L	0.1	U	0.1	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	LINDANE	8081A	µg/L	0.2	U	0.2	U	0.02	U	0.02	U	0.02	U	0.02	U

Appendix G
Groundwater Results
Pesticides

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31146 M25-06 9-Nov-05 14.75 to 14.75 FT		31147 M25-07 9-Nov-05 14.75 to 14.75 FT		31131 M25-09 8-Nov-05 14.75 to 14.75 FT		31130 PW-12 8-Nov-05 14.5 to 14.5 FT	
(Group Code)	**(Group Description)**										
72-54-8	4,4-DDD	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
72-55-9	4,4-DDE	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
50-29-3	4,4-DDT	8081A	µg/L	0.05	U	0.05	U	0.05	U	0.05	U
309-00-2	ALDRIN	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
319-84-6	ALPHA-BHC	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
319-85-7	BETA-BHC	8081A	µg/L	0.05	U	0.05	U	0.05	U	0.05	U
8001-35-2	CAMPHECHLOR	8081A	µg/L	1	UJ	1	UJ	1	U	1	U
57-74-9	CHLORDANE	8081A	µg/L	0.1	U	0.1	U	0.1	U	0.1	U
60-57-1	DIELDRIN	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
115-29-7	ENDOSULFAN	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
1031-07-8	ENDOSULFAN SULFATE	8081A	µg/L	0.1	U	0.1	U	0.1	U	0.1	U
72-20-8	ENDRIN	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
7421-93-4	ENDRIN ALDEHYDE	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
76-44-8	HEPTACHLOR	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U
1024-57-3	HEPTACHLOR EPOXIDE	8081A	µg/L	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	LINDANE	8081A	µg/L	0.02	U	0.02	U	0.02	U	0.02	U

Appendix G
Groundwater Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31172 3119 10-Nov-05 11 to 16 FT		31123 3141 8-Nov-05 15 to 20 FT		31125 3142 8-Nov-05 14 to 19 FT		31126 3142 8-Nov-05 18 to 23 FT		31127 3143 8-Nov-05 12 to 17 FT	
(Group Code)	**(Group Description)**												
12674-11-2	AROCLOR 1016	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11104-28-2	AROCLOR 1221	8082	µg/L	1	U	1	U	1	U	1	U	1	U
11141-16-5	AROCLOR 1232	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
53469-21-9	AROCLOR 1242	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
12672-29-6	AROCLOR 1248	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11097-69-1	AROCLOR 1254	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11096-82-5	AROCLOR 1260	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Appendix G
Groundwater Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31165 3145 10-Nov-05 13 to 18 FT		31148 3146 9-Nov-05 9_5 to 14_5 FT		31149 3146 9-Nov-05 9.5 to 14.5 FT		31164 3147 9-Nov-05 9 to 14 FT		31163 3148 10-Nov-05 10 to 15 FT		31169 3149 10-Nov-05 9 to 14 FT	
(Group Code)	**(Group Description)**														
12674-11-2	AROCLOR 1016	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11104-28-2	AROCLOR 1221	8082	µg/L	1	U	1	U	1	U	1	U	1	U	1	U
11141-16-5	AROCLOR 1232	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
53469-21-9	AROCLOR 1242	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
12672-29-6	AROCLOR 1248	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11097-69-1	AROCLOR 1254	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11096-82-5	AROCLOR 1260	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Appendix G
Groundwater Results
PCBs

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31129 M25-01 8-Nov-05 14.95 to 14.95 FT		31146 M25-06 9-Nov-05 14.75 to 14.75 FT		31147 M25-07 9-Nov-05 14.75 to 14.75 FT		31131 M25-09 8-Nov-05 14.75 to 14.75 FT		31130 PW-12 8-Nov-05 14.5 to 14.5 FT	
(Group Code)	**(Group Description)**												
12674-11-2	AROCLOR 1016	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11104-28-2	AROCLOR 1221	8082	µg/L	1	U	1	U	1	U	1	U	1	U
11141-16-5	AROCLOR 1232	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
53469-21-9	AROCLOR 1242	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
12672-29-6	AROCLOR 1248	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11097-69-1	AROCLOR 1254	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
11096-82-5	AROCLOR 1260	8082	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Appendix G
Groundwater Results
Inorganics

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31172 3119 10-Nov-05 11 to 16 FT		31123 3141 8-Nov-05 15 to 20 FT		31125 3142 8-Nov-05 14 to 19 FT		31126 3142 8-Nov-05 18 to 23 FT		31127 3143 8-Nov-05 12 to 17 FT		31167 3144 9-Nov-05 15 to 20 FT	
(Group Code)	**(Group Description)**														
7440-36-0	ANTIMONY	6010B	µg/L	6.7	U	12		14.5		9.4	J	7	J	11.5	
7440-38-2	ARSENIC	6010B	µg/L	5	U	5	U	5	U	14.8		5	U	5	U
7440-39-3	BARIUM	6010B	µg/L	811		1260		571		1520		750		342	
7440-41-7	BERYLLIUM	6010B	µg/L	2	U	0.095	J	0.082	J	0.067	J	2	U	0.088	J
7440-43-9	CADMIUM	6010B	µg/L	2.6	U	2	U	2	U	2	U	0.64	U	8.1	
7440-47-3	CHROMIUM	6010B	µg/L	6.1	U	10.2		50.5		5.9		13.8		13.3	
7440-48-4	COBALT	6010B	µg/L	0.99	J	1.1	J	5	U	2.4	J	1.3	J	1.8	J
7440-50-8	COPPER	6010B	µg/L	10	U	10	U	2.6	U	10	U	10	U	10	U
7439-89-6	IRON	6010B	µg/L	12700		2090		615		34400		702		49.4	J
7439-92-1	LEAD	6010B	µg/L	20.1	U	5	U	5	U	5	U	7.5	U	50.6	
7439-98-7	MOLYBDENUM	6010B	µg/L	5.1	U	9.7		5	U	6.7	U	6.6	U	8.1	U
7440-02-0	NICKEL	6010B	µg/L	5	U	5	U	24.4		5.7		5	U	0.67	J
7782-49-2	SELENIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U
7440-22-4	SILVER	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U
7440-28-0	THALLIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U
7440-62-2	VANADIUM	6010B	µg/L	1.6	J	9.5	J	4.8	U	1.6	U	22.7		7	J
7440-66-6	ZINC	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U

Appendix G
Groundwater Results
Inorganics

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31165 3145 10-Nov-05 13 to 18 FT		31148 3146 9-Nov-05 9.5 to 14.5 FT		31149 3146 9-Nov-05 9.5 to 14.5 FT		31164 3147 9-Nov-05 9 to 14 FT		31163 3148 10-Nov-05 10 to 15 FT	
(Group Code)	**(Group Description)**												
7440-36-0	ANTIMONY	6010B	µg/L	11.7		8.9	J	6.8	J	7.9	J	9.1	J
7440-38-2	ARSENIC	6010B	µg/L	11.8	U	5	U	5	U	5	U	5	U
7440-39-3	BARIUM	6010B	µg/L	136		589		611		610		348	
7440-41-7	BERYLLIUM	6010B	µg/L	2	U	0.078	J	2	U	0.087	J	2	
7440-43-9	CADMIUM	6010B	µg/L	6.3	U	0.89	U	0.82	U	18.5		46.6	U
7440-47-3	CHROMIUM	6010B	µg/L	11.1		12		12.4		5.6		11	
7440-48-4	COBALT	6010B	µg/L	2.2	J	1.5	J	1.7	J	5	U	2.1	J
7440-50-8	COPPER	6010B	µg/L	10	U	10	U	10	U	10	U	6.2	U
7439-89-6	IRON	6010B	µg/L	310		12000		11800		304		4500	
7439-92-1	LEAD	6010B	µg/L	33.7	U	8.1	UJ	13.3		98.5		214	U
7439-98-7	MOLYBDENUM	6010B	µg/L	21.2		5.9	U	6.6	U	9.2		15.5	
7440-02-0	NICKEL	6010B	µg/L	7.7		0.71	J	1.7	J	5	U	14.1	
7782-49-2	SELENIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	
7440-22-4	SILVER	6010B	µg/L	10	U	10	U	10	U	10	U	10	U
7440-28-0	THALLIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	U
7440-62-2	VANADIUM	6010B	µg/L	10.5		6.7	J	6.9	J	3.9	J	8.2	J
7440-66-6	ZINC	6010B	µg/L	10	U	10	U	10	U	10	U	11.7	U

Appendix G
Groundwater Results
Inorganics

CAS Number	Chemical Name	Analytic Method	Sample ID Location ID Sample Date Unit \\ Depth	31169 3149 10-Nov-05 9 to 14 FT		31173 3150 10-Nov-05 9 to 14 FT		31129 M25-01 8-Nov-05 14.95 to 14.95 FT		31146 M25-06 9-Nov-05 14.75 to 14.75 FT		31147 M25-07 9-Nov-05 14.75 to 14.75 FT		31131 M25-09 8-Nov-05 14.75 to 14.75 FT		31130 PW-12 8-Nov-05 14.5 to 14.5 FT	
(Group Code)	**(Group Description)**																
7440-36-0	ANTIMONY	6010B	µg/L	12.2	U	8.5	J	7.5	J	8.1	J	10.6		12		13.8	
7440-38-2	ARSENIC	6010B	µg/L	5	U	5	U	5	U	14	U	5	U	5	U	5	U
7440-39-3	BARIUM	6010B	µg/L	911		210		885		244		672		557		1540	
7440-41-7	BERYLLIUM	6010B	µg/L	2	U	2	U	0.12	J	2	U	2	U	2	U	0.099	J
7440-43-9	CADMIUM	6010B	µg/L	2.2	U	33.7	U	2	U	0.81	U	0.72	U	2	U	0.51	J
7440-47-3	CHROMIUM	6010B	µg/L	7.8	U	22.4		9.5		14.7		4.1	J	7		10	
7440-48-4	COBALT	6010B	µg/L	1.5	J	5	U	1.3	J	5	U	0.99	J	3.7	J	5	U
7440-50-8	COPPER	6010B	µg/L	0.95	U	10	U	10	U	10	U	10	U	10.3		10	U
7439-89-6	IRON	6010B	µg/L	20200		529		19200		960		20600		132000		411	
7439-92-1	LEAD	6010B	µg/L	16.6	U	213	U	5	U	6.2	U	5.5	U	5.6		5	U
7439-98-7	MOLYBDENUM	6010B	µg/L	4.4	U	24.5		8.5		9.4		4.2	U	5	U	7.1	U
7440-02-0	NICKEL	6010B	µg/L	0.82	U	6.9		1.5	J	1.3	J	1.7	J	3.5	J	1.9	J
7782-49-2	SELENIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-22-4	SILVER	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-28-0	THALLIUM	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	4.6	U	10	U
7440-62-2	VANADIUM	6010B	µg/L	1.4	J	21.8		3.5	U	22.9		10	U	1.8	U	11.1	
7440-66-6	ZINC	6010B	µg/L	10	U	10	U	10	U	10	U	10	U	10.1		10	U

APPENDIX G

Analytical Results for Quality Control Samples

Appendix G
Equipment Blank Results

Analytical Method	Sample ID Sample Date Chemical Name/Units	31050 4-NOV-05 µg/L	31051 4-NOV-05 µg/L	31076 6-NOV-05 µg/L	31155 10-NOV-05 µg/L	31168 10-NOV-05 µg/L
Metals						
6010B	ANTIMONY	6.8 U	10 U	10 U	10 U	10 U
6010B	ARSENIC	5 U	5 U	5 U	5 U	4.4 U
6010B	BARIUM	4.1 U	9.6 U	10 U	1.3 J	0.82 J
6010B	BERYLLIUM	2 U	0.078 U	0.078 J	2 U	2 U
6010B	CADMIUM	2 U	2 U	2 U	3.1 U	11.6
6010B	CHROMIUM	0.78 J	4.9 J	5 U	2 J	1 J
6010B	COBALT	5 U	0.84 J	5 U	5 U	5 U
6010B	COPPER	1.9 U	3.3 U	10 U	3.1 U	4 U
6010B	IRON	267	1560	55.7	264	21.3 J
6010B	LEAD	5 U	5 U	5 U	27.9	71
6010B	MOLYBDENUM	5 U	1.5 U	5 U	1.6 U	5 U
6010B	NICKEL	2.3 J	9.6	5 U	0.8 J	0.74 J
6010B	SELENIUM	10 U	3.7 U	4.5 U	10 U	10 U
6010B	SILVER	1.4 U	10 U	10 U	10 U	10 U
6010B	THALLIUM	10 U	3.5 U	10 U	10 U	10 U
6010B	VANADIUM	0.94 U	2.6 U	1.6 U	10 U	10 U
6010B	ZINC	10 U	17.9	10 U	9.6 U	10.9 U
7470A	MERCURY	0.061 U	0.098 U	0.91	0.18 U	0.28 J
Pesticides						
8081A	4,4-DDD	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	4,4-DDE	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	4,4-DDT	0.05 U	0.05 U	0.05 U	0.5 U	0.05 U
8081A	ALDRIN	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	ALPHA-BHC	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	BETA-BHC	0.05 U	0.05 U	0.05	0.5 U	0.05 U
8081A	CAMPHECHLOR	1 UJ	1 UJ	1 UJ	10 UJ	1 U
8081A	CHLORDANE	0.1 U	0.1 U	0.1 U	1 U	0.1 U
8081A	DECACHLOROBIPHENYL	0.445	0.47	0.445	0.55	0.31
8081A	DIELDRIN	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	ENDOSULFAN	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	1 U	0.1 U
8081A	ENDRIN	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	ENDRIN ALDEHYDE	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	HEPTACHLOR	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	HEPTACHLOR EPOXIDE	0.01 U	0.01 U	0.01 U	0.1 U	0.01 U
8081A	LINDANE	0.02 U	0.02 U	0.02 U	0.2 U	0.02 U
8081A	TETRACHLORO-M-XYLENE	0.435	0.535	0.48	0.425	0.285

Appendix G
Equipment Blank Results

Analytical Method	Sample ID Sample Date Chemical Name/Units	31050 4-NOV-05 µg/L	31051 4-NOV-05 µg/L	31076 6-NOV-05 µg/L	31155 10-NOV-05 µg/L	31168 10-NOV-05 µg/L
PCBs						
8082	AROCLOR 1016	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
8082	AROCLOR 1221	0.96 U	0.96 U	1 U	1 U	1 U
8082	AROCLOR 1232	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
8082	AROCLOR 1242	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
8082	AROCLOR 1248	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
8082	AROCLOR 1254	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
8082	AROCLOR 1260	0.48 U	0.48 U	0.5 U	0.5 U	0.5 U
VOCs						
8260B	1,1,1,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2,3-TRICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2-DIBROMO-3-CHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,2-DICHLOROETHANE-D41	4.03	4.19	4.07	4.1	3.63
8260B	1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,3,5-TRIMETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,3-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	4-BROMOFLUOROBENZENE	4.17	4.19	4.12	3.7	4.01
8260B	ACETONE	50 U	50 U	50 U	50 U	50 U
8260B	BENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	BENZENE, 1,2,4-TRIMETHYL-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	BROMOBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	CHLOROFORM	0.5 U	0.5 U	0.6	0.5 U	0.4 J
8260B	CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	DICHLORODIFLUOROMETHANE	1 U	1 U	1 U	1 U	1 U

Appendix G
Equipment Blank Results

Analytical Method	Sample ID Sample Date Chemical Name/Units	31050 4-NOV-05 µg/L	31051 4-NOV-05 µg/L	31076 6-NOV-05 µg/L	31155 10-NOV-05 µg/L	31168 10-NOV-05 µg/L
VOCs cont.						
8260B	ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	METHYLENE CHLORIDE	1 U	1 U	1 U	1 U	1 U
8260B	N-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	PROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	SEC-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	TERT-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U	0.4 J	0.5 U
8260B	TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	TOLUENE-D8	4	3.95	3.94	3.7	3.84
8260B	TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	TRICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
8260B	XYLENES (TOTAL)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs						
8270C	2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	10 U	10 U
8270C	2,4,5-TRICHLOROPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2,4,6-TRIBROMOPHENOL	50.7	59.4	59.8	55.8	35.1
8270C	2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2,4-DICHLOROPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2,4-DIMETHYLPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2,4-DINITROPHENOL	50 U	50 U	50 U	50 U	50 U
8270C	2,4-DINITROTOLUENE	10 U	10 U	10 U	10 U	10 U
8270C	2,6-DINITROTOLUENE	10 U	10 U	10 U	10 U	10 U
8270C	2-CHLOROPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2-FLUORO-1,1-BIPHENYL	44	53.8	54.2	47	37.2
8270C	2-FLUOROPHENOL	34.8	38.4	37.9	37.3	31.5
8270C	2-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	2-NITROANILINE	50 U	50 U	50 U	50 U	50 U
8270C	3,3-DICHLOROBENZIDINE	20	20	20	20 U	20 U
8270C	3-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	3-NITROANILINE	50 U	50 U	50 U	50 U	50 U
8270C	4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U
8270C	4-NITROANILINE	50 UJ	50 UJ	50 UJ	50 UJ	50 U
8270C	ACENAPHTHENE	10 U	10 U	10 U	10 U	10 U
8270C	ACENAPHTHYLENE	10 U	10 U	10 U	10 U	10 U
8270C	ANILINE	10 U	10 U	10 U	10 U	10 U

Appendix G
Equipment Blank Results

Analytical Method	Sample ID Sample Date Chemical Name/Units	31050 4-NOV-05 µg/L	31051 4-NOV-05 µg/L	31076 6-NOV-05 µg/L	31155 10-NOV-05 µg/L	31168 10-NOV-05 µg/L
SVOCs cont.						
8270C	BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	10 U
8270C	BENZO(A)PYRENE	10 U	10 U	10 U	10 U	10 U
8270C	BENZO[B]FLUORANTHENE	10 U	10 U	10 U	10 U	10 U
8270C	BENZO[G,H,I]PERYLENE	10 U	10 U	10 U	10 U	10 U
8270C	BENZO[K]FLUORANTHENE	10 U	10 U	10 U	10 U	10 U
8270C	BENZOIC ACID	50 U	50 U	50 U	50 U	50 U
8270C	BENZYL ALCOHOL	20	20	20	20 U	20 U
8270C	BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	10 U	10 U
8270C	BIS(2-ETHYLHEXYL)PHTHALATE	10 U	10 U	10 U	10 U	10 U
8270C	BUTYLBENZYLPHTHALATE	10 U	10 U	10 U	10 U	10 U
8270C	CARBAZOLE	10 U	10 U	10 U	10 U	11 U
8270C	CHRYSENE	10 U	10 U	10 U	10 U	10 U
8270C	DIBENZ(A,H)ANTHRACENE	10 U	10 U	10 U	10 U	10 U
8270C	DIBENZOFURAN	10 U	10 U	10 U	10 U	10 U
8270C	DIETHYLPHTHALATE	10 U	10 U	10 U	10 U	10 U
8270C	DIMETHYL PHTHALATE	10 U	10 U	10 U	10 U	10 U
8270C	DI-N-OCTYLPHTHALATE	10 U	10 U	10 U	10 U	10 U
8270C	FLUORANTHENE	10 U	10 U	10 U	10 U	10 U
8270C	FLUORENE	10 U	10 U	10 U	10 U	10 U
8270C	HEXACHLOROBENZENE	10 U	10 U	10 U	10 U	10 U
8270C	HEXACHLOROBUTADIENE	10 U	10 U	10 U	10 U	10 U
8270C	HEXACHLOROETHANE	10 U	10 U	10 U	10 U	10 U
8270C	INDENO[1,2,3-CD]PYRENE	10 U	10 U	10 U	10 U	10 U
8270C	ISOPHORONE	10 U	10 U	10 U	10 U	10 U
8270C	METHYLNAPHTHALENE	10 U	10 U	10 U	10 U	10 U
8270C	NAPHTHALENE	10 U	10 U	10 U	10 U	10 U
8270C	NITROBENZENE	10 U	10 U	10 U	10 U	10 U
8270C	NITROBENZENE-D5	42.5	50.9	51	42.8	30.2
8270C	N-NITROSODIMETHYLAMINE	10 U	10 U	10 U	10 U	10 U
8270C	N-NITROSODINPROPYLAMINE	10 U	10 U	10 U	10 U	10 U
8270C	N-NITROSODIPHENYLAMINE	50 U	50 U	50 U	50 U	50 U
8270C	PENTACHLOROPHENOL	50 U	50 U	50 U	50 U	50 U
8270C	PHENANTHRENE	10 U	10 U	10 U	10 U	10 U
8270C	PHENOL	10 U	10 U	10 U	10 U	10 U
8270C	PHENOL-D5	21.9	23.8	24	26.6	23.1
8270C	P-TERPHENYL-D14	47.4	53.5	53.1	47.1	42
8270C	PYRENE	10 U	10 U	10 U	10 U	10 U
8270C	PYRIDINE	10 U	10 U	10 U	10 U	10 U

Appendix G
Source Blank Results

Final Qualifier Sample Date Chemical Name/ Units	Analytical Method	31077 6-NOV-05 µg/L
Metals		
ANTIMONY	6010B	10 U
ARSENIC	6010B	5 U
BARIUM	6010B	10 U
BERYLLIUM	6010B	2 U
CADMIUM	6010B	2 U
CHROMIUM	6010B	5 U
COBALT	6010B	5 U
COPPER	6010B	10 U
IRON	6010B	50 U
LEAD	6010B	5 U
MOLYBDENUM	6010B	5 U
NICKEL	6010B	5 U
SELENIUM	6010B	4.6 U
SILVER	6010B	1.7 U
THALLIUM	6010B	10 U
VANADIUM	6010B	10 U
ZINC	6010B	10 U
MERCURY	7470A	0.98
Pesticides		
4,4-DDD	8081A	0.02 U
4,4-DDE	8081A	0.02 U
4,4-DDT	8081A	0.05 U
ALDRIN	8081A	0.02 U
ALPHA-BHC	8081A	0.02 U
BETA-BHC	8081A	0.05 U
CAMPHECHLOR	8081A	1 UJ
CHLORDANE	8081A	0.1 U
DECACHLOROBIPHENYL	8081A	0.375
DIELDRIN	8081A	0.02 U
ENDOSULFAN	8081A	0.02 U
ENDOSULFAN SULFATE	8081A	0.1 U
ENDRIN	8081A	0.02 U
ENDRIN ALDEHYDE	8081A	0.02 U
HEPTACHLOR	8081A	0.02 U
HEPTACHLOR EPOXIDE	8081A	0.01 U
LINDANE	8081A	0.02 U
TETRACHLORO-M-XYLENE	8081A	0.39
PCBs		
AROCLOR 1016	8082	0.5 U
AROCLOR 1221	8082	1 U
AROCLOR 1232	8082	0.5 U
AROCLOR 1242	8082	0.5 U
AROCLOR 1248	8082	0.5 U
AROCLOR 1254	8082	0.5 U
AROCLOR 1260	8082	0.5 U
DECACHLOROBIPHENYL	8082	0.236
TETRACHLORO-M-XYLENE	8082	0.246

Appendix G
Source Blank Results

Final Qualifier Sample Date Chemical Name/ Units	Analytical Method	31077 6-NOV-05 µg/L
VOCs		
1,1,1,2-TETRACHLOROETHANE	8260B	0.5 U
1,1,1-TRICHLOROETHANE	8260B	0.5 U
1,1,2,2-TETRACHLOROETHANE	8260B	0.5 U
1,1,2-TRICHLOROETHANE	8260B	0.5 U
1,1-DICHLOROETHANE	8260B	0.5 U
1,1-DICHLOROETHENE	8260B	0.5 U
1,2,3-TRICHLOROPROPANE	8260B	0.5 U
1,2,4-TRICHLOROBENZENE	8260B	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	8260B	0.5 U
1,2-DIBROMOETHANE	8260B	0.5 U
1,2-DICHLOROBENZENE	8260B	0.5 U
1,2-DICHLOROETHANE	8260B	0.5 U
1,2-DICHLOROETHANE-D41	8260B	4.2
1,2-DICHLOROPROPANE	8260B	0.5 U
1,3,5-TRIMETHYLBENZENE	8260B	0.5 U
1,3-DICHLOROBENZENE	8260B	0.5 U
1,3-DICHLOROPROPANE	8260B	0.5 U
1,4-DICHLOROBENZENE	8260B	0.5 U
4-BROMOFLUOROBENZENE	8260B	4.26
ACETONE	8260B	50 U
BENZENE	8260B	0.5 U
BENZENE, 1,2,4-TRIMETHYL-	8260B	0.5 U
BROMOBENZENE	8260B	0.5 U
CHLOROBENZENE	8260B	0.5 U
CHLOROETHANE	8260B	0.5 U
CHLOROFORM	8260B	0.6
CHLOROMETHANE	8260B	0.5 U
CIS-1,2-DICHLOROETHENE	8260B	0.5 U
DIBROMOCHLOROMETHANE	8260B	0.5 U
DICHLORODIFLUOROMETHANE	8260B	1 U
ETHYLBENZENE	8260B	0.5 U
METHYLENE CHLORIDE	8260B	1 U
N-BUTYLBENZENE	8260B	0.5 U
PROPYLBENZENE	8260B	0.5 U
SEC-BUTYLBENZENE	8260B	0.5 U
STYRENE	8260B	0.5 U
TERT-BUTYLBENZENE	8260B	0.5 U
TETRACHLOROETHENE	8260B	0.4 J
TOLUENE	8260B	0.5 U
TOLUENE-D8	8260B	3.96
TRANS-1,2-DICHLOROETHENE	8260B	0.5 U
TRICHLOROETHENE	8260B	0.5 U
TRICHLOROFLUOROMETHANE	8260B	0.5 U
VINYL CHLORIDE	8260B	0.5 U
XYLENES (TOTAL)	8260B	0.5 U

Appendix G
Source Blank Results

Final Qualifier Sample Date Chemical Name/ Units	Analytical Method	31077 6-NOV-05 µg/L
SVOCs		
2,2'-OXYBIS(1-CHLOROPROPANE)	8270C	10 U
2,4,5-TRICHLOROPHENOL	8270C	10 U
2,4,6-TRIBROMOPHENOL	8270C	54.6
2,4,6-TRICHLOROPHENOL	8270C	10 U
2,4-DICHLOROPHENOL	8270C	10 U
2,4-DIMETHYLPHENOL	8270C	10 U
2,4-DINITROPHENOL	8270C	50 U
2,4-DINITROTOLUENE	8270C	10 U
2,6-DINITROTOLUENE	8270C	10 U
2-CHLOROPHENOL	8270C	10 U
2-FLUORO-1,1-BIPHENYL	8270C	50.1
2-FLUOROPHENOL	8270C	34.9
2-METHYLPHENOL	8270C	10 U
2-NITROANILINE	8270C	50 U
3,3-DICHLOROBENZIDINE	8270C	20 U
3-METHYLPHENOL	8270C	10 U
3-NITROANILINE	8270C	50 U
4-METHYLPHENOL	8270C	10 U
4-NITROANILINE	8270C	50 UJ
ACENAPHTHENE	8270C	10 U
ACENAPHTHYLENE	8270C	10 U
ANILINE	8270C	10 U
ANTHRACENE	8270C	10 U
BENZO(A)ANTHRACENE	8270C	10 U
BENZO(A)PYRENE	8270C	10 U
BENZO[B]FLUORANTHENE	8270C	10 U
BENZO[G,H,I]PERYLENE	8270C	10 U
BENZO[K]FLUORANTHENE	8270C	10 U
BENZOIC ACID	8270C	50 U
BENZYL ALCOHOL	8270C	20 U
BIS(2-CHLOROETHYL)ETHER	8270C	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	8270C	10 U
BUTYLBENZYLPHTHALATE	8270C	10 U
CARBAZOLE	8270C	10 U
CHRYSENE	8270C	10 U
DIBENZ(A,H)ANTHRACENE	8270C	10 U
DIBENZOFURAN	8270C	10 U
DIETHYLPHTHALATE	8270C	10 U
DIMETHYL PHTHALATE	8270C	10 U
DI-N-OCTYLPHTHALATE	8270C	10 U
FLUORANTHENE	8270C	10 U
FLUORENE	8270C	10 U
HEXACHLOROBENZENE	8270C	10 U
HEXACHLOROBUTADIENE	8270C	10 U
HEXACHLOROETHANE	8270C	10 U
INDENO[1,2,3-CD]PYRENE	8270C	10 U
ISOPHORONE	8270C	10 U
METHYLNAPHTHALENE	8270C	10 U
NAPHTHALENE	8270C	10 U
NITROBENZENE	8270C	10 U
NITROBENZENE-D5	8270C	45.8
N-NITROSODIMETHYLAMINE	8270C	10 U
N-NITROSODINPROPYLAMINE	8270C	10 U
N-NITROSODIPHENYLAMINE	8270C	50 U
PENTACHLOROPHENOL	8270C	50 U
PHENANTHRENE	8270C	10 U
PHENOL	8270C	10 U
PHENOL-D5	8270C	22
P-TERPHENYL-D14	8270C	49.4
PYRENE	8270C	10 U
PYRIDINE	8270C	10 U

Appendix G
Trip Blank Results

Final Qualifier		31150	31151	31152	31153	31154	31200	31201	31202	31203	31204	31205	31206
Sample Date		9-NOV-05	9-NOV-05	10-NOV-05	10-NOV-05	10-NOV-05	1-NOV-05	2-NOV-05	2-NOV-05	3-NOV-05	3-NOV-05	4-NOV-05	4-NOV-05
Chemical Name/Units	Analytical Method	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,1,1,2-TETRACHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-TRICHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROPROPANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	8260B	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMOETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE-D41	8260B	4.19	10.3	4.05	4.07	4.01	3.49	3.68	3.68	3.9	3.84	4.21	4.32
1,2-DICHLOROPROPANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-TRIMETHYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROPROPANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-BROMOFLUOROBENZENE	8260B	4.29	10.2	4.25	3.72	3.72	3.84	4.07	4.22	4.17	4.14	4.31	4.27
ACETONE	8260B	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
BENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BENZENE, 1,2,4-TRIMETHYL-	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	8260B	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	8260B	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
N-BUTYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PROPYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SEC-BUTYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
STYRENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYLBENZENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE-D8	8260B	3.94	9.6	3.91	3.74	3.66	4.06	3.99	3.75	3.82	3.79	3.88	3.93
TRANS-1,2-DICHLOROETHENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES (TOTAL)	8260B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Appendix G
Trip Blank Results

Final Qualifier	31207	31208	31209	31210	31211	31212	31213	31214	31215
Sample Date	4-NOV-05	5-NOV-05	6-NOV-05	6-NOV-05	6-NOV-05	6-NOV-05	6-NOV-05	8-NOV-05	8-NOV-05
Chemical Name/Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,1,1,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE-D41	4.28	4.22	4.27	4.16	4.11 U	4.22 U	4.28 U	4.08	4.09
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-TRIMETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-BROMOFLUOROBENZENE	4.26	4.24	4.24	4.24	4.26 U	4.33 U	4.23 U	4.28	4.32
ACETONE	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
BENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BENZENE, 1,2,4-TRIMETHYL-	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
N-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SEC-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TERT-BUTYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE-D8	3.95	3.91	3.88	3.88	3.92 U	3.91 U	3.87 U	3.92	3.92
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
XYLENES (TOTAL)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

APPENDIX ~~H1~~ H

H1 –ALAMEDA POINT BACKGROUND

H2 – EVALUATION OF ARSENIC AND OTHER METALS IN SOIL AT IR SITES 30 AND 31

OVERVIEW OF APPENDIX H

This appendix presents two different statistical evaluations of concentrations of metals in soil as follows:

- Appendix H1 describes Alameda Point pink background data presents a statistical comparison with the concentrations of metals in soil at IR Site 31. This approach is used at Alameda Point IR sites to determine metals present at concentrations above Alameda Point background. The results of these analyses indicate that the majority of metals at IR Site 31 are present at concentrations above Alameda Point pink background.

- Appendix H2 presents a statistical analysis of arsenic at IR Sites 30 and 31 and five other metals (cadmium, chromium, iron, lead and vanadium) at IR Site 31 using a DTSC policy on selection of inorganic chemicals of potential concern. This analysis was conducted because multiple lines of evidence indicate that these metals were not the result of releases from industrial activities by the Navy. The results of these analyses indicate that arsenic, cadmium, chromium, and vanadium represent ambient populations, and likely iron also, at IR Site 31. The evaluation in this appendix indicates that the Alameda Point pink background is not applicable at IR Site 31 as also concluded for adjacent IR Site 25 in the 2002 final OU5 RI report.

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SSIC NO. 5090.3

APPENDIX H1
ALAMEDA POINT BACKGROUND

FINAL SOIL REMEDIAL INVESTIGATION REPORT FOR MARINA VILLAGE HOUSING

DATED 1 AUGUST 2007

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ACRONYMS/ABBREVIATIONS

bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Nave
IR	Installation Restoration (Program)
RI	Remedial Investigation
WRS	Wilcoxon Rank Sum (test)

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Appendix H
Alameda Point Background

In accordance with the typical process at Alameda Point, metal concentrations at IR Site 31 were compared to those in the Alameda Point background. IR Site 31 was originally included in the area covered by the Alameda Point pink background (TtEMI, 2001). The Alameda Point background data and statistical approach are based on information presented in Appendix G of the Remedial Investigation (RI) Report for Installation Restoration (IR) Program Sites 14 and 15 (TtEMI 2003, PRC 1997). The methods have been modified to account for characteristics of the actual data sets used. Figures and tables are presented at the end of this appendix. This comparison found that 15 of 17 metals at IR Site 31 have concentrations that are higher than the Alameda Point pink background.

In Appendix H2, statistical analysis of arsenic, cadmium, chromium, iron, lead and vanadium conducted using DTSC's policy shows that these metals are ambient. In addition, evidence that the Alameda Point pink background data are not applicable to IR Site 31 is presented.

H1 Comparison for Soil

The RI report for IR Sites 14 and 15 notes that soil data previously collected at Alameda Point were segregated based on the time of fill deposition (five time periods within the 75-year history of fill depositions) (TtEMI 2003, PRC 1997). Statistical evaluation of two naturally occurring soil constituents, iron and manganese, resulted in the identification of three specific background areas. These areas, designated pink, blue, and yellow, were located as follows (Figure H-1):

- Pink area - runway area and central portion;
- Blue area - southeast portion; and
- Yellow area - far west portion.

This section describes the methodology used to compare concentrations of site metals with concentrations in pink background locations. Statistical comparisons were conducted for two depth intervals: 0 to 2 feet below ground surface (bgs) and 0 to 7 feet bgs. This was based on exposure units presented in the human-health risk assessment. Pink background data are presented in Tables H-1 and H-2 for the 0-to-2-foot-bgs and 0-to-7-foot-bgs depth intervals, respectively. Results not reported above the detection limit (or the reporting limit) are highlighted in the tables, and the value listed is one-half the detection limit (or the reporting limit). Site data are presented in Tables H-3 and H-4 for the 0-to-2-foot-bgs and 0-to-7-foot-bgs depth intervals, respectively.

Two approaches were used to evaluate the data, depending on the percentage of values reported above the detection limits. For infrequently reported metals (i.e., metals reported above detection limits in less than 50 percent of the samples analyzed) in either the pink background or the site data sets, the comparison was made using a subjective evaluation of dot plots, a visual tool. For frequently reported metals in both data sets (i.e., metals reported in at least 50 percent of the samples analyzed), the Wilcoxon rank sum (WRS) test was used, followed by visual inspection of box plots. Frequencies of analytes reported above detection limits are given in Tables H-5 and H-6 for both the pink background and site data sets for each of the soil intervals.

For soil collected from 0 to 2 feet bgs, the pink background data consisted of 19 samples, and the IR Site 31 data consisted of 49 samples. All metals except antimony, cadmium, mercury, molybdenum, selenium, and thallium were reported at a frequency of at least 50 percent and thus qualified for the WRS comparison and evaluation of box plots. Antimony, cadmium, mercury, molybdenum, selenium, and thallium were evaluated using dot plots.

For soil collected from 0 to 7 feet bgs, the pink background data consisted of 51 samples, and the IR Site 31 data consisted of 120 samples. The detection frequency was less than 50 percent for six metals: antimony, cadmium, mercury, molybdenum, selenium, and thallium; therefore, these metals were evaluated using dot plots. The remaining metals were evaluated by the WRS comparison and review of the box plots. The evaluation methods are described in greater detail in subsequent subsections.

H1.1 Metals in Soil Infrequently Reported Above Detection Limits

Concentrations of metals infrequently reported above detection limits were qualitatively evaluated using dot plots and constructed using the statistical software program Minitab (Minitab, Inc. 2000). Dot plots of metals concentrations in site and pink background soil are presented on Figures H-2 and H-3 for 0-to-2-foot-bgs and 0-to-7-foot-bgs depth intervals, respectively. Each dot represents a single data point. "Nondetects" are shown as hollow dots, and "detects" are shown as solid dots. Results based on analysis of the dot plots are summarized in Tables H-9 and H-10 for 0-to-2 foot-bgs and 0-to-7-foot-bgs depth intervals, respectively .

H1.2 Metals in Soil Frequently Reported Above Detection Limits

Two-sample hypothesis testing was used to compare reported site concentrations with pink background data for analytes reported at concentrations above the reporting limit in at least 50 percent of the samples in both data sets. The purpose of the analysis was to determine whether site concentrations are greater than pink background concentrations by a statistically significant amount.

Hypothesis testing was conducted using a distribution-free method known as the WRS test. Because the WRS test does not require the data to have a specific distribution, no distributional testing was conducted before applying the test. The WRS tests were conducted according to procedures explained in Gilbert (1987) using the statistical software program Statistica (StatSoft 2004).

There are two versions of the WRS test: the exact test and the large-sample approximation. If the size of the smaller sample does not exceed 20 and the size of the larger sample does not exceed 40, the exact version of the WRS test is used. Otherwise, the large-sample approximation version of the test is appropriate. The large sample approximation was applied to data from both the 0-to-2-foot-bgs interval and the 0-to-7-foot-bgs interval.

The large-sample approximation version of the WRS test is briefly described below. Additional details are presented in Gilbert (1987). Results of the analysis are presented in Tables H-7 and H-8 and summarized in Tables H-9 and H-10.

- The null and alternative hypotheses were expressed as follows:

  H_0: the median concentration in site samples is less than or equal to the median concentration in pink background samples;

  H_A: the median concentration in site samples is greater than the median concentration in pink background samples;
- A significance level (α) of 0.05 was selected for the test;
- Sample sizes were indicated as n_1 and n_2 for site and pink background data, respectively;
- Site and pink background data were combined and ranked;
- The test statistic, W_{RS}, was calculated as the sum of ranks for the site data (designated as "Rank Sum Site" in Statistica output);
- ZRS, which is the large sample statistic adjusted for ties, was calculated from WRS as shown in equation 18.9 in Gilbert (1987) (designated as "Z adjusted" in Statistica output);
- $Z_{1-\alpha}$ was obtained from Table A1 in Gilbert (1987), which gives Z values for varying levels of α; and
- H_0 was rejected and HA was accepted if $Z_{RS} \geq Z_{1-\alpha}$.

Box plots were constructed for all data sets that were analyzed using the WRS test. The standard box plot was used in this analysis. The box itself contains the center 50 percent of data (i.e., the interquartile range), and the median is indicated as a horizontal line within the box. The top edge of the box is the 75th percentile, and the bottom edge is the 25th percentile. Vertical lines, sometimes called whiskers, extend to

the last observation within one step beyond either end of the box. A step is 1.5 times the height of the box. Data points that fall outside one step are considered "outliers," and values that fall outside two steps are labeled "extremes." Outliers and extremes are plotted individually.

If the null hypothesis was accepted, the box plots were examined to assure that the upper tail of the site data was not higher than the upper tail of the pink background data. This evaluation was conducted because the WRS test primarily identifies differences in central tendency rather than differences in tails of the distributions. The box plots are presented on Figures H-4 and H-5 for 0-to-2-foot-bgs and 0-to-7-foot-bgs depth intervals, respectively. No conclusions were changed based on inspection of the box plots.

H1.3 Results

The statistical comparisons for IR Site 31 soil and the pink background resulted in the following.

- For soil at 0 to 2 feet bgs, 15 out of 17 metals were above background levels, including arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, thallium, vanadium, and zinc.
- For soil at 0 to 7 feet bgs, 15 out of 17 metals were above background levels, including arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, thallium, vanadium, and zinc.

However, it is not essential to have a background data set to identify ambient (background) populations. In this case, there is evidence that the Alameda Point pink background is not applicable to IR Site 31. This evidence and an additional evaluation of arsenic, cadmium, chromium, iron, lead and vanadium is presented in Appendix H2 using DTSC's policy on identifying ambient populations using data from the Site.

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Table H-1
Ordered Background Data (mg/kg)
Surface Soil (0 to 2 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
8.6	15.6	92.5	1.47	3.19	56.6	49.7	49.1	21100	70.7	0.481	2.6	64.6	5	5	55.3	66.3
3.6	8.1	82.3	1.35	0.5	54.4	21.1	37.4	17700	24.4	0.142	1.55	53.2	1.25	0.225	46.4	43
3.1	7.4	81.3	1.01	0.452	41.1	11.4	18.6	16700	20	0.09	1.55	45.6	0.65	0.22	29.2	33.2
2.9	5	76	0.899	0.19	35.6	8.2	15	13900	11.6	0.085	1.45	29.7	0.6	0.21	27.7	30.5
2.6	2.34	62.7	0.69	0.185	34	8	13.8	12900	11	0.08	1.45	29.5	0.54	0.205	25.3	29.1
2.3	2.2	51.8	0.67	0.175	31	7.3	11.4	12700	7.22	0.08	1.4	25.1	0.305	0.2	24.9	28
1.3	2.1	39.1	0.568	0.1625	30.8	6.5	10.3	12500	5.63	0.08		25.1	0.295	0.14	24	27.2
1.3	1.88	38.4	0.531	0.1585	30.4	6.38	8.79	10800	4.7	0.08		25	0.285	0.1395	23.9	27.1
1.25	1.69	33.5	0.5	0.1565	30.3	4.9	8.4	10500	3.8	0.057		24.4	0.275	0.139	22	22.5
1.25	1.68	33	0.48	0.1525	29.3	4.8	8	9290	3.49	0.052		24.4	0.27	0.1385	21.7	21.7
1.25	1.65	32.4	0.44	0.1495	27.7	4.7	7.5	9050	3.2	0.05		23.8	0.109	0.1355	21	21.6
1.2	1.56	30.6	0.316	0.1485	27.1	4.69	7	8480	3.19	0.049		23.7	0.1085	0.1335	20.3	21.6
0.95	1.46	28.2	0.275	0.1375	25.5	4.35	6.91	8180	3.1	0.0485		23	0.1075	0.133	20.2	20.2
0.95	1.11	28	0.27	0.123	24.4	4.2	6.57	8030	3.01	0.03		22.1	0.1055	0.131	18.1	20
0.9	1.09	26.1	0.263	0.11	23.7	3.72	6.12	8010	2.9	0.03		22	0.104	0.1165	17.8	18.8
0.7	0.85	25.8	0.246	0.075	23.5	3.63	5.5	7890	2.8	0.0255		21.5	0.1035	0.1155	17	18.3
0.27	0.495	24.6	0.085	0.045	23.4	3.4	5.1	7450	2.56	0.0245		18	0.102	0.055	16.8	15.1
0.24	0.435	21.5	0.08	0.04	18.3	2.6	4.58	6920	2.01	0.0245		17	0.091	0.055	16.3	15
0.235	0.34	6.91	0.08	0.04	18	2.5	3.79	4910	0.474			11.5	0.0895	0.055	12.2	13.1

Note:

= value is equal to one-half of the reporting limit

Acronym/Abbreviation:

mg/kg - milligrams per kilogram

Table H-2
Ordered Background Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
8.6	15.6	156	1.47	3.19	66.7	49.7	49.1	27900	165	2.71	2.6	80.4	5	5	55.3	191
5.5	8.93	98.4	1.35	2.5	56.6	21.1	46.1	27000	70.7	0.481	1.8	64.6	1.25	0.255	51.1	72.2
4.75	8.1	92.5	1.25	1.52	54.4	12.6	37.4	21100	29.4	0.233	1.6	53.5	0.8	0.2495	46.4	66.3
4.75	7.4	84.2	1.18	0.94	53.4	11.4	25.7	18800	24.4	0.142	1.6	53.2	0.65	0.23	41.6	61.8
4.55	6.66	82.3	1.01	0.595	42.8	9.62	18.6	17700	20	0.1345	1.6	45.6	0.6	0.23	38.1	43
4.3	5.3	81.3	0.954	0.5	41.1	8.2	15.4	16700	19.8	0.095	1.55	44.3	0.54	0.225	29.2	36.2
4.3	5	76	0.946	0.4935	39.6	8	15	14900	11.6	0.09	1.55	43	0.345	0.225	28.6	34.4
4	4.7	75.7	0.899	0.4925	39.5	7.87	13.8	13900	11	0.09	1.55	29.7	0.31	0.225	27.8	33.2
4	4.5	62.7	0.865	0.48	36.5	7.58	11.4	13800	9.9	0.09	1.55	29.5	0.31	0.22	27.7	30.5
3.95	3.7	60.3	0.832	0.471	36.5	7.3	10.3	13000	8.87	0.09	1.5	27.6	0.305	0.22	27.4	29.1
3.6	3.6	54.9	0.792	0.452	36.4	6.84	10	12900	7.84	0.09	1.45	27.5	0.305	0.215	26	28.4
3.6	3.1	51.8	0.779	0.417	35.6	6.5	9.79	12700	7.7	0.085	1.45	27.4	0.305	0.21	25.3	28
3.1	2.37	49.2	0.69	0.4115	34	6.38	8.79	12500	7.22	0.085	1.45	27.4	0.295	0.21	24.9	27.2
3.1	2.34	46.3	0.67	0.378	32.5	6.26	8.4	11100	7.15	0.085	1.45	27.3	0.295	0.206	24.3	27.1
2.9	2.2	43.7	0.61	0.19	31.2	5.68	8.27	10800	6.51	0.08	1.4	26.8	0.2935	0.206	24	26.4
2.7	2.11	39.1	0.609	0.185	31	5.27	8.08	10500	5.63	0.08	1.4	26.4	0.29	0.205	23.9	25.5
2.6	2.1	38.4	0.603	0.175	30.8	5.2	8	9420	5	0.08		25.6	0.285	0.205	22.7	25
2.3	2.1	37.8	0.572	0.175	30.6	5.12	8	9360	4.7	0.08		25.1	0.28	0.2	22.4	24.6
1.45	1.92	35.6	0.568	0.1735	30.5	4.9	7.9	9290	4.6	0.08		25.1	0.28	0.2	22	23.9
1.45	1.88	35	0.531	0.1715	30.4	4.9	7.5	9270	4.3	0.08		25	0.275	0.1975	21.7	22.5
1.4	1.88	33.9	0.5	0.169	30.3	4.8	7.4	9220	3.8	0.08		24.8	0.27	0.1805	21.6	22.2
1.4	1.84	33.5	0.48	0.1685	30	4.7	7.24	9050	3.49	0.058		24.6	0.27	0.17	21.5	21.7
1.35	1.74	33.2	0.445	0.164	29.6	4.7	7.2	8740	3.39	0.057		24.4	0.2425	0.156	21.5	21.6
1.3	1.71	33	0.44	0.1625	29.3	4.69	7	8640	3.2	0.056		24.4	0.242	0.1515	21.2	21.6
1.3	1.69	32.5	0.3815	0.1585	29.2	4.38	6.91	8590	3.19	0.0525		24.3	0.2325	0.151	21	20.7
1.3	1.68	32.4	0.38	0.158	28.4	4.35	6.9	8520	3.1	0.0525		23.8	0.212	0.147	20.9	20.6
1.25	1.68	32.3	0.38	0.1565	28.4	4.31	6.9	8480	3.1	0.052		23.7	0.2	0.143	20.7	20.6
1.25	1.66	31.5	0.341	0.155	28.1	4.3	6.8	8360	3.01	0.052		23.4	0.15	0.143	20.5	20.5
1.25	1.65	31.2	0.316	0.1525	27.7	4.3	6.57	8180	3	0.0515		23.4	0.15	0.1425	20.3	20.5
1.2	1.62	30.9	0.316	0.1495	27.6	4.2	6.4	8100	2.9	0.05		23.1	0.1215	0.142	20.3	20.2
1.2	1.56	30.6	0.31	0.1485	27.1	4.2	6.12	8030	2.81	0.049		23	0.1175	0.1415	20.2	20
1.1	1.5	30.2	0.302	0.1485	26.2	4.2	6.1	8010	2.8	0.049		22.9	0.1175	0.1415	20	19.5
1.1	1.46	30.2	0.275	0.145	25.6	4.18	6	7910	2.77	0.0485		22.6	0.114	0.14	19.8	18.8
1.1	1.4	29.1	0.27	0.144	25.5	4	6	7890	2.73	0.0475		22.4	0.1115	0.14	18.8	18.5

Table H-2 (continued)
Ordered Background Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
1.05	1.31	28.6	0.27	0.1375	25.3	3.9	5.92	7890	2.6	0.0455		22.2	0.111	0.1395	18.3	18.3
0.95	1.29	28.2	0.27	0.13	24.4	3.86	5.91	7740	2.56	0.0445		22.2	0.111	0.139	18.1	18.3
0.95	1.12	28	0.2675	0.123	24.4	3.72	5.6	7620	2.5	0.0415		22.1	0.1105	0.1385	17.9	18
0.9	1.11	27.8	0.265	0.11	24.4	3.7	5.54	7520	2.48	0.0415		22.1	0.11	0.138	17.8	17.7
0.85	1.1	26.7	0.2635	0.11	24.3	3.7	5.5	7450	2.01	0.0365		22.1	0.11	0.1355	17.4	17.2
0.77	1.09	26.1	0.263	0.1	24	3.67	5.13	7160	2	0.0315		22	0.109	0.1335	17	16.7
0.7	0.95	25.8	0.26	0.1	24	3.63	5.1	6920	1.83	0.0305		22	0.109	0.133	16.8	15.8
0.27	0.92	25.4	0.246	0.075	23.7	3.49	5	6830	1.7	0.03		21.8	0.1085	0.131	16.5	15.1
0.265	0.917	24.6	0.18	0.05	23.5	3.4	4.68	6710	1.62	0.03		21.5	0.1075	0.1165	16.3	15
0.26	0.85	24.3	0.125	0.045	23.4	3.3	4.58	6550	1.6	0.026		21.3	0.107	0.1155	15.4	15
0.26	0.85	21.5	0.095	0.045	22.7	3.02	4.4	6320	1.5	0.0255		21	0.1055	0.1155	14.4	13.8
0.26	0.85	21.4	0.095	0.045	20.5	2.85	4.3	6280	1.5	0.025		18.5	0.104	0.07	14.1	13.5
0.24	0.495	19.4	0.09	0.045	18.9	2.6	4.03	6080	1.4	0.025		18	0.1035	0.07	13.5	13.1
0.24	0.435	19.2	0.085	0.045	18.3	2.5	3.79	5890	1.1	0.0245		18	0.102	0.065	12.4	12
0.24	0.375	18.2	0.08	0.04	18	2.25	3.68	4910	1.05	0.0245		17.1	0.091	0.055	12.2	11.6
0.235	0.34	12.5	0.08	0.04	15.8	2.175	3.43	4660	0.95	0.0235		17	0.09	0.055	10.6	9.98
0.23	0.295	6.91	0.075	0.04	15.6	2.08	3.12	4500	0.474			11.5	0.0895	0.055	10.5	9

Note:

= value is equal to one-half of the reporting limit

Acronym/Abbreviation:

mg/kg - milligrams per kilogram

Table H-3
Ordered Site Data (mg/kg)
Surface Soil (0 to 2 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
3.2	32.6	476	0.46	0.88	176	28.2	118	67000	168	2	1.9	389	3	3.3	104	228
3.15	27.2	440	0.4	0.7	123	26.2	106	59100	167	1.3	0.395	263	2.8	2.9	98	194
2.85	26.8	407	0.38	0.69	115	24.6	102	53300	139	1.2	0.245	246	2.1	2.8	91.1	176
2.85	18.4	378	0.37	0.67	90	23.5	76.2	52700	110	0.98	0.125	226	2	2.6	86.7	165
2.85	16.7	361	0.37	0.62	80.7	22.2	75.6	52600	107	0.84	0.125	141	1.9	2.6	82.2	153
2.8	15.5	355	0.36	0.54	79.1	22.1	72.2	51700	93.3	0.77	0.115	98.7	0.85	2.4	76.9	138
2.8	15.3	345	0.35	0.51	78.3	21.8	66	49600	89	0.75	0.115	88.2	0.7	2.4	72.8	138
2.75	14.3	340	0.33	0.51	73.2	20.5	63.5	49400	86.9	0.71	0.115	72.3	0.65	2.3	71.9	133
2.75	14.2	318	0.27	0.47	67.8	20.4	59.4	48300	54	0.66	0.115	65.6	0.65	2.3	71.6	131
2.75	14.1	312	0.25	0.47	67.7	18.6	57	47900	39.5	0.65	0.115	64.2	0.47	2.2	65.7	125
2.75	13.9	303	0.24	0.45	65	18.2	56.5	47200	36.7	0.59	0.115	60.5	0.45	2.2	63.3	123
2.75	13.4	301	0.24	0.44	63.8	17.5	56	46400	35.8	0.54	0.11	60.3	0.37	2.1	63	123
2.7	13.2	287	0.23	0.44	55.3	17.2	54	45600	32.6	0.51	0.11	56.3	0.315	1.9	60	121
2.65	12.5	261	0.22	0.42	54.1	16.3	53.6	45000	25.5	0.51	0.11	55.2	0.3	1.8	58.5	120
2.65	12	257	0.21	0.4	51.9	16	51.4	45000	24.5	0.49	0.11	55	0.29	1.7	58.3	120
2.65	11.9	254	0.21	0.4	50.7	16	51	44600	24.5	0.49	0.11	50.7	0.285	1.6	56.2	120
2.65	11.5	240	0.21	0.39	49.7	15.4	50.5	44400	23.5	0.43	0.11	46.5	0.285	1.5	56	119
2.65	11.5	234	0.19	0.37	45.5	15.3	49.4	44300	22.9	0.4	0.11	44.7	0.285	1.5	55.9	117
2.65	11.5	233	0.17	0.37	45	14.9	49	44200	22.6	0.38	0.11	44.6	0.285	1.5	54.6	116
2.6	11.2	231	0.17	0.35	44.1	14.9	48	43400	22.5	0.37	0.11	44.2	0.285	1.4	54.4	115
2.55	11.1	222	0.17	0.34	41.3	14.8	44.6	42700	22.3	0.36	0.11	43.7	0.28	1.3	53.2	113
2.2	10.8	209	0.16	0.32	38.9	14.6	41.6	42500	21.1	0.35	0.11	43.5	0.28	0.99	51.7	113
1.4	10.8	190	0.15	0.32	38.9	14.4	41.5	41900	20.5	0.34	0.11	42.9	0.275	0.55	51	112
1.3	10.6	188	0.15	0.32	36.9	14.3	40.1	41800	20	0.3	0.11	41.7	0.275	0.5	50.8	112
0.6	10.3	187	0.14	0.31	35.9	14.2	38.1	41000	19.9	0.29	0.11	41.4	0.275	0.48	50.7	109
0.55	10.2	183	0.14	0.28	35.1	13.7	38	40800	19.7	0.28	0.11	39.9	0.275	0.435	50.1	108
0.55	9.5	180	0.13	0.28	34.6	13.7	37.1	40700	19.3	0.28	0.11	36.3	0.275	0.41	49.3	107
0.485	9.4	180	0.13	0.28	33.7	13.6	35.8	40500	18.8	0.275	0.11	35.8	0.275	0.335	48.8	107
0.47	9	179	0.12	0.28	32.8	13.4	34.7	40100	18.7	0.27	0.11	35.1	0.275	0.325	47.7	106
0.465	8.7	174	0.115	0.26	32.3	13.4	33.9	39500	18.4	0.26	0.11	34.5	0.275	0.305	47.2	105
0.46	8.6	170	0.11	0.26	32.2	13.3	33.1	33000	17.7	0.24	0.11	34	0.275	0.29	46.3	104
0.44	8.2	167	0.11	0.26	31.9	12.8	30.8	32300	17.6	0.24	0.11	33.9	0.275	0.285	44.6	102
0.425	8.2	163	0.11	0.26	31.6	12.4	30.6	32100	17.6	0.23	0.105	33.5	0.27	0.285	44.2	101
0.41	8.1	161	0.11	0.25	31.2	12.3	29.4	31600	17.4	0.23	0.105	32.8	0.27	0.275	44	100
0.405	8.1	160	0.11	0.24	29	12.2	28.6	31000	16.7	0.23	0.105	32.5	0.27	0.275	42.3	98.9
0.375	7.9	150	0.11	0.24	28.9	12.1	28.5	30800	15.3	0.21	0.105	31.1	0.27	0.275	42.2	98.1

Table H-3 (continued)
Ordered Site Data (mg/kg)
Surface Soil (0 to 2 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
0.365	7.7	148	0.11	0.23	26.8	11.8	28.4	29900	15.1	0.2	0.105	29.6	0.265	0.275	42	95.5
0.355	7.5	145	0.105	0.23	26.5	10.9	26.8	28500	14.7	0.19	0.105	24.7	0.265	0.275	41.7	95.4
0.315	7.5	139	0.105	0.22	25.7	10.7	26.6	27800	14.6	0.19	0.105	24.3	0.265	0.27	41.1	93.3
0.31	7.3	135	0.105	0.21	23.7	10.6	26.3	27700	14.1	0.18	0.105	22.6	0.265	0.265	40.8	92.8
0.305	7.2	129	0.105	0.21	23.4	10.3	25	26400	13.4	0.18	0.105	21.7	0.265	0.265	39.5	90.9
0.3	6.9	127	0.105	0.21	21.8	10.3	23.1	22400	13.3	0.17	0.105	21.3	0.265	0.265	36.9	87.1
0.3	6.8	114	0.1	0.2	20	9.8	22.5	21700	13	0.155	0.105	21.1	0.265	0.265	35.5	84.4
0.28	6.7	111	0.084	0.175	19.3	9.6	22.2	21700	12.8	0.13	0.105	21	0.265	0.265	34.2	76.4
0.245	6.3	107	0.081	0.17	19.2	9.5	22.1	20300	11.4	0.11	0.105	19	0.265	0.22	31.2	76
0.23	4.6	107	0.077	0.16	18.1	9.1	21.9	19900	10.9	0.1	0.105	18.4	0.265	0.205	30.9	75.7
0.19	4.6	90.6	0.07	0.15	12.7	8.7	17.5	19600	9.8	0.085	0.105	17.1	0.26	0.15	28.9	70.2
0.155	4.5	79.7	0.022	0.13	11.8	8.6	11.6	18500	7.6	0.075	0.105	15.7	0.23	0.15	26.1	46.1
0.09	3.7	46.9	0.0065	0.03	9.8	8.5	10.5	15300	6.9	0.055	0.105	11.9	0.195	0.1	21.9	39.1

Note:

= value is equal to one-half of the reporting limit

Acronym/Abbreviation:

mg/kg - milligrams per kilogram

Table H-4
Ordered Site Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
3.5	42.4	476	0.66	1.5	197	28.6	118	67000	168	2.4	2.5	474	3.1	3.7	104	901
3.45	42.1	464	0.6	0.92	176	28.3	106	59100	167	2.2	1.9	389	3	3.3	102	228
3.25	32.6	459	0.56	0.88	152	28.2	102	56600	139	2.1	0.54	378	2.8	2.9	98	194
3.2	30.8	440	0.55	0.76	146	28	86.5	53300	110	2	0.47	364	2.7	2.8	91.1	189
3.15	29.8	407	0.53	0.7	140	27.6	76.2	53300	107	2	0.395	357	2.2	2.8	86.7	188
3.1	27.2	378	0.5	0.69	139	26.2	75.6	52700	96.7	1.9	0.28	356	2.1	2.8	82.2	182
3.05	26.8	361	0.46	0.67	134	24.6	74	52600	94.8	1.9	0.245	350	2	2.7	79.8	176
3	26.3	360	0.45	0.67	132	23.5	72.2	52000	93.3	1.9	0.23	344	1.9	2.7	77.4	175
3	23.8	355	0.45	0.65	130	23.5	70.9	51700	89	1.9	0.14	317	1.4	2.6	76.9	165
3	23.7	345	0.44	0.62	124	23.2	66	50200	86.9	1.6	0.135	297	1.4	2.6	74.9	161
3	18.8	340	0.44	0.54	123	22.2	63.5	50100	79.3	1.5	0.13	286	1.3	2.6	74.4	153
2.9	18.4	318	0.44	0.52	123	22.1	59.4	49600	69.4	1.5	0.13	268	1.3	2.6	74.2	150
2.9	17.4	312	0.42	0.51	117	21.8	57	49400	60.2	1.4	0.13	263	1.15	2.4	72.8	144
2.85	17.4	311	0.4	0.51	115	21.8	56.5	48400	55.9	1.4	0.125	246	0.88	2.4	72.3	142
2.85	16.7	303	0.38	0.5	109	21.7	56	48300	55.2	1.3	0.125	244	0.85	2.3	71.9	142
2.85	15.9	301	0.37	0.48	109	21.1	55.5	47900	54	1.3	0.125	226	0.85	2.3	71.6	138
2.85	15.5	291	0.37	0.47	106	20.5	54.3	47200	50.5	1.2	0.12	219	0.75	2.2	68.4	138
2.85	15.3	287	0.37	0.47	99.4	20.5	54	47100	42.7	1.2	0.12	200	0.7	2.2	66.9	133
2.8	14.7	265	0.36	0.45	95.7	20.4	53.6	46600	41.5	1.1	0.12	200	0.65	2.1	65.7	133
2.8	14.4	261	0.35	0.44	94.1	20.4	52	46400	40.3	1	0.12	166	0.65	1.9	64.1	131
2.8	14.3	257	0.35	0.44	92.6	19.6	51.7	46400	39.7	1	0.12	164	0.65	1.8	63.6	128
2.8	14.2	254	0.34	0.42	91.6	19.6	51.4	45800	39.5	0.98	0.12	157	0.6	1.8	63.5	127
2.8	14.1	250	0.33	0.41	90	19.2	51	45600	36.9	0.94	0.115	152	0.6	1.8	63.3	125
2.8	13.9	240	0.33	0.4	80.7	19.1	50.5	45000	36.9	0.92	0.115	152	0.6	1.7	63	123
2.8	13.9	240	0.31	0.4	80	18.6	50.1	45000	36.7	0.89	0.115	141	0.6	1.6	62.1	123
2.8	13.6	237	0.3	0.4	79.3	18.2	49.4	44600	35.8	0.88	0.115	131	0.495	1.6	60	121
2.8	13.4	234	0.3	0.39	79.2	17.9	49	44400	33.1	0.87	0.115	127	0.47	1.6	58.5	121
2.75	13.2	233	0.3	0.39	79.1	17.6	48.5	44400	32.6	0.86	0.115	113	0.45	1.6	58.3	120
2.75	13.2	231	0.27	0.37	78.5	17.5	48	44400	31.2	0.84	0.115	111	0.425	1.5	56.2	120
2.75	12.5	231	0.26	0.37	78.3	17.5	47.7	44300	30.8	0.82	0.115	109	0.42	1.5	56.2	120
2.75	12.5	225	0.26	0.36	77.7	17.3	44.9	44200	29.9	0.78	0.115	107	0.41	1.5	56.1	120
2.75	12.5	222	0.25	0.36	73.8	17.2	44.7	44000	29.4	0.77	0.115	105	0.38	1.4	56	119
2.75	12	219	0.24	0.35	73.2	17.1	44.6	43700	28.7	0.76	0.115	101	0.37	1.4	55.9	118
2.75	11.9	209	0.24	0.34	73.1	17	42.7	43400	25.5	0.75	0.115	98.7	0.345	1.3	55.4	117
2.75	11.8	204	0.24	0.33	73.1	16.9	41.9	43400	25.1	0.75	0.115	91	0.345	1.3	55.2	116
2.7	11.6	190	0.23	0.32	69.4	16.9	41.6	43100	24.7	0.75	0.115	88.2	0.33	1.3	54.6	115

Table H-4 (continued)
Ordered Site Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
2.7	11.5	189	0.23	0.32	67.8	16.5	41.5	43000	24.5	0.72	0.115	86.1	0.33	1.2	54.4	114
2.7	11.5	188	0.22	0.32	67.7	16.3	41	42700	24.5	0.71	0.11	81.9	0.325	1.2	53.6	113
2.7	11.5	187	0.22	0.32	65	16.2	40.9	42500	23.5	0.68	0.11	81.1	0.315	0.99	53.2	113
2.7	11.5	187	0.21	0.32	64.7	16	40.4	42400	22.9	0.66	0.11	81	0.31	0.99	53	112
2.7	11.5	186	0.21	0.32	64.5	16	40.2	41900	22.9	0.65	0.11	78	0.305	0.94	52.6	112
2.7	11.2	184	0.21	0.31	63.8	15.5	40.1	41800	22.6	0.65	0.11	72.3	0.3	0.55	52	112
2.65	11.1	183	0.19	0.28	63.2	15.5	39.8	41000	22.5	0.64	0.11	69.1	0.3	0.52	51.7	111
2.65	10.8	181	0.19	0.28	62.4	15.4	39.6	40800	22.3	0.63	0.11	68.7	0.3	0.5	51.5	109
2.65	10.8	180	0.19	0.28	60.5	15.4	38.1	40700	21.1	0.63	0.11	67.7	0.3	0.5	51.1	108
2.65	10.7	180	0.18	0.28	59.1	15.3	38	40500	20.5	0.6	0.11	67.4	0.3	0.49	51	107
2.65	10.7	179	0.18	0.28	59	15.3	37.1	40100	20	0.59	0.11	67.1	0.295	0.48	50.8	107
2.65	10.6	176	0.18	0.28	58.9	15.3	35.8	39500	19.9	0.57	0.11	65.6	0.29	0.435	50.7	106
2.65	10.3	174	0.17	0.27	55.3	15	35.6	39500	19.8	0.55	0.11	65.3	0.29	0.425	50.1	106
2.65	10.2	172	0.17	0.26	55	14.9	35.1	37700	19.7	0.54	0.11	64.2	0.29	0.41	50	105
2.65	10.1	170	0.17	0.26	54.9	14.9	34.7	37000	19.7	0.51	0.11	63.1	0.29	0.395	49.9	105
2.6	9.8	167	0.17	0.26	54.1	14.9	34.5	35800	19.3	0.51	0.11	62.8	0.285	0.38	49.3	104
2.6	9.7	164	0.16	0.26	54.1	14.8	33.9	34500	18.8	0.5	0.11	60.5	0.285	0.345	48.9	104
2.6	9.7	163	0.15	0.26	51.9	14.7	33.2	33600	18.7	0.49	0.11	60.3	0.285	0.335	48.8	102
2.6	9.6	162	0.15	0.25	50.7	14.6	33.1	33000	18.5	0.49	0.11	60.1	0.285	0.335	48.5	101
2.55	9.5	161	0.15	0.245	49.8	14.5	32.4	32300	18.4	0.48	0.11	56.3	0.285	0.335	47.7	100
2.3	9.4	160	0.14	0.24	49.7	14.4	32.4	32100	18.2	0.48	0.11	55.7	0.285	0.325	47.3	100
2.2	9.4	157	0.14	0.24	49.7	14.3	32.2	31600	18.1	0.47	0.11	55.2	0.285	0.325	47.2	98.9
2.1	9.1	150	0.14	0.24	47.1	14.3	32	31300	17.7	0.46	0.11	55	0.285	0.31	47.1	98.1
1.7	9	149	0.14	0.24	45.5	14.2	31.3	31000	17.6	0.46	0.11	53.9	0.28	0.305	47.1	96.7
1.7	9	148	0.135	0.23	45.3	13.9	30.8	30800	17.6	0.44	0.11	51.9	0.28	0.3	46.6	95.5
1.5	8.7	146	0.13	0.23	45	13.7	30.6	30800	17.4	0.44	0.11	50.7	0.28	0.3	46.3	95.4
1.5	8.6	145	0.13	0.22	44.1	13.7	29.9	30400	17.4	0.43	0.11	46.5	0.28	0.3	46	95
1.4	8.3	140	0.13	0.22	43.8	13.7	29.6	30400	16.7	0.43	0.11	45.5	0.28	0.29	45.7	93.5
1.4	8.3	139	0.13	0.21	42.6	13.7	29.4	30400	16.6	0.4	0.11	45.1	0.28	0.29	45.5	93.3
1.3	8.2	136	0.12	0.21	41.3	13.6	29.4	30100	16.5	0.395	0.11	44.7	0.28	0.29	44.6	93.1
1.2	8.2	135	0.12	0.21	40.4	13.4	28.7	30000	15.8	0.38	0.11	44.6	0.28	0.29	44.5	92.8
0.75	8.1	134	0.12	0.2	39.4	13.4	28.6	29900	15.5	0.38	0.11	44.2	0.28	0.29	44.2	91.7
0.6	8.1	133	0.12	0.2	39.2	13.3	28.6	29600	15.3	0.37	0.11	43.7	0.28	0.29	44	90.9
0.6	8.1	129	0.12	0.19	38.9	13.3	28.5	29600	15.1	0.37	0.11	43.5	0.28	0.285	43.3	90.3
0.55	7.9	127	0.115	0.18	38.9	13.3	28.4	29400	14.9	0.36	0.11	42.9	0.28	0.285	42.8	89.9
0.55	7.7	127	0.115	0.175	38.7	13.2	28.3	28500	14.8	0.36	0.11	41.9	0.275	0.285	42.3	89.3

Table H-4 (continued)
Ordered Site Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
0.55	7.7	127	0.115	0.17	36.9	13.1	27.8	28100	14.7	0.35	0.11	41.7	0.275	0.285	42.3	87.3
0.55	7.5	118	0.115	0.16	35.9	12.9	27.8	27800	14.6	0.34	0.11	41.6	0.275	0.285	42.2	87.1
0.55	7.5	117	0.115	0.16	35.8	12.8	27.2	27700	14.5	0.335	0.11	41.6	0.275	0.28	42.2	86.8
0.485	7.4	114	0.115	0.16	35.4	12.8	27.2	27700	14.3	0.33	0.11	41.4	0.275	0.28	42	86.6
0.47	7.3	111	0.115	0.15	35.1	12.8	26.8	27500	14.3	0.32	0.11	39.9	0.275	0.28	41.7	86.3
0.465	7.2	110	0.11	0.15	34.6	12.7	26.8	26600	14.1	0.32	0.11	36.3	0.275	0.28	41.6	86
0.46	7.1	107	0.11	0.14	33.8	12.4	26.7	26400	14	0.3	0.11	35.8	0.275	0.28	41.1	84.4
0.455	6.9	107	0.11	0.14	33.7	12.4	26.6	26400	13.9	0.295	0.11	35.1	0.275	0.28	40.8	82.3
0.45	6.9	101	0.11	0.14	32.8	12.4	26.3	26300	13.9	0.29	0.11	35.1	0.275	0.28	40.2	80.9
0.44	6.8	95.9	0.11	0.13	32.3	12.3	25.3	26300	13.5	0.29	0.11	34.5	0.275	0.28	40.1	79
0.425	6.8	94.1	0.11	0.13	32.3	12.3	25	26000	13.4	0.28	0.11	34.5	0.275	0.275	39.5	78.9
0.41	6.7	93.6	0.11	0.13	32.2	12.2	24.5	26000	13.3	0.28	0.11	34.3	0.275	0.275	39.4	76.4
0.41	6.7	90.6	0.11	0.12	31.9	12.2	23.8	25800	13	0.275	0.11	34	0.275	0.275	38.4	76
0.405	6.3	90.3	0.11	0.12	31.6	12.2	23.4	25600	12.8	0.27	0.11	33.9	0.275	0.275	37.7	75.8
0.405	6.3	89.1	0.11	0.115	31.2	12.1	23.1	25400	12.5	0.26	0.11	33.5	0.275	0.275	36.9	75.7
0.405	6.2	88.9	0.11	0.11	30.7	11.9	23.1	25300	11.7	0.24	0.11	33.5	0.275	0.275	36.4	74.6
0.39	6.2	84.6	0.11	0.11	29.9	11.8	22.9	24000	11.7	0.24	0.105	33.5	0.27	0.275	35.5	72.5
0.375	6.2	84.5	0.11	0.11	29	11.6	22.5	23800	11.6	0.24	0.105	33	0.27	0.275	34.6	71.9
0.37	6.1	79.9	0.11	0.11	28.9	11.6	22.2	23700	11.5	0.23	0.105	32.8	0.27	0.275	34.5	70.2
0.37	5.9	79.7	0.105	0.11	28.3	11.5	22.2	23500	11.4	0.23	0.105	32.5	0.27	0.275	34.5	67.6
0.365	5.7	79.3	0.105	0.11	27.4	10.9	22.1	22600	11.4	0.23	0.105	31.9	0.27	0.275	34.2	66.2
0.36	5.4	74.5	0.105	0.11	27	10.9	21.9	22400	11.2	0.22	0.105	31.9	0.27	0.27	33.5	63.7
0.36	5	72.8	0.105	0.11	26.8	10.9	19.5	21900	11.2	0.21	0.105	31.3	0.27	0.27	33.4	60.6
0.355	5	70	0.105	0.11	26.5	10.8	18.4	21800	11	0.21	0.105	31.1	0.27	0.27	33.2	59
0.35	4.9	67.6	0.105	0.11	25.7	10.8	17.5	21700	10.9	0.21	0.105	30.6	0.27	0.27	32.1	58
0.315	4.9	66	0.105	0.11	25.4	10.7	17	21700	10.6	0.21	0.105	29.6	0.27	0.27	31.7	56.4
0.31	4.9	66	0.105	0.11	25.2	10.6	16.5	21700	10	0.2	0.105	29.6	0.27	0.265	31.2	54.7
0.305	4.7	61.6	0.105	0.11	25.1	10.5	14.1	21700	9.8	0.19	0.105	25	0.27	0.265	31	48.4
0.3	4.6	57.7	0.105	0.11	24.9	10.5	13.7	21400	9.2	0.19	0.105	24.7	0.27	0.265	30.9	47.7
0.3	4.6	57	0.105	0.1	24.6	10.3	13.4	20900	9.1	0.185	0.105	24.5	0.265	0.265	30.9	47.3
0.3	4.6	56.3	0.1	0.098	24.3	10.3	13.1	20800	8.9	0.18	0.105	24.3	0.265	0.265	28.9	46.1
0.29	4.5	55.7	0.097	0.097	23.7	10.2	12.9	20500	8.9	0.18	0.105	22.9	0.265	0.265	28.2	45.2
0.28	4.5	55	0.096	0.096	23.4	9.8	12.1	20400	8.8	0.18	0.105	22.6	0.265	0.265	27	44.9
0.28	4.4	53	0.089	0.089	22.7	9.6	11.6	20300	8.8	0.17	0.105	21.7	0.265	0.265	27	43
0.28	4.3	51.8	0.084	0.088	22.7	9.5	11.5	20200	8.5	0.17	0.105	21.3	0.265	0.265	26.7	42.9
0.255	3.9	51.6	0.081	0.086	22.5	9.4	11.5	19900	8.4	0.16	0.105	21.1	0.265	0.26	26.7	42.8

Table H-4 (continued)
Ordered Site Data (mg/kg)
Vadose Zone Soil (0 to 7 feet bgs)

Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
0.245	3.7	49.4	0.08	0.083	21.8	9.1	11.1	19600	8.2	0.155	0.105	21	0.265	0.23	26.7	41.9
0.245	3.7	49.2	0.077	0.075	20	9	10.8	18900	8.2	0.15	0.105	20.3	0.265	0.22	26.2	41.1
0.23	3.5	48.9	0.074	0.071	19.3	8.8	10.6	18500	7.6	0.145	0.105	19	0.265	0.205	26.1	39.9
0.19	3.5	48.2	0.07	0.066	19.2	8.7	10.5	18400	7.1	0.13	0.105	18.9	0.265	0.19	25.7	39.7
0.18	3.5	46.9	0.066	0.063	18.1	8.6	10.4	18100	7.1	0.11	0.105	18.4	0.265	0.175	25.3	39.7
0.165	3.4	43.5	0.065	0.045	14.6	8.5	10.1	17800	7	0.1	0.105	17.8	0.265	0.15	25.2	39.1
0.16	3.2	43.4	0.058	0.033	12.7	7.7	10	16900	6.9	0.085	0.105	17.1	0.26	0.15	24.3	38.7
0.155	3	43	0.033	0.031	11.9	6.6	9.7	15900	6.8	0.085	0.105	15.7	0.26	0.13	23.7	38
0.155	2.9	37.2	0.024	0.03	11.8	6.6	9.6	15300	6.5	0.075	0.105	13.3	0.26	0.115	23.1	37.7
0.14	2.9	36.7	0.022	0.03	11.4	6.4	8.9	14100	6.3	0.07	0.105	12.8	0.23	0.1	22.6	37.1
0.135	2.8	31.3	0.0065	0.023	9.8	6.1	7.3	12700	6.1	0.065	0.075	11.9	0.195	0.095	21.9	33.1
0.09	2.3	30.9	0.00475	0.017	3	5.5	3.6	10500	6.1	0.055	0.0485	2.4	0.12	0.085	20.9	27.5

Note:

= value is equal to one-half of the reporting limit

Acronym/Abbreviation:

mg/kg - milligrams per kilogram

Table H-5
Metals Reported Above Detection Limits
Surface Soil (0 to 2 feet bgs)

	BACKGROUND			SITE			
Analyte	No. of Samples	No. of Detects	%Detects	No. of Samples	No. of Detects	%Detects	WRS?
Antimony	19	7	37	49	6	12	no
Arsenic	19	15	79	49	49	100	yes
Barium	19	19	100	49	49	100	yes
Beryllium	19	11	58	49	36	73	yes
Cadmium	19	3	16	49	46	94	no
Chromium	19	19	100	49	49	100	yes
Cobalt	19	17	89	49	49	100	yes
Copper	19	18	95	49	49	100	yes
Iron	19	19	100	49	49	100	yes
Lead	19	19	100	49	49	100	yes
Mercury	18	4	22	49	38	78	no
Molybdenum	6	0	0	49	1	2	no
Nickel	19	19	100	49	49	100	yes
Selenium	19	0	0	49	5	10	no
Thallium	19	0	0	49	23	47	no
Vanadium	19	19	100	49	49	100	yes
Zinc	19	19	100	49	49	100	yes

Acronym/Abbreviation:
WRS – Wilcoxon rank sum test

Table H-6
Metals Reported Above Detection Limits
Vadose Zone Soil (0 to 7 feet bgs)

	BACKGROUND			SITE			
Analyte	No. of Samples	No. of Detects	%Detects	No. of Samples	No. of Detects	%Detects	WRS?
Antimony	51	16	31	120	17	14	no
Arsenic	51	41	80	120	120	100	yes
Barium	51	51	100	120	120	100	yes
Beryllium	51	26	51	120	75	63	yes
Cadmium	51	11	22	120	98	82	no
Chromium	51	51	100	120	120	100	yes
Cobalt	51	45	88	120	120	100	yes
Copper	51	48	94	120	120	100	yes
Iron	51	51	100	120	120	100	yes
Lead	51	47	92	120	120	100	yes
Mercury	50	6	12	120	97	81	no
Molybdenum	16	0	0	120	4	3	no
Nickel	51	51	100	120	120	100	yes
Selenium	51	0	0	120	13	11	no
Thallium	51	0	0	120	44	37	no
Vanadium	51	51	100	120	120	100	yes
Zinc	51	50	98	120	120	100	yes

Acronym/Abbreviation:
WRS – Wilcoxon rank sum test

Table H-7
Results of Wilcoxon Rank Sum Test
Surface Soil (0 to 2 feet bgs)

Analyte	n1	n2	W_{RS}	Z_{RS}	$Z_{(1-a)}$	Z_{RS} >/= $Z_{(1-a)}$?	Conclusion
Arsenic	49	19	2,083.0	5.365	1.645	Yes	Reject Ho
Barium	49	19	2,146.0	6.226	1.645	Yes	Reject Ho
Beryllium	49	19	1,402.5	-3.940	1.645	No	Accept Ho
Chromium	49	19	1,854.0	2.235	1.645	Yes	Reject Ho
Cobalt	49	19	2,053.0	4.955	1.645	Yes	Reject Ho
Copper	49	19	2,094.0	5.515	1.645	Yes	Reject Ho
Iron	49	19	2,149.0	6.267	1.645	Yes	Reject Ho
Lead	49	19	2,046.5	4.866	1.645	Yes	Reject Ho
Nickel	49	19	1,906.0	2.945	1.645	Yes	Reject Ho
Vanadium	49	19	2,096.0	5.542	1.645	Yes	Reject Ho
Zinc	49	19	2,153.0	6.322	1.645	Yes	Reject Ho

Acronyms/Abbreviations:

a - significance level
H_o - Site ≤ Background (null hypothesis)
n1 - number of site samples
n2 - number of background samples
W_{RS} - sum of ranks for the site data
Z_{RS} - Z adjusted for ties, per equation 18.9 in Gilbert 1987

Table H-8
Results of Wilcoxon Rank Sum Test
Vadose Zone Soil (0 to 7 feet bgs)

Analyte	n1	n2	W_{RS}	Z_{RS}	$Z_{(1-a)}$	Z_{RS} >/= $Z_{(1-a)}$?	Conclusion
Arsenic	120	51	12,970.5	8.950	1.645	Yes	Reject Ho
Barium	120	51	12,971.5	8.953	1.645	Yes	Reject Ho
Beryllium	120	51	8,614.5	-5.761	1.645	No	Accept Ho
Chromium	120	51	11,778.0	4.923	1.645	Yes	Reject Ho
Cobalt	120	51	13,029.5	9.149	1.645	Yes	Reject Ho
Copper	120	51	12,920.5	8.780	1.645	Yes	Reject Ho
Iron	120	51	13,234.0	9.839	1.645	Yes	Reject Ho
Lead	120	51	12,703.5	8.048	1.645	Yes	Reject Ho
Nickel	120	51	12,240.5	6.484	1.645	Yes	Reject Ho
Vanadium	120	51	12,947.5	8.872	1.645	Yes	Reject Ho
Zinc	120	51	13,153.5	9.567	1.645	Yes	Reject Ho

Acronyms/Abbreviations:

a - significance level
H_o - Site ≤ Background (null hypothesis)
n1 - number of site samples
n2 - number of background samples
W_{RS} - sum of ranks for the site data
Z_{RS} - Z adjusted for ties, per equation 18.9 in Gilbert 1987

Table H-9
Conclusions of Background Evaluation
Surface Soil (0 to 2 feet bgs)

Analyte	Site > Background?	Rationale
Antimony	no	Graphical analysis using dotplots
Arsenic	YES	WRS test
Barium	YES	WRS test
Beryllium	no	WRS test / boxplots
Cadmium	YES	Graphical analysis using dotplots
Chromium	YES	WRS test
Cobalt	YES	WRS test
Copper	YES	WRS test
Iron	YES	WRS test
Lead	YES	WRS test
Mercury	YES	Graphical analysis using dotplots
Molybdenum	YES	Graphical analysis using dotplots
Nickel	YES	WRS test
Selenium	YES	Graphical analysis using dotplots
Thallium	YES	Graphical analysis using dotplots
Vanadium	YES	WRS test
Zinc	YES	WRS test

Acronym/Abbreviation:
WRS = Wilcoxon rank sum test

Table H-10
Conclusions of Background Evaluation
Vadose Zone Soil (0 to 7 feet bgs)

Analyte	Site > Background?	Rationale
Antimony	no	Graphical analysis using dotplots
Arsenic	YES	WRS test
Barium	YES	WRS test
Beryllium	no	WRS test / boxplots
Cadmium	YES	Graphical analysis using dotplots
Chromium	YES	WRS test
Cobalt	YES	WRS test
Copper	YES	WRS test
Iron	YES	WRS test
Lead	YES	WRS test
Mercury	YES	Graphical analysis using dotplots
Molybdenum	YES	Graphical analysis using dotplots
Nickel	YES	WRS test
Selenium	YES	Graphical analysis using dotplots
Thallium	YES	Graphical analysis using dotplots
Vanadium	YES	WRS test
Zinc	YES	WRS test

Acronym/Abbreviation:
WRS = Wilcoxon rank sum test

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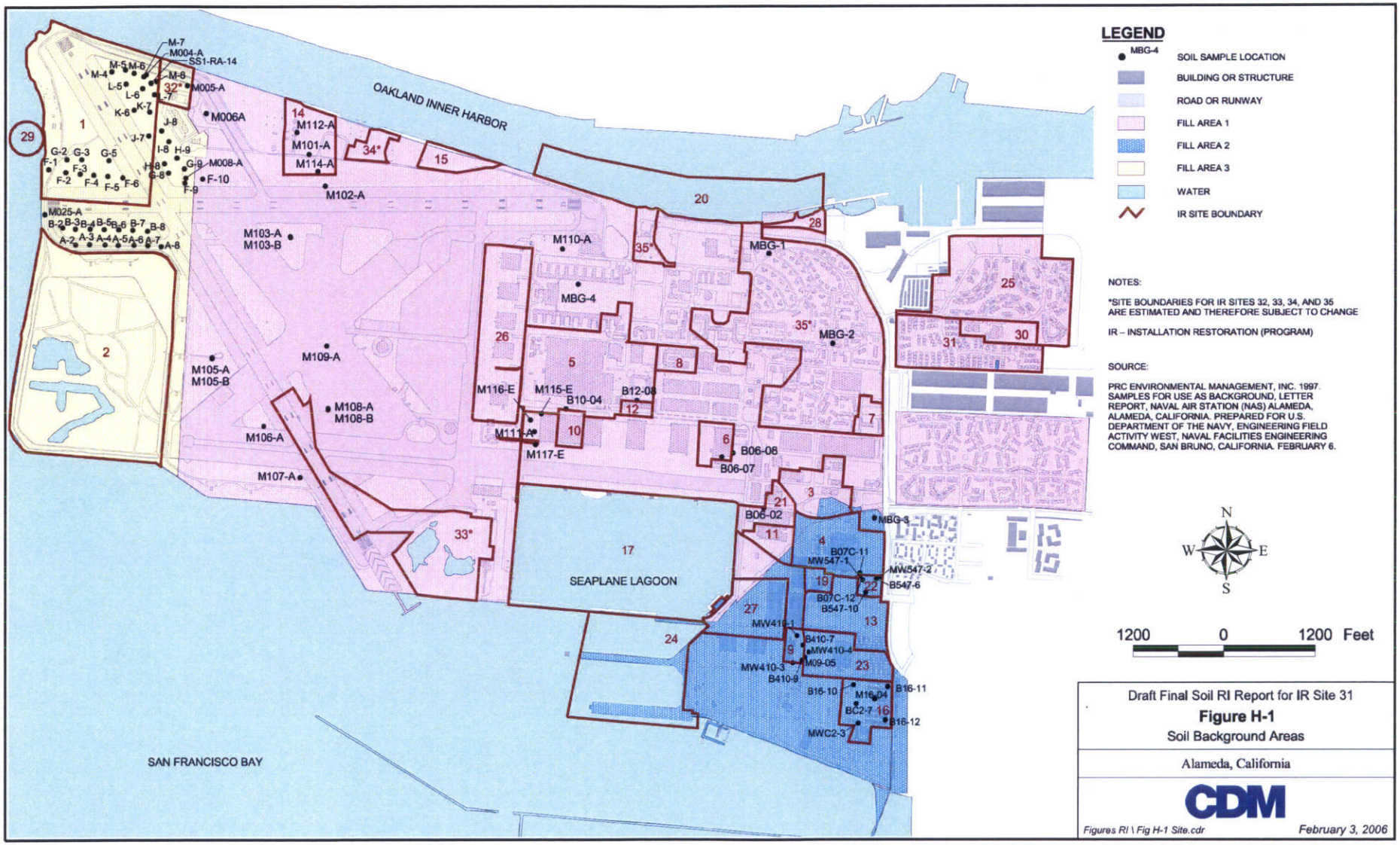


Draft Final Soil RI Report for IR Site 31

Figure H-1

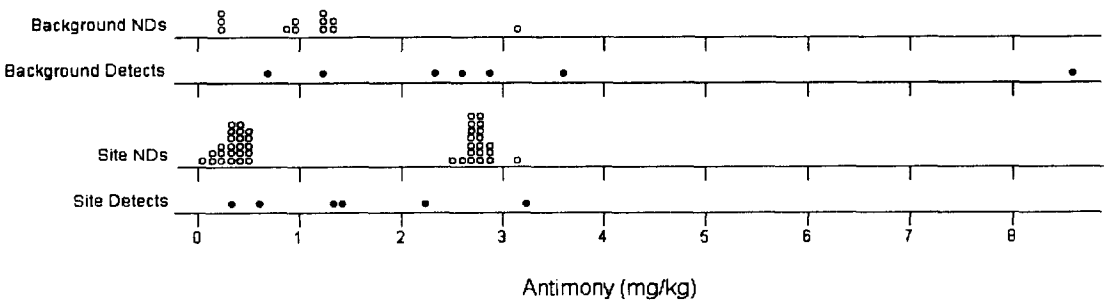
Soil Background Areas

Alameda, California

CDM

Figures RI \ Fig H-1 Site.cdr *February 3, 2006*

Figure H-2
Dot Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



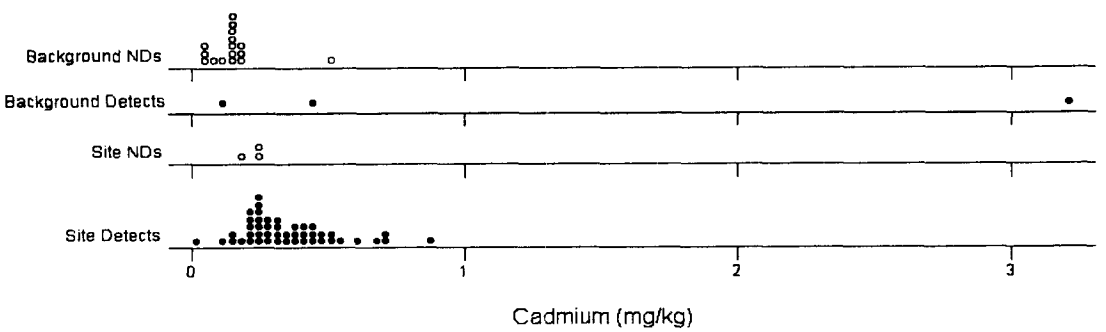
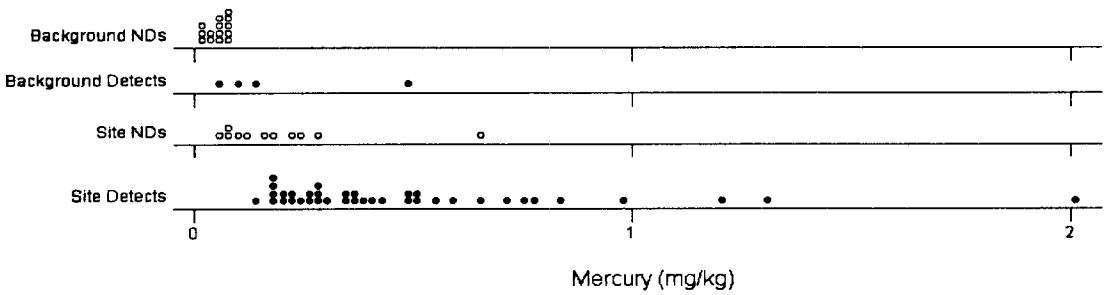


Figure H-2 (continued)
Dot Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



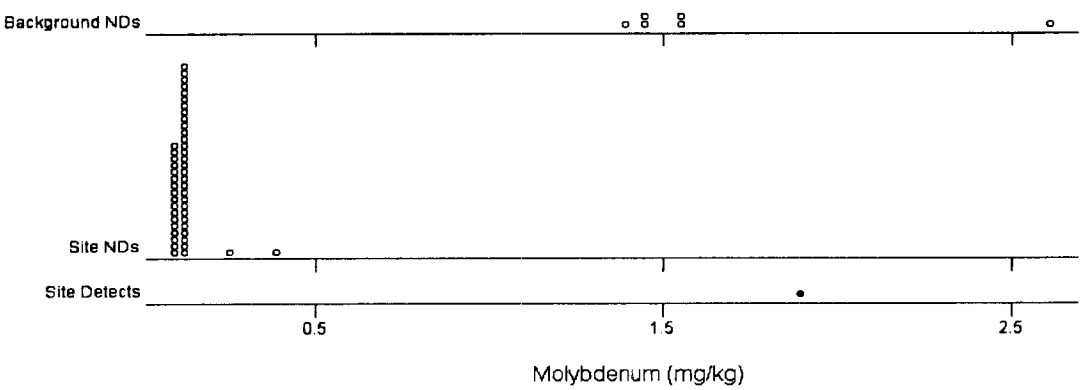
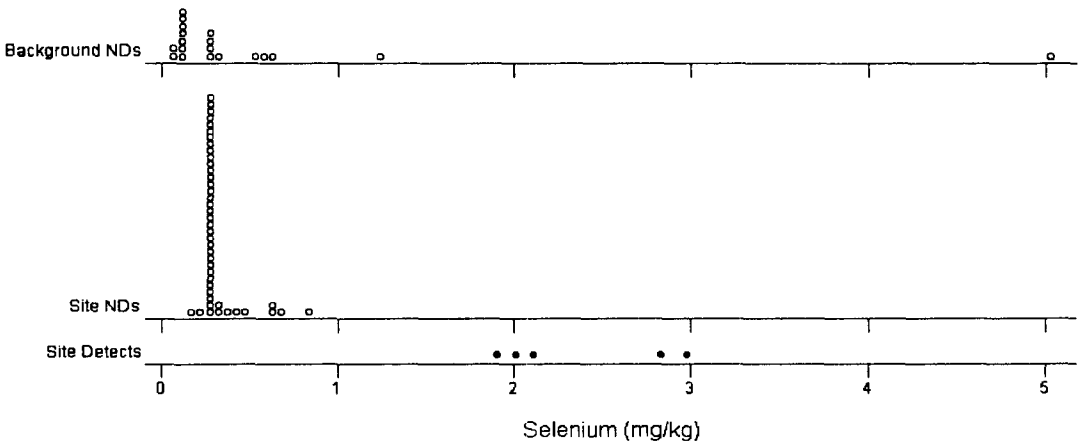


Figure H-2 (continued)
Dot Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



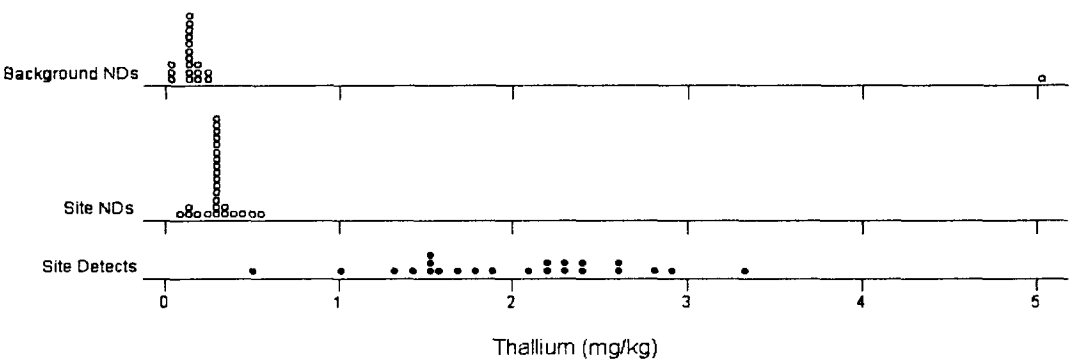


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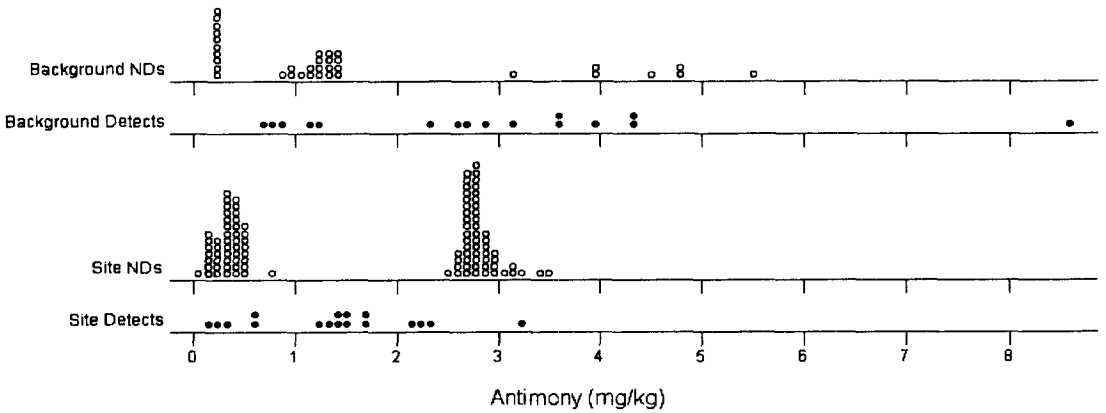
Figure H-3
Dot Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



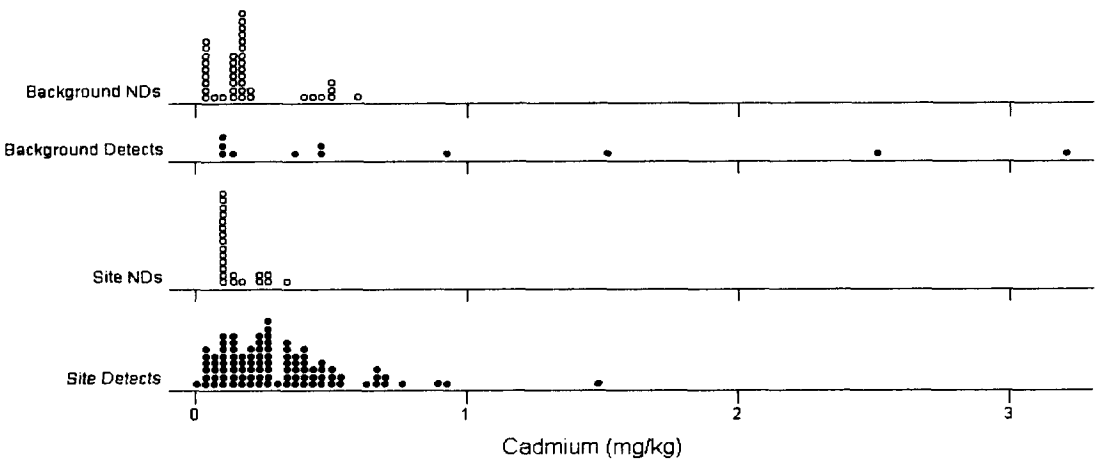


Figure H-3 (continued)
Dot Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)

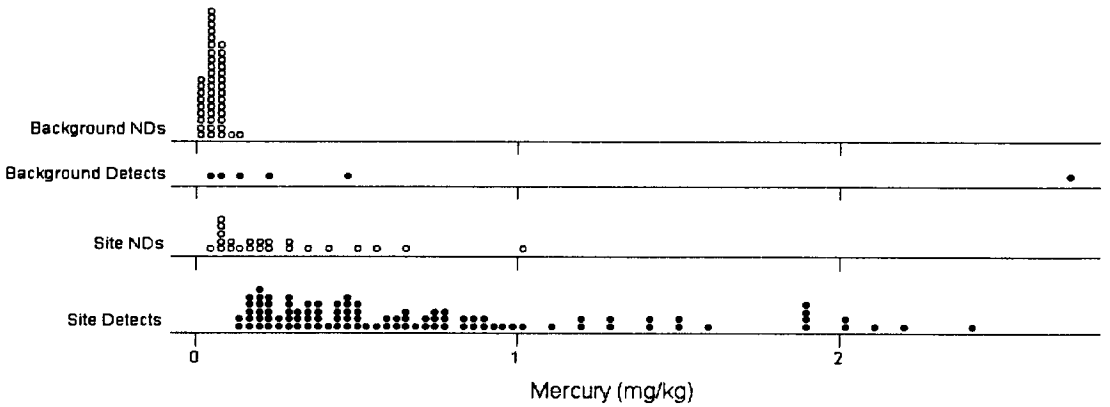
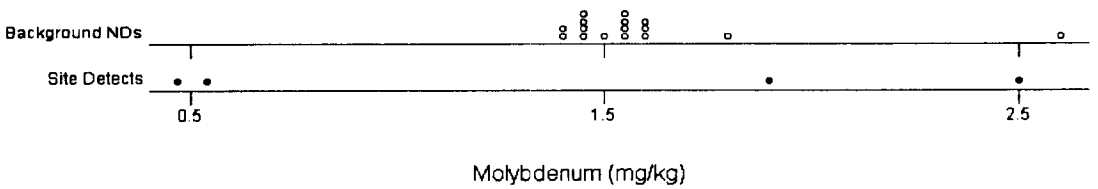


Figure H-3 (continued)
Dot Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)

Background NDs and Site Detects for Molybdenum - Site NDs Shown Separately



Site NDs for Molybdenum (note different scale than previous graph)

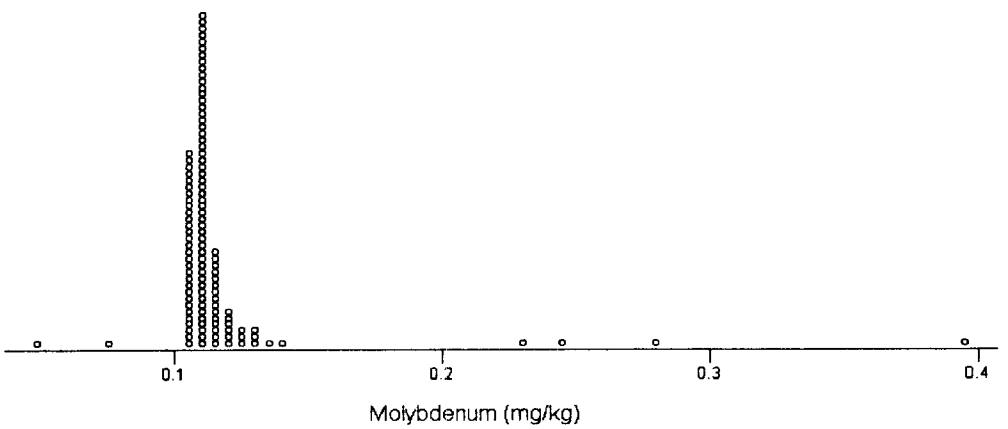
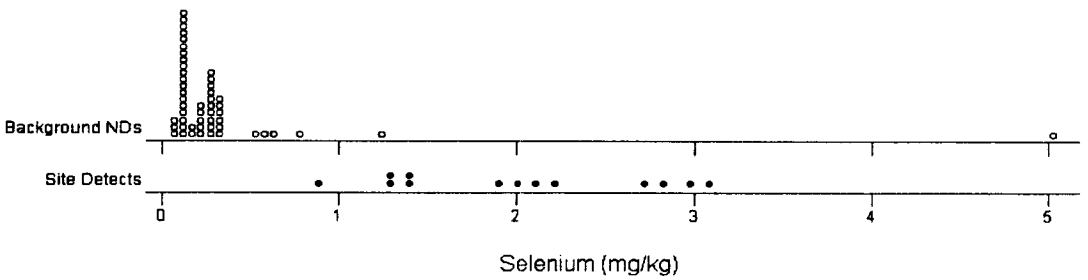


Figure H-3 (continued)
Dot Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)

Background NDs and Site Detects for Selenium - Site NDs Shown Separately



Site NDs for Selenium (note different scale than previous graph)

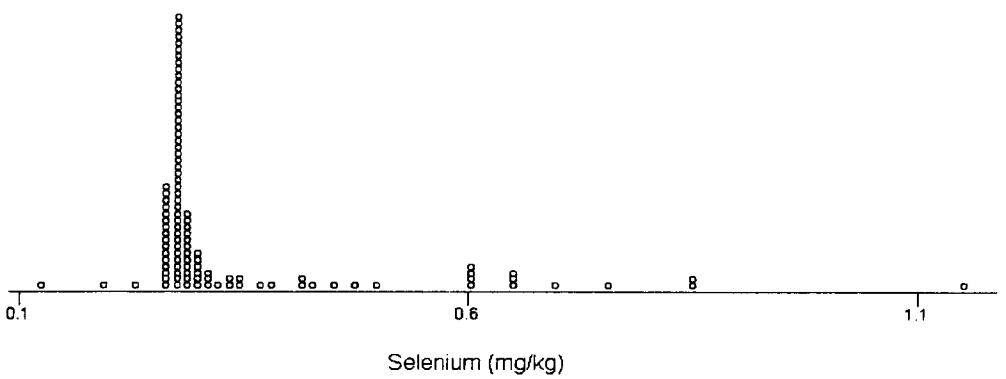


Figure H-3 (continued)
Dot Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)

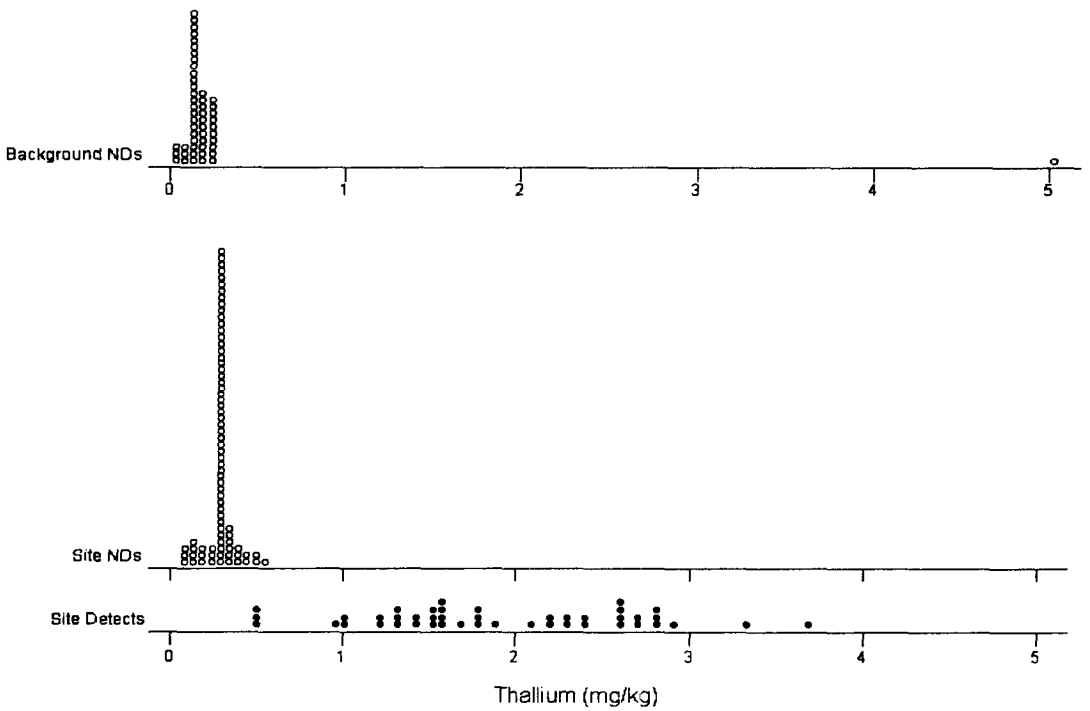


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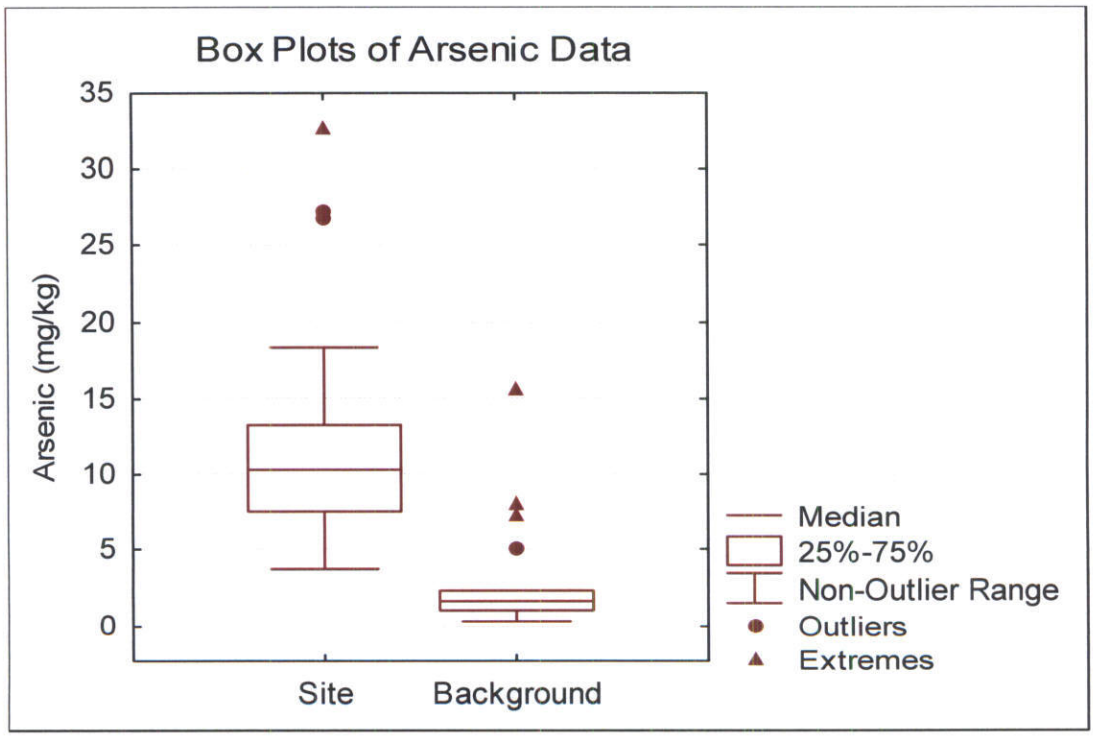
Figure H-4
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



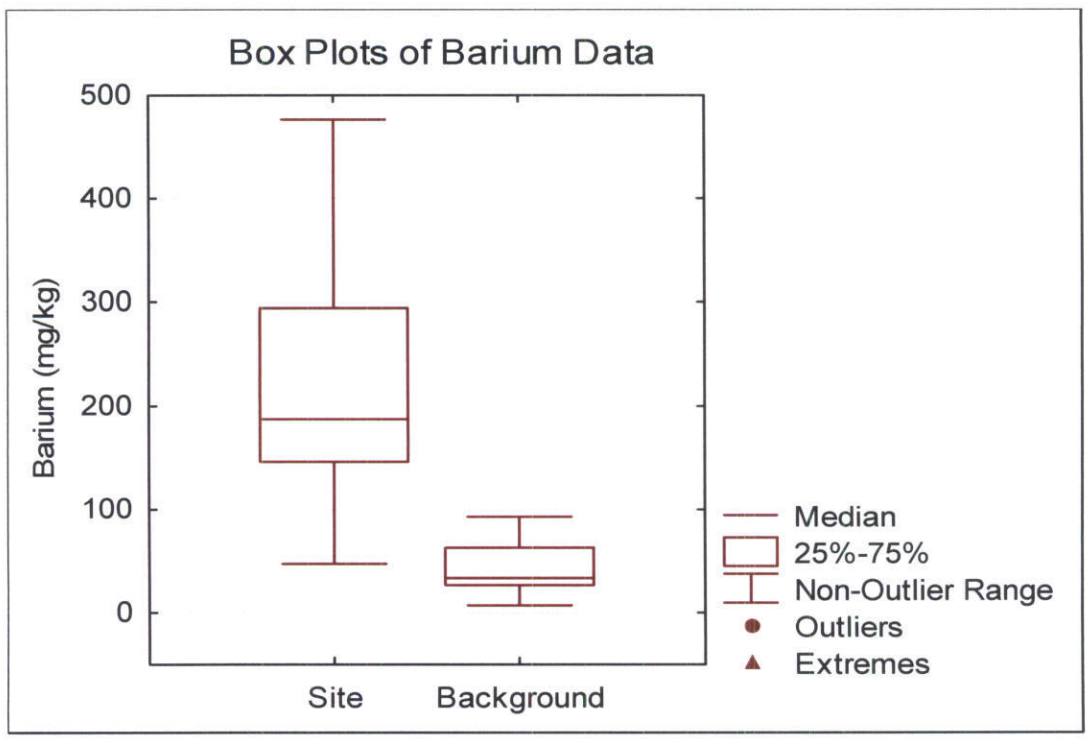
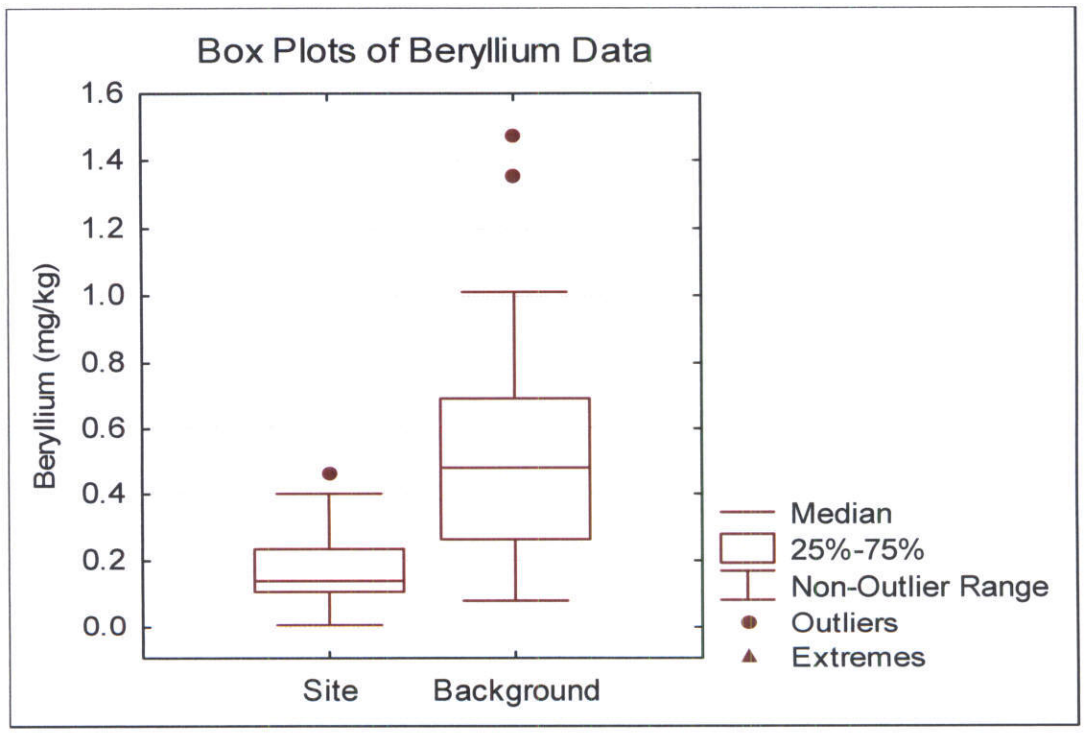


Figure H-4 (continued)
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



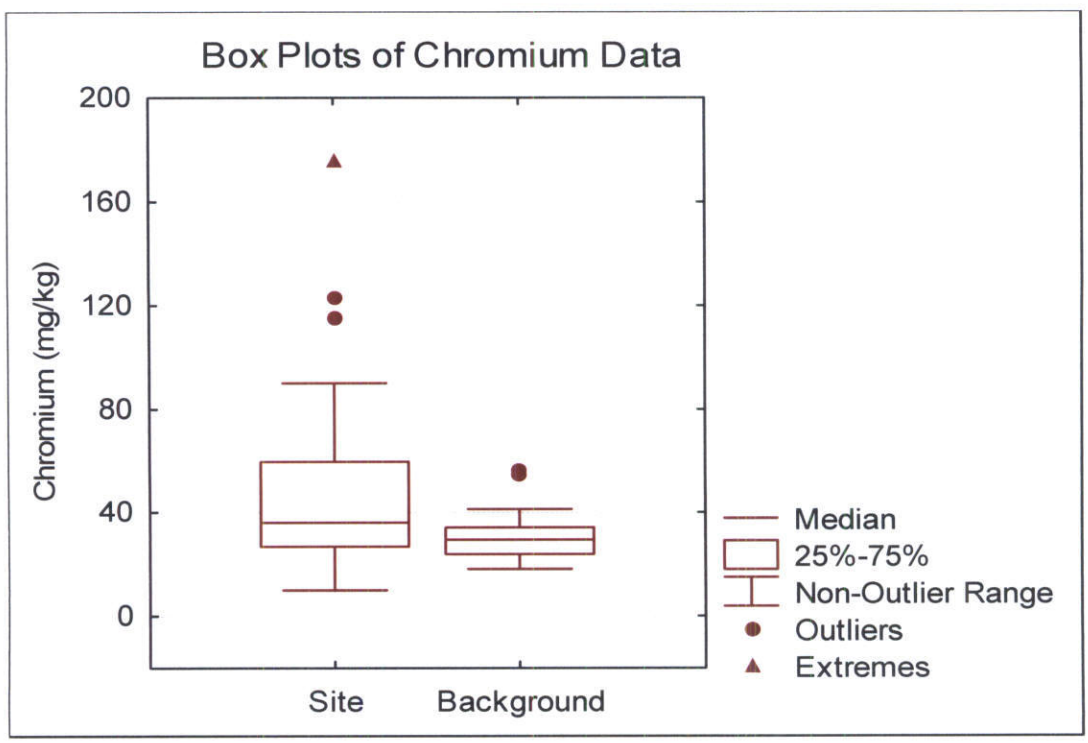
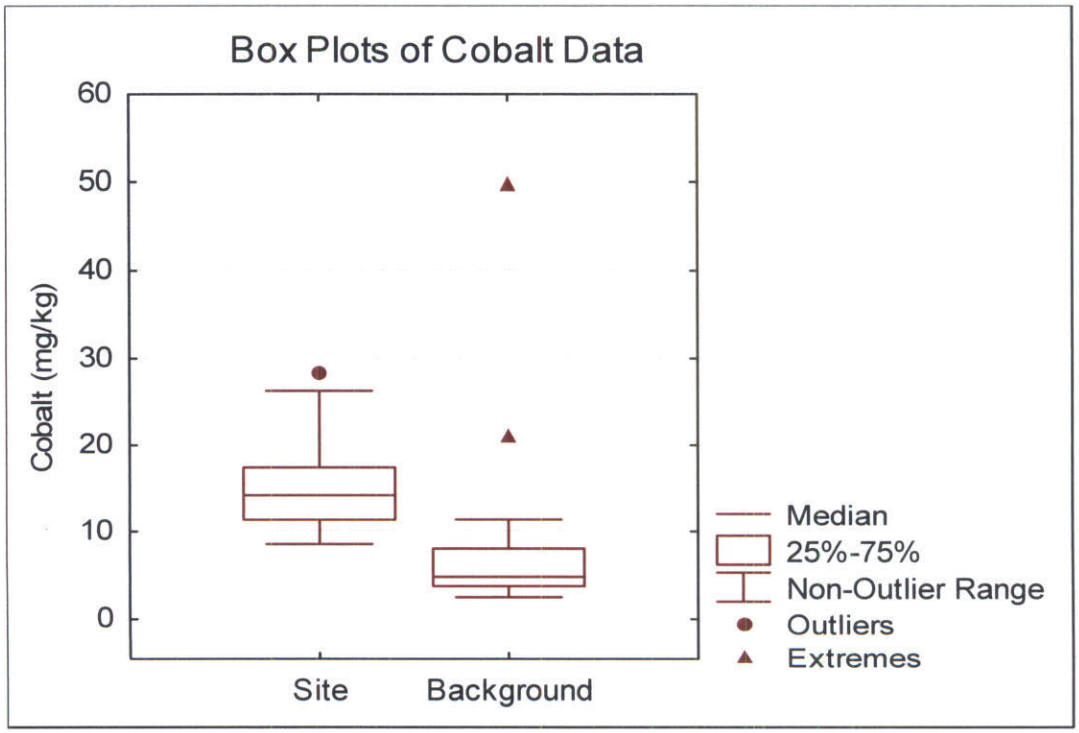


Figure H-4 (continued)
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



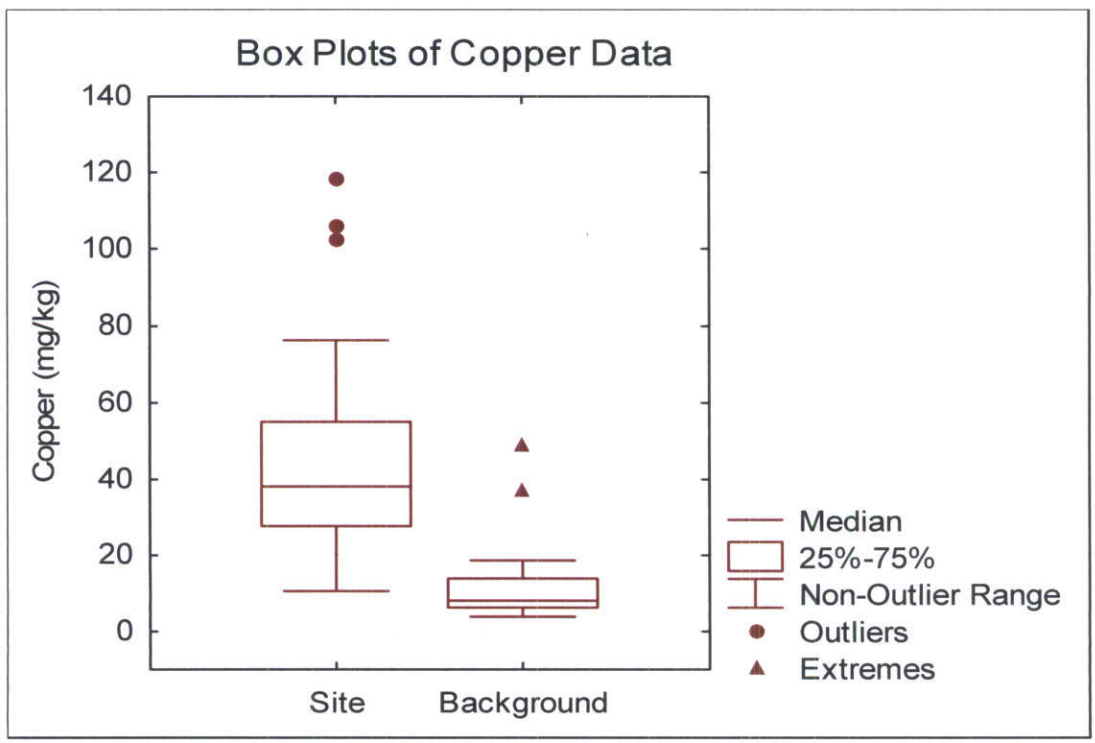
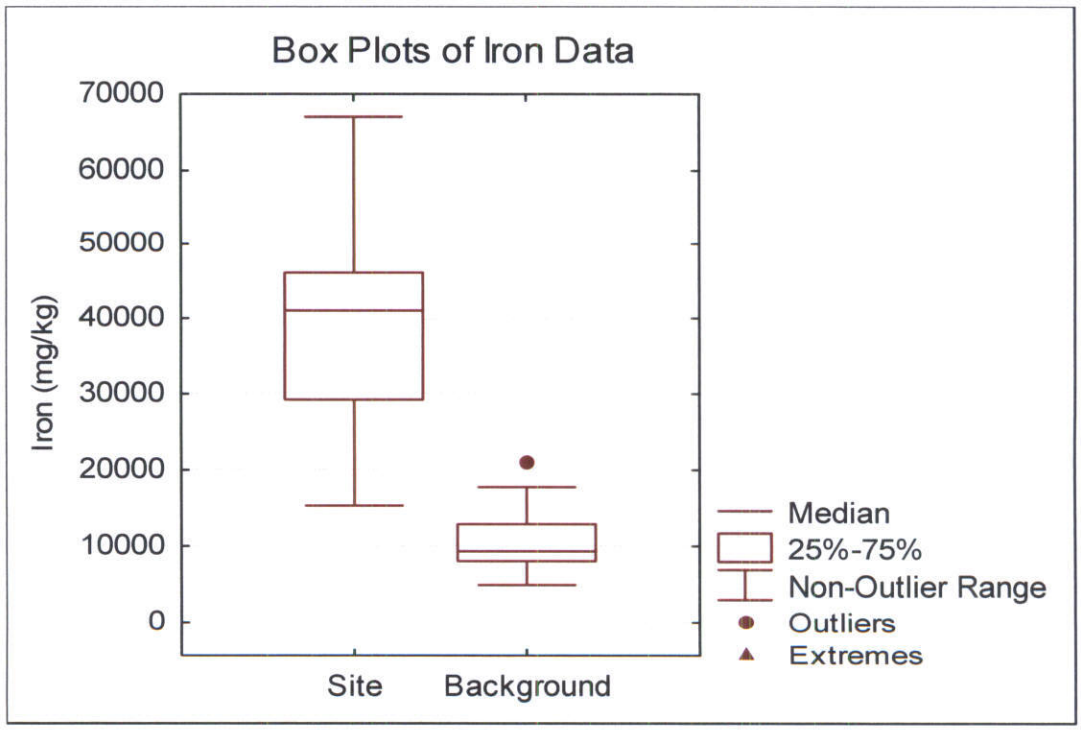


Figure H-4 (continued)
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



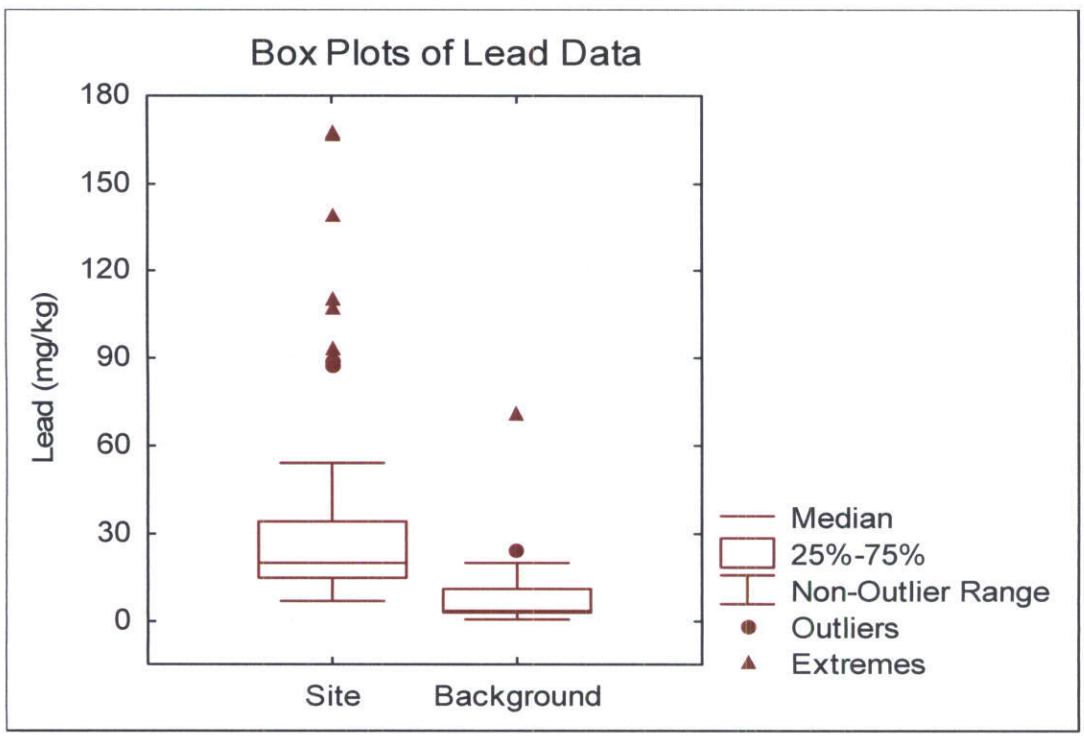
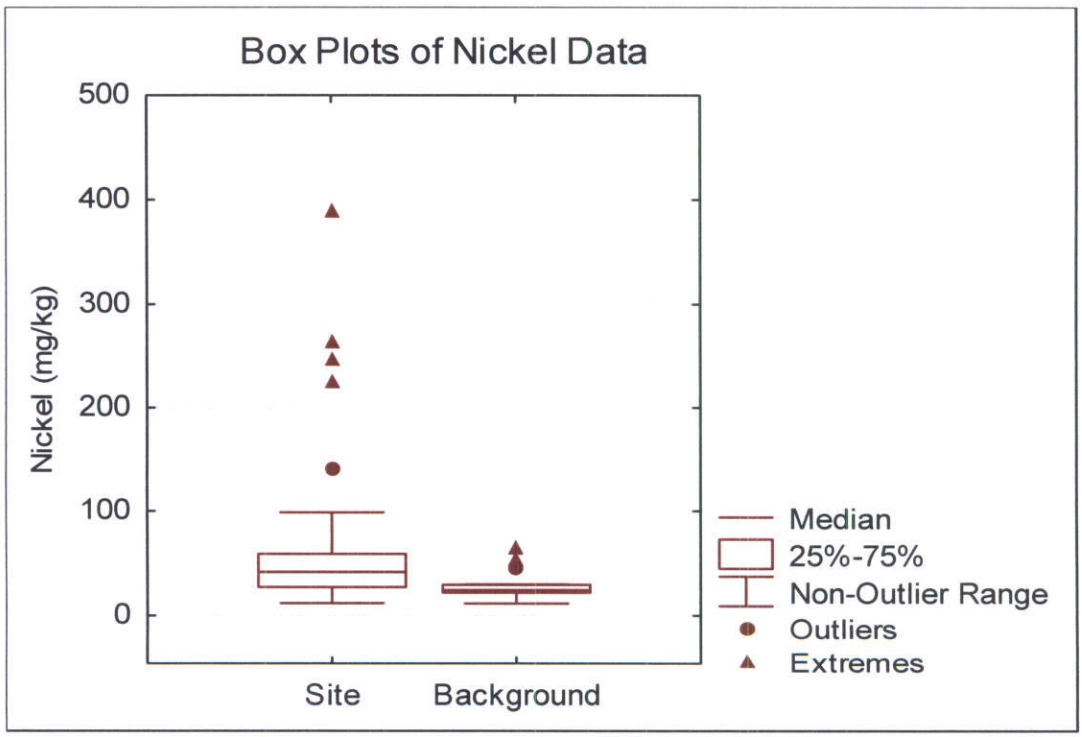


Figure H-4 (continued)
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)



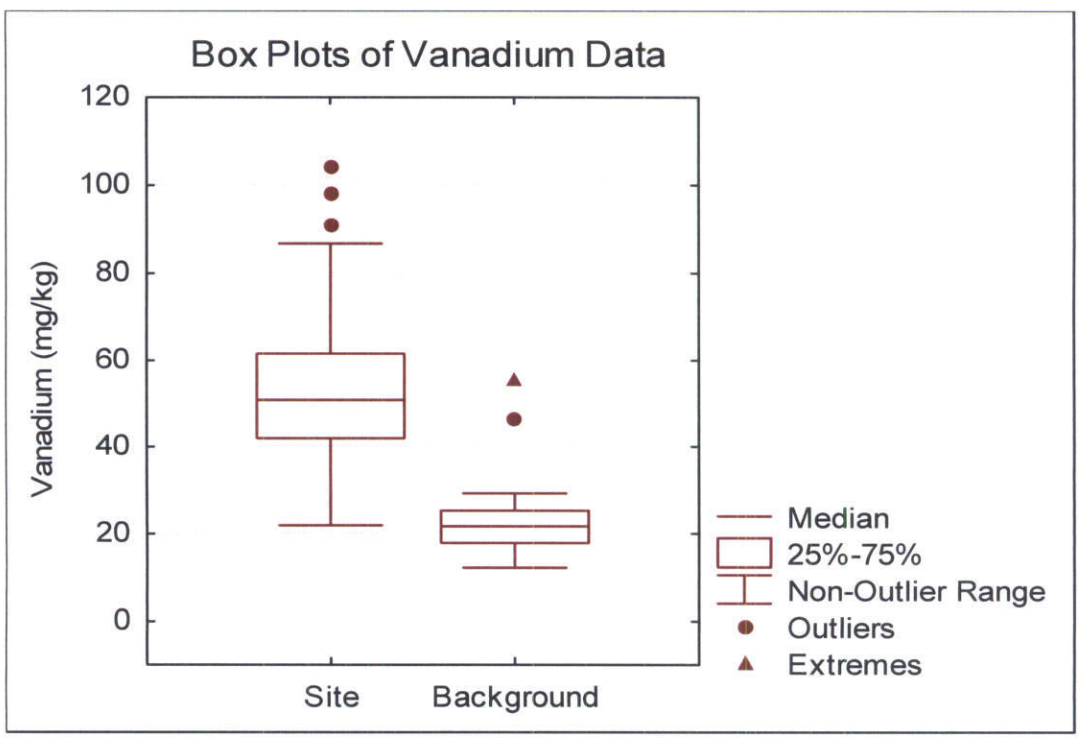


Figure H-4 (continued)
Box Plots of Site and Background Data
Surface Soil (0 to 2 feet bgs)

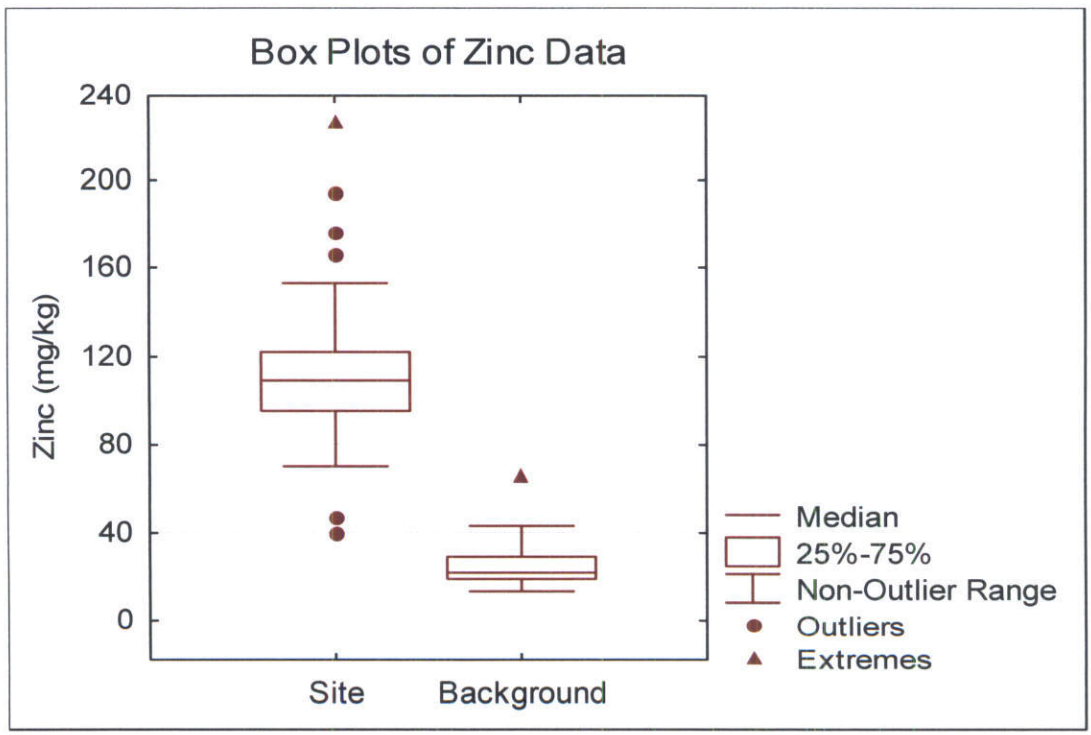
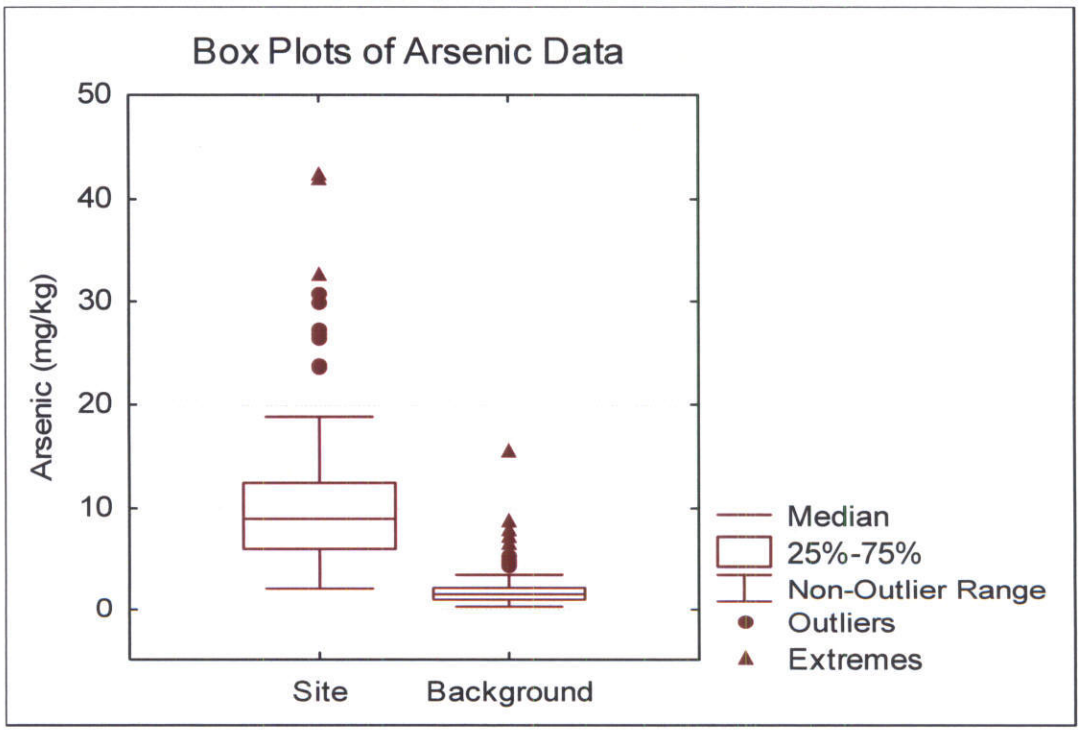


Figure H-5
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



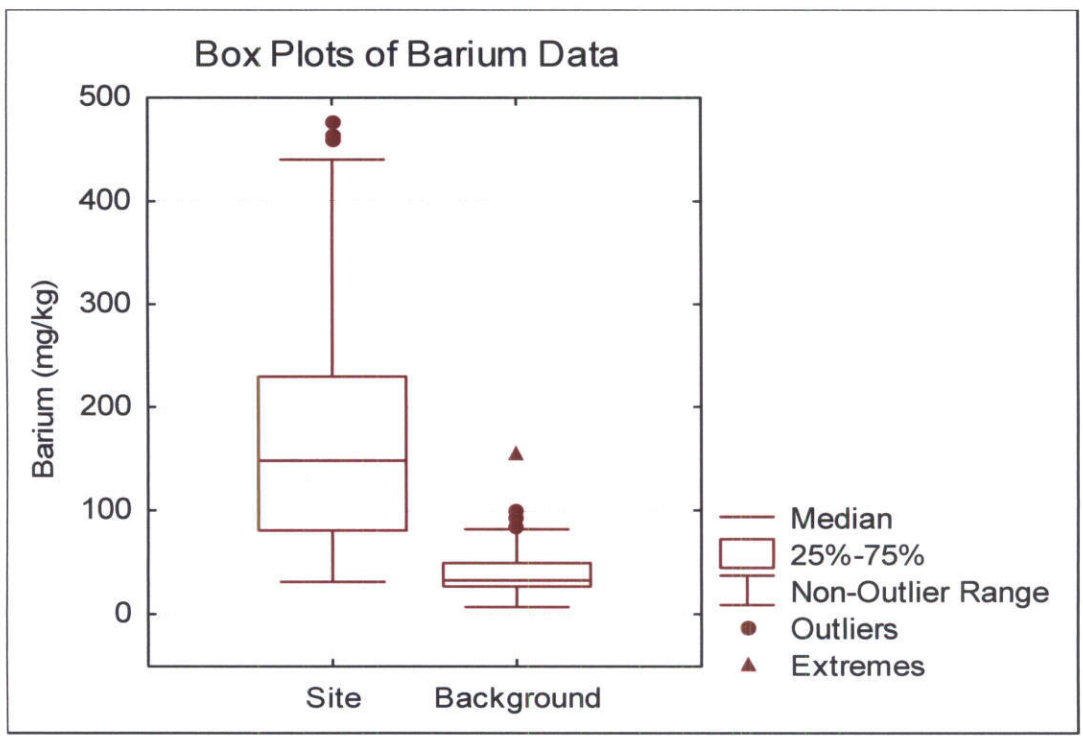
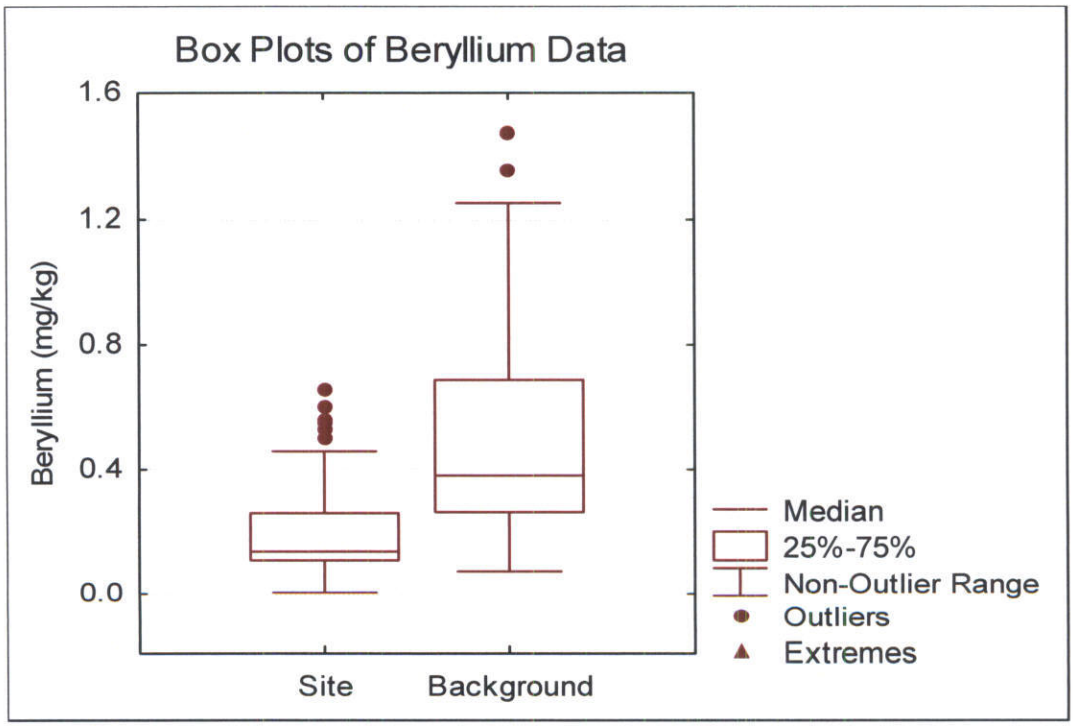


Figure H-5 (continued)
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



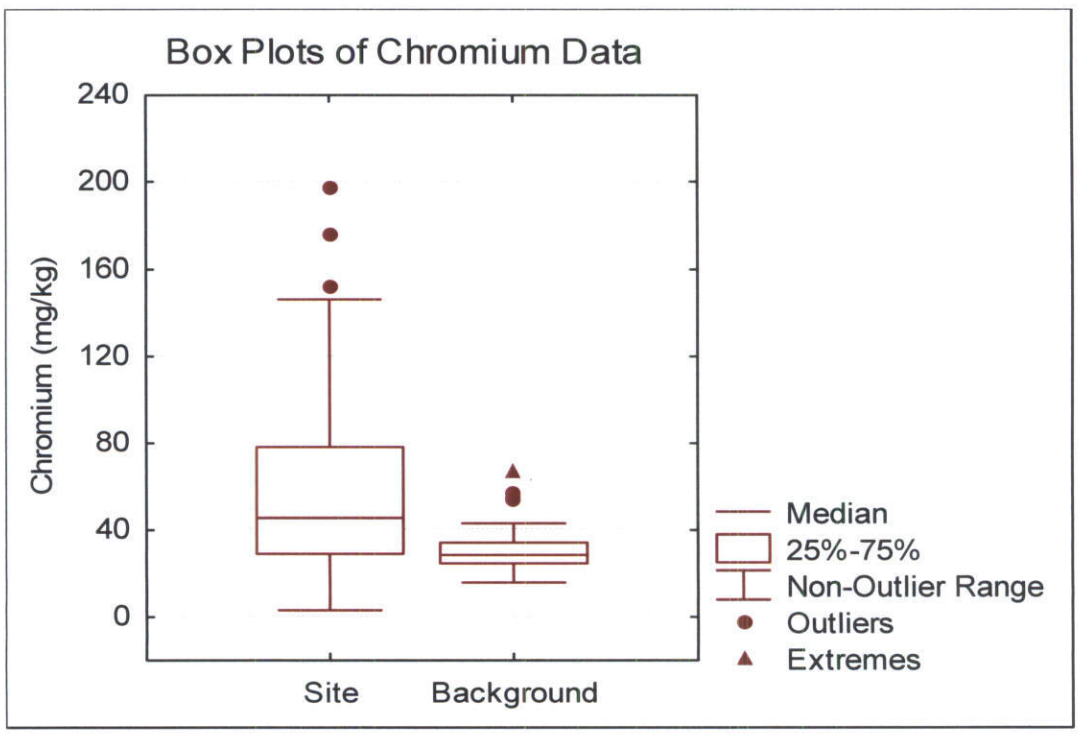
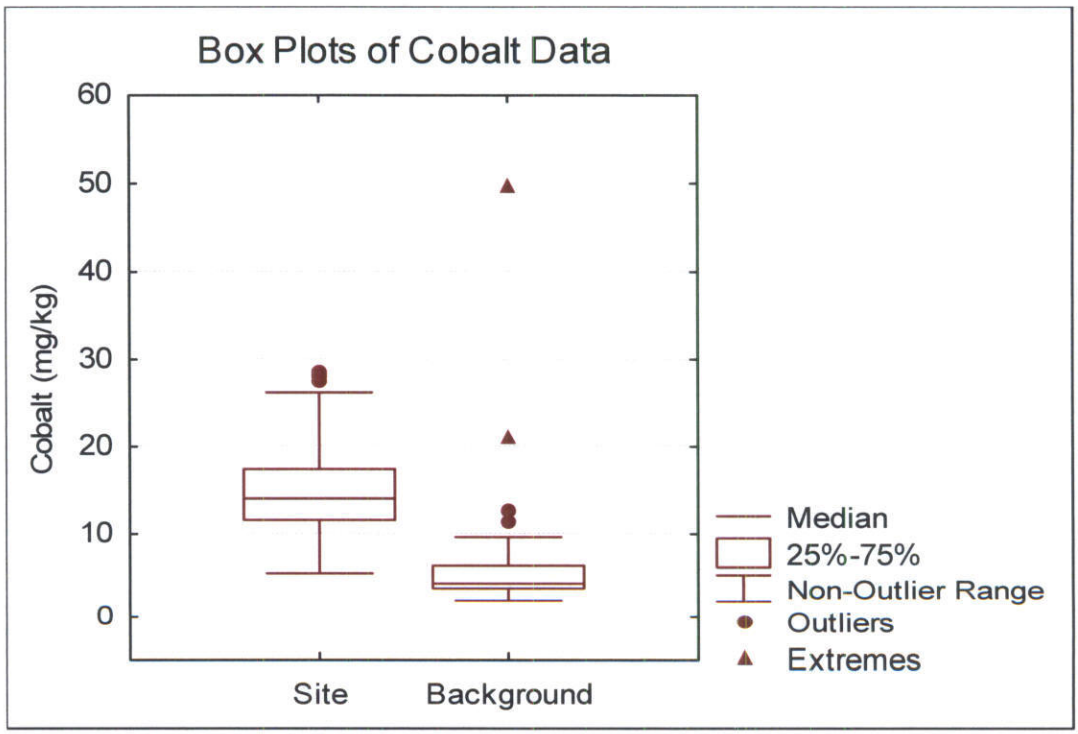


Figure H-5 (continued)
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



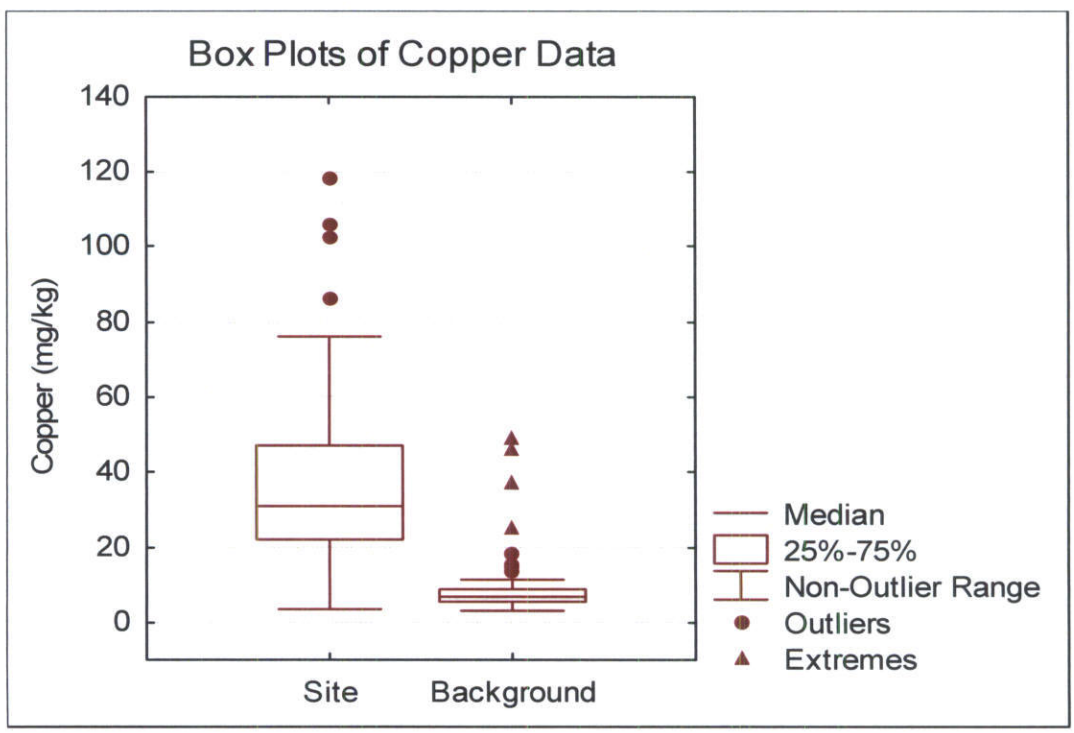
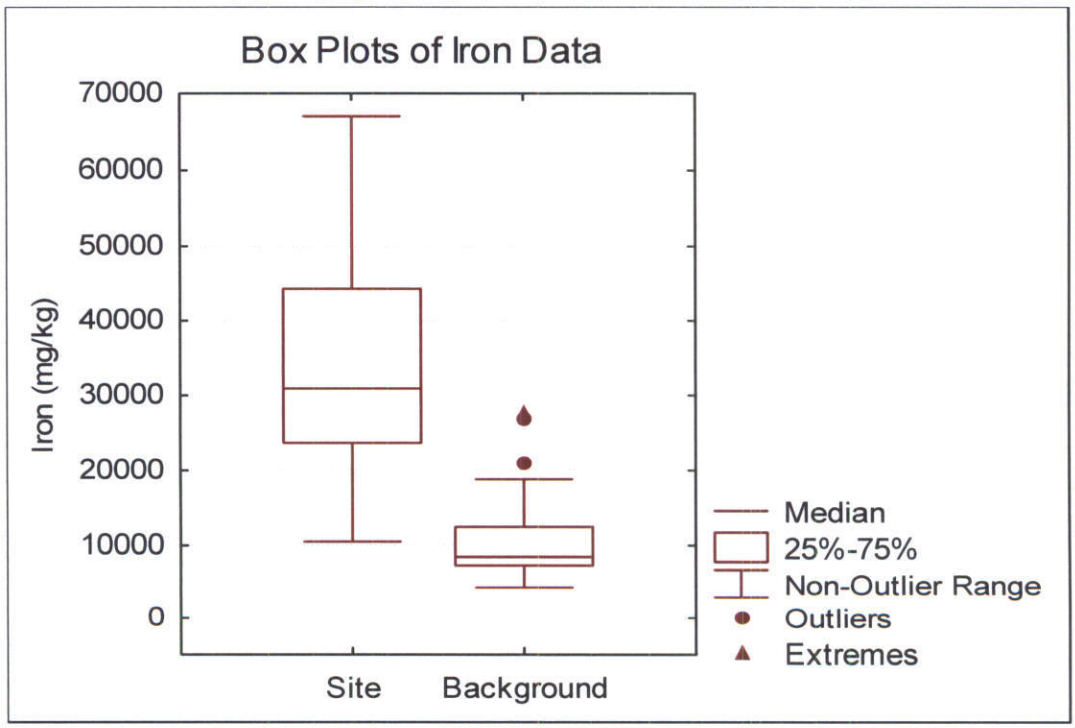


Figure H-5 (continued)
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



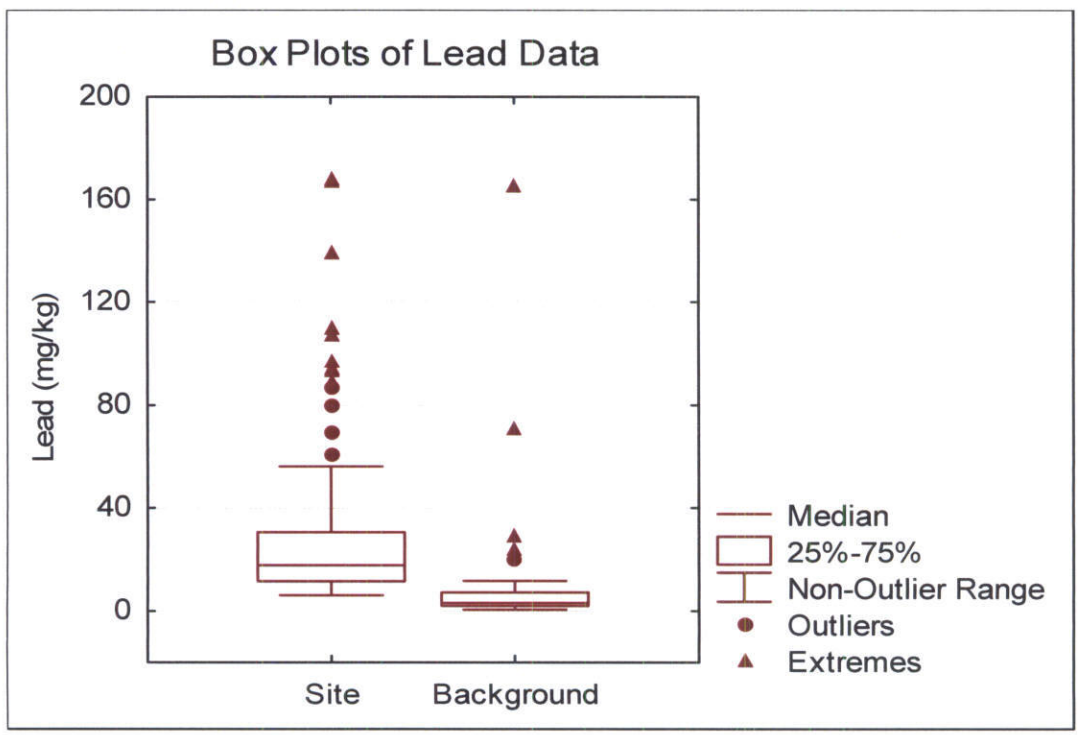
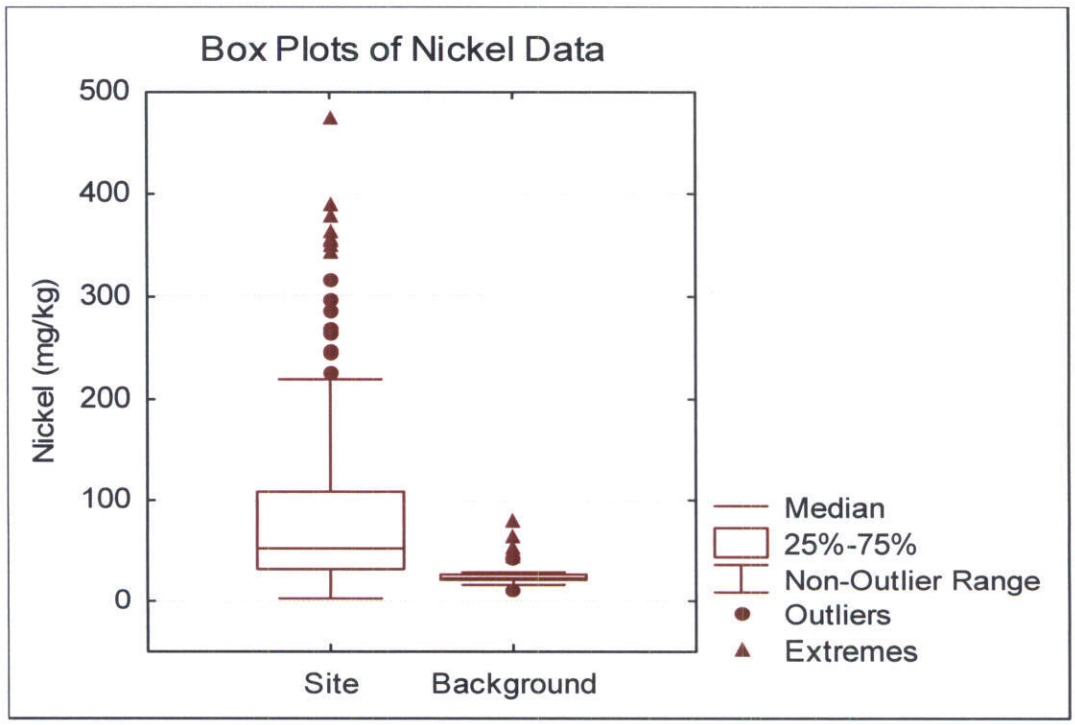


Figure H-5 (continued)
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



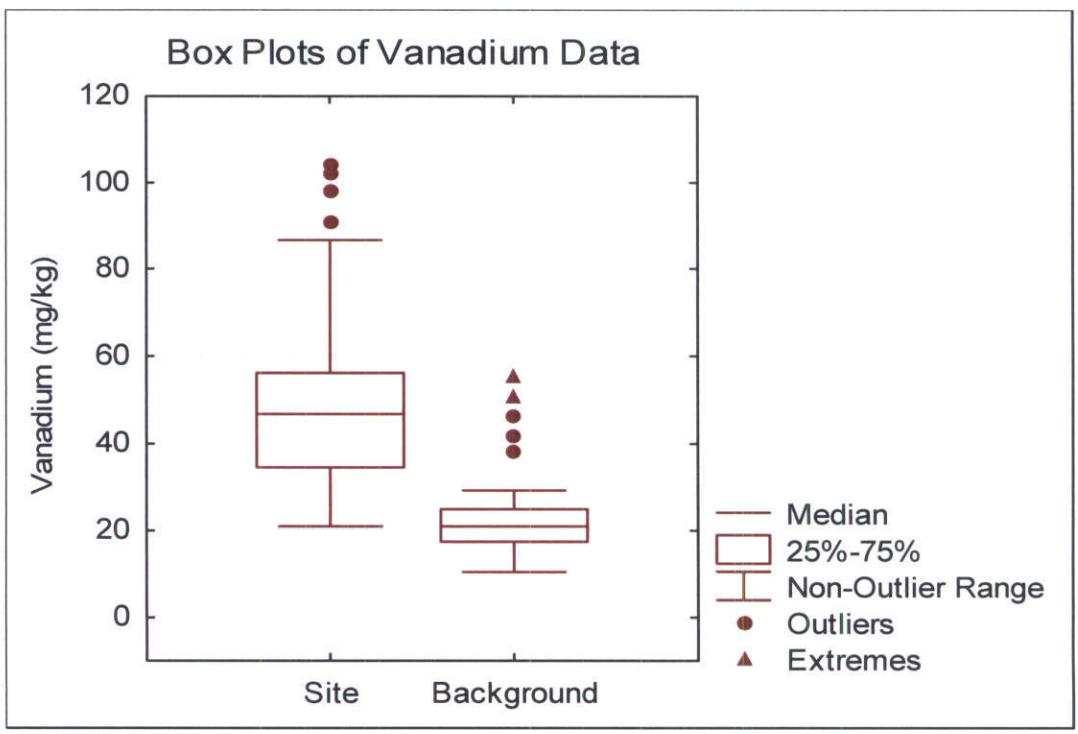
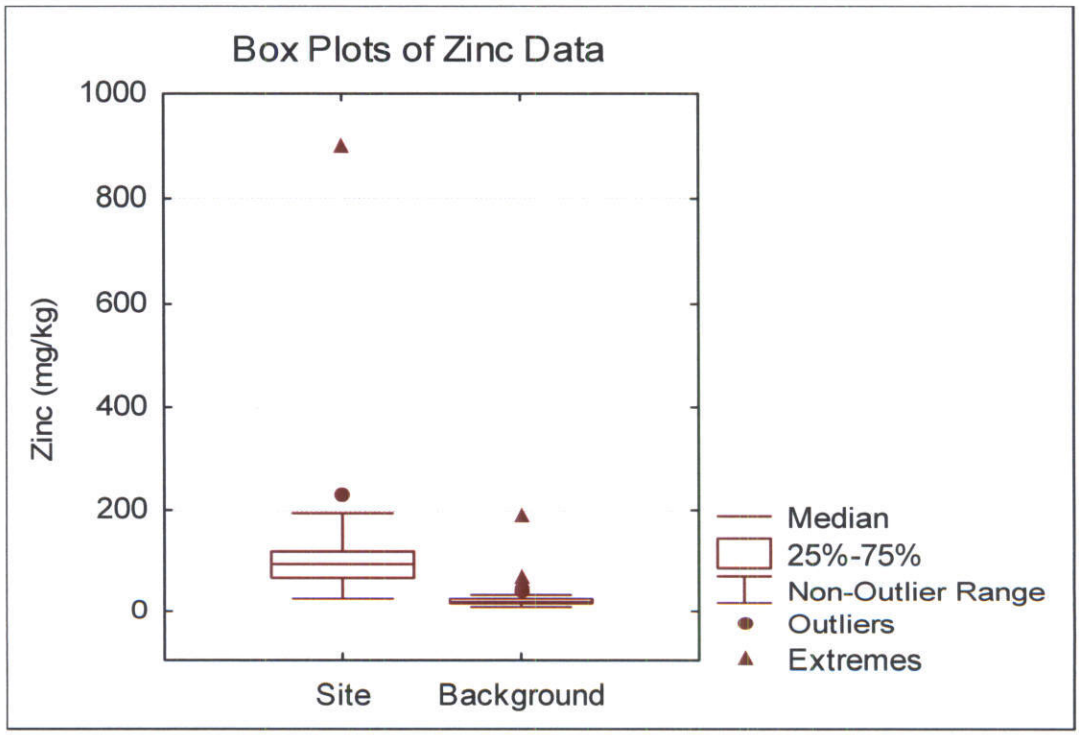


Figure H-5 (continued)
Box Plots of Site and Background Data
Vadose Zone Soil (0 to 7 feet bgs)



N00236.002789
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX H2
EVALUATION OF ARSENIC AND OTHER METALS IN SOIL AT IR SITES 30 AND 31

FINAL SOIL REMEDIAL INVESTIGATION REPORT FOR MARINA VILLAGE HOUSING

DATED 1 AUGUST 2007

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

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
EVALUATION OF ARSENIC AND OTHER METALS IN SOIL AT IR SITES 30 AND 31 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0089/0032
July 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
1230 Columbia Street, Suite 400
San Diego, California 92101-8502

PROFESSIONAL GEOLOGIST
ERIC A. JOHANSEN
No 6643
Exp. 10/31/08
STATE OF CALIFORNIA

Signature: Eric Johansen Date: 6/26/07
Eric Johansen, PG 6643, Bechtel Environmental, Inc.

Signature: Linda Henry Date: 6/26/07
Linda Henry, PhD, Brown and Caldwell

EXECUTIVE SUMMARY

This report presents the results of an evaluation of arsenic in soil at Installation Restoration (IR) Program Sites 30 and 31 and five other metals (cadmium, chromium, iron, lead, and vanadium) in soil at IR Site 31, Alameda Point, Alameda, California. This evaluation was conducted to determine whether the concentrations of these metals represent ambient conditions or are the result of releases from Navy activities.

Background evaluations conducted between 1997 and 2001 indicated that the Alameda Point pink background data set compiled by PRC Environmental Management, Inc., (PRC) (1997a,b) was applicable to IR Site 31; therefore, metals at IR Site 31 were initially compared to the pink background data set. Separate statistical evaluations conducted during the remedial investigations (RIs) at IR Sites 30 and 31 showed that most metals at the sites, including common rock-forming metals such as iron, are present at higher concentrations than those in the pink background data set. A number of factors, such as the even horizontal and vertical distribution of several metals, indicated that further evaluation was warranted. Also, the 2002 Final RI Report for Operable Unit 5 concluded that the pink background data set was not appropriate for adjacent IR Site 25 (Neptune 2002).

Arsenic was selected for further evaluation because it is the primary risk driver at IR Sites 30 and 31. Cadmium, chromium, iron, lead, and vanadium in soil at IR Site 31 were included in the additional statistical evaluation because these metals exceeded risk-based screening levels for soil, were risk drivers, or were present in groundwater at concentrations above historical levels.

The Navy initially proposed to identify an alternative background data set for IR Site 31. However, it was determined that an alternative background data set was not needed because the concentrations of arsenic in soil at IR Sites 30 and 31 and cadmium, chromium, and vanadium in soil at IR Site 30 meet the criteria for ambient populations as described in a policy of the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) (1997).

The conclusion of the evaluation discussed in this report is that arsenic concentrations represent ambient conditions at both IR Sites 30 and 31 rather than indicating a release from on-site activities. This finding is based on arsenic concentrations meeting the DTSC criteria for ambient conditions (DTSC 1997) and is supported by the presence of similar concentrations of arsenic at adjacent locations unaffected by Navy activities. Additional evaluation of other metals in soil at IR Site 31 does not indicate a release from on-site activities. Therefore, a feasibility study to address arsenic concentrations in soil at IR Sites 30 and 31 and other metals in soil at IR Site 31 is not warranted. In addition, the fill history and lithology indicate that the fill at IR Sites 30 and 31 originated from a different source than the fill used in the PRC pink background data set area west of Main Street.

ARSENIC AT IR SITES 30 AND 31

Analytical data from a site can be used to determine whether or not a release has occurred, without determining an off-site background level for comparison. The DTSC policy for selecting inorganic constituents as chemicals of potential concern describes a methodology for using site data to determine whether chemical concentrations represent ambient conditions (a single population) or possibly represent contamination (multiple

populations) (DTSC 1997). The following results of the evaluation of two separate data sets from IR Sites 30 and 31, using the methodology outlined in the DTSC policy, demonstrate that arsenic concentrations at each site meet the DTSC criteria for ambient conditions.

- Each data set fits a lognormal distribution. DTSC guidance states that trace metals such as arsenic typically fit a lognormal distribution. The Shapiro-Wilk test confirmed that the arsenic data from IR Sites 30 and 31 are lognormally distributed.
- The coefficient of variation is less than 1. The coefficients of variation for arsenic at IR Sites 30 and 31 are 0.81 and 0.69, respectively. These values show that the data are not highly variable.
- The range between minimum and maximum values is less than two orders of magnitude. Arsenic data at IR Site 30 range from 0.8 to 56.3 milligrams per kilogram (mg/kg), a factor of 70. Arsenic data at IR Site 31 range from 2.3 to 42.4 mg/kg, a factor of 18. Both ranges show lower variability than the DTSC criterion of a factor of 100.
- The cumulative probability plot is a straight line. The data sets for IR Sites 30 and 31 plotted (separately) in this manner form a straight line without gaps or inflection points. As is common with these plots, the tails of the lines depart slightly from the line. However, none of the values in the tail with the higher concentrations are outliers.
- Additionally, there are no outliers. The Rosner's test for outliers (not required by the DTSC policy) also shows that neither the IR Site 30 nor the IR Site 31 arsenic data set includes outliers that could be associated with a release.

OTHER METALS AT IR SITE 31

In addition to arsenic, five metals (cadmium, chromium, iron, lead, and vanadium) in soil at IR Site 31 were also evaluated using the methodology outlined in the DTSC policy to determine whether the concentrations meet the criteria for ambient populations. These metals were included because they were reported at concentrations above a risk-based screening level, were risk drivers, or were present in groundwater at concentrations above historical levels.

Cadmium, chromium, and vanadium meet all DTSC criteria for ambient populations (i.e., the range of detections is less than two orders of magnitude, the coefficient of variation is less than 1, and the data represent one population on a probability plot).

The probability plots for iron and lead indicate the presence of more than one population. However, this finding is not unexpected for iron, a common rock-forming metal. The PRC pink background data probability plot also indicates multiple populations. The finding for lead is consistent with the multiple sources of lead in the environment.

ARSENIC CONCENTRATIONS AT ADJACENT LOCATIONS

Arsenic concentrations in soil were evaluated for locations surrounding IR Sites 30 and 31 to determine if similar concentrations of arsenic are present at areas that were not associated with Navy industrial activities. Arsenic concentrations at IR Sites 30 and 31 and the surrounding locations were grouped into two general areas. The first is a 140-acre contiguous area adjacent to and encompassing IR Sites 30 and 31. Sites in this area, located east of Main Street, are the East Housing Area, portions of the Fleet and Industrial Supply Center Alameda (FISCA) Warehouse Area, and IR Sites 30 and 31, and have mean arsenic concentrations higher than the mean in the PRC pink background data set. Mean arsenic concentrations in this 140-acre area range from 10.6 mg/kg at IR Sites 30 and 31 to 13.1 mg/kg at the East Housing Area. The East Housing Area has never been used by the Navy for industrial activities. Nevertheless, the East Housing Area has levels of arsenic similar to the rest of the 140-acre area, despite the absence of industrial activities. The fact that the mean arsenic concentration in soil from the East Housing Area is similar to that of nearby sites used by the Navy for industrial purposes supports the conclusion that soil with arsenic concentrations higher than those in the PRC pink background data set was used as fill material.

In contrast, sites in the second general area, including the remaining FISCA area, IR Site 25, and College of Alameda campus, have lower concentrations of arsenic. The 95th percent upper confidence limit (UCL) of the mean arsenic concentration at IR Site 25 is 4.2 mg/kg. (The 95th percent UCL, by definition, will be higher than the mean.) The mean arsenic concentrations range from 1.7 mg/kg at FISCA Area of Concern 1 to 4.2 mg/kg at FISCA Solid Waste Management Unit 1 (Operable Unit 2). At the College of Alameda campus, the 95th percent UCL is 8.4 mg/kg. Neither IR Site 25 nor the College of Alameda campus has been used by the Navy for industrial activities.

COMPARISON TO PRC PINK BACKGROUND DATA SET

In the PRC 1997 background study, data from Alameda Point were assigned to one of three groups (pink, yellow, or blue) on the basis of similar fill history and iron and manganese concentrations (PRC 1997a,b). Iron and manganese were selected because these metals were thought unlikely to be associated with Navy activities. This study also selected data from locations that appeared to have been minimally impacted by industrial activities. PRC assigned the area east of Main Street, which includes IR Sites 30 and 31, to the pink background data set. However, based on the criteria that PRC used, the PRC pink background data set is not an appropriate background data set for comparison to IR Sites 30 and 31 because of the following.

- The fill history shows that IR Sites 30 and 31 were filled at a different time than most of the PRC pink background area. No samples used for the three PRC background data sets were collected east of Main Street, an area which includes IR Sites 30 and 31.
- Iron and manganese concentrations at IR Site 30 are statistically higher than those in the PRC pink background data set. The iron concentrations at IR Site 31 are statistically higher than those in the PRC pink background data

set. (Manganese data were not available for IR Site 31.) If these data had been available when PRC defined the background areas at Alameda Point, IR Sites 30 and 31 would probably not have been assigned to the pink background area based on the differences in iron and manganese concentrations in soil.

FILL HISTORY

The fill history indicates that a large area east of Main Street was filled at a different time than the majority of the area sampled for the PRC pink background data set. The fill material was placed during the same period at IR Sites 30 and 31, the East Housing Area, a portion of the College of Alameda campus adjoining the East Housing Area, and the FISCA Warehouse Area (an area of FISCA between IR Site 31 and the East Housing Area). IR Site 25, the remaining portion of the College of Alameda campus, and the remaining FISCA area received fill material during two other fill events.

Differences in the fill history increase the likelihood that the fill came from different sources, although the specific source of fill is unknown. Hydraulic fill came from Oakland Inner Harbor and San Francisco Bay. It is also reasonable to assume that construction fill was brought in prior to construction of warehouses and buildings at IR Sites 30 and 31, the East Housing Area, and other locations.

LITHOLOGY

Physical characteristics of the soil at locations adjacent to IR Sites 30 and 31 were evaluated in response to requests from the regulatory agencies in an August 2006 meeting. At that time, this evaluation was considered important to the selection of a background data set. However, based on the application of DTSC policy, this information is no longer essential because statistical evaluation in accordance with DTSC policy shows that the concentrations of arsenic at IR Sites 30 and 31 represent ambient conditions. Nevertheless, the findings of the comparison support the conclusion that IR Sites 30 and 31 have lithologic characteristics significantly different from those of the PRC pink background area.

Lithology and fill history, gravel content, geotechnical data, and color differences were examined for IR Sites 30 and 31 and adjacent locations (IR Site 25, the East Housing Area, the College of Alameda campus, and the PRC pink background data set area west of Main Street). Boring logs from IR Sites 25, 30, and 31, the East Housing Area, and the College of Alameda campus were evaluated. Based on a general correlation between the lithology in boring logs and the sequence of fill events, IR Sites 30 and 31, the FISCA Warehouse Area, and the East Housing Area would be grouped under the gravel-laden fill material in place by 1927. IR Site 25, FISCA (outside the FISCA Warehouse Area), and most of the College of Alameda campus would be grouped under the hydraulic fill material in place by 1919 and 1930. Additionally, the physical properties, grain-size distributions, and descriptions of soil color indicate that the soil at IR Sites 30 and 31 is different from the soil west of Main Street in the PRC pink background data set area (as represented by IR Site 35).

CONCLUSIONS

Arsenic in soil at IR Sites 30 and 31 and cadmium, chromium, and vanadium in soil at IR Site 31 meet DTSC criteria for ambient populations and are not the result of a release from Navy activities. This finding is supported by analysis of arsenic at adjacent locations as well as the fill history and lithology. The basis for this finding is summarized as follows.

- **Data evaluation of arsenic at IR Sites 30 and 31.** Application of DTSC criteria to arsenic at IR Sites 30 and 31, considered separately, demonstrates that arsenic concentrations in soil at these sites represent ambient conditions.
- **Other metals at IR Site 31.** Cadmium, chromium, and vanadium concentrations at IR Site 31 also meet the DTSC criteria for ambient populations. Iron meets the statistical criteria, but the probability plot indicates possible subpopulations. However, this characteristic of iron is also found in the PRC pink background data set and is not unexpected for a common rock-forming metal like iron. Lead concentrations do not meet the criteria for an ambient population, which is consistent with multiple environmental sources.
- **Arsenic concentrations at adjacent locations.** IR Sites 30 and 31, along with the East Housing Area and portions of the FISCA, represent approximately 140 acres of land with similar concentrations of arsenic. The similar arsenic concentrations, which are higher than those in the PRC pink background data set, appear to be related to the composition of the fill soil.
- **Comparison to PRC pink background data set.** Inclusion of IR Sites 30 and 31 in the PRC pink background area is not appropriate based on the original criteria for grouping background data of similar fill history and similar iron and manganese concentrations. Compared with that data set, soil at IR Sites 30 and 31 has significantly higher concentrations of iron, and soil at IR Site 30 also has significantly higher concentrations of manganese. (Manganese data were not available for IR Site 31.)
- **Fill history and lithological evaluation.** An updated fill history shows that IR Sites 30 and 31 have a fill history different from the portion of the PRC pink background area located west of Main Street. Soil at IR Sites 30 and 31, the FISCA Warehouse Area, and the East Housing Area have higher gravel content than soil in other nearby areas. Additionally, the yellow color of the fill soil at IR Sites 30 and 31 distinguishes it from the fill soil at IR Site 25 and sites within the pink background area west of Main Street.

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D HISTORICAL MAPS AND PHOTOGRAPH

ACRONYMS/ABBREVIATIONS

AOC	area of concern
ASTM	American Society for Testing and Materials
bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	contract task order
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
EDC	economic development conveyance
FISCA	Fleet and Industrial Supply Center Alameda
FS	feasibility study
IR	Installation Restoration (Program)
mg/kg	milligrams per kilogram
PG	Professional Geologist
PRC	PRC Environmental Management, Inc.
RI	remedial investigation
SWMU	solid waste management unit
UCL	upper confidence limit

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EVALUATION OF ARSENIC AND OTHER METALS IN SOIL AT IR SITES 30 AND 31

This report presents the results of an evaluation of arsenic in soil at Installation Restoration (IR) Program Sites 30 and 31 and five other metals (cadmium, chromium, iron, lead, and vanadium) in soil at IR Site 31, Alameda Point, Alameda, California. This evaluation was conducted to determine whether the concentrations of these metals represent ambient conditions or are the result of releases from Navy activities.

Background evaluations conducted between 1997 and 2001 indicated that the Alameda Point pink background data set compiled by PRC Environmental Management, Inc., (PRC) (1997a,b) was applicable to IR Site 31; therefore, metals at IR Site 31 were initially compared to the pink background data set. Separate statistical evaluations conducted during the remedial investigations (RIs) at IR Sites 30 and 31 showed that most metals at the sites, including common rock-forming metals such as iron, are present at higher concentrations than those in the pink background data set. A number of factors, such as the even horizontal and vertical distribution of several metals, indicated that further evaluation was warranted. Also, the 2002 Final RI Report for Operable Unit 5 concluded that the pink background data set was not appropriate for adjacent IR Site 25 (Neptune 2002).

Arsenic was selected for further evaluation because it is the primary risk driver at IR Sites 30 and 31. Cadmium, chromium, iron, lead, and vanadium in soil at IR Site 31 were included in the additional statistical evaluation because these metals exceeded risk-based screening levels for soil, were risk drivers, or were present in groundwater at concentrations above historical levels.

The Navy initially proposed the background data set from the Bay Area called the Great Valley Group as an alternative background data set for arsenic in the draft RI Report in April 2006 (CDM 2006a). The use of this data set was not acceptable to the regulatory agencies. In a meeting with the agencies on August 24, 2006, the Navy proposed instead to evaluate data from surrounding areas; in particular, the recently acquired data from the East Housing Area were proposed for evaluation as a potential background data set. Subsequent to that meeting, the Navy determined that an alternative background data set for arsenic was not needed because the concentrations of arsenic in soil at IR Sites 30 and 31 meet the criteria for ambient conditions as described in a policy of the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) (1997).

The conclusion of the evaluation discussed in this report is that arsenic concentrations represent ambient conditions at both IR Sites 30 and 31 rather than indicating a release from on-site activities. This finding is based on arsenic concentrations meeting the DTSC criteria for ambient conditions (DTSC 1997) and is supported by the presence of similar concentrations of arsenic at adjacent locations unaffected by Navy activities. In addition, the fill history and lithology indicate that the fill at IR Sites 30 and 31 originated from a different source than the fill used in the PRC pink background data set area west of Main Street. Additional evaluation of other metals in soil at IR Site 31 does not indicate a release from on-site activities. Therefore, a feasibility study (FS) to address arsenic concentrations in soil at IR Sites 30 and 31 and other metals in soil at IR Site 31 is not warranted.

This evaluation was conducted in the following steps.

1. Arsenic data from IR Sites 30 and 31, considered separately, were evaluated using the DTSC policy (DTSC 1997) to determine whether the data consisted of a single population, likely representative of ambient conditions, or of multiple populations, likely associated with a release.
2. Cadmium, chromium, iron, lead, and vanadium data from IR Site 31 were evaluated using the DTSC policy (DTSC 1997).
3. Arsenic concentrations at locations adjacent to IR Sites 30 and 31 were assessed.
4. The PRC pink background data set and its applicability to IR Sites 30 and 31 were evaluated.
5. The fill history for IR Sites 30 and 31 and adjacent locations (IR Site 25, the Fleet and Industrial Supply Center Alameda [FISCA], the College of Alameda, the East Housing Area, and the PRC pink background area west of Main Street) was reviewed.
6. The lithology and physical soil data for IR Sites 30 and 31 and adjacent areas were assessed.

The findings of this evaluation demonstrate that arsenic at IR Sites 30 and 31 and other metals at IR Site 31 are present at ambient levels and do not represent a release resulting from on-site Navy-related activities. Furthermore, the concentrations of arsenic at either site and other metals at IR Site 31 do not warrant remediation.

Figures and tables are located at the end of this report. The findings from the evaluation are summarized below. Note that the previous version of this report was entitled "Area-Specific Background Evaluation, IR Sites 30 and 31, Alameda Point, Alameda, California."

1 ARSENIC AT IR SITES 30 AND 31

Analytical data from a site can be used to determine whether or not a release has occurred without using an off-site background level for comparison. The DTSC policy for selecting inorganic chemicals of potential concern provides a methodology to evaluate data from a site, even a potentially contaminated site, and to determine whether the data represent a release or ambient conditions (DTSC 1997).

This evaluation followed the DTSC process and also included additional statistical tests for outliers (Attachment A).

The DTSC criteria for determining whether there are multiple populations represented by a data set (indicating a release) or a single population (indicating ambient levels) were used in this evaluation. The criteria and the results for IR Sites 30 and 31 are as follows.

- Test of Distributions. The ambient data set is normally or lognormally distributed. The distribution of the arsenic data for IR Sites 30 and 31 was tested using the Shapiro-Wilk test and found to fit lognormal distributions. DTSC policy states that trace metals tend to be lognormally distributed. The statistical fit between the data and a lognormal distribution indicates that there are no outliers. Rosner's outlier test (U.S. EPA 2006) also shows that the

maximum concentration at IR Site 30 and the two highest values at IR Site 31 are not outliers.

- Test of Maximum and Coefficient of Variation. The range of detected values in an ambient data set is no more than two orders of magnitude, and the coefficient of variation is not greater than 1. The range of detected values and coefficients of variation for arsenic data at IR Sites 30 and 31 meet these criteria as follows.
  - IR Site 30. The detected concentrations range from 0.8 to 56.3 milligrams per kilogram (mg/kg), and the coefficient of variation is 0.81.
  - IR Site 31. The detected concentrations range from 2.3 to 42.4 mg/kg, and the coefficient of variation is 0.69.
- Test of Probability Plots. Ambient data (single populations) fall in a straight line when plotted in a cumulative probability plot. As shown on Figure 2, arsenic data at IR Sites 30 and 31 meet this criterion. Data in the upper and lower tails of the distribution tend to fall farthest from the line. However, none of the points in the upper tail represent outliers as indicated by Rosner's outlier test (next bullet). Note that box and whisker plots of the arsenic data are also provided in Attachment A.
- Test of Outliers. While not required in the DTSC policy, a test of outliers was conducted to support the findings of the Shapiro-Wilk test that there is no evidence of high values that might represent a release. Rosner's outlier test (U.S. EPA 2006) also shows that the maximum concentration at IR Site 30 and the two highest values at IR Site 31 are not outliers.

Other published papers on the use of probability plots for identification of ambient populations include Cook (1998), Fleischhauer and Korte (1990), Sinclair (1976), and Singh et al. (1994).

2 OTHER METALS AT IR SITE 31

In addition to arsenic, five other metals (cadmium, chromium, iron, lead, and vanadium) in soil at IR Site 31 were evaluated using the methodology outlined in the DTSC policy (DTSC 1997) to determine whether the concentrations meet the criteria for ambient populations (Attachment A). These metals were reported at concentrations above risk-based screening levels, were risk drivers, or were present in groundwater at concentrations above historical levels.

Cadmium, chromium, and vanadium data meet all DTSC criteria for ambient populations (i.e., the range of detections is less than two orders of magnitude, the coefficient of variation is less than 1, and the data represent one population on a probability plot). Distributional analysis and outlier testing were conducted on cadmium, chromium, and vanadium to substantiate the above results. No outliers were identified at high concentrations. After removal of one chromium outlier at the lowest concentration, all three data sets were lognormally distributed at a significance level of 5 percent.

The probability plots for iron and lead indicate the presence of more than one population. However, this finding is not unexpected for iron, a common rock-forming metal.

The PRC pink background data probability plot also indicates multiple populations (Attachment A). The finding for lead is consistent with multiple sources of lead in the environment.

3 ARSENIC CONCENTRATIONS AT ADJACENT LOCATIONS

An evaluation of arsenic concentrations east of Main Street was conducted for IR Sites 25, 30, and 31, the East Housing Area, FISCA, and the College of Alameda campus to determine the extent of soil with concentrations of arsenic above those in the PRC pink background data set. Current and past uses of IR Site 25 and East Housing Area have only been for residences. The College of Alameda campus has a mixed history, with use as a commercial airport before 1940 and then as housing until the college was constructed.

The concentrations of arsenic in soil east of Main Street, shown on Figure 3, fall into two general groups. The first group covers a 140-acre contiguous area where mean arsenic concentrations range from 10.6 mg/kg at IR Site 31 to 13.1 mg/kg at the East Housing Area. This contiguous area includes IR Sites 30 and 31, the East Housing Area, and portions of the FISCA Warehouse Area between IR Site 31 and the East Housing Area. The median values for arsenic at IR Sites 30 and 31, the East Housing Area, and the FISCA Warehouse Area were compared to Bay Area data collected from background locations and the PRC pink background data set, as presented on Figure 4. Bay Area data are included on Figure 4 to indicate that potential sources of fill soil with higher arsenic concentrations exist in the Bay Area, not to suggest that these areas were the source of the fill at IR Sites 30 and 31. Mean and median concentrations are robust descriptors of populations.

In contrast, the second group, including the remaining FISCA area and IR Site 25, has lower concentrations of arsenic. The mean arsenic concentrations range from 1.7 mg/kg at FISCA Area of Concern (AOC) 1 to 4.2 mg/kg at FISCA Solid Waste Management Unit (SWMU) 1 (Operable Unit 2). The 95th percent upper confidence limit (UCL) of the mean concentration at IR Site 25 is 4.2 mg/kg. (The 95th percent UCL, by definition, will be higher than the mean.) The College of Alameda campus has intermediate concentrations of arsenic, and the 95th percent UCL is 8.4 mg/kg. In comparison, the 95th percent UCL and mean at the East Housing Area are 16.3 and 13.1 mg/kg, respectively.

East Housing Area data were compared statistically with the arsenic concentrations at IR Sites 30 and 31, which were considered separately. Three two-population statistical tests (Wilcoxon rank sum test, two-sample t-test, and Gehan test) were used to compare the arsenic data distributions at IR Sites 30 and 31 with those at the East Housing Area. All three comparisons show that the concentrations of arsenic in these data sets are not statistically different (Attachment A).

Summary statistics of the data for the above areas and others discussed in this evaluation are presented in tables in Attachment B. The tables listed below show sample size, detection frequency, maximum, minimum, mean, median, standard deviation, coefficient of variation, 95th quantile, and 95th percent UCL of the mean:

- PRC background: pink, yellow, and blue areas – Tables B-1, B-2, and B-3, respectively
- IR Sites 30 and 31 – Tables B-4 and B-5, respectively
- East Housing Area and FISCA Warehouse Area – Tables B-6 and B-7, respectively

A comparison of sample size, detection frequency, and maximum and minimum values between FISCA (SWMUs and AOCs) and the College of Alameda campus is shown in Table B-8 in Attachment B. Sample size, detection frequency, ranges of metals, means, and exposure point concentrations for IR Site 25 are shown in Table B-9. Discrete data for IR Site 25 were not compiled for this evaluation, and discrete data for FISCA and the College of Alameda were not available.

The arsenic concentrations in the PRC yellow background data set are similar to those at IR Site 31. The yellow background data set is from an area that borders San Francisco Bay along the western side of Alameda Point, a location farther from IR Site 31 than the sites discussed above (Figure 5). The 95th percent UCL for the yellow background data set of 12 mg/kg is approximately the same as the 95th percent UCL for IR Site 31 of 11.7 mg/kg, and both are above the 95th percent UCL for the pink background data set (4.2 mg/kg). This is further evidence that arsenic concentrations that are ambient and unrelated to Navy activities are present at Alameda Point.

In summary, there is a 140-acre area east of Main Street (i.e., IR Sites 30 and 31, the East Housing Area, and portions of the FISCA Warehouse Area) with concentrations of arsenic that are similar. Statistical evaluation of arsenic at IR Sites 30 and 31 in accordance with DTSC policy shows that the arsenic is ambient. Over 50 percent of this 140-acre area (the East Housing Area) was never used for industrial purposes. Therefore, the arsenic concentrations are considered ambient.

4 COMPARISON TO PRC PINK BACKGROUND DATA SET

In the PRC background study (PRC 1997a,b), data from Alameda Point were assigned to one of three groups (pink, yellow, or blue) on the basis of similar fill history and iron and manganese concentrations (Figure 5). The study collected data from locations that appeared to have been minimally impacted by industrial activities. Although IR Sites 30 and 31 were grouped by PRC into the pink background area, there is strong evidence that the PRC pink background data set is not an appropriate background data set for IR Sites 30 and 31. The finding that arsenic concentrations at IR Sites 30 and 31, considered separately, meet the DTSC criteria for an ambient population makes comparison to a background data set unnecessary. However, the following factors, which indicate that inclusion of IR Sites 30 and 31 into the pink background area may not be appropriate, should be considered.

- The fill history shows that IR Sites 30 and 31 were filled at a different time than most of the PRC pink background area. The fill history updated by Bechtel Environmental, Inc., (Figure 6) shows that the area where samples were collected for the PRC pink background data set was filled between 1927 and

1941, while the majority of the original Navy land east of Main Street was either dry land or filled before 1927. The differences in fill history increase the likelihood that fill soil at the sites and at most of the PRC pink background area originated from different sources.

- Iron and manganese concentrations at IR Site 30 and iron concentrations at IR Site 31 (manganese data were not available for IR Site 31) are statistically significantly higher than those in the PRC pink background data set. PRC reports (1997a,b) stated that iron and manganese would be good indicators of ambient conditions because these metals would not be related to Navy activities.
- No samples for the PRC background data sets were collected in the vicinity of IR Site 30 or 31 or even east of Main Street. The PRC pink background data set included samples from approximately 26 locations (the number of samples for each metal varies, as not all samples were analyzed for all metals). The sampling locations were all west of Main Street. The two closest sampling locations were approximately 800 and 1,900 feet west of IR Site 31; all other locations were between 0.5 and 1.8 miles from IR Site 31.

5 FILL HISTORY AND SOIL CHARACTERISTICS

This section presents an updated evaluation of the fill history, a discussion of lithology, and an evaluation of the physical soil characteristics of IR Sites 25, 30, 31, and 35, FISCA, the College of Alameda campus, and the East Housing Area. The regulatory agencies requested that the Navy evaluate lithology to support use of an alternative background data set at the meeting between the Navy and the agencies on August 24, 2006. Subsequently, the Navy determined that an alternative background data set was not needed because the arsenic concentrations, as well as those of several other metals, meet DTSC criteria for ambient conditions. Nevertheless, the Navy conducted an evaluation of the lithology. Boring logs are provided in Attachment C, and historical maps and an aerial photograph are provided in Attachment D.

5.1 Fill History

An updated fill history shows that IR Sites 30 and 31 were not filled during the same fill event as the PRC pink background area. The area of the PRC pink background data set was filled between 1927 and 1941, while the majority of the land used by the Navy east of Main Street was either originally dry land or filled before 1927. The differences in fill history increase the likelihood that the fill originated from a different area.

The history of artificial fill (1859–1973) is depicted on Figure 6, and a recent update explained in this section is shown in the inset. When the background areas were identified (Figure 5), PRC likely used a version of the fill history that showed that the land east and west of Main Street was filled between 1930 and 1939. However, a later, more detailed study of the fill events indicates that the area east of Main Street, which includes IR Site 31 and parts of IR Site 30, was in place by 1927 (BEI 2002). While the exact boundaries of the fill events are uncertain (due to early photographs having been taken at an oblique angle), there is information to suggest that the areas east and west of Main Street were filled at different times.

Figure 6 has been refined with an inset based on the most recent interpretation of fill history. Historical maps from 1903 to 1930 and a 1930 photograph were used to refine the fill history shown on this figure and have been reproduced and included in Attachment D. Historical maps (USCGS 1903, E.C. Sessions 1906) show levees aligned north-south along the existing Main and Webster Streets. These levees likely acted as physical barriers restricting the limits of fill events. Additionally, the boundaries of fill events shown in the inset have been refined by assessing lithologic characteristics described in boring logs. As shown in the inset on Figure 6, the northern boundary of the 1927 fill event is believed to be located at the northern boundary of IR Sites 30 and 31. This change to the figure was based on the gravel-laden soil noted in the boring logs from the northern edge of IR Sites 30 and 31. The eastern boundary of the 1927 fill event within the College of Alameda was also refined based on an evaluation of the lithologic data.

The fill history figure indicates that IR Sites 30 and 31, the FISCA Warehouse Area, and the East Housing Area were all filled prior to 1927. Information in the boring logs for these sites supports this interpretation (Section 5.3.1) indicating gravel-laden fill. In contrast, the fill placed by 1919 and 1930, which includes IR Site 25, the remaining FISCA area, and most of the College of Alameda campus, would be grouped under the areas having hydraulic fill material.

As shown on the fill history map, fill material at the College of Alameda campus was emplaced during two fill events. About 30 percent of the area in the northwestern portion of the campus was filled during the same period as IR Sites 30 and 31, the FISCA Warehouse Area, and the East Housing Area (i.e., in place by 1927). The majority of the campus, about 70 percent, appears to have been filled during the same period as IR Site 25 and FISCA (i.e., in place by 1919).

5.2 Lithology

A review of boring logs from IR Site 25, FISCA, the College of Alameda campus, and most Alameda Point transfer parcels west of Main Street indicates that these areas have a soil lithology (0 to 4 feet below ground surface [bgs]) that is very different from that of IR Sites 30 and 31. Over 400 boring logs from various investigations at IR sites and transfer parcels west of Main Street were reviewed to assess lithological characteristics (i.e., IR Site 26, IR Site 35, and Transfer Parcels Economic Development Conveyance [EDC]-3, EDC-5, Public Benefit Conveyance 1A, and Federal Agency Parcel 1A). These boring logs represent the majority of the PRC pink background area. It was concluded that the lithology of the PRC pink background area is that of hydraulic fill material composed primarily of poorly graded, fine-grained sand.

In contrast, the gravel-laden fill soil typical of the upper 4 feet of soil at IR Sites 30 and 31 is classified as well-graded sand (SW), well-graded gravel (GW), clayey gravel (GC), and silty gravel (GM). The wide range of particle sizes and abundant gravel in the fill soil at IR Sites 30 and 31 support the conclusion that this gravel-laden fill soil is from a different source. It is likely that gravel was imported at IR Sites 30 and 31 and the East Housing Area prior to construction.

The lithology of fill material at IR Site 25 and most of the sites and transfer parcels west of Main Street in the PRC pink background area is typically fine-grained sand and silt that overlies clay. The fill material was derived from hydraulic dredging of San Francisco Bay and Oakland Inner Harbor. Review of boring logs indicates that samples from most soil borings within the hydraulic fill material are classified as poorly graded sand (SP), silty sand (SM), silt (ML), and clay (CL and CH) (ASTM 1993). These hydraulic fill soils are characterized by a limited range in particle size, and they contain little or no gravel.

5.3 Physical Soil Characteristics

Physical characteristics of the soil at IR Sites 30 and 31 and at locations adjacent to IR Sites 30 and 31 were evaluated in response to a request from the regulatory agencies during the August 2006 meeting. At that time, this evaluation was considered important to the selection of a background data set. However, because the statistical evaluation based on DTSC policy was conducted, a background data set is no longer considered a necessary part of the evidence for the conclusion that the concentrations of arsenic at IR Sites 30 and 31 are representative of ambient conditions. However, the evaluation of physical soil characteristics does support that conclusion.

Physical soil characteristics were evaluated for IR Sites 30 and 31 and compared to adjacent areas (IR Site 25, the East Housing Area, the College of Alameda campus, and FISCA) and the PRC pink background area. Specifically, the following parameters were evaluated:

- gravel content
- soil type and grain-size distribution
- color differences in soil

The following subsections present more detail about the evaluations.

5.3.1 GRAVEL CONTENT

An evaluation of the gravel content of the fill material was performed for IR Sites 25, 30, and 31, the East Housing Area, and the College of Alameda campus. Boring logs from IR Sites 25, 30, and 31, the East Housing Area, and the College of Alameda campus were evaluated.

The fill soil at IR Sites 30 and 31 is composed of a coarse-grained sand and gravel mixture that is lithologically characteristic of an inland source. The evaluation demonstrates that soil at IR Sites 30 and 31 contains more gravel than soil at IR Site 25, which consists of more sand and clay. This difference in physical characteristics suggests that the fill material may be from different sources. The boring logs for the East Housing Area also repeatedly describe gravel in the soil in the majority of the borings.

IR Sites 25, 30, and 31

The percentage of gravel, sand, and fines (i.e., silt and clay) was evaluated for all available borings logs from IR Sites 25, 30, and 31. This evaluation included tabulating and reviewing the grain size from the boring logs and summarizing this information for comparative analysis (Table 1). The percentages of various grain sizes were recorded on most logs and were included in the evaluation. If the grain-size percentages were not recorded, then the percentage was estimated based on the percentages of gravel, sand, and fines for the assigned soil type (e.g., well-graded sand with gravel [SW]) presented in the American Society for Testing and Materials (ASTM) standard for visual classification (ASTM 1993).

In total, 488 boring logs from these three sites were evaluated to a depth of 8 feet bgs (Table 1). As shown in the table, there is significantly more gravel in the upper 4 feet of soil at IR Sites 30 and 31 than at IR Site 25. The average percentage of gravel by depth interval ranges up to 43 percent and 30 percent at IR Sites 30 and 31, respectively, yet is a maximum of only 7 percent at IR Site 25. Figure 7 shows the percentage of gravel at various depth intervals between 0 and 4 feet bgs for all three IR sites. Figure 8 consists of pie charts that graphically display the percentage of gravel, sand, and fines for the 0- to 2-foot-bgs intervals at IR Sites 25, 30, and 31.

While this statistical review focused on the upper 4 feet bgs, the composition of the soil at depths below 4 feet bgs at IR Sites 30 and 31 is also different from that at IR Site 25. IR Sites 30 and 31 have a large percentage of fines (especially clay) compared to IR Site 25, which has more silt and fine sand. Differences in the distribution of sand and fines can be seen in Table 1.

College of Alameda Campus and East Housing Area

Ten borings were drilled at the College of Alameda campus, and sampling results were used as background data for the FISCA RI Report (PRC and Versar 1996). A review of boring logs for the College of Alameda campus showed that the lithology in the northwestern portion of the campus includes gravel, while the lithology of the remainder of the campus includes of hydraulic fill material, primarily fine sand and clay. The fill history map (Figure 6) shows that a contact line between two fill events (fill in place by 1919 and fill in place by 1927) crosses the northwestern corner of the campus. A review of boring logs indicated that three of four borings in the northwestern corner (in the area with fill in place by 1927) contained gravel. One of these four borings from the 1927 fill event contained 60 percent gravel. Of the remaining six borings located in the area with fill in place by 1919, two borings contained gravel (up to 10 percent); all other borings contained no gravel and are characterized as sand and clay, typical of hydraulic fill soil. This evidence confirms the approximate location of the fill contact lines in this area and supports the conclusion that the College of Alameda campus is characterized by a mixture of fill materials from two sources, one a gravel-laden fill material and one a hydraulic fill material.

Boring logs for the East Housing Area were also reviewed. Although descriptions in these boring logs did not follow the Unified Soil Classification System or ASTM standards,

they did document the presence of gravel. Forty-six of 65 boring logs (71 percent) from the East Housing Area contained the notation that gravel was present. This suggests that the fill soils in the East Housing Area likely have a gravel content more similar to the fill soils at IR Sites 30 and 31 than to the hydraulic fill soil at IR Site 25. This information supports the premise of gravel-laden fill material being present in the area with fill soil in place by 1927, which includes IR Sites 30 and 31 (Figure 6).

5.3.2 SOIL TYPE AND GRAIN-SIZE DISTRIBUTION

Soil samples collected for geotechnical analyses at IR Sites 25, 30, 31, and 35 and FISCA (outside the FISCA Warehouse Area between IR Site 31 and the East Housing Area) provide information on soil type classification and grain-size distribution. Information from IR Site 35, located west of Main Street, is considered representative data for the PRC pink background area because the sample locations for this site are widespread and fairly well dispersed across the PRC pink background area. Geotechnical results from FISCA are included to show the similarity to IR Site 25, since they are part of the same hydraulic fill event, and to show contrast to IR Sites 30 and 31.

Results confirm a higher gravel content at IR Sites 30 and 31 and indicate that the fill soil is different from that of some other sites in the PRC pink background area. The evaluation was useful in distinguishing differences in soil types (lithologies) between sites built with hydraulic fill soil and those built with construction fill material. Using ASTM Standard D422 for particle-size analysis, geotechnical laboratories determine the percentage of gravel, sand, silt, and clay for a given sample and use these data to assign a soil type.

Soil type and grain-size distribution results are presented in Table 2. These data support the assessment of gravel content discussed below and show significant lithologic differences among these sites. As shown in the table, sites filled with hydraulic material (e.g., IR Sites 25 and 35 and FISCA) are typically characterized by poorly graded, fine-grained sand and silt (SP, SM, and ML). Sites with gravel-laden fill material (e.g., IR Sites 30 and 31) are typically characterized by well-graded, coarse-grained sand and gravel mixtures (SW and GC).

Example grain-size distribution curves for IR Sites 30, 31, and 35 were plotted on Figure 9. A typical sand representative of hydraulic fill material contains a very narrow range of particle sizes (i.e., poorly graded [well sorted]) represented by a steep or near-vertical line as shown on Figure 9, while a typical sand or gravel representative of gravel-laden fill has a wide range of particle sizes (i.e., well graded [poorly sorted]). As shown on Figure 9, the IR Site 35 soil sample has a narrow range of particles sizes (typically representative of poorly graded sand with little or no gravel) compared to the wide range of particle sizes present in the soil samples from IR Sites 30 and 31. These lithologic differences indicate separate fill events and different source materials. The fine-grained materials were derived from hydraulic dredging of marine sediment, while the coarse-grained materials were likely derived from an inland fill source(s).

The following subsections summarize geotechnical results for IR Site 30 and 31 and each adjacent site and compare them to other sites.

IR Site 25

Eighteen geotechnical samples were collected and analyzed from IR Site 25 during the RI (Neptune 2002). Although grain-size distribution data were not available, soil classification indicates that the soil type is consistent with FISCA, IR Site 35, and other areas that are part of the PRC pink background area. Ten samples were classified as poorly graded fine-grained sand or silty sand. Seven samples were classified as silt or clay. Only one sample (from boring CH-08 near the northern boundary of IR Site 30) was classified as gravel.

IR Site 30

Nine geotechnical samples were collected and analyzed from IR Site 30 during the RI (BEI 2005). These samples were taken primarily from the deeper clay layer (below the gravel) to support vapor migration modeling efforts. There was, however, one gravel sample collected from 1 to 2 feet bgs to characterize the gravelly fill material. This sample was analyzed by the laboratory and reported to contain 42 percent gravel. This result is very similar to the average percentage of gravel (41 percent) at this depth, as calculated from information noted in the boring logs (Table 1).

IR Site 31

Fifteen geotechnical samples were collected and analyzed from IR Site 31 during the RI (CDM 2006a,b). Thirteen of these samples were classified as sand (i.e., 12 as SW and 1 as SM), and each of these contained gravel. Review of the grain-size distribution curves indicates a wide range of particle sizes including gravel; coarse-, medium-, and fine-grained sand; and silt and clay. Gravel content in sand samples ranged from 2 to 24 percent, with an average of 16 percent.

IR Site 35

Fourteen geotechnical samples were collected from IR Site 35 and analyzed during the RI/FS (BEI 2006). Twelve of these samples were classified as sand (i.e., six as SP-SM, five as SM, and one as SC), and two were classified as clay (CL). The grain-size distribution curves for IR Site 35 soil samples indicated a narrow range of particle sizes compared to the wide range of sizes present at IR Sites 30 and 31. The sand at IR Site 35 is generally very poorly graded, containing primarily fine-grained sand and little or no gravel. Only 3 of the 12 soil samples contained gravel.

The fine-grained, poorly graded sand and silty sand at IR Site 35 are the representative lithology throughout the PRC pink background area west of Main Street and are similar to soil at IR Site 25 and FISCA. The comparison with IR Site 35 is made because field observations and boring log data from this site as well as other sites in the immediate area (e.g., from the polynuclear aromatic hydrocarbon investigation at Transfer Parcel EDC-5) include a similar and consistent lithology.

FISCA (Outside the Warehouse Area)

This subsection addresses the area of FISCA that is outside the FISCA Warehouse Area between IR Site 31 and the East Housing Area. Five geotechnical samples from FISCA were collected and analyzed (PRC and Versar 1996). Two of these samples were classified as sand (i.e., one as SP-SM and one as SM), and three were classified as clay (CH). The sand grain-size distribution curves indicate that they are poorly graded and similar to sand in the PRC pink background area. Sand samples contained very different particle sizes from those collected at IR Site 31. This sand is generally very poorly graded (well sorted), containing primarily fine-grained sand and no gravel. None of the five geotechnical samples from FISCA contained gravel.

Overall, the designated soil type, differences in particle-size distribution, and differences in percentage of gravel indicate that the soil at IR Sites 25 and 35 and the FISCA area is different from soil at IR Sites 30 and 31.

5.3.3 COLOR DIFFERENCES IN SOIL

Soil color is another physical property that distinguishes the soil at IR Sites 30 and 31 from the soil at IR Site 25 and sites within the PRC pink background area west of Main Street. A simple comparison was made between records of soil color in boring logs from three sites: IR Sites 25, 30, and 31. A total of 488 boring logs from these sites were evaluated using the color yellow as the distinguishing characteristic. Results of the color comparison indicate that the color yellow is used to describe soil samples in 11 percent of the IR Site 25 boring logs. In contrast, the color yellow is used to describe soil samples in 83 and 63 percent of the boring logs from IR Sites 30 and 31, respectively.

The color of fill soil at these sites is variable; however, soil composed of sand and gravel mixtures at IR Sites 30 and 31 is commonly recorded as yellowish brown (10YR 5/6) or brownish yellow (10YR 6/6) using standardized color plates from the Munsell Soil Color Charts (Soil Test, Inc. 1975). This distinct yellowish color is in contrast to other sands from the PRC pink background area. Most sands from the PRC pink background area are described as olive brown (2.5Y 4/4) or very dark grayish brown (2.5Y 3/2).

The color yellow, derived using Munsell Soil Color Charts, therefore corresponds with the gravel-laden soil type commonly found at IR Sites 30 and 31 yet rarely found at IR Site 25. Review of other Alameda Point boring logs from sites west of Main Street within the PRC pink background area indicates that the color yellow is rarely noted.

6 CONCLUSIONS

Arsenic in soil at IR Sites 30 and 31 and cadmium, chromium, and vanadium in soil at IR Site 31 meet DTSC criteria for ambient populations and are not the result of a release from Navy activities. This finding is supported by analysis of arsenic at adjacent locations as well as the fill history and a comparison of the lithology. The basis for this finding is summarized as follows.

- **Data evaluation of arsenic at IR Sites 30 and 31.** Application of DTSC criteria to arsenic at IR Sites 30 and 31, considered separately, demonstrates that

arsenic concentrations in soil at these sites represent an ambient population. Additional statistical analysis shows that there are no outliers in the arsenic data sets. Therefore, identification of an off-site background location is not necessary to show that arsenic concentrations are present at ambient levels.

- **Other metals at IR Site 31.** Cadmium, chromium, and vanadium concentrations at IR Site 31 also meet the DTSC criteria for ambient populations. Iron meets the statistical criteria, but the probability plot indicates possible subpopulations. However, this characteristic of iron is also found in the PRC pink background data set and is not unexpected for a common rock-forming metal like iron. Lead concentrations do not meet the criteria for an ambient population, which is consistent with multiple environmental sources of lead.

- **Arsenic concentrations at adjacent locations.** Arsenic concentrations at adjacent locations provides additional evidence that fill soil with concentrations of arsenic that are different from soil sampled as part of the PRC pink background data set was used. IR Sites 30 and 31, along with the East Housing Area and portions of the FISCA Warehouse Area between the East Housing Area and IR Site 31, represent approximately 140 acres of land with similar concentrations of arsenic. The similar arsenic concentrations, which are higher than those in the PRC pink background data set, appear to be related to the composition of the fill soil.

- **Comparison to PRC pink background data set.** Inclusion of IR Sites 30 and 31 in the PRC pink background area is not appropriate based on the original criteria for grouping background data of similar fill history and similar iron and manganese concentrations. None of the samples included in the pink background data set were collected east of Main Street where IR Sites 30 and 31 are located. Compared with that data set, soil at IR Sites 30 and 31 has significantly higher concentrations of iron, and soil at IR Site 30 also has significantly higher concentrations of manganese. (Manganese data were not available for IR Site 31.) Concentrations of iron and manganese were used to group the background data sets because these metals were not typically associated with Navy activities.

- **Fill history and lithological evaluation.** An updated fill history shows that IR Sites 30 and 31 have a fill history different from the portion of the PRC pink background area west of Main Street. The lithological evaluation for IR Sites 25, 30, 31, and 35, the College of Alameda, FISCA, and the East Housing Area reveals differences in soil composition between some of the sites, which could reflect differences in sources of fill. Soil at IR Sites 30 and 31, the FISCA Warehouse Area, and the East Housing Area have higher gravel content than soil in other nearby areas. Additionally, the yellow color of the fill soil at IR Sites 30 and 31 distinguishes it from the fill soil at IR Site 25 and sites within the PRC pink background area west of Main Street.

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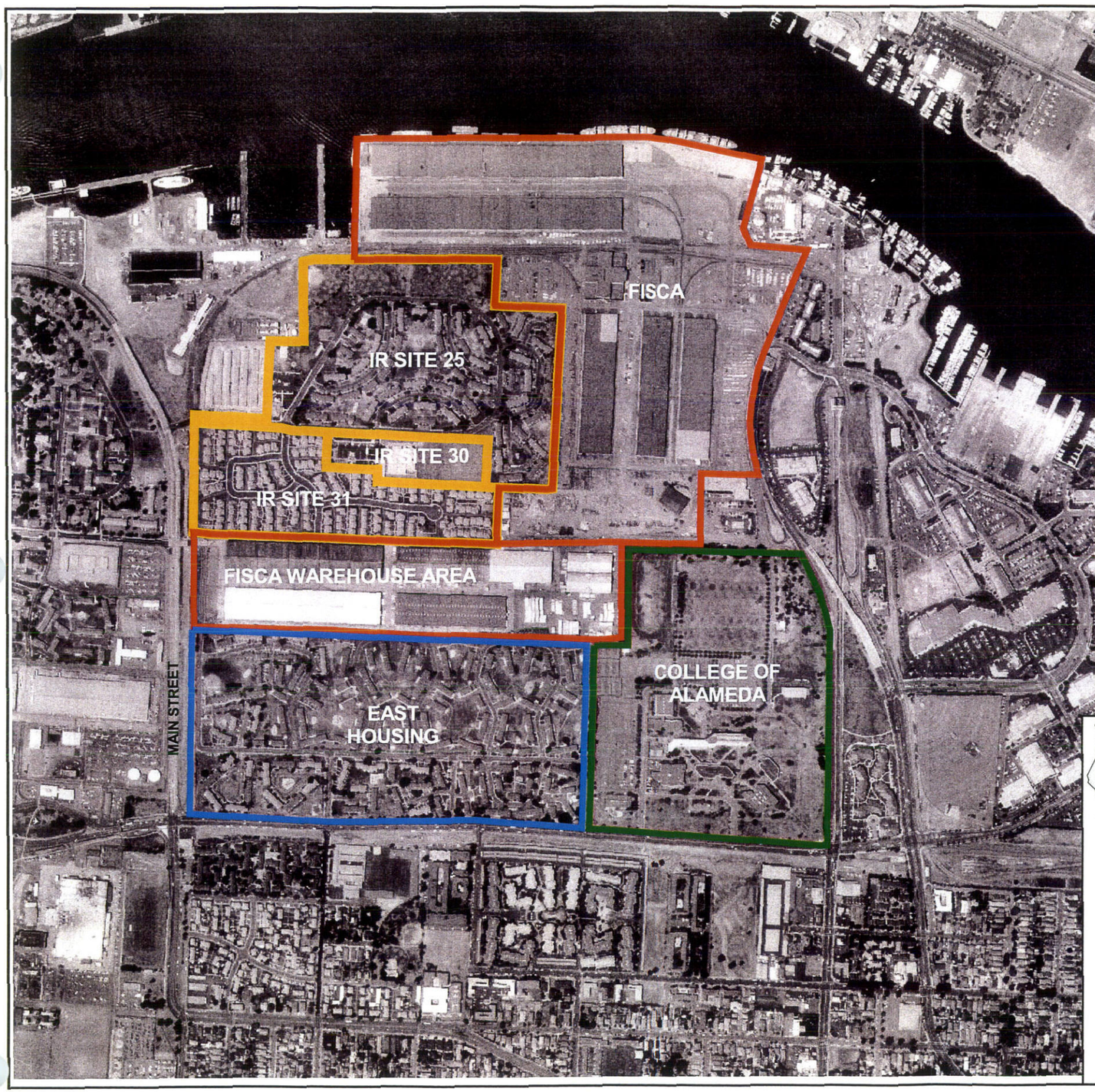
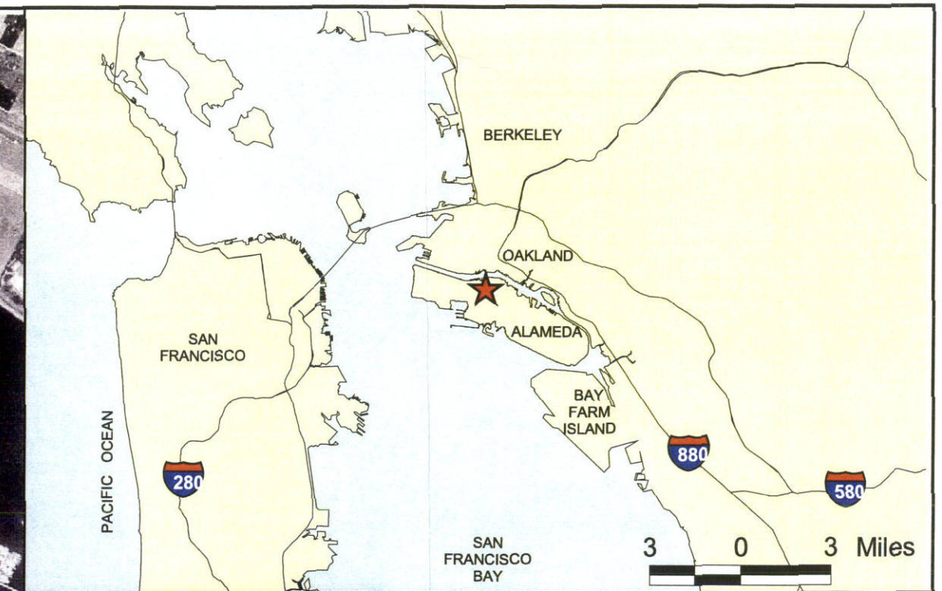
U.S. EPA. *See* United States Environmental Protection Agency.

USGS. *See* United States Geological Survey.

FIGURES





LEGEND

- IR SITE BOUNDARIES
- FISCA SITE BOUNDARIES
- EAST HOUSING BOUNDARY
- COLLEGE OF ALAMEDA BOUNDARY

NOTES:

IR - INSTALLATION RESTORATION (PROGRAM)

FISCA - FLEET AND INDUSTRIAL SUPPLY CENTER OAKLAND, ALAMEDA FACILITY/ALAMEDA ANNEX

N

750 0 750 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure 1

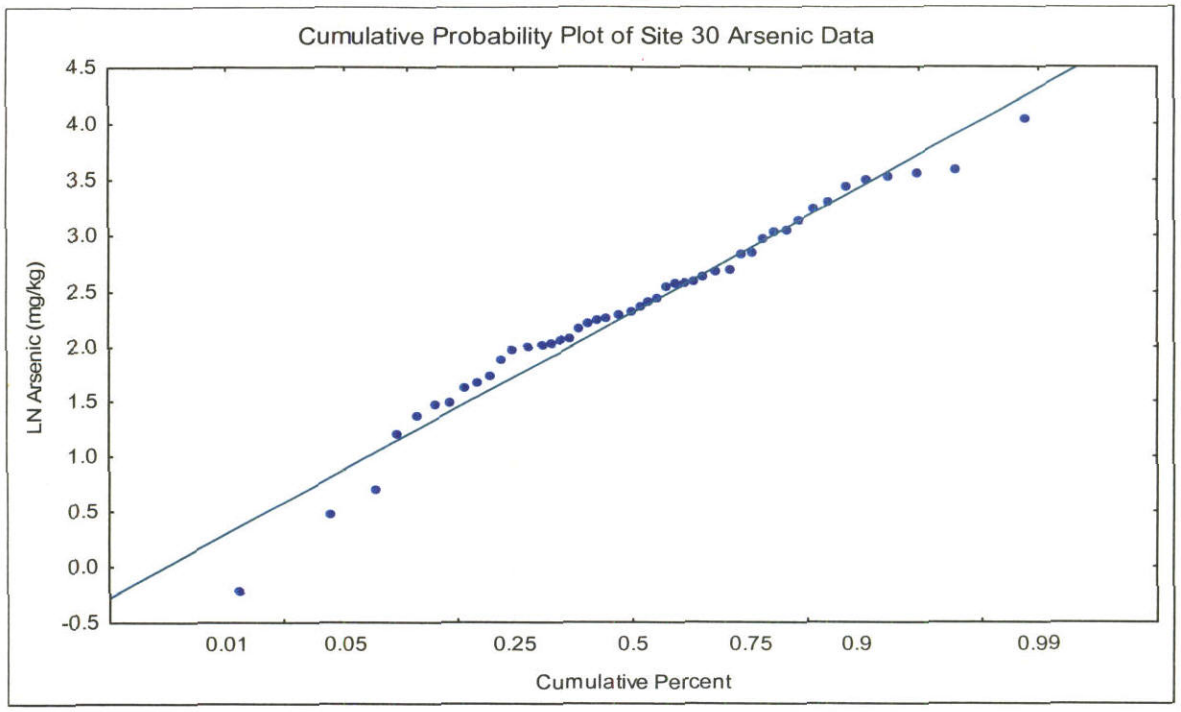
Site Location Map

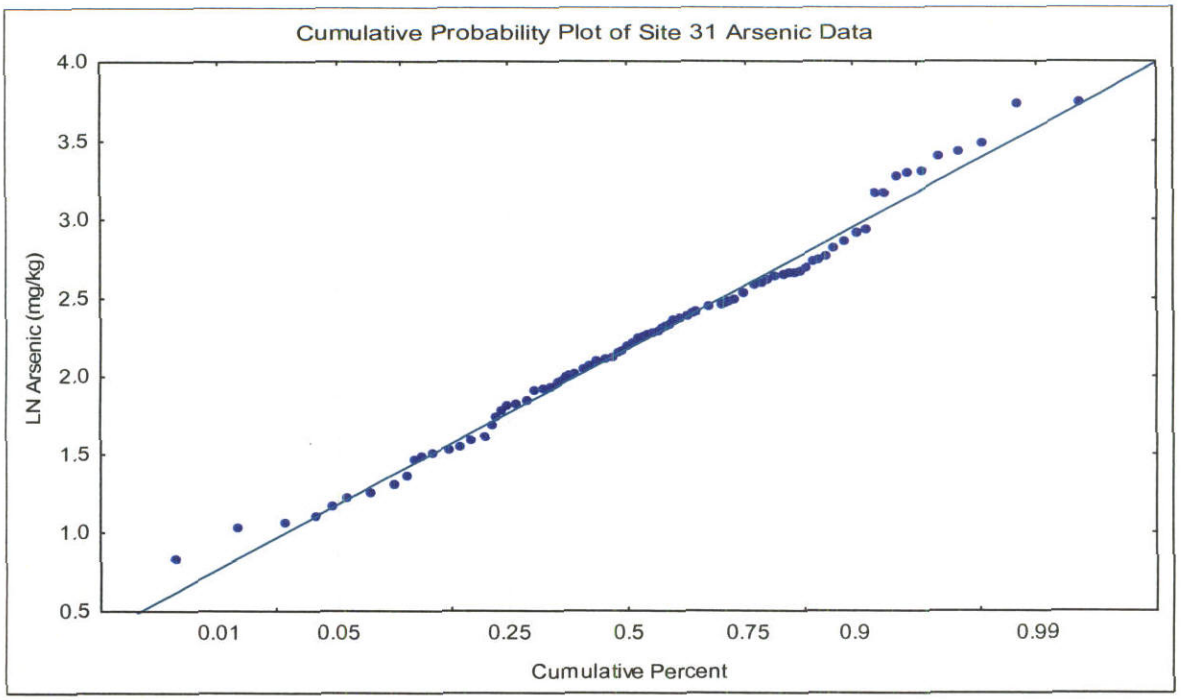
Alameda Point, Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07
File No.: 089L15610
Job No.: 23818-089
Rev No.: B





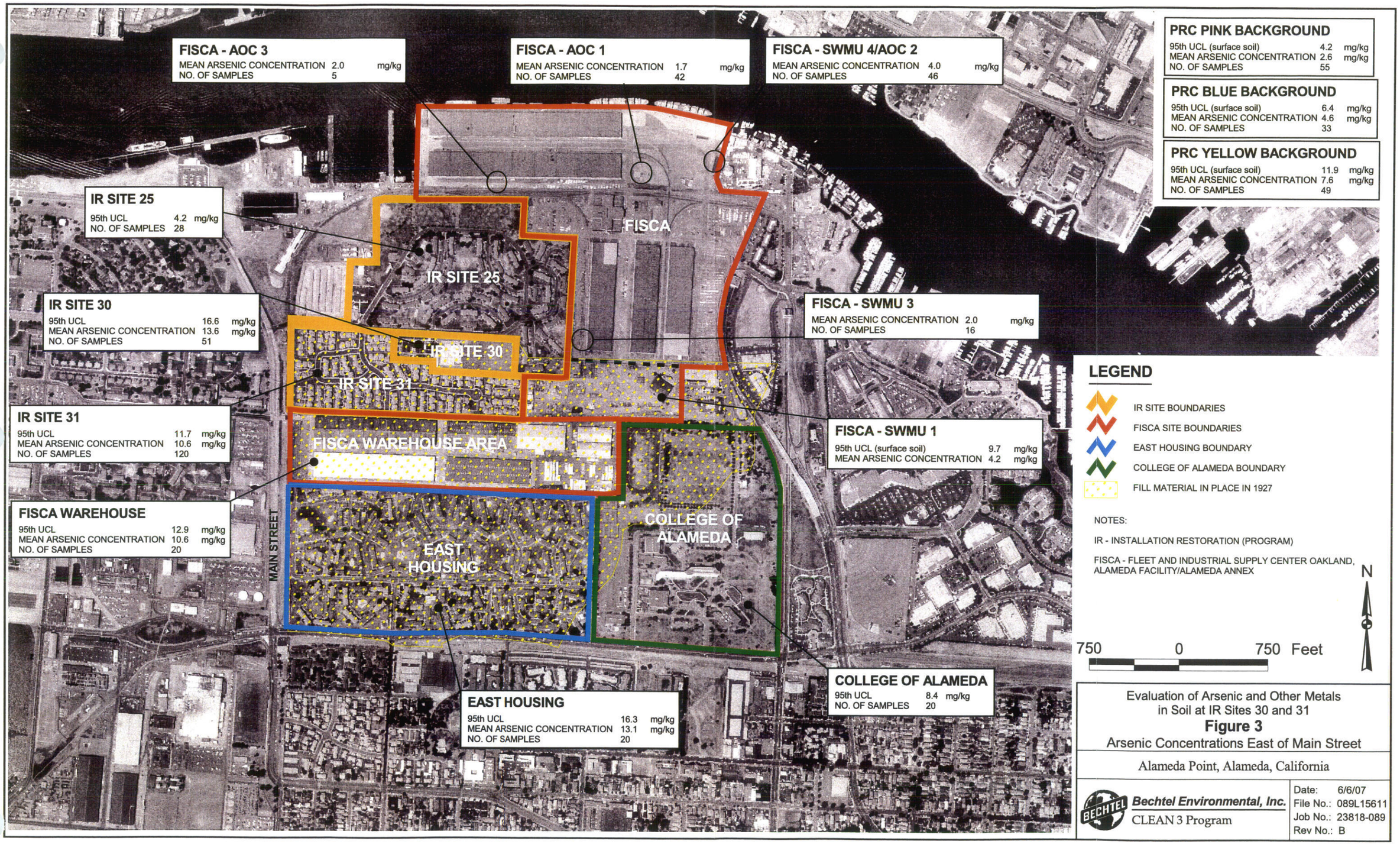
Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure 2
Cumulative Probability Plots for IR Sites 30 and 31

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/5/07
File No. 089002
Rev. D



Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

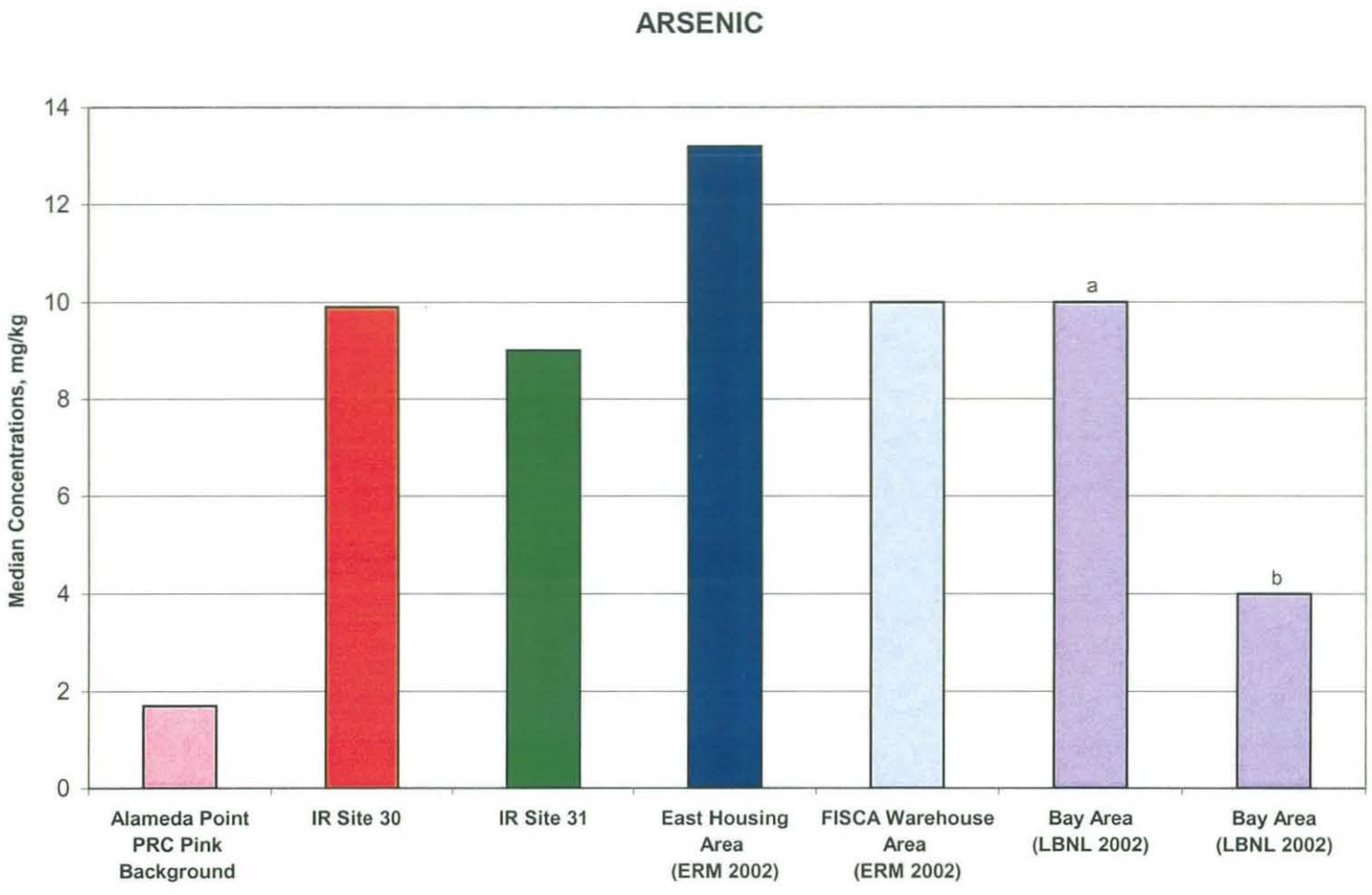
Figure 3

Arsenic Concentrations East of Main Street

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/6/07
File No.: 089L15611
Job No.: 23818-089
Rev No.: B



Notes:

[a] Great Valley Group

[b] all data

Source for PRC Pink Background: Table B-1 in Attachment B

Source for East Housing and FISCA Warehouse Area Data:

ERM. 2002. Updated Risk Analysis of Shallow Soil and Groundwater Conditions, Fleet and Industrial Supply Center, Oakland, Alameda Facility/Alameda Annex (FISCA) Warehouse Area and Alameda Point East Housing Area, Alameda, California.

Source for Bay Area Background Data:

LBNL. 2002. Lawrence Berkeley National Laboratory. *Analysis of Background Distributions of Metals in the Soil at the Lawrence Berkeley National Laboratory*. ERP-2805 June 27.

Note for FISCA Warehouse Area Data:

This data set includes only data for the area between IR Site 31 and East Housing Area reported in ERM 2002.

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

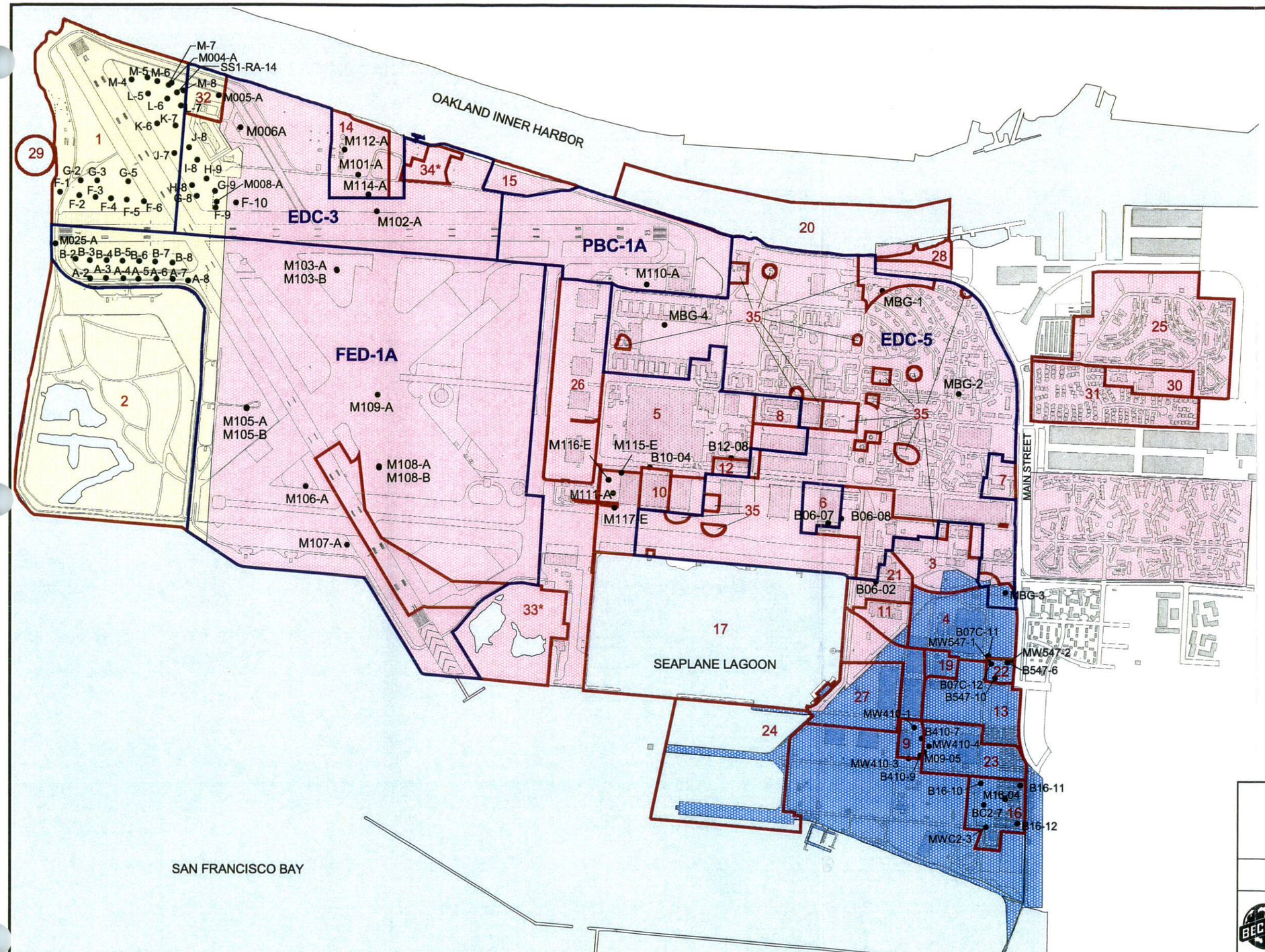
Figure 4

Comparison of Median Values for Arsenic

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 06/07/07
File No. 089009
Rev. c



LEGEND

- MBG-4 — BACKGROUND SOIL SAMPLE LOCATION
- BUILDING OR STRUCTURE
- ROAD OR RUNWAY
- FILL AREA 1
- FILL AREA 2
- FILL AREA 3
- WATER
- IR SITE BOUNDARY
- TRANSFER PARCEL BOUNDARY

NOTES:

*SITE BOUNDARIES FOR IR SITES 33 AND 34 ARE ESTIMATED AND THEREFORE SUBJECT TO CHANGE

IR – INSTALLATION RESTORATION (PROGRAM)

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SOURCE:

PRC ENVIRONMENTAL MANAGEMENT, INC. 1997. SAMPLES FOR USE AS BACKGROUND, LETTER REPORT, NAVAL AIR STATION (NAS) ALAMEDA, ALAMEDA, CALIFORNIA. PREPARED FOR U.S. DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. FEBRUARY 6.

N

1200 0 1200 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

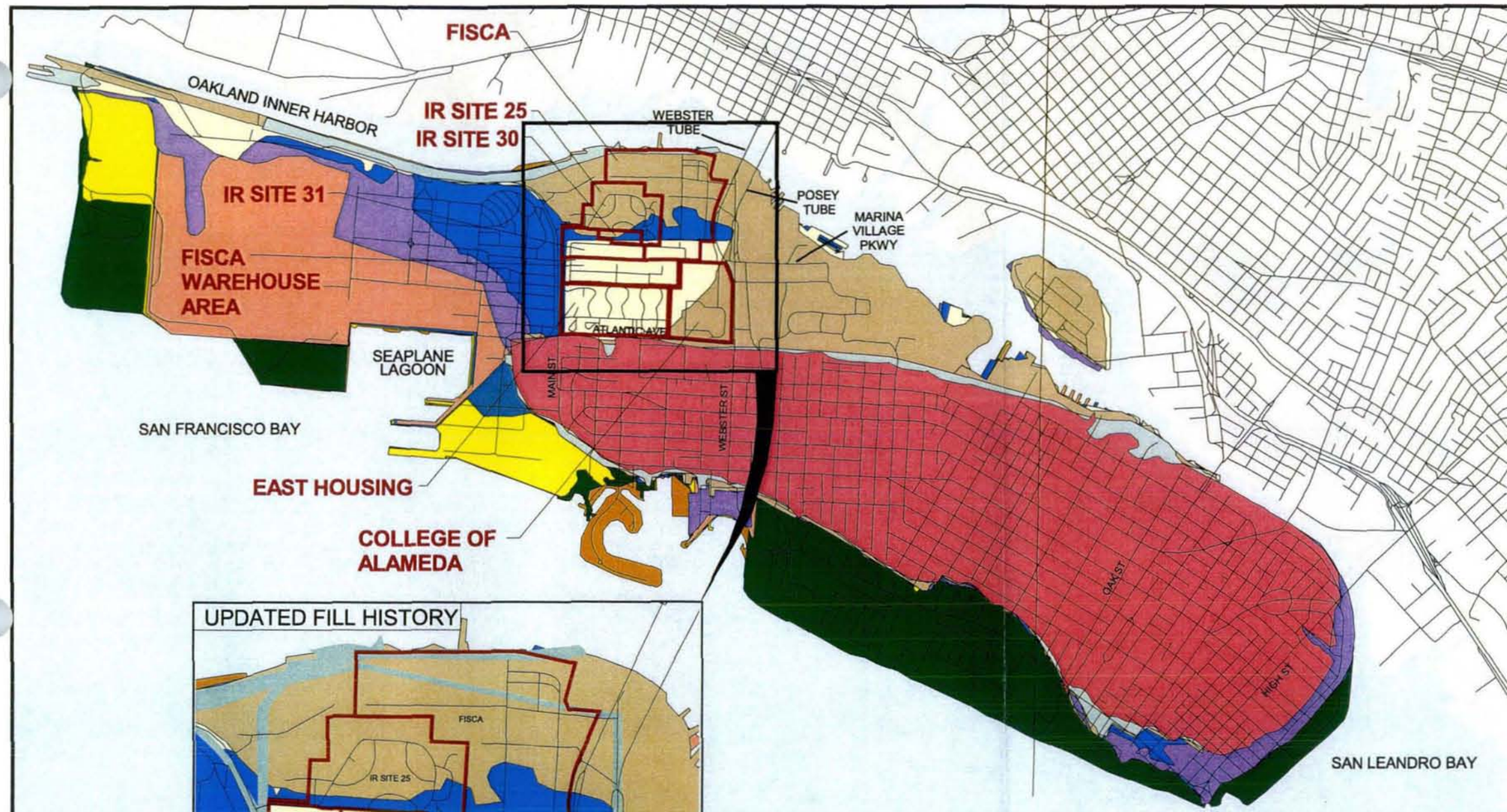
Figure 5

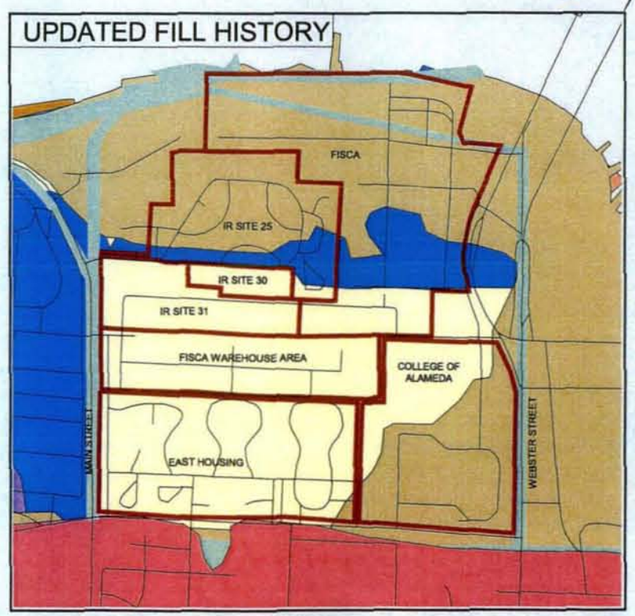
PRC Soil Background Areas

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/6/07
File No.: 089L15612
Job No.: 23818-089
Rev No.: C





INSET

LEGEND

- SITE BOUNDARIES
- DRY LAND 1859
- FILL MATERIAL IN PLACE IN 1903
- FILL MATERIAL IN PLACE IN 1919
- FILL MATERIAL IN PLACE IN 1927
- FILL MATERIAL IN PLACE IN 1930
- FILL MATERIAL IN PLACE IN 1936
- FILL MATERIAL IN PLACE IN 1941
- FILL MATERIAL IN PLACE IN 1945
- FILL MATERIAL IN PLACE IN 1949
- FILL MATERIAL IN PLACE IN 1959
- FILL MATERIAL IN PLACE IN 1973
- WATER

NOTES:

IR - INSTALLATION RESTORATION (PROGRAM)

FISCA - FLEET AND INDUSTRIAL SUPPLY CENTER OAKLAND, ALAMEDA FACILITY/ALAMEDA ANNEX

N

3000 0 3000 Feet

NOTE:

INSET REPRESENTS A REVISED FILL HISTORY INTERPRETATION BASED UPON ADDITIONAL REVIEW OF HISTORIC MAPS AND SITE-SPECIFIC BORING LOG DATA

SOURCES:

UNITED STATES COAST GEODETIC SURVEY 1859, 1903, 1919, 1927, 1930, AND 1941;
OAKLAND PORT OF BOARD COMMISSIONERS 1936 AND 1945;
UNITED STATES GEOLOGICAL SURVEY 1949, 1959
[PHOTO REVISED 1968 AND 1973], 1980a, 1980b, 1980c, AND 1980d;
E.C. SESSIONS 1906.

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

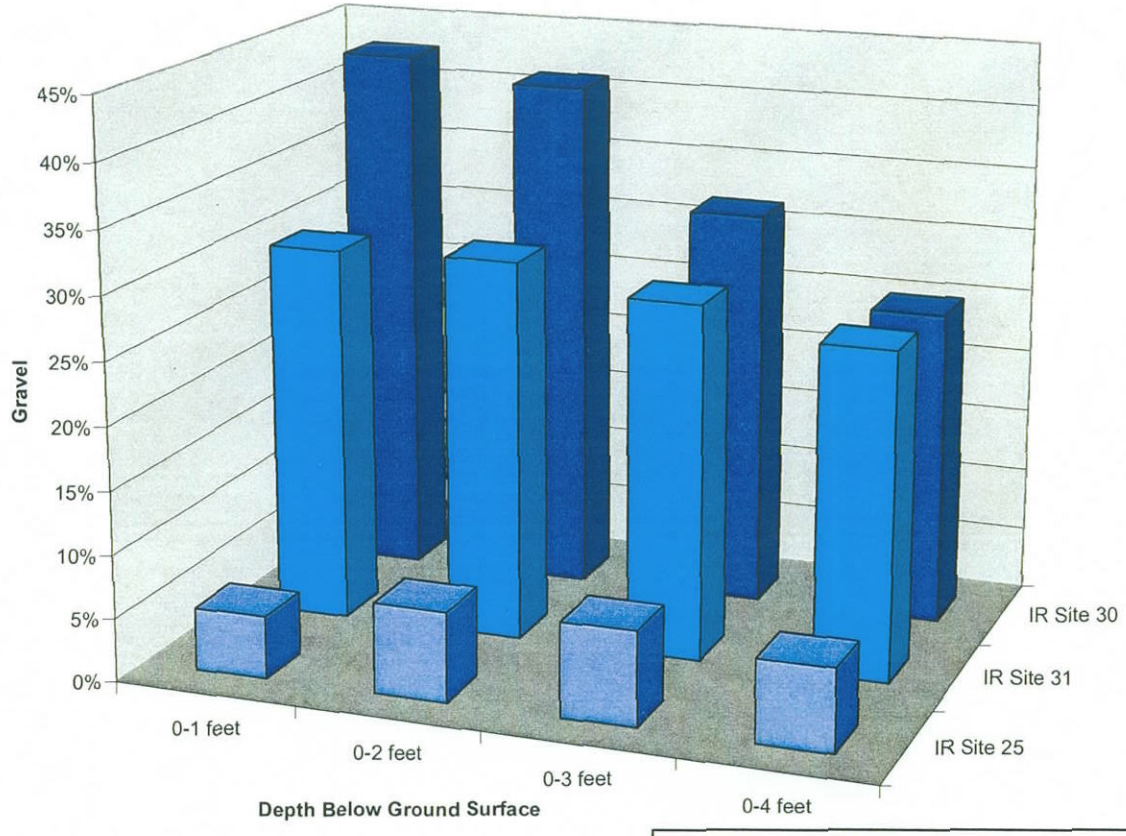
Figure 6

History of Artificial Fill (1859-1973)

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/6/07
File No.: 089L15613
Job No.: 23818-089
Rev No.: B



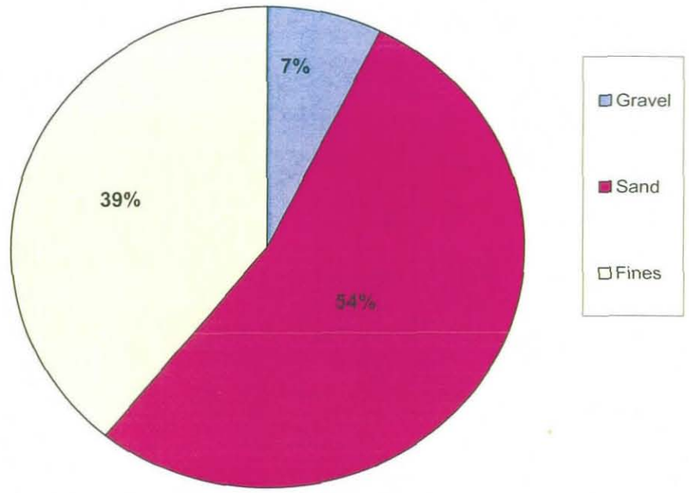
Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure 7
Percent Gravel at 0–4 Feet Below Ground Surface at IR Sites 25, 30, and 31

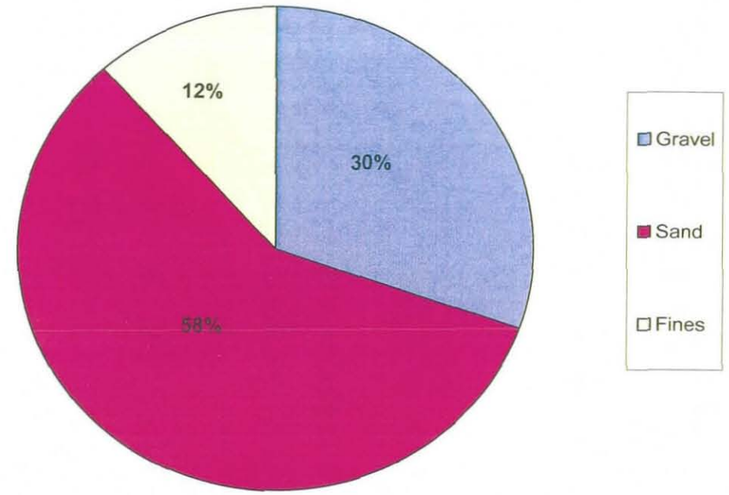
Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

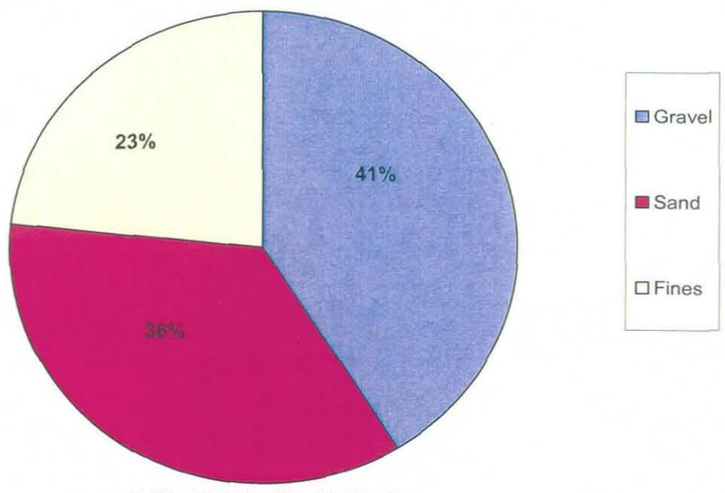
Date: 06/07/07
File No. 089005
Rev. D



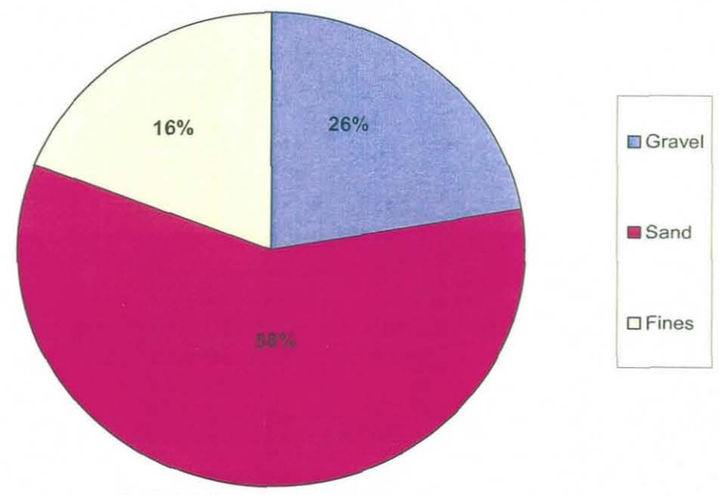
IR Site 25 Grain-Size Distribution
(0–2 feet bgs)



IR Site 31 Grain-Size Distribution
(0–2 feet bgs)



IR Site 30 Grain-Size Distribution
(0–2 feet bgs)



IR Site 31 Grain-Size Distribution
(2–4 feet bgs)

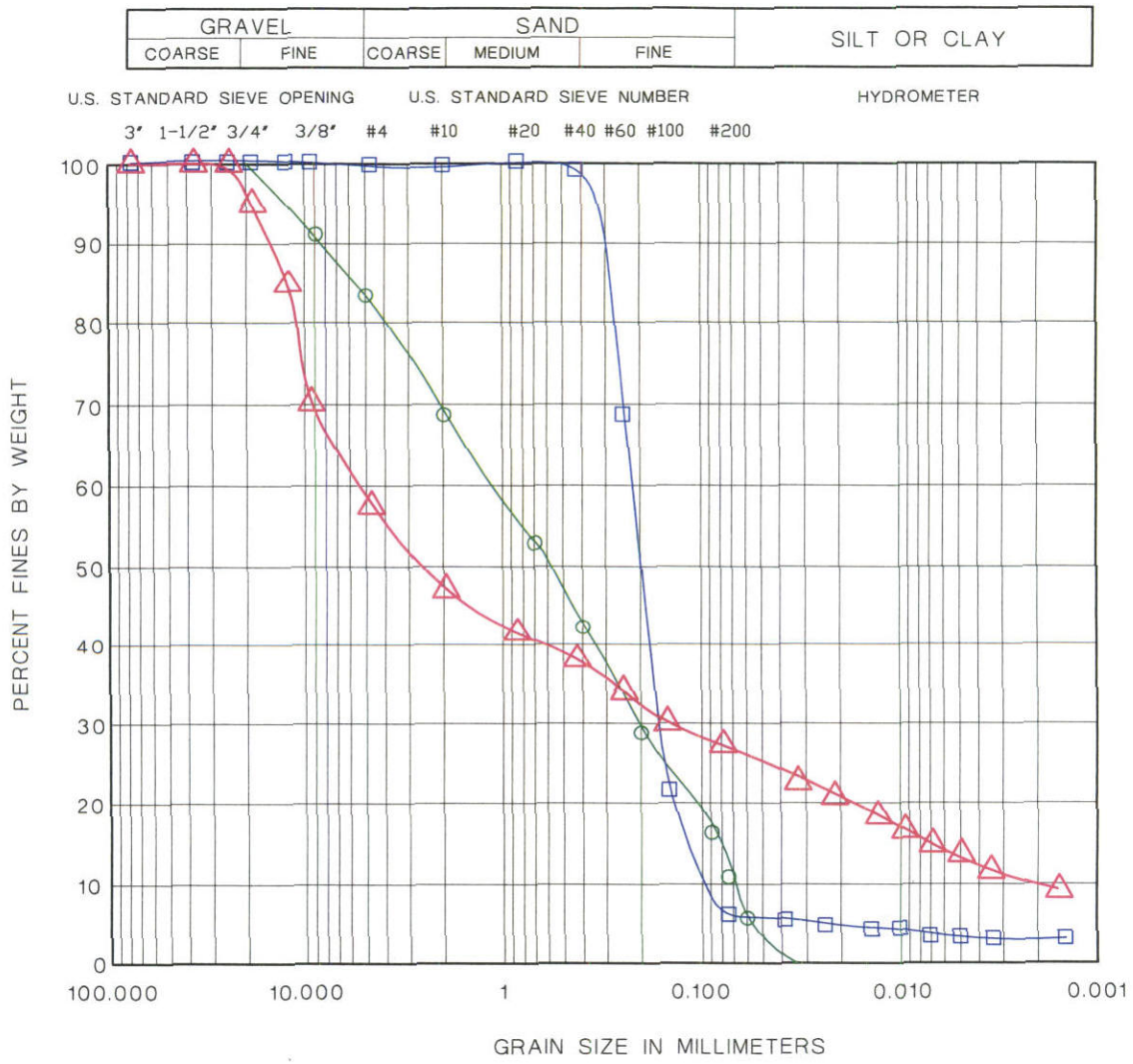
Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure 8
Grain-Size Distribution for IR Sites 25, 30, and 31

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 06/05/07
File No. 089006
Rev. B



LEGEND

- IR SITE 30 - GC (UPLAND GRAVEL SOURCE)
- IR SITE 31 - SW (UPLAND - SAND & GRAVEL MIXTURE)
- IR SITE 35 - SP-SM (TYPICAL HYDRAULIC FILL)

GC - CLAYEY GRAVEL

SW - WELL GRADED SAND WITH GRAVEL

SP-SM - POORLY GRADED SAND - SILTY SAND

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure 9

Typical Grain Size Distribution Curves

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/7/07
File No: 089C15614
Job No: 23818-089
Rev No: C

TABLES

Table 1
Average Percentage of Gravel by Depth at IR Sites 25, 30, and 31

Site	Total Boring Logs	DEPTH RANGE (feet bgs)		AVERAGE PERCENTAGE		
		Top	Bottom	Gravel	Sand	Fines
IR Site 25[a]	198	0	1	5	52	43
		0	2	7	54	39
		0	3	7	56	37
		0	4	7	54	40
		2	4	6	54	40
		4	6	2	54	44
		4	8	1	59	40
		6	8	1	64	36
IR Site 30[b]	78	0	1	43	37	21
		0	2	41	36	23
		0	3	32	33	35
		0	4	25	31	44
		2	4	9	28	63
		4	6	1	18	82
		4	8	1	27	72
		6	8	0	38	62
IR Site 31[c]	212	0	1	30	58	12
		0	2	30	58	12
		0	3	28	59	13
		0	4	26	58	16
		2	4	22	59	19
		4	6	9	45	46
		4	8	5	34	60
		6	8	2	23	75

Notes:
[a] the percentages of gravel, sand, and fines were estimated for 15 percent of the boring logs based on ASTM standards for visual classification because the percentages were not noted on the logs
[b] the percentages of gravel, sand, and fines were estimated for 13 percent of the boring logs based on ASTM standards for visual classification because the percentages were not noted on the logs
[c] the percentages of gravel, sand, and fines were estimated for 50 percent of the boring logs based on ASTM standards for visual classification because the percentages were not noted on the logs

Acronyms/Abbreviations:
ASTM – American Society for Testing and Materials
bgs – below ground surface
IR – Installation Restoration (Program)

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Table 2
Soil Type and Grain-Size Distribution Summary for
IR Sites 25, 30, 31, and 35 and FISCA Annex

Site	Boring Number	Sample Number	Depth (feet bgs)	Soil Type	GRAIN SIZE PERCENTAGE		
					Gravel	Sand	Fines[a]
IR Site 25	CH-08	178-0035	2.0	GC	NA	NA	NA
	CH-03	181-0800	7.0	SP	NA	NA	NA
	CH-05	181-0802	7.0	SP	NA	NA	NA
	CH-09	176-0031	2.0	SP	NA	NA	NA
	CH-02	181-0798	7.0	SP-SM	NA	NA	NA
	CH-03	181-0799	2.0	SP-SM	NA	NA	NA
	CH-06	181-0803	2.0	SP-SM	NA	NA	NA
	CH-09	176-0032	7.0	SP-SM	NA	NA	NA
	CH-01	181-0796	7.0	SM	NA	NA	NA
	CH-02	181-0797	2.0	SM	NA	NA	NA
	CH-05	181-0801	2.0	SM	NA	NA	NA
	CH-04	181-0806	7.0	ML	NA	NA	NA
	CH-06	181-0804	7.0	ML	NA	NA	NA
	CH-10	181-0807	2.0	ML	NA	NA	NA
	CH-10	181-0808	7.0	ML	NA	NA	NA
	CH-01	181-0795	2.0	CL	NA	NA	NA
	CH-08	178-0036	7.0	CL	NA	NA	NA
	CH-04	181-0805	2.0	CL	NA	NA	NA
IR Site 30[b]	C3S030B050	C072S201	1.0–2.0	GC	42	31	27
	C3S030B064	C072S206	3.0–3.5	SP-SM	0	90	10
	C3S030B051	C072S200	3.0–4.0	CH	0	5	95
	C3S030B059	C072S202	2.5–3.5	CH	0	3	97
	C3S030B065	C072S203	4.5–5.5	CH	0	2	98
	C3S030B061	C072S204	2.0–3.0	CH	0	5	95
	C3S030B076	C072S207	2.5–3.5	CH	0	3	97
	C3S030B078	C072S205	3.5–4.0	CL	0	20	80
	C3S030B074	C072S208	1.0–2.0	CL	0	4	96
IR Site 31	3122	31066	0.0–2.0	SW	17	73	11
	3113	31037	0.0–2.0	SW	24	72	4
	3113	31038	2.0–4.0	SW	14	73	13
	3104	31007	0.0–2.0	SW	18	71	11
	3104	31008	2.0–4.0	SW	15	77	8
	3132	31087	0.0–2.0	SW	20	73	6
	3132	31088	2.0–4.0	SW	11	78	11
	3132	31090	5.0–7.0	SW	10	81	9
	3102	31144	0.0–2.0	SW	21	74	5
	3102	31145	2.0–4.0	SW	21	74	5

Table 2 (continued)

Site	Boring Number	Sample Number	Depth (feet bgs)	Soil Type	GRAIN SIZE PERCENTAGE		
					Gravel	Sand	Fines[a]
IR Site 31 (continued)	3127	31081	0.0–2.0	SW	23	71	6
	3127	31082	2.0–4.0	SW	2	89	10
	3113	31039	4.0–6.0	SM	5	79	16
	3122	31068	2.0–4.0	ML	0	27	73
	3104	31009	4.0–6.0	ML	0	4	96
IR Site 35	A11SB03	C077S178	2.5–4.0	SP-SM	0	95	5
	A11SB03	C077S179	6.5–8.0	SP-SM	0	95	5
	A18SB04	C077S311	2.5–3.0	SP-SM	0	95	5
	A23SB15	C077S395	2.5–3.5	SP-SM	0	92	8
	A18SB03	C077S308	2.5–3.0	SP-SM	0	94	6
	A23SB37	C077S443	2.0–3.5	SP-SM	0	94	6
	A02SB02	C077S026	4.0–4.5	SM	5	78	17
	A02SB03	C077S028	2.5–4.0	SM	18	67	15
	A17SB01	C077S281	0.5–2.0	SM	12	73	15
	A17SB01	C077S282	2.5–4.0	SM	0	88	12
	A23SB37	C077S444	5.0–6.5	SM	0	73	27
	A15SB02	C077S265	2.5–3.5	SC	0	63	37
	A15SB02	C077S266	5.0–6.0	CL	0	3	97
	A23SB15	C077S396	6.5–7.5	CL	0	15	85
FISCA Annex	A38	A38-9.0	9.0	SP-SM	0	90	10
	S23	S23-10	10.0	SM	0	77	23
	A72	A72-9	9.0	CH	0	2	99
	S1	S1-9.5	9.5	CH	0	2	98
	S1	S1-15.5	15.5	CH	0	1	99

Notes:
[a] fines represent a combination of silt and clay
[b] the soil type results for IR Site 30 reflect the original purpose of the sampling, which included evaluation of the physical properties of the clay for the vapor transport modeling efforts; the overlying gravel was not generally collected for geotechnical analysis (BEI 2005)

Acronyms/Abbreviations:
bgs – below ground surface
CH – fat clay
CL – lean clay
FISCA – Fleet and Industrial Supply Center Alameda
GC – clayey gravel
IR – Installation Restoration (Program)
ML – silt
NA – not available
SC – clayey sand
SM – silty sand
SP – poorly graded sand
SW – well graded sand

ATTACHMENT A

SUPPORTING INFORMATION FOR STATISTICAL ANALYSIS

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A-3 Results of Rosner's Outlier Test

A-4 Results of Distributional Testing for Select Metals at IR Site 31

ACRONYMS/ABBREVIATIONS

bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	contract task order
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
IR	Installation Restoration (Program)
IVP	individual value plot
mg/kg	milligrams per kilogram
NAVFAC	Naval Facilities Engineering Command
RI	remedial investigation
WRS	Wilcoxon rank sum

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Attachment A
SUPPORTING INFORMATION FOR STATISTICAL ANALYSIS

This attachment presents supporting information for the statistical analysis of arsenic data at Installation Restoration (IR) Program Sites 30 and 31 and data for five additional metals (cadmium, chromium, iron, lead, and vanadium) at IR Site 31, as presented in Appendix H2. A site-specific statistical methodology was used to determine whether arsenic concentrations in soil at IR Sites 30 and 31 are ambient (naturally occurring) or related to Navy activities. The evaluation was done in three steps.

1. Evaluation of Arsenic Data at IR Sites 30 and 31 – California Environmental Protection Agency Department of Toxic Substances Control (DTSC) policy was followed to evaluate the distributional characteristics of arsenic in soil at IR Sites 30 and 31 (DTSC 1997). The DTSC policy sets criteria for determining whether a data set is from one population and therefore representative of ambient concentrations, or from multiple populations, which may indicate that releases have occurred.

2. Evaluation of Select Metals at IR Site 31 – The process used for arsenic was also applied to cadmium, chromium, iron, lead, and vanadium in soil at IR Site 31. These five metals were included in the statistical evaluation based on regulatory agency comments on the draft Soil Remedial Investigation (RI) Report – Revision 1 for IR Site 31 because the metals were reported at concentrations above a risk-based screening level, were risk drivers, or were present in groundwater at concentrations above historical levels.

3. Comparison of IR Sites 30 and 31Arsenic Data With East Housing Area Data – The concentrations of arsenic in soil at IR Sites 30 and 31 were compared with data from the East Housing Area. Concentrations of arsenic and other metals in the East Housing Area can be considered ambient because the area was used only for residential housing and not for industrial Navy activities. The East Housing Area is not proposed as a background location for IR Sites 30 and 31 because a background location is not needed once it has been established that the arsenic concentrations, considered separately at IR Site 30 and 31, meet DTSC criteria for an ambient population.

The statistical evaluations are described below. The descriptions are supported by graphs and tables that are either specific to this attachment or associated with Appendix H2.

Data used in the statistical evaluation are presented in Table A-1 and are ranked from highest to lowest concentrations. The nondetect results are highlighted, and the value listed is one-half the reporting limit. A proxy value of one-half the reporting limit was used for all graphs and calculations with the exception of the Gehan test, which uses the full reporting limit.

The following describes the data sets used in this attachment.

- IR Site 30 – The data set consists of 50 data points from the 0- to 5-foot below ground surface (bgs) vadose zone data set that was used in the risk assessment conducted during the RI for IR Site 30 (BEI 2005). One sample was removed from the data set that was used in the risk assessment because the location of this sample was the subject of a removal action and the soil is no longer present.

- IR Site 31 – The data set consists of 120 data points from the 0- to 7-foot bgs vadose zone data set that was used in the risk assessment conducted during the RI for IR Site 31 (CDM 2006). Two depth intervals were evaluated: 2 to 7 feet bgs and 0 to 7 feet bgs. Soil in the 0- to 2-foot-bgs interval was imported in the early 1990s as construction fill for current housing. Therefore, the upper 2 feet of soil was not impacted by Navy activities.
- East Housing Area – The data set consists of 21 data points collected from the surface to 4.5 feet bgs (ERM 2002).

A1 EVALUATION OF ARSENIC DATA AT IR SITES 30 AND 31

This section describes the methodology used to evaluate the distribution of arsenic concentrations in soil at IR Sites 30 and 31. The primary purpose of the evaluation was to determine whether arsenic data sets from IR Sites 30 and 31 represent single populations.

The DTSC policy describes criteria for determining whether there are multiple populations represented by a data set (suggesting contamination) or only a single population (ambient levels). The policy recommends a multifaceted approach including 1) calculation of the range and coefficient of variation, 2) distributional testing, and 3) examination of probability plots. All three approaches were used to evaluate data sets from IR Sites 30 and 31. In addition, a test of outliers was conducted.

A1.1 Range and Coefficient of Variation

DTSC criteria for determining one population include a range of detected values that is no more than two orders of magnitude (i.e., a ratio of the maximum to minimum value that does not exceed 100) and a coefficient of variation that is not greater than 1. The coefficient of variation is equal to the standard deviation divided by the mean. The arsenic concentration ranges and coefficients of variation for IR Sites 30 and 31 meet these criteria as follows.

- IR Site 30 – Concentrations range from 0.8 to 56.3 milligrams per kilogram (mg/kg) (a ratio of 70), and the coefficient of variation is 0.81.
- IR Site 31, 2 to 7 feet – Concentrations range from 2.3 to 42.4 mg/kg (a ratio of 18), and the coefficient of variation is 0.69.
- IR Site 31, 0 to 7 feet – Concentrations range from 2.3 to 42.4 mg/kg (a ratio of 18), and the coefficient of variation is 0.69.

Additional summary statistics for IR Sites 30 and 31 are presented in Attachment B Tables B-4 and B-5, respectively.

A1.2 Distributional Testing

Results of distributional testing (Table A-2) show that IR Sites 30 and 31 arsenic data are lognormally distributed, without removal of any high values. Probability plots of the logtransformed data are shown on Figure 2 of the main report. This conformance to the

lognormal distribution indicates that the arsenic data for each site represent a single population with no outliers. In fact, the Shapiro-Wilk normality test can be used as an outlier identification method (Gibbons 1994) where values are removed one at a time until a normal or lognormal distribution is obtained. Statistica (StatSoft 2004) was used to conduct the Shapiro-Wilk tests. If there are more than 50 observations, Statistica uses a modified version of the Shapiro-Wilk test.

In summary, distributional testing indicates that arsenic data for IR Sites 30 and 31 represent single, lognormal populations. Results of distributional testing are presented in Table A-2.

A1.3 Probability Plots and Outlier Tests

Probability plots of IR Sites 30 and 31 arsenic concentrations in soil are shown on Figure 2 of Appendix H2. The data were logtransformed (natural log) prior to plotting because distributional testing showed that the data are lognormal. This finding is consistent with the DTSC policy, which states that trace inorganic constituents (metals) in soil are generally lognormally distributed.

Cumulative probability plots can be presented in more than one way. On the Figure 2 plots, the natural log of the arsenic concentration is plotted on the y-axis and the expected normal value is plotted on the x-axis.

The probability plots for IR Sites 30 and 31 show that the arsenic data closely follow the lognormal distribution (i.e., closely follow the straight line), with only minor gaps and inflections. It is common for the tails of the distribution to depart from the line, and for minor gaps and inflections to occur in the data set.

Although distributional testing indicates that there are no outliers in the data, a second method, Rosner's outlier test, was used to test values at the upper tails of the arsenic distributions. Rosner's test was conducted in Excel following procedures presented in United States Environmental Protection Agency's Statistical Methods for Practitioners (U.S. EPA 2006). Rosner's test was applied to the maximum value in the IR Site 30 data set and the highest two values in the IR Site 31 data sets (Table A-3). None of these values were identified as outliers.

Distributional testing was conducted on the data without the suspected outliers to assure that assumptions of the outlier test were satisfied. Rosner's test requires that the data without the outlier(s) are normally or lognormally distributed. The IR Sites 30 and 31 data sets are lognormal both before and after removal of the suspected outliers (Table A-2).

In summary, arsenic data for IR Sites 30 and 31 closely follow the lognormal distribution. Rosner's test indicates that high values are not outliers, thereby providing additional evidence that the data represent single populations.

A1.4 Conclusions

Multiple lines of evidence suggest that arsenic concentrations in soil at IR Sites 30 and 31 represent single, ambient populations. The lines of evidence include range and coefficient of variation, distributional testing, probability plots, and outlier tests.

A2 EVALUATION OF SELECT METALS AT IR SITE 31

The DTSC methodology, with additional statistics used to evaluate distributions of arsenic concentrations in soil at IR Sites 30 and 31, was applied to concentrations of five other metals at IR Site 31: cadmium, chromium, iron, lead, and vanadium. Results of that analysis are discussed here. Details of the methods are given in Section A1. The range of detected values and coefficient of variation for the five metals are as follows.

- Cadmium – Observations range from 0.017 to 1.5 mg/kg (a ratio of 88), and the coefficient of variation is 0.80.
- Chromium – Observations range from 3.0 to 197 mg/kg (a ratio of 66), and the coefficient of variation is 0.67.
- Iron – Observations range from 10,500 to 67,000 mg/kg (a ratio of 6.4), and the coefficient of variation is 0.35.
- Lead – Observations range from 6.1 to 168 mg/kg (a ratio of 28), and the coefficient of variation is 1.1.
- Vanadium – Observations range from 21to 104 mg/kg (a ratio of 5.0), and the coefficient of variation is 0.37.

The concentration ranges for all five metals are less than two orders of magnitude. The coefficient of variation is less than 1.0 for all metals except for lead, which has a coefficient of variation of 1.1. The coefficient of variation for lead does not meet the DTSC criterion that the coefficient of variation for an ambient population is typically less than 1.

Results of distributional testing (Table A-4) show that cadmium, chromium, and vanadium are lognormally distributed at a significance level of 2 percent. This step is not required by the DTSC policy but is an additional verification that the data are lognormally distributed and that there are no outliers. A review of the probability plots (Figure A-1) for those three metals indicates a potential low-end outlier for chromium. Rosner's test confirmed that the value is an outlier at a significance level of 5 percent (the test statistic, R, is equal to 3.930, which exceeds the critical value of 3.436). The chromium data remain lognormally distributed after removal of the low-end outlier; therefore, assumptions of Rosner's test are satisfied.

Probability plots for each of the five IR Site 31 metals are shown on Figure A-1. The logtransformed data were used because, based on the Shapiro-Wilk test statistic (Table A-4), the lognormal distribution provides a better fit than the normal distribution in all five instances. A probability plot of iron data for pink background soil is also presented.

The probability plots indicate that cadmium, chromium, and vanadium belong to one population, which is supported by the distributional tests. Iron and lead, however, appear to have multiple populations. The probability plot for iron in background soil also indicates the presence of multiple populations.

A3 COMPARISON OF IR SITES 30 AND 31 ARSENIC DATA WITH EAST HOUSING AREA DATA

This section describes the methodology used to compare arsenic concentrations in soil at IR Sites 30 and 31 with concentrations in soil at the East Housing Area. As noted earlier, East Housing Area data are not proposed as a background data set. This comparison is for informational purposes because the East Housing Area is near IR Sites 30 and 31 and has similar arsenic concentrations. A statistical similarity in arsenic concentrations supports the evidence that arsenic at IR Sites 30 and 31 is naturally occurring.

Statistical comparisons were conducted for the vadose zone soil intervals used in the risk assessments, which were 0 to 5 feet bgs for IR Site 30 and 2 to 7 feet bgs for IR Site 31. Arsenic concentration data for the East Housing Area were attained from samples collected at 0 to 4.5 feet bgs.

Three two-population statistical tests (Wilcoxon rank sum [WRS] test, Gehan test, and two-sample t-test) were conducted to compare the IR Sites 30 and 31 arsenic data with East Housing Area arsenic data. The tests were conducted to determine whether the populations of data from IR Sites 30 and 31 have concentrations that are statistically greater than those from the East Housing Area. The WRS and two-sample t-tests were conducted using Statistica, and the Gehan test was performed in Excel. Each test is described in more detail below.

Summary statistics for the arsenic data used in the comparisons are presented in Attachment B Tables B-4 (IR Site 30), B-5 (IR Site 31), and B-6 (East Housing Area). IR Site 30 has 50 arsenic observations, all of which are detects, and IR Site 31 has 120 arsenic observations, all of which are detects. Twelve of the 21 East Housing Area arsenic observations are detects, resulting in a detection frequency of 57 percent.

Statistical comparisons were conducted with and without the maximum East Housing Area arsenic value of 40.7 mg/kg. The maximum value is not a statistical outlier. If the maximum value were an outlier, then the Shapiro-Wilk test would not conclude that the data are lognormally distributed (see Section A1.2). A single high value in 21 samples is not unexpected. The next highest arsenic value is 20 mg/kg. Nevertheless, there could be a perception that this value is an outlier. Therefore, the two-sample statistical comparisons were conducted both with and without this value.

A3.1 Evaluation of Nondetect Observations

Nondetect observations in the East Housing Area data were evaluated to assure that they would not produce misleading conclusions when used in the statistical analysis. Nine of

the 21 East Housing Area arsenic observations are nondetects; five nondetects have a reporting limit of 10 mg/kg, and the remaining four have a reporting limit of 20 mg/kg.

Individual value plots (IVPs) of the nondetect and detected concentrations for the East Housing Area are shown on Figure A-2. A proxy value of one-half the reporting limit was used for all nondetects. (One-half the reporting limit was used for the nondetects in all graphs and statistical calculations with the exception of the Gehan test, which uses data at the reporting limit.) The IVPs show that nondetect proxy values are generally lower than the detects. Table A-1 supports the graphical analysis; only one detected observation, 9.96 mg/kg, is lower than the maximum nondetect proxy value of 10 mg/kg. Based on this evaluation, all nondetects were retained in the East Housing Area data set. The IVPs were produced using Minitab (2004).

A3.2 Box Plots

Box plots were constructed for all data sets to provide a visual representation of the data. It is important to have a visual representation of data to evaluate in conjunction with statistical comparisons. Therefore, box plots are often used by statisticians to aid in the interpretation of statistical comparison results; however, decisions are not made on the box plots alone. Statistica (StatSoft 2004) was used to generate the box plots. The plots (Figure A-2) were constructed using both the original and logtransformed data. The standard box plot was used in this analysis. The box itself contains the center 50 percent of data (i.e., the interquartile range), and the median is indicated as a horizontal line within the box. The top edge of the box is the 75th percentile, and the bottom edge is the 25th percentile. Vertical lines, sometimes called whiskers, extend to the last observation within one step beyond either end of the box. A step is 1.5 times the height of the box. Data points that fall outside the step are plotted individually. Although these individual points on box plots are commonly referred to as outliers, they may or may not be statistical outliers. Hypothesis tests such as the Rosner's test should be used to identify statistical outliers.

A3.3 Wilcoxon Rank Sum Test

There are two versions of the WRS test: the exact test and the large-sample approximation. If the size of the smaller sample does not exceed 20 and the size of the larger sample does not exceed 40, the exact version of the WRS test is used. Otherwise, the large-sample approximation version of the test is appropriate. The large-sample approximation is appropriate for this analysis. More details regarding the WRS test are presented in Statistical Methods for Environmental Pollution Monitoring (Gilbert 1987) and the Naval Facilities Engineering Command (NAVFAC) guidance (NAVFAC 2002).

Results of the WRS tests are presented in Table A-4. The WRS tests were conducted as described below.

- The null and alternative hypotheses were expressed as follows.
  - H_0: the median arsenic concentration in site samples is less than or equal to the median arsenic concentration in East Housing Area samples.

- H_A: the median arsenic concentration in site samples is greater than the median arsenic concentration in East Housing Area samples.

- A significance level (α) of 0.05 was selected for the test.
- Sample sizes were indicated as n1 and n2 for site and East Housing Area data, respectively.
- Site and East Housing Area data were combined and ranked.
- The test statistic, W_{RS}, was calculated as the sum of ranks for the site data (designated as "Rank Sum Site" in Statistica output).
- Z_{RS}, which is the large sample statistic adjusted for ties, was calculated from W_{RS} as shown in equation 18.9 in Gilbert (1987) (designated as "Z adjusted" in Statistica output).
- $Z_{1-\alpha}$ was obtained from Table A-1 in Gilbert (1987), which gives Z values for varying levels of α.
- H_0 was rejected and H_A was accepted if $Z_{RS} \geq Z_{1-\alpha}$.

The null hypothesis was accepted in all cases, indicating that the median arsenic concentrations at IR Sites 30 and 31 are less than or equal to the median arsenic concentration at the East Housing Area, both with and without the maximum value in the East Housing Area data set.

Box plots were examined to assure that the upper tails of the site data are not higher than the upper tails of the East Housing Area data. This evaluation was conducted because the WRS test primarily identifies differences in central tendency rather than differences in tails of the distributions.

There are a few samples from IR Sites 30 and 31 with concentrations of arsenic that are higher than concentrations in the East Housing Area. These results can be attributed to differences in sample size, which is considered in the statistical approaches. There are 50 arsenic observations at IR Site 30, and 71 arsenic observations at IR Site 31, compared with 21 arsenic observations at the East Housing Area. As sample size increases, there is an increase in the number of observations at the tails of the distribution (DTSC 1997). This fact explains why, although IR Sites 30 and 31 appear to have higher arsenic concentrations, results of the statistical analysis support the conclusion that the populations are the same as the East Housing Area. None of the WRS conclusions were changed based on inspection of the box plots.

A3.4 Gehan Test

The Gehan test is specifically intended for two-sample comparisons of data sets with nondetect data at multiple reporting limits. There are no nondetect data in the IR Sites 30 and 31 data sets. The East Housing Area data set has nine nondetects (21 samples), resulting in a detection frequency of 57 percent. The nondetects are present at reporting limits of either 10 or 20 mg/kg. Proxy values such as one-half the reporting limit are not

used in the Gehan test. Rather, each data point is coded as a nondetect (at the reporting limit) or as a detect.

Results of the Gehan tests are presented in Table A-4. The null and alternative hypotheses are the same as those used for the WRS test. The Gehan tests were conducted in accordance with NAVFAC guidance (NAVFAC 2002) as summarized below.

- The null and alternative hypotheses were expressed as follows.
  - H_0: the median arsenic concentration in site samples is less than or equal to the median arsenic concentration in East Housing Area samples.
  - H_A: the median arsenic concentration in site samples is greater than the median arsenic concentration in East Housing Area samples.
- A significance level (α) of 0.05 was selected for the test.
- IR Sites 30 and 31 and East Housing Area data were combined and ranked from smallest to largest. The less than (<) sign on the nondetects was disregarded when ranking the data.
- The test statistic, G, was calculated according to equations presented in NAVFAC guidance (NAVFAC 2002).
- $Z_{1-\alpha}$ was obtained from Table C1 in NAVFAC guidance (NAVFAC 2002), which gives Z values for varying levels of α.
- H_0 was rejected and H_A was accepted if $G \geq Z_{1-\alpha}$.

The null hypothesis was accepted in all cases, indicating that the median arsenic concentrations at IR Sites 30 and 31 are less than or equal to the median arsenic concentration at the East Housing Area, both with and without the maximum value in the East Housing Area data set.

A3.5 Two-Sample t-Test

The two-sample t-test is a useful procedure for conducting two-sample comparisons if both data sets follow either the normal or lognormal distribution (NAVFAC 2002). The WRS and Gehan tests compare medians, whereas the two-sample t-test compares means. For this reason, the tails of the distribution are given more consideration in the t-test than in either the WRS or Gehan test.

The Shapiro-Wilk test evaluated the distribution of the arsenic data sets used in the two-sample t-tests. Arsenic concentrations at IR Sites 30 and 31 are lognormally distributed assuming a significance level of 5 percent. The East Housing Area data are approximately lognormally distributed with a probability value (p-value) of 0.043.[1] With

[1] The significance level is the probability of rejecting the null hypothesis when it is in fact true. In this case, the null hypothesis states that the data are normally (or lognormally) distributed. The p-value is the smallest level of significance that would have allowed the null hypothesis to be rejected. So for the p-value of 0.043, the null hypothesis would be rejected at a significance level of 5 percent, but accepted at a significance level of 4 percent.

the maximum value removed, however, East Housing Area data are not lognormally distributed (they fit the normal distribution). Results of distributional testing are presented in Table A-2.

Based on results of the distributional testing, the two-sample t-test was used to compare IR Sites 30 and 31 arsenic data with the East Housing Area arsenic data. The data were logtransformed prior to conducting the comparisons. The two-sample t-test was not used to compare IR Sites 30 and 31 data with the East Housing Area data set with the maximum value removed, because that data set is not lognormally distributed.

The t-test can be performed by assuming that the variances of the data sets are either equal or unequal. Levene's test for variances (U.S. EPA 2006) was conducted and the variances were shown to be equal. (The null hypothesis of equal variances is accepted if $p > 0.05$, and p-values of 0.14 and 0.26 were achieved for IR Sites 30 and 31, respectively.) Levene's test and the two-sample t-test were conducted using Statistica. Results of the two-sample t-test are presented in Table A-4.

The null and alternative hypotheses are different from hypotheses used with the WRS and Gehan tests because the two-sample t-test compares mean (rather than median) concentrations. The two-sample t-tests were conducted as summarized below.

- The null and alternative hypotheses were expressed as follows.
  - H_0: the mean arsenic concentration in site samples is less than or equal to the mean arsenic concentration in East Housing Area samples.
  - H_A: the mean arsenic concentration in site samples is greater than the mean arsenic concentration in East Housing Area samples.
- A significance level (α) of 0.05 was selected for the test.
- The test statistic, T, was calculated using Statistica (StatSoft 2004).
- t_{CRIT} was obtained from Table C-9 in NAVFAC guidance (NAVFAC 2002).
- H_0 was rejected and H_A was accepted if $T \geq t_{CRIT}$.

The null hypothesis was accepted in both cases, indicating that the mean arsenic concentrations at IR Sites 30 and 31 are less than or equal to the mean arsenic concentration at the East Housing Area.

A3.6 Conclusions

Results of the three statistical approaches, with and without the highest value in the East Housing Area data set, are as follows.

- IR Site 30 – All three statistical tests found that the arsenic concentrations are less than or equal to those from the East Housing Area.
- IR Site 31 – All three statistical tests found that the arsenic concentrations are less than or equal to those from the East Housing Area.

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FIGURES

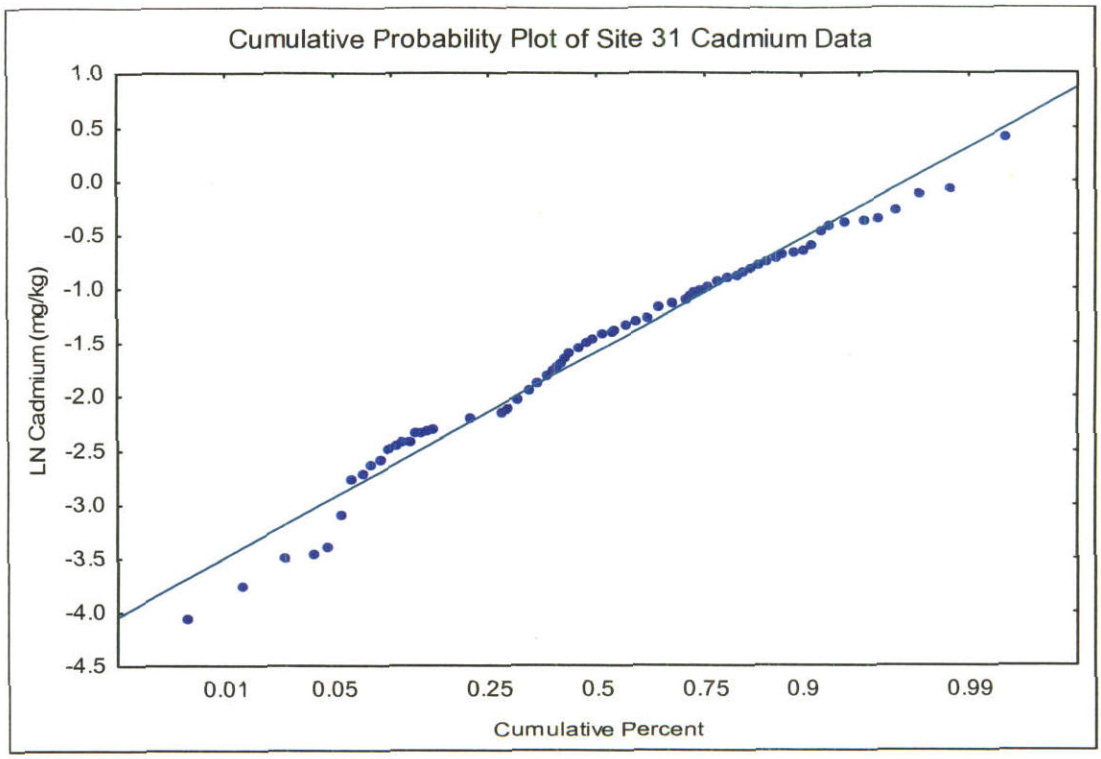
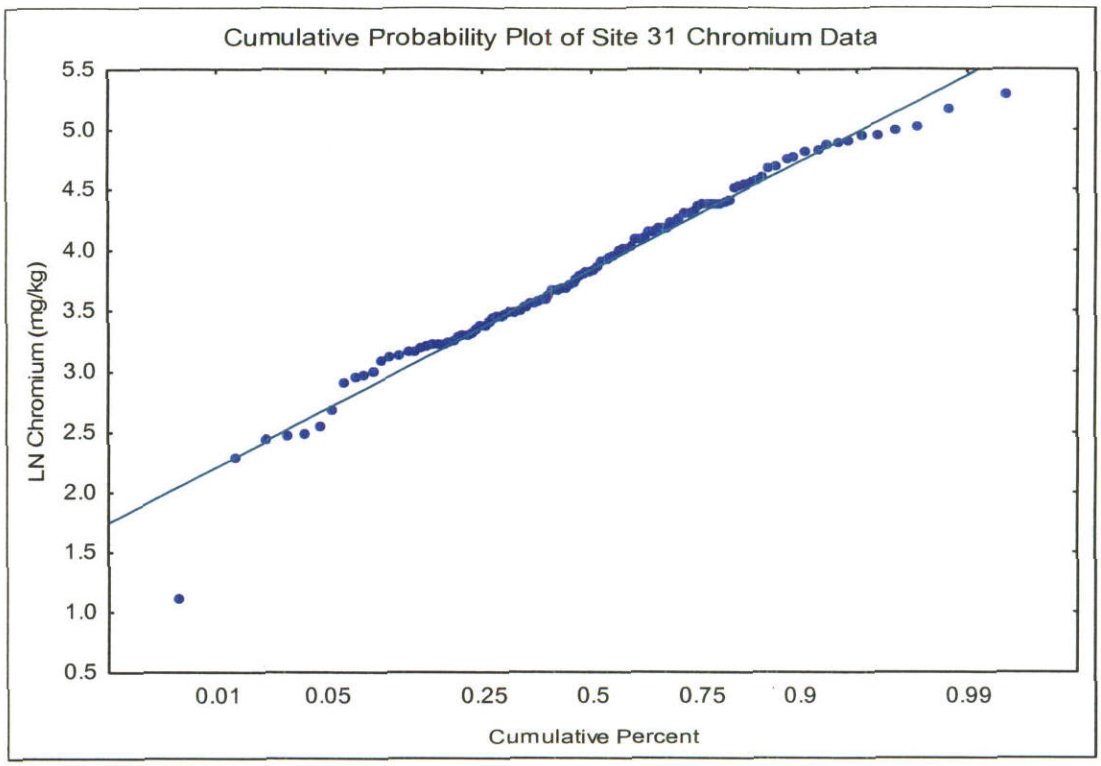


Figure A-1
Probability Plots for Select Metals at IR Site 31 and Iron in Pink Background



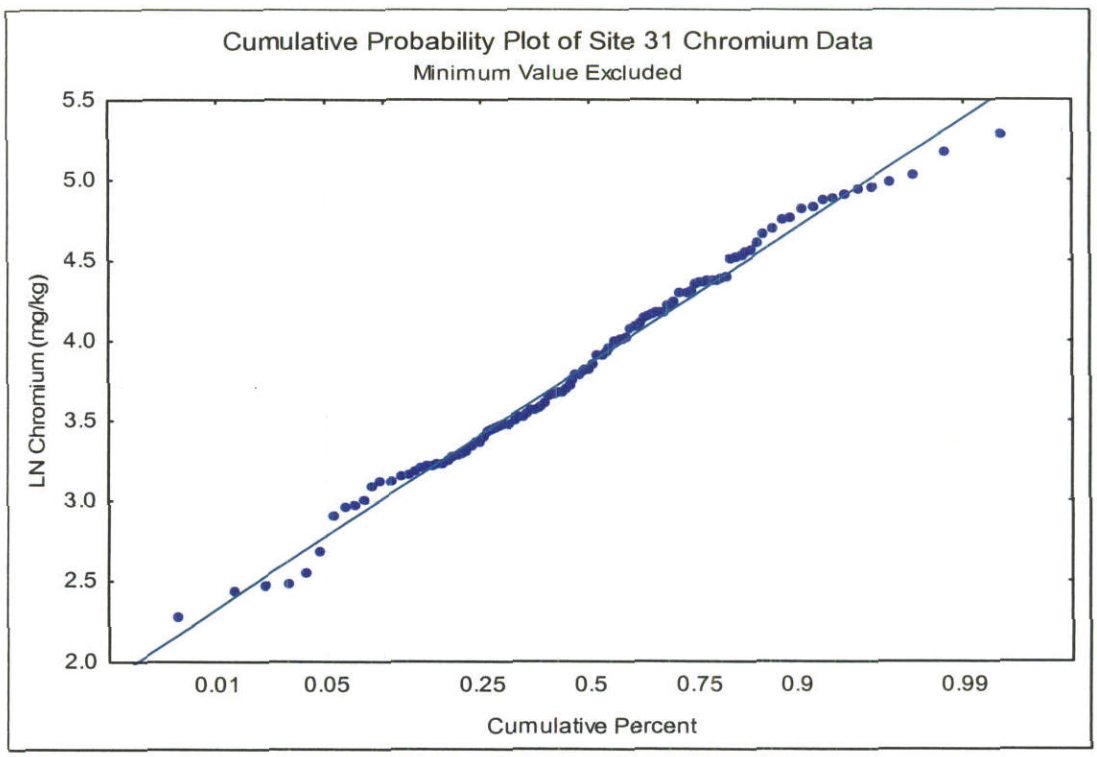
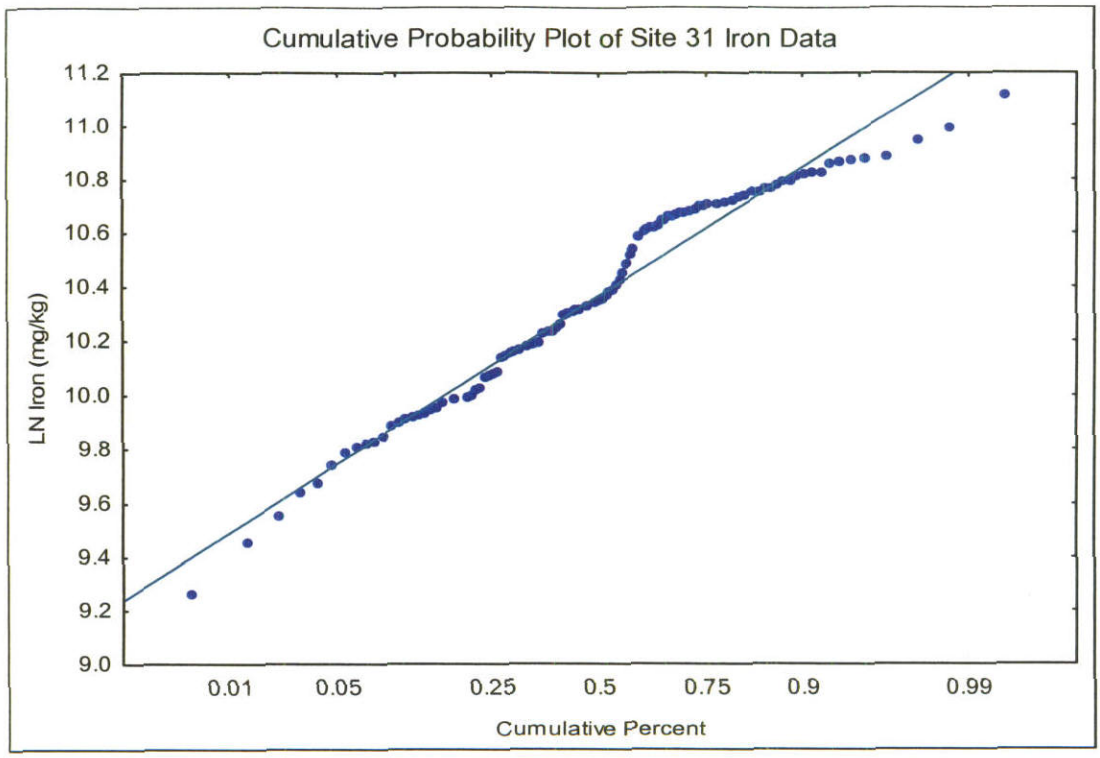


Figure A-1
Probability Plots for Select Metals at IR Site 31 and Iron in Pink Background



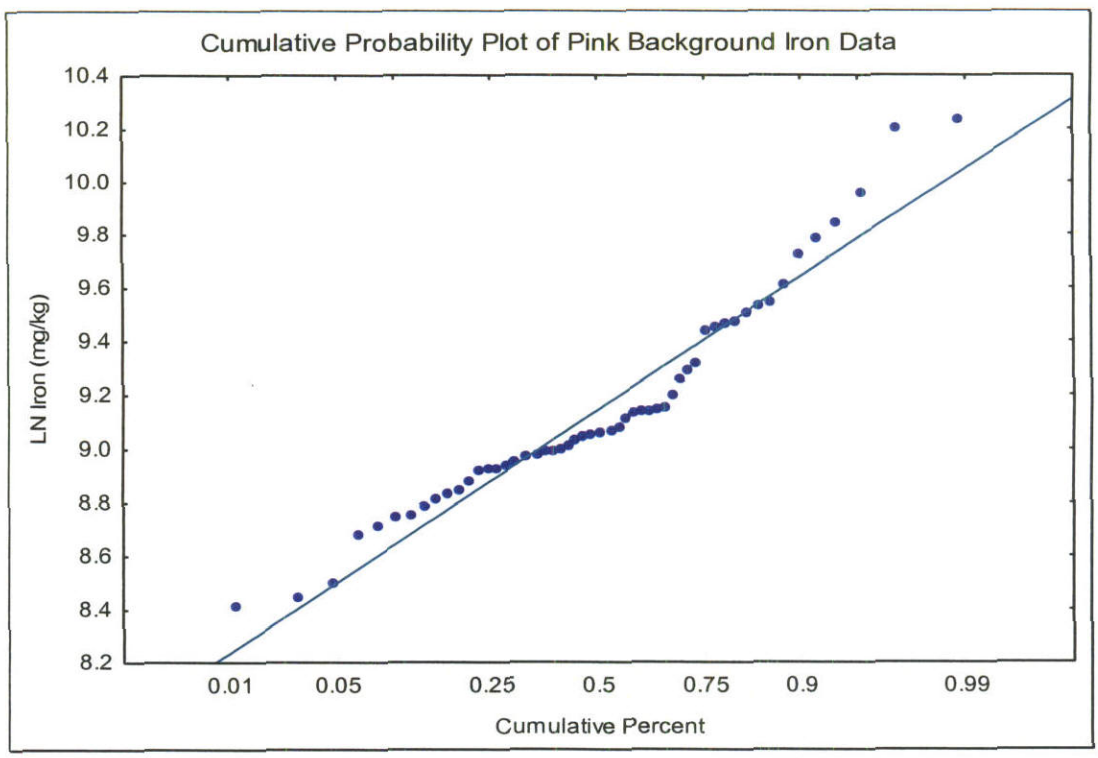


Figure A-1
Probability Plots for Select Metals at IR Site 31 and Iron in Pink Background

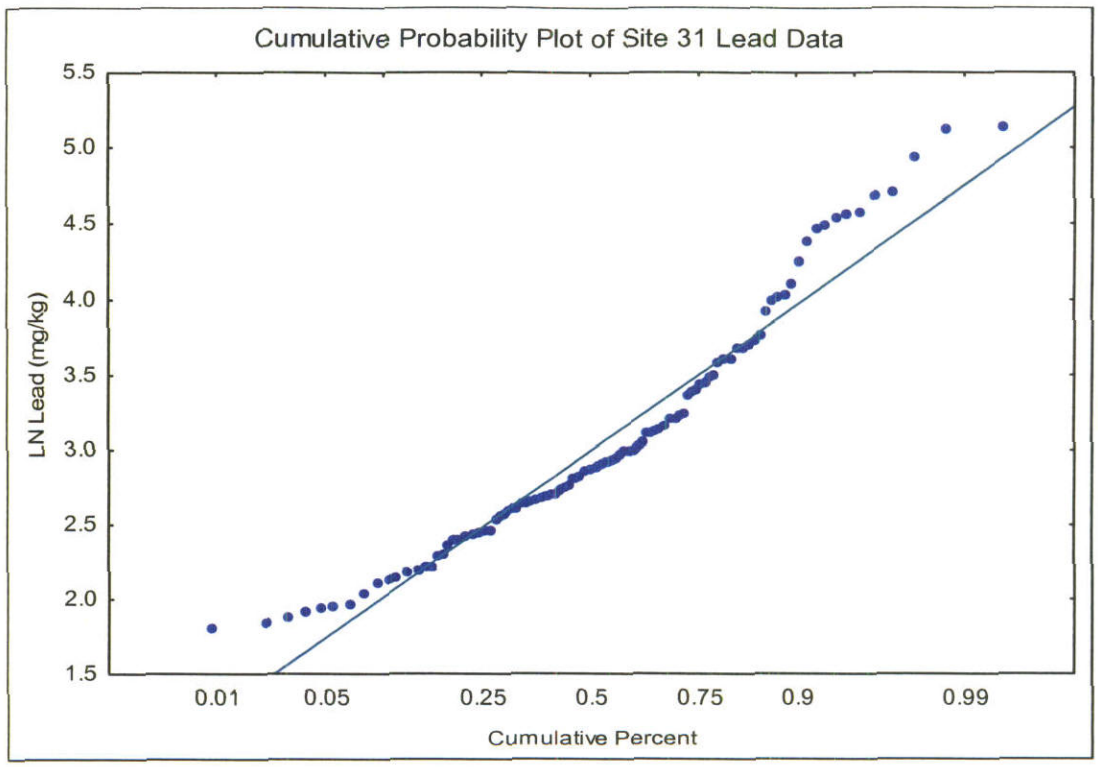


Figure A-1
Probability Plots for Select Metals at IR Site 31 and Iron in Pink Background

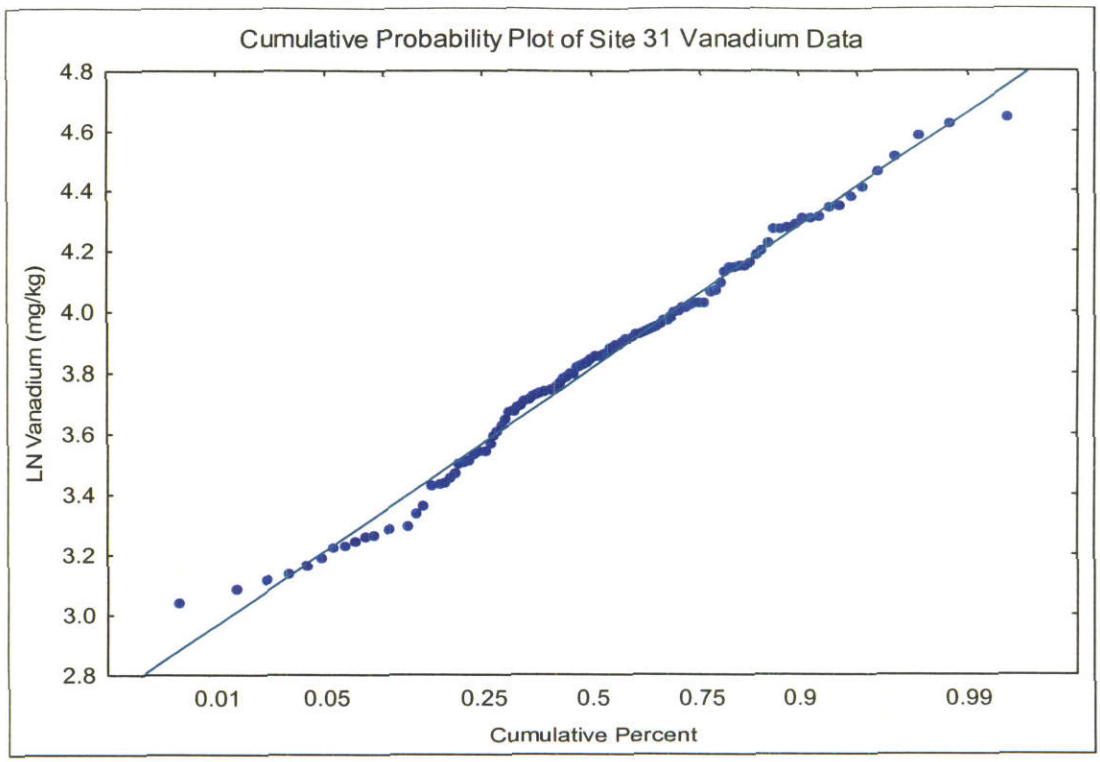
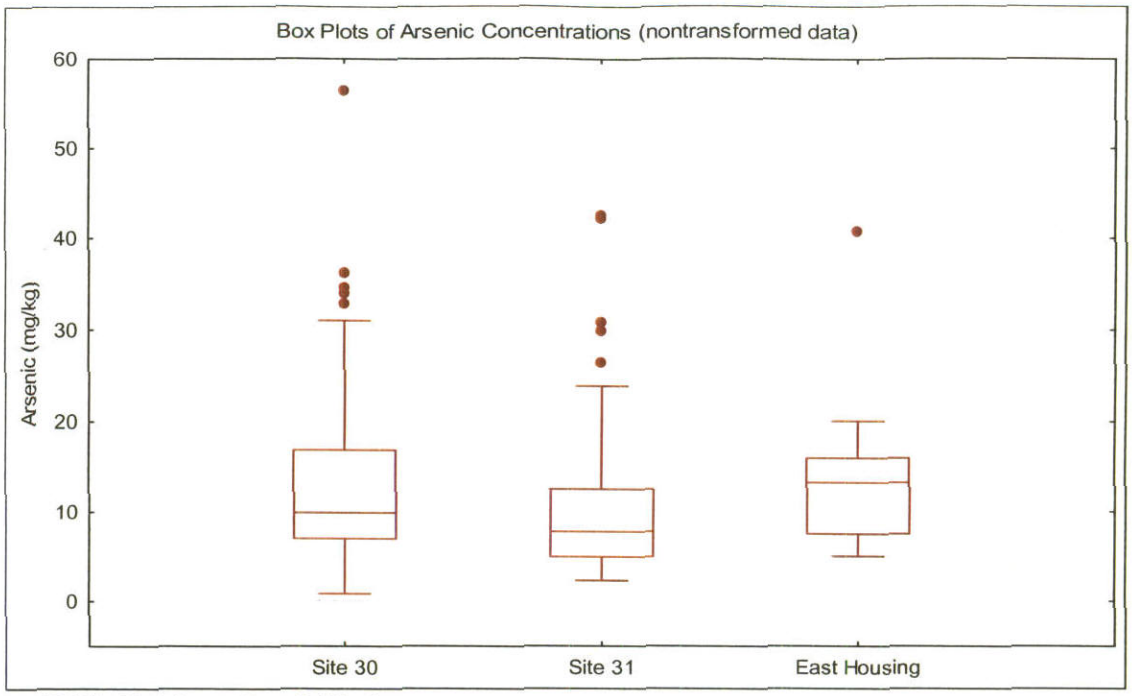
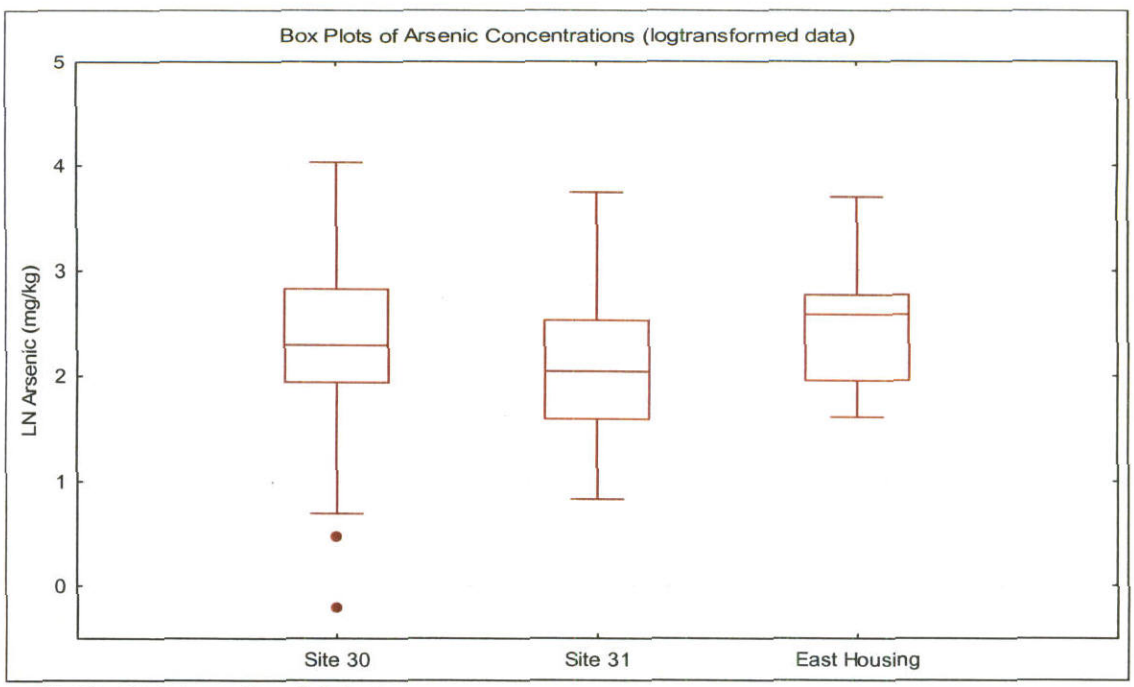


Figure A-1
Probability Plots for Select Metals at IR Site 31 and Iron in Pink Background



IR Site 31 data are from 2-7 feet.



IR Site 31 data are from 2-7 feet.

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure A-2

Box Plots of Arsenic Concentrations in IR Sites 30 and 31 and East Housing Area Data Sets

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/11/07
File No. 0890A2
Rev. B

TABLES

Table A-1
Arsenic Concentrations at IR Sites 30 and 31 and the East Housing Area
(concentrations in milligrams per kilogram)

IR Site 30	LN IR Site 30	IR Site 31 2–7 ft bgs	LN IR Site 31 2–7 ft bgs	IR Site 31 0–7 ft bgs	LN IR Site 31 0–7 ft bgs	East Housing Area	LN East Housing Area
56.30	4.031	42.40	3.747	42.400	3.747	40.7	3.706
36.10	3.586	42.10	3.740	42.100	3.740	20	2.996
34.60	3.544	30.80	3.428	32.600	3.484	19.8	2.986
33.90	3.523	29.80	3.395	30.800	3.428	16.7	2.815
32.80	3.490	26.30	3.270	29.800	3.395	16.5	2.803
31.00	3.434	23.80	3.170	27.200	3.303	15.4	2.734
27.00	3.296	23.70	3.165	26.800	3.288	15.1	2.715
25.50	3.239	18.80	2.934	26.300	3.270	14.8	2.695
22.70	3.122	17.40	2.856	23.800	3.170	14	2.639
20.90	3.040	17.40	2.856	23.700	3.165	13.9	2.632
19.20	2.955	15.90	2.766	18.800	2.934	13.2	2.580
17.10	2.839	14.70	2.688	18.400	2.912	10*	2.303
16.80	2.821	14.40	2.667	17.400	2.856	10	2.303
14.70	2.688	13.90	2.632	17.400	2.856	10	2.303
14.40	2.667	13.60	2.610	16.700	2.815	10	2.303
14.40	2.667	13.20	2.580	15.900	2.766	9.96	2.299
13.90	2.632	12.50	2.526	15.500	2.741	5	1.609
13.30	2.588	12.50	2.526	15.300	2.728	5	1.609
13.10	2.573	11.80	2.468	14.700	2.688	5	1.609
13.00	2.565	11.60	2.451	14.400	2.667	5	1.609
12.70	2.542	11.50	2.442	14.300	2.660	5	1.609
11.30	2.425	11.50	2.442	14.200	2.653	—	—
11.10	2.407	10.70	2.370	14.100	2.646	—	—
10.50	2.351	10.70	2.370	13.900	2.632	—	—
10.10	2.313	10.10	2.313	13.900	2.632	—	—
9.70	2.272	9.80	2.282	13.600	2.610	—	—
9.70	2.272	9.70	2.272	13.400	2.595	—	—
9.50	2.251	9.70	2.272	13.200	2.580	—	—
9.30	2.230	9.60	2.262	13.200	2.580	—	—
9.10	2.208	9.40	2.241	12.500	2.526	—	—
8.60	2.152	9.10	2.208	12.500	2.526	—	—
7.90	2.067	9.00	2.197	12.500	2.526	—	—
7.80	2.054	8.30	2.116	12.000	2.485	—	—
7.60	2.028	8.30	2.116	11.900	2.477	—	—
7.40	2.001	8.10	2.092	11.800	2.468	—	—
7.30	1.988	7.70	2.041	11.600	2.451	—	—
7.30	1.988	7.40	2.001	11.500	2.442	—	—
7.10	1.960	7.10	1.960	11.500	2.442	—	—
6.50	1.872	6.90	1.932	11.500	2.442	—	—
5.60	1.723	6.80	1.917	11.500	2.442	—	—
5.30	1.668	6.70	1.902	11.500	2.442	—	—
5.00	1.609	6.30	1.841	11.200	2.416	—	—
4.40	1.482	6.20	1.825	11.100	2.407	—	—
4.30	1.459	6.20	1.825	10.800	2.380	—	—
3.90	1.361	6.20	1.825	10.800	2.380	—	—
3.30	1.194	6.10	1.808	10.700	2.370	—	—
2.00	0.693	5.90	1.775	10.700	2.370	—	—

Table A-1
Arsenic Concentrations at IR Sites 30 and 31 and the East Housing Area
(concentrations in milligrams per kilogram)

IR Site 30	LN IR Site 30	IR Site 31 2–7 ft bgs	LN IR Site 31 2–7 ft bgs	IR Site 31 0–7 ft bgs	LN IR Site 31 0–7 ft bgs	East Housing Area	LN East Housing Area
1.60	0.470	5.70	1.740	10.600	2.361	—	—
1.60	0.470	5.40	1.686	10.300	2.332	—	—
0.80	-0.223	5.00	1.609	10.200	2.322	—	—
—	—	5.00	1.609	10.100	2.313	—	—
—	—	4.90	1.589	9.800	2.282	—	—
—	—	4.90	1.589	9.700	2.272	—	—
—	—	4.90	1.589	9.700	2.272	—	—
—	—	4.70	1.548	9.600	2.262	—	—
—	—	4.60	1.526	9.500	2.251	—	—
—	—	4.50	1.504	9.400	2.241	—	—
—	—	4.40	1.482	9.400	2.241	—	—
—	—	4.30	1.459	9.100	2.208	—	—
—	—	3.90	1.361	9.000	2.197	—	—
—	—	3.70	1.308	9.000	2.197	—	—
—	—	3.50	1.253	8.700	2.163	—	—
—	—	3.50	1.253	8.600	2.152	—	—
—	—	3.50	1.253	8.300	2.116	—	—
—	—	3.40	1.224	8.300	2.116	—	—
—	—	3.20	1.163	8.200	2.104	—	—
—	—	3.00	1.099	8.200	2.104	—	—
—	—	2.90	1.065	8.100	2.092	—	—
—	—	2.90	1.065	8.100	2.092	—	—
—	—	2.80	1.030	8.100	2.092	—	—
—	—	2.30	0.833	7.900	2.067	—	—
—	—	—	—	7.700	2.041	—	—
—	—	—	—	7.700	2.041	—	—
—	—	—	—	7.500	2.015	—	—
—	—	—	—	7.500	2.015	—	—
—	—	—	—	7.400	2.001	—	—
—	—	—	—	7.300	1.988	—	—
—	—	—	—	7.200	1.974	—	—
—	—	—	—	7.100	1.960	—	—
—	—	—	—	6.900	1.932	—	—
—	—	—	—	6.900	1.932	—	—
—	—	—	—	6.800	1.917	—	—
—	—	—	—	6.800	1.917	—	—
—	—	—	—	6.700	1.902	—	—
—	—	—	—	6.700	1.902	—	—
—	—	—	—	6.300	1.841	—	—
—	—	—	—	6.300	1.841	—	—
—	—	—	—	6.200	1.825	—	—
—	—	—	—	6.200	1.825	—	—
—	—	—	—	6.200	1.825	—	—
—	—	—	—	6.100	1.808	—	—
—	—	—	—	5.900	1.775	—	—
—	—	—	—	5.700	1.740	—	—
—	—	—	—	5.400	1.686	—	—
—	—	—	—	5.000	1.609	—	—

Table A-1
Arsenic Concentrations at IR Sites 30 and 31 and the East Housing Area
(concentrations in milligrams per kilogram)

IR Site 30	LN IR Site 30	IR Site 31 2–7 ft bgs	LN IR Site 31 2–7 ft bgs	IR Site 31 0–7 ft bgs	LN IR Site 31 0–7 ft bgs	East Housing Area	LN East Housing Area
—	—	—	—	5.000	1.609	—	—
—	—	—	—	4.900	1.589	—	—
—	—	—	—	4.900	1.589	—	—
—	—	—	—	4.900	1.589	—	—
—	—	—	—	4.700	1.548	—	—
—	—	—	—	4.600	1.526	—	—
—	—	—	—	4.600	1.526	—	—
—	—	—	—	4.600	1.526	—	—
—	—	—	—	4.500	1.504	—	—
—	—	—	—	4.500	1.504	—	—
—	—	—	—	4.400	1.482	—	—
—	—	—	—	4.300	1.459	—	—
—	—	—	—	3.900	1.361	—	—
—	—	—	—	3.700	1.308	—	—
—	—	—	—	3.700	1.308	—	—
—	—	—	—	3.500	1.253	—	—
—	—	—	—	3.500	1.253	—	—
—	—	—	—	3.500	1.253	—	—
—	—	—	—	3.400	1.224	—	—
—	—	—	—	3.200	1.163	—	—
—	—	—	—	3.000	1.099	—	—
—	—	—	—	2.900	1.065	—	—
—	—	—	—	2.900	1.065	—	—
—	—	—	—	2.800	1.030	—	—
—	—	—	—	2.300	0.833	—	—

Note:
* shaded cells indicate nondetect results at one-half the reporting limit

Acronyms/Abbreviations:
bgs – below ground surface
ft – feet
IR – Installation Restoration (Program)
LN – natural logtransformed

Table A-2
Results of Distributional Testing

Data Set Description	Are Data Logtransformed?	Number of Observations	Shapiro-Wilk W Statistic	P-value	Conclusion[a]
IR Site 30	No	50	0.835	0.000	Data not normal
IR Site 30, highest value removed	No	49	0.875	0.000	Data not normal
IR Site 31 (2–7 ft bgs)	No	71	0.763	0.000	Data not normal
IR Site 31 (2–7 ft bgs), highest 2 values removed	No	69	0.838	0.000	Data not normal
IR Site 31 (0–7 ft bgs)	No	120	0.797	0.000	Data not normal
IR Site 31 (0–7 ft bgs), highest 2 values removed	No	118	0.858	0.000	Data not normal
East Housing	No	21	0.791	0.000	Data not normal
East Housing, highest value removed	No	20	0.911	0.068	Data are normal
IR Site 30	Yes	50	0.968	0.193	Data are lognormal
IR Site 30, highest value removed	Yes	49	0.954	0.052	Data are lognormal
IR Site 31 (2–7 ft bgs)	Yes	71	0.976	0.190	Data are lognormal
IR Site 31 (2–7 ft bgs), highest 2 values removed	Yes	69	0.981	0.380	Data are lognormal
IR Site 31 (0–7 ft bgs)	Yes	120	0.987	0.324	Data are lognormal
IR Site 31 (0–7 ft bgs), highest 2 values removed	Yes	118	0.988	0.421	Data are lognormal
East Housing	Yes	21	0.905	0.043	Data not lognormal[b]
East Housing, highest value removed	Yes	20	0.853	0.006	Data not lognormal

Notes:

[a] null hypothesis: data are normal (lognormal);
accept null hypothesis if p-value > selected significance level of 0.05;
reject null hypothesis if p-value ≤ selected significance level of 0.05

[b] null hypothesis rejected by a narrow margin; data are lognormal at a significance level of 4 percent

Acronyms/Abbreviations:

bgs – below ground surface
ft – feet
IR – Installation Restoration (Program)
p – probability

Table A-3
Results of Rosner's Outlier Test

Data Set Description	Are Data Logtransformed?	Number of Potential Outliers	Test Statistic, R	Critical Value, λ	Conclusion*
IR Site 30 – highest value removed	Yes	1	2.016	3.130	Highest value is not an outlier
IR Site 31 (2–7 ft bgs) – highest 2 values removed	Yes	2	2.572	3.255	Highest 2 values are not outliers
IR Site 31 (0–7 ft bgs) – highest 2 values removed	Yes	2	2.680	3.430	Highest 2 values are not outliers

Note:
* null hypothesis: there are no outliers in the data;
accept null hypothesis if $R \leq \lambda$;
reject null hypothesis if $R > \lambda$

Acronyms/Abbreviations:
bgs – below ground surface
ft – feet
IR – Installation Restoration (Program)

Table A-4
Results of Distributional Testing for Select Metals at IR Site 31

Data Set Description	Are Data Logtransformed?	Number of Observations	Shapiro-Wilk W Statistic	P-value	Conclusion[a]
IR Site 31 – Cadmium	No	120	0.827	0.000	Data not normal
IR Site 31 – Chromium	No	120	0.891	0.000	Data not normal
IR Site 31 – Chromium – lowest value removed	No	119	0.885	0.000	Data not normal
IR Site 31 – Iron	No	120	0.962	0.002	Data not normal
IR Site 31 – Lead	No	120	0.650	0.000	Data not normal
IR Site 31 – Vanadium	No	120	0.948	0.000	Data not normal
IR Site 31 – Cadmium	Yes	120	0.975	0.026	Data are not lognormal[b]
IR Site 31 – Chromium	Yes	120	0.977	0.038	Data are not lognormal[b]
IR Site 31 – Chromium – lowest value removed	Yes	119	0.988	0.356	Data are lognormal
IR Site 31 – Iron	Yes	120	0.964	0.003	Data are not lognormal
IR Site 31 – Lead	Yes	120	0.941	0.000	Data are not lognormal
IR Site 31 – Vanadium	Yes	120	0.986	0.264	Data are lognormal

Notes:

[a] null hypothesis: data are normal (lognormal)
accept null hypothesis if p-value > selected significance level of 0.05
reject null hypothesis if p-value ≤ selected significance level of 0.05

[b] null hypothesis rejected by a narrow margin; data are lognormal at a significance level of 2 percent

Acronyms/Abbreviations:

IR – Installation Restoration (Program)
p – probability

ATTACHMENT B

STATISTICS TABLES

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Table B-1
Summary Statistics[a] for PRC Pink Background Data

	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
Metal	Detected	Total	Frequency	Min	Max	Min	Max	Median[b]	Q95[b]	Mean[c]	SD[c]	CV	UCL95[d]
aluminum	55	55	100%	N/A	N/A	1,760	22,600	5,230	13,960	5,799.87	374.73	0.06	6,521.20
antimony	18	55	33%	0.46	11.00	0.70	8.60	2.60	9.50	2.77	0.66	0.24	3.82
arsenic	45	55	82%	0.59	10.00	0.44	15.60	1.70	9.14	2.58	0.38	0.15	4.21
barium	55	55	100%	N/A	N/A	6.91	156.00	32.50	93.68	41.33	3.15	0.08	47.55
beryllium	28	55	51%	0.15	1.00	0.25	1.47	0.58	1.27	0.50	0.37	0.75	0.61
cadmium	11	55	20%	0.08	1.19	0.10	3.19	0.33	1.72	0.36	0.09	0.24	0.71
calcium	55	55	100%	N/A	N/A	816	66,600	2,400	16,800	3,805.34	419.95	0.11	4,704.82
chromium	55	55	100%	N/A	N/A	15.60	66.70	29.20	54.84	30.31	1.23	0.04	32.56
cobalt	48	55	87%	3.96	5.70	3.02	49.70	4.70	14.30	5.68	0.45	0.08	6.58
copper	52	55	95%	8.80	10.20	3.12	49.10	6.91	39.14	8.95	0.77	0.09	10.51
iron	55	55	100%	N/A	N/A	4,500	27,900	8,590	22,280	10,108.88	555.72	0.05	11,154.70
lead	51	55	93%	1.90	3.00	0.47	165.00	3.20	37.66	7.05	1.20	0.17	9.98
magnesium	55	55	100%	N/A	N/A	1,290	8,800	2,320	7,304	2,859.91	166.36	0.06	3,175.36
manganese	55	55	100%	N/A	N/A	55.50	748.00	108.00	383.00	145.19	11.12	0.08	167.20
mercury	7	54	13%	0.05	0.27	0.06	2.71	0.10	0.52	0.11	0.02	0.23	0.36
molybdenum	0	16	0%	2.80	5.20	N/A	N/A	3.10	5.20	N/A	N/A	N/A	N/A
nickel	55	55	100%	N/A	N/A	11.50	80.40	24.30	55.72	27.22	1.25	0.05	29.53
potassium	55	55	100%	N/A	N/A	209	2,480	691	1,232	740.63	42.05	0.06	820.09
selenium	0	55	0%	0.18	10.00	N/A	N/A	0.42	1.70	N/A	N/A	N/A	N/A
silver	11	55	20%	0.18	5.20	0.32	5.64	0.54	2.22	0.53	0.12	0.22	1.12
sodium	54	55	98%	520	520	62.60	1,580	325	1,230	411.81	40.19	0.10	495.34
thallium	0	55	0%	0.11	10.00	N/A	N/A	0.30	0.50	N/A	N/A	N/A	N/A
titanium	1	1	100%	N/A	N/A	518	518	518	518	N/A	N/A	N/A	N/A
vanadium	55	55	100%	N/A	N/A	10.50	55.30	21.00	47.34	22.52	1.07	0.05	24.50
zinc	54	55	98%	18.00	18.00	9.98	191.00	20.60	67.48	25.68	1.85	0.07	29.27

Source:

Tetra Tech EM Inc. 2004. Final Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Appendix E, Table E-2: Summary Statistics for Pink Soil Data Set. November 18.

References:

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*. New York: John Wiley & Sons, Inc.

U.S. Environmental Protection Agency. 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Intermittent Bulletin, Volume 1, Number 1. Publication 9285.7-081.

———. 2002. Calculating Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10. Washington DC. December.

Table B-1
Summary Statistics[a] for PRC Pink Background Data

Notes:

[a] units are mg/kg; for samples with less than 15 percent censored data, one-half the reporting limit is substituted for each nondetect measurement in all calculations; for higher frequencies of censored data, all calculations were performed using stochastic modeling, following the "bounding" approach for U.S. EPA (2002), as described below under note d; no calculations of the mean, SD, CV, or UCL95 are performed for sample sizes less than 3 or detection frequencies of zero

[b] estimated for all samples using a nonparametric approach, based on rank ordering of the data (reported values used for all censored data)

[c] for all samples with at least one detection, calculated using distribution-dependent formulae; for confirmed or estimated normal distributions with fewer than 15 percent censored data, calculated using equations 4.3 (mean) and 4.4 (standard deviation) in Gilbert (1987); for confirmed or estimated lognormal distributions with fewer than 15 percent censored data, these are the minimum variance unbiased (MVU) estimators, following equations 13.3 (mean) and 13.5 (standard deviation) in Gilbert (1987); all other calculations use the median values generated from 2,000 iterations of a Monte Carlo model, following the "bounding" approach described in U.S. EPA (2002)

[d] for confirmed or estimated normal distributions with fewer than 15 percent censored data, calculated using equation 11.6 in Gilbert (1987); for confirmed or estimated lognormal distributions with fewer than 15 percent censored data, calculated using Land's method (U.S. EPA 1992, Gilbert 1987); calculations for all cases with greater than 15 percent censored data use the 95th percentile generated from 2,000 iterations of a Monte Carlo model, following the "bounding" approach described in U.S. EPA (2002); calculations are based on either normal or lognormal (nonparametric Chebyshev inequality) model equations

Acronyms/Abbreviations:

CV – coefficient of variation (SD/mean)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
N/A – not applicable
OSWER – Office of Solid Waste and Emergency Response
PRC – PRC Environmental Management, Inc.
Q95 – 95th quantile
RAGS – (U.S. EPA) Risk Assessment Guidance for Superfund
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-2
Summary Statistics[a] for PRC Yellow Background Data

	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
Metal	Detected	Total	Frequency	Min	Max	Min	Max	Median	Q95	Mean	SD	CV	UCL95[c]
aluminum	49	49	100%	—[d]	—	3,830	13,300	5,220	12,250	6,308	2,389	0.38	7,796
antimony	3	49	6%	1.3	7.3	1.3	7	6	7	6	1.40	0.24	3
arsenic	20	49	41%	10	12	1.1	33	11	25	11	6	0.52	12
barium	42	49	86%	21	24	21	260	30	78	40	36	0.89	61
beryllium	8	49	16%	1	1.2	0.30	1.3	1.00	1.20	1.00	0.15	0.15	0.68
cadmium	12	49	24%	0.355	1.2	0.33	3	1.0	2	1.1	0.40	0.38	0.98
chromium	49	49	100%	—	—	23	70	31	45	33	7	0.22	37
cobalt	18	49	37%	5	7.6	4	11	5	9	6	1.4	0.23	6
copper	47	49	96%	5.5	5.6	5	49	12	48	17	12	0.71	20
iron	49	49	100%	—	—	7,150	20,800	9,050	18,850	10,590	3,567	0.34	12,811
lead	49	49	100%	—	—	4	752	23	175	49	109	2.23	117
manganese	49	49	100%	—	—	66	330	109	315	141	72	0.51	186
mercury	5	8	63%	0.05	0.15	0.05	0.18	0.10	0.18	0.11	0.05	0.47	0.13
nickel	49	49	100%	—	—	20	71	25	48	28	9	0.33	34
selenium	0	49	0%	0.167	23	—	—	—	—	—	—	—	—
silver	6	49	12%	0.18	6	0.18	30	5	8	5	4	0.81	6
thallium	0	49	0%	0.215	12	—	—	—	—	—	—	—	—
vanadium	49	49	100%	—	—	17	50	23	47	26	8	0.30	31
zinc	49	49	100%	—	—	17	140	34	125	49	32	0.66	69

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from ProUCL and Statistica model output; for censored data, one half the detection limit was used in calculations

[c] the UCL95 was selected from ProUCL based on a heirarchy established by U.S. EPA; the t-statistic was used for normally distributed data, the H-statistic was used for lognormally distributed data, the approximate gamma was used for data following a gamma distribution, and the 95% Chebyshev was used for nonparametric data sets

[d] dash indicates not applicable

Table B-2
Summary Statistics[a] for PRC Yellow Background Data

Acronyms/Abbreviations:
CV – coefficient of variation (SD/mean)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
PRC – PRC Environmental Management, Inc.
Q95 – 95th quantile
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-3
Summary Statistics[a] for PRC Blue Background Data

	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
Metal	Detected	Total	Frequency	Min	Max	Min	Max	Median[b]	Q95[b]	Mean[c]	SD[c]	CV	UCL95[d]
aluminum	88	88	100%	N/A	N/A	2,880.00	26,800.00	4,965.00	16,000.00	6,417.49	352.02	0.05	7,073.70
antimony	2	88	2%	0.46	9.20	0.89	1.00	2.40	7.71	2.16	0.39	0.18	2.90
arsenic	33	88	38%	0.61	13.00	0.74	23.00	2.90	16.55	4.59	0.95	0.21	6.39
barium	85	88	97%	24.00	25.00	0.30	198.00	38.75	114.60	53.01	5.04	0.10	63.26
beryllium	25	88	28%	0.20	1.30	0.09	0.77	0.30	1.20	0.37	0.06	0.15	0.49
cadmium	29	88	33%	0.06	1.30	0.10	0.82	0.30	1.20	0.40	0.08	0.19	0.49
calcium	88	88	100%	N/A	N/A	1,360.00	19,200.00	2,600.00	14,165.00	3,883.74	267.39	0.07	4,201.93
chromium	88	88	100%	N/A	N/A	11.40	81.70	29.50	64.26	33.50	1.25	0.04	35.74
cobalt	66	88	75%	3.94	6.80	1.90	14.00	5.35	12.04	5.37	0.45	0.08	6.45
copper	83	88	94%	5.80	6.30	4.20	89.40	9.70	40.35	13.12	1.07	0.08	15.23
iron	88	88	100%	N/A	N/A	760.00	26,900.00	8,140.00	20,995.00	10,072.09	548.13	0.05	11,092.99
lead	27	88	31%	1.40	6.80	1.30	41.00	5.90	13.01	5.31	0.88	0.17	7.54
magnesium	88	88	100%	N/A	N/A	1,510.00	42,400.00	2,240.00	6,503.00	2,867.67	154.94	0.05	3,156.01
manganese	88	88	100%	N/A	N/A	50.00	1,060.00	108.50	340.75	143.63	8.45	0.06	159.52
mercury	0	22	0%	0.07	0.18	N/A	N/A	0.17	0.18	N/A	N/A	N/A	N/A
molybdenum	0	85	0%	0.31	6.50	N/A	N/A	1.40	6.20	N/A	N/A	N/A	N/A
nickel	88	88	100%	N/A	N/A	11.60	88.50	23.80	64.13	29.17	1.35	0.05	31.64
potassium	87	88	99%	610.00	610.00	310.00	6,382.00	769.50	2,310.00	902.98	50.21	0.06	996.73
selenium	1	88	1%	0.43	13.00	5.70	5.70	5.00	12.00	4.05	0.97	0.24	4.67
silver	2	88	2%	0.18	6.50	0.44	0.61	0.70	6.20	1.07	0.27	0.25	1.88
sodium	88	88	100%	288.00	650.00	88.10	3,510.00	340.00	1,544.50	422.62	47.51	0.11	718.20
thallium	1	88	1%	0.36	13.00	5.30	5.30	3.10	12.00	3.20	0.83	0.26	4.16
titanium	66	66	100%	N/A	N/A	223.00	1,020.00	372.50	701.20	407.10	16.33	0.04	436.76
vanadium	88	88	100%	N/A	N/A	12.80	62.30	20.00	41.78	22.23	0.81	0.04	23.68
zinc	88	88	100%	N/A	N/A	14.00	84.00	24.65	65.38	28.55	1.30	0.05	30.93

Source:

Tetra Tech EM Inc. 2004. Final Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Appendix E, Table E-1: Summary Statistics for Blue Soil Data Set. November 18.

References:

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*. New York: John Wiley & Sons, Inc.

U.S. Environmental Protection Agency. 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Intermittent Bulletin, Volume 1, Number 1. Publication 9285.7-081.

———. 2002. Calculating Exposure Point Concentrations at Hazardous Waste Sites. OSWER 9285.6-10. Washington DC. December.

Table B-3
Summary Statistics[a] for PRC Blue Background Data

Notes:

[a] units are mg/kg; for samples with less than 15 percent censored data, one-half the reporting limit is substituted for each nondetect measurement in all calculations; for higher frequencies of censored data, all calculations were performed using stochastic modeling, following the "bounding" approach for U.S. EPA (2002), as described below under note d; no calculations of the mean, SD, CV, or UCL95 are performed for sample sizes less than 3 or detection frequencies of zero

[b] estimated for all samples using a nonparametric approach, based on rank ordering of the data (reported values used for all censored data)

[c] for all samples with at least one detection, calculated using distribution-dependent formulae; for confirmed or estimated normal distributions with fewer than 15 percent censored data, calculated using equations 4.3 (mean) and 4.4 (standard deviation) in Gilbert (1987); for confirmed or estimated lognormal distributions with fewer than 15 percent censored data, these are the minimum variance unbiased (MVU) estimators, following equations 13.3 (mean) and 13.5 (standard deviation) in Gilbert (1987); all other calculations use the median values generated from 2,000 iterations of a Monte Carlo model, following the "bounding" approach described in U.S. EPA (2002)

[d] for confirmed or estimated normal distributions with fewer than 15 percent censored data, calculated using equation 11.6 in Gilbert (1987); for confirmed or estimated lognormal distributions with fewer than 15 percent censored data, calculated using Land's method (U.S. EPA 1992, Gilbert 1987); calculations for all cases with greater than 15 percent censored data use the 95th percentile generated from 2,000 iterations of a Monte Carlo model, following the "bounding" approach described in U.S. EPA (2002); calculations are based on either normal or lognormal (nonparametric Chebyshev inequality) model equations

Acronyms/Abbreviations:

CV – coefficient of variation (SD/mean)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
N/A – not applicable
PRC – PRC Environmental Management, Inc.
Q95 – 95th quantile
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-4
Summary Statistics[a] for IR Site 30

Metal	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
	Detected	Total[c]	Frequency	Min	Max	Min	Max	Median	Q95	Mean	SD	CV	UCL95[d]
aluminum	50	50	100%	—[e]	—	4,570	29,100	16,750	27,225	16,187.60	5,848.20	0.36	17,574
antimony	4	35	11%	0.5	0.9	0.47	1.3	0.3	1.06	0.39	0.21	0.55	0.55
arsenic	50	50	100%	—	—	0.8	56.3	9.9	35.275	13.58	11.06	0.81	16
barium	50	50	100%	—	—	14.2	176	85.25	159.9	88.46	33.94	0.38	97
beryllium	50	50	100%	—	—	0.098	2.2	0.305	1.245	0.41	0.38	0.91	0.64
cadmium	48	50	96%	0.5	0.9	0.033	0.78	0.305	0.659	0.32	0.15	0.47	0.36
calcium	50	50	100%	—	—	559	41,000	5,605	24,855	8,046.62	7,364.55	0.92	10,391
chromium	50	50	100%	—	—	7.4	97.6	41.35	93.98	44.22	24.30	0.55	51
cobalt	50	50	100%	—	—	4.8	24.8	13.45	21.925	13.96	5.09	0.36	15
copper	50	50	100%	—	—	4.1	208	38.9	135.7	47.05	37.14	0.79	56
iron	50	50	100%	—	—	8,690	69,600	38,750	55,560	37,607.80	11,428.48	0.30	40,317
lead	50	50	100%	—	—	0.98	87.1	22.1	74.65	25.80	18.49	0.72	31
magnesium	50	50	100%	—	—	1,160	19,800	8,240	16,775	8,685.40	4,123.03	0.47	9,663
manganese	50	50	100%	—	—	124	2,300	759	1,449.5	801.62	434.96	0.54	905
mercury	37	50	74%	0.043	0.19	0.13	0.58	0.19	0.519	0.23	0.15	0.65	0.27
molybdenum	3	7	43%	2.7	3	3.2	5.3	1.5	5.3	2.53	1.53	0.60	4.65
nickel	50	50	100%	—	—	3.8	149	33.6	121.2	39.44	30.59	0.78	47
potassium	50	50	100%	—	—	97.1	4,260	1,085	3,917.5	1,342.76	1,112.14	0.83	1,634
selenium	21	50	42%	0.48	0.9	0.32	2.5	0.35	2.245	0.77	0.70	0.91	1.21
silver	3	50	6%	0.1	0.35	0.08	0.39	0.05	0.17	0.08	0.06	0.77	0.11
sodium	24	50	48%	137	403	228	2,160	198.5	1,298	333.77	387.27	1.16	572
thallium	7	48	15%	0.51	4	0.29	2	1	1.955	1.06	0.39	0.36	1.30
vanadium	50	50	100%	—	—	17.8	158	61.25	123.9	65.13	29.25	0.45	73
zinc	50	50	100%	—	—	21.2	248	118	220.25	127.93	47.44	0.37	139

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from ProUCL and Statistica model output; for censored data, one half the detection limit was used in calculations

[c] sample C072S068 from boring C3S030B068 (0–0.5 foot bgs) was removed as part of a soil excavation

[d] the UCL95 was selected from ProUCL based on a hierarchy established by U.S. EPA; the t-statistic was used for normally distributed data, the H-statistic was used for lognormally distributed data, the approximate gamma was used for data following a gamma distribution, and the 95% Chebyshev was used for nonparametric data sets

[e] dash indicates not applicable

Table B-4
Summary Statistics[a] for IR Site 30

Acronyms/Abbreviations:
- bgs – below ground surface
- CV – coefficient of variation (SD/mean)
- IR – Installation Restoration (Program)
- max – maximum concentration reported
- mg/kg – milligrams per kilogram
- min – minimum concentration reported
- Q95 – 95th quantile
- SD – standard deviation
- UCL95 – 95 percent upper confidence limit of the mean
- U.S. EPA – United States Environmental Protection Agency

Table B-5
Summary Statistics[a] for IR Site 31

Metal	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
	Detected	Total	Frequency	Min	Max	Min	Max	Median	Q95	Mean	SD	CV	UCL95[c]
aluminum	120	120	100%	—[d]	—	6,040	33,300	1,320	23,795	14,279	5,143	0.36	15,045
antimony	17	120	14%	5.3	7.6	0.14	3.2	1.7	3.1	1.6	1.2	0.73	2.1
arsenic	120	120	100%	—	—	2.3	42	9.0	27	11	7.4	0.69	12
barium	120	120	100%	—	—	31	476	149	377	167	105	0.63	184
beryllium	75	120	63%	0.21	0.26	0.0065	0.66	0.14	0.5	0.20	0.14	0.70	0.25
cadmium	98	120	82%	0.21	0.34	0.017	1.5	0.24	0.7	0.27	0.22	0.80	0.31
chromium	120	120	100%	—	—	3.0	197	45	139	58	39	0.67	64
cobalt	120	120	100%	—	—	5.5	29	14	26	15	5.1	0.34	16
copper	120	120	100%	—	—	3.6	118	31	76	35	21	0.59	39
iron	120	120	100%	—	—	10,500	67,000	30,900	52,695	33,866	11,965	0.35	38,627
lead	120	120	100%	—	—	6.1	168	18	97	28	31	1.08	41
manganese	120	120	100%	—	—	118.0	2,750	751	1,840	869	517	0.59	953
mercury	97	120	81%	0.21	0.67	0.13	2.4	0.45	1.9	0.62	0.54	0.86	0.71
molybdenum	4	120	3%	0.22	0.3	0.47	2.5	0.11	0.3	0.16	0.28	1.75	0.27
nickel	120	120	100%	—	—	2.4	474	53	356	95	102	1.07	135
selenium	13	120	11%	0.51	0.65	0.88	3.1	0.28	2.1	0.52	0.59	1.13	0.75
thallium	44	120	37%	0.51	0.85	0.48	3.7	0.30	2.8	0.87	0.91	1.04	1.2
vanadium	120	120	100%	—	—	21	104	47	82	48	18	0.37	51
zinc	120	120	100%	—	—	28	901	96	182	103	83	0.81	137

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from ProUCL and Statistica model output; for censored data, one half the detection limit was used in calculations

[c] the UCL95 was selected from ProUCL based on a hierarchy established by U.S. EPA; the t-statistic was used for normally distributed data, the H-statistic was used for lognormally distributed data, the approximate gamma was used for data following a gamma distribution, and the 95% Chebyshev was used for nonparametric data sets

[d] dash indicates not applicable

Table B-5
Summary Statistics[a] for IR Site 31

Acronyms/Abbreviations:

CV – coefficient of variation (SD/mean)
IR – Installation Restoration (Program)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
Q95 – 95th quantile
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-6
Summary Statistics[a] for the East Housing Area

	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
Metal	Detected	Total	Frequency	Min	Max	Min	Max	Median	Q95	Mean	SD	CV	UCL95[c]
arsenic	12	21	57%	10	20	9.96	40.7	13.2	38.6	13.1	8.0	0.61	16.3
barium	21	21	100%	—[d]	—	20.20	224.0	85.9	220.0	94.1	53.7	0.57	114.3
beryllium	21	21	100%	—	—	0.23	0.8	0.5	0.79	0.5	0.1	0.29	0.6
cadmium	2	21	10%	1	2	1.06	1.6	1.0	1.5	0.9	0.3	0.31	1.2
chromium	20	21	95%	2	2	6.17	70.9	32.3	70.8	34.3	21.3	0.62	42.3
cobalt	21	21	100%	—	—	4.34	21.7	7.3	20.9	8.3	3.7	0.44	9.6
copper	21	21	100%	—	—	13.20	85.2	31.2	84.9	38.0	19.5	0.51	45.9
lead	15	21	71%	7.5	15	7.66	57.9	20.0	56.7	21.2	15.5	0.73	27.1
mercury	21	21	100%	—	—	0.09	9.4	0.4	8.5	0.8	2.0	2.49	2.7
molybdenum	1	21	5%	2	4	1.17	1.2	2.0	2.0	1.7	0.5	0.28	2.1
nickel	20	21	95%	6	6	11.70	89.4	37.0	87.7	41.1	21.5	0.52	49.2
vanadium	21	21	100%	—	—	15.90	71.7	32.8	70.5	37.7	16.3	0.43	43.8
zinc	21	21	100%	—	—	32.80	216.0	70.6	208.2	83.2	38.8	0.47	97.8

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from ProUCL and Statistica model output; for censored data, one half the detection limit was used in calculations

[c] the UCL95 was selected from ProUCL based on a hierarchy established by U.S. EPA; the t-statistic was used for normally distributed data, the H-statistic was used for lognormally distributed data, the approximate gamma was used for data following a gamma distribution, and the 95% Chebyshev was used for nonparametric data sets

[d] dash indicates not applicable

Acronyms/Abbreviations:

CV – coefficient of variation (SD/mean)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
Q95 – 95th quantile
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-7
Summary Statistics[a] for the FISCA Warehouse Area

	SAMPLE SIZE		Detection	CENSORED DATA		DETECTED DATA		DETECTED AND CENSORED DATA[b]					
Metal	Detected	Total	Frequency	Min	Max	Min	Max	Median	Q95	Mean	SD	CV	UCL95[c]
antimony	1	18	6%	6	12	12.50	12.50	6.0	—	5.2	2.3	0.45	7.6
arsenic	10	18	56%	10	40	5.24	25.40	10.0	25.4	10.6	5.3	0.50	12.9
barium	18	18	100%	—[d]	—	9.82	180.00	50.2	180.0	59.7	43.9	0.74	82.1
beryllium	18	18	100%	—	—	0.13	0.76	0.4	0.8	0.4	0.2	0.45	0.5
chromium	17	18	94%	4	4	1.07	182.00	28.5	182.0	40.1	44.7	1.11	65.2
cobalt	18	18	100%	—	—	2.07	28.60	6.8	28.6	8.4	6.5	0.78	11.6
copper	18	18	100%	—	—	1.95	87.80	16.7	87.8	21.8	21.8	1.00	33.3
lead	15	18	83%	15	30	3.90	32.40	13.5	32.4	14.1	7.7	0.54	17.2
mercury	15	18	83%	0.05	0.05	0.04	1.01	0.2	1.0	0.3	0.3	1.02	0.4
molybdenum	4	18	22%	2	8	1.99	4.53	2.0	4.5	2.0	1.0	0.51	3.1
nickel	17	18	94%	12	12	3.32	592.00	31.4	592.0	77.5	139.3	1.80	140.8
vanadium	18	18	100%	—	—	4.44	71.70	25.8	71.7	30.1	17.0	0.57	37.1
zinc	18	18	100%	—	—	10.10	152.00	47.3	152.0	55.3	35.5	0.64	69.8

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from ProUCL and Statistica model output; for censored data, one half the detection limit was used in calculations

[c] the UCL95 was selected from ProUCL based on a hierarchy established by U.S. EPA; the t-statistic was used for normally distributed data, the H-statistic was used for lognormally distributed data, the approximate gamma was used for data following a gamma distribution, and the 95% Chebyshev was used for nonparametric data sets

[d] dash indicates not applicable

Acronyms/Abbreviations:

CV – coefficient of variation (SD/mean)
FISCA – Fleet and Industrial Supply Center Alameda
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
Q95 – 95th quantile
SD – standard deviation
UCL95 – 95 percent upper confidence limit of the mean
U.S. EPA – United States Environmental Protection Agency

Table B-8
Summary Statistics[a,b] for FISCA SWMUs and AOCs

Chemical	SWMU 1					SWMU 3					SWMU 4/AOC 2				
	SAMPLE SIZE		Detection	DETECTED DATA		SAMPLE SIZE		Detection	DETECTED DATA		SAMPLE SIZE		Detection	DETECTED DATA	
	Detected	Total	Frequency	Min	Max	Detected	Total	Frequency	Min	Max	Detected	Total	Frequency	Min	Max
aluminum	388	396	98%	501	46,600	16	16	100%	1,960	17,600	51	51	100%	2,270	25,400
antimony	197	396	50%	0.33	35.8	8	16	50%	0.34	0.81	32	51	63%	0.36	3.3
arsenic	296	396	75%	0.27	212	16	16	100%	0.78	7.7	46	51	90%	0.58	30.4
barium	390	396	98%	2.8	358	16	16	100%	17.3	60.7	51	51	100%	16.9	1,610
beryllium	227	396	57%	0.05	1.1	8	16	50%	0.06	0.16	30	51	59%	0.05	0.42
cadmium	174	396	44%	0.07	86.4	5	16	31%	0.12	0.49	37	51	73%	0.07	2.6
calcium	373	396	94%	208	445,000	16	16	100%	835	4,790	51	51	100%	1,280	12,500
chromium	384	396	97%	0.46	458	16	16	100%	13.3	70.3	51	51	100%	0.9	81.7
cobalt	384	396	97%	0.61	212	16	16	100%	2.5	13	51	51	100%	2.5	15.6
copper	387	396	98%	1	2,110	16	16	100%	2.8	32	51	51	100%	1.8	529
iron	368	396	93%	1,440	170,000	3	16	19%	4,460	31,200	51	51	100%	4,500	36,700
lead	390	396	98%	0.56	26,600	16	16	100%	2	39.4	51	51	100%	2	498
magnesium	376	396	95%	262	123,000	16	16	100%	1,130	11,600	51	51	100%	1,130	13,000
manganese	385	396	97%	12.2	1,690	16	16	100%	40.6	363	51	51	100%	49.1	39,500
mercury	281	396	71%	0.007	9.4	11	16	69%	0.009	0.107	36	51	71%	0.008	0.29
molybdenum	43	396	11%	0.21	24	—[c]	16	0%	—	—	2	51	4%	0.2	20.7
nickel	384	396	97%	1	1,070	16	16	100%	13.9	73.5	51	51	100%	3.6	65.3
potassium	364	396	92%	134	7,640	16	16	100%	275	3,790	51	51	100%	166	4,790
selenium	43	396	11%	0.1	4.4	—	16	0%	—	—	—	—	—	—	—
silver	24	396	6%	0.2	5.4	—	16	0%	—	—	—	—	—	—	—
sodium	329	396	83%	12.8	20,200	9	16	56%	55.4	795	35	51	69%	43.5	21,300
thallium	10	396	3%	0.25	2	—	16	0%	—	—	3	51	6%	0.34	39.1
vanadium	377	396	95%	1.5	106	16	16	100%	11.4	52.9	51	51	100%	7.1	65.4
zinc	383	396	97%	9.1	1,580	16	16	100%	11.4	76.4	51	51	100%	12.7	393

Table B-8
Summary Statistics[a,b] for FISCA SWMUs and AOCs

Chemical	AOC 1					AOC 3					AOC 8				
	SAMPLE SIZE		Detection	DETECTED DATA		SAMPLE SIZE		Detection	DETECTED DATA		SAMPLE SIZE		Detection	DETECTED DATA	
	Detected	Total	Frequency	Min	Max	Detected	Total	Frequency	Min	Max	Detected	Total	Frequency	Min	Max
aluminum	58	61	95%	2,230	17,400	8	8	100%	2,980	15,400	12	12	100%	4,010	17,700
antimony	50	61	82%	0.34	0.93	4	8	50%	0.54	1.2	12	12	100%	0.58	7.2
arsenic	42	61	69%	0.93	5.5	5	8	63%	0.47	5.1	12	12	100%	2.5	19.6
barium	61	61	100%	15	191	8	8	100%	23	123	12	12	100%	47.3	433
beryllium	16	61	26%	0.04	0.56	4	8	50%	0.06	0.29	7	12	58%	0.21	0.55
cadmium	11	61	18%	0.07	0.87	4	8	50%	0.09	0.45	12	12	100%	0.58	38.9
calcium	57	61	93%	766	52,800	8	8	100%	1,210	10,700	12	12	100%	3,790	21,900
chromium	60	61	98%	2.9	54.6	8	8	100%	5.3	47.6	12	12	100%	19.9	205
cobalt	19	61	31%	2.6	19	8	8	100%	3.7	11.8	12	12	100%	6.7	73.7
copper	60	61	98%	2.9	109	8	8	100%	2.8	53	12	12	100%	24.7	373
iron	55	61	90%	3,970	39,800	8	8	100%	5,890	26,300	12	12	100%	13,700	52,100
lead	60	61	98%	2.1	17.5	8	8	100%	2	13.2	12	12	100%	83.2	785
magnesium	57	61	93%	1,140	9,240	8	8	100%	1,540	4,930	12	12	100%	2,940	13,500
manganese	59	61	97%	50.6	866	8	8	100%	73.9	671	12	12	100%	227	14,300
mercury	51	61	84%	0.0185	2.47	4	8	50%	0.022	0.221	12	12	100%	0.136	15
molybdenum	3	61	5%	0.16	0.68	—	—	—	—	—	6	12	50%	1.8	6
nickel	59	61	97%	3.9	55.1	8	8	100%	4.8	40.7	12	12	100%	23.1	334
potassium	59	61	97%	201	2,600	8	8	100%	330	1,170	12	12	100%	518	3,520
selenium	—	—	—	—	—	—	—	—	—	—	1	12	8%	2	2
silver	1	61	2%	0.22	0.22	—	—	—	—	—	1	12	8%	8	8
sodium	41	61	67%	12.8	650	8	8	100%	97	1,140	12	12	100%	963	11,800
thallium	1	61	2%	0.66	0.66	—	—	—	—	—	2	12	17%	20.4	20.4
vanadium	59	61	97%	6.6	108	8	8	100%	13.7	37	12	12	100%	17.7	92.1
zinc	59	61	97%	9.3	101	8	8	100%	14.2	92.4	12	12	100%	185	1,590

Table B-8
Summary Statistics[a,b] for FISCA SWMUs and AOCs

	COA				
	SAMPLE SIZE		Detection	DETECTED DATA	
Chemical	Detected	Total	Frequency	Min	Max
aluminum	20	20	100%	2,920	60,100
antimony	19	20	95%	0.51	5.6
arsenic	20	20	100%	1.6	25.6
barium	19	20	95%	34.4	400
beryllium	13	20	65%	0.32	2.1
cadmium	10	20	50%	0.08	1.3
calcium	20	20	100%	2,420	108,000
chromium	20	20	100%	9.2	314
cobalt	20	20	100%	4.3	64.6
copper	20	20	100%	14	238
iron	20	20	100%	7,310	119,000
lead	20	20	100%	4.3	168
magnesium	20	20	100%	1,740	37,800
manganese	20	20	100%	172	1,440
mercury	19	20	95%	0.071	0.989
molybdenum	3	20	15%	0.33	0.46
nickel	20	20	100%	9.7	335
potassium	20	20	100%	602	8,850
selenium	—	—	—	—	—
silver	2	20	10%	0.22	0.28
sodium	19	20	95%	53.6	6,420
thallium	—	—	—	—	—
vanadium	20	20	100%	11.5	236
zinc	20	20	100%	25.5	417

Reference:
PRC 1996. Fleet and Industrial Supply Center. Oakland, Alameda Facility /Alameda Annex, Alameda, California

Notes:
[a] units are mg/kg
[b] summary statistics were compiled from PRC 1996
[c] dash indicates not applicable

Acronyms/Abbreviations:
AOC – area of concern
COA – College of Alameda
FISCA – Fleet and Industrial Supply Center Alameda
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported
PRC – PRC Environmental Management, Inc.
SWMU – solid waste management unit

Table B-9
Summary Statistics[a,b] for IR Site 25

Metal	SAMPLE SIZE Detected	SAMPLE SIZE Total	Detection Frequency	DETECTED DATA Min	DETECTED DATA Max	Mean	EPC
antimony	13	28	46%	2.57	6.59	4.21	4.79
arsenic	28	28	100%	1.37	8.71	3.59	4.24
barium	28	28	100%	26.74	157.63	65.02	75.64
beryllium	11	28	39%	0.11	0.67	0.26	0.34
cadmium	13	28	46%	0.09	0.91	0.24	0.30
chromium	28	28	100%	25.66	96.33	48.47	54.25
cobalt	28	28	100%	3.90	17.18	8.77	10.09
copper	28	28	100%	5.70	51.26	21.50	26.60
lead	28	28	100%	7.00	49.35	21.00	25.77
mercury	25	28	89%	0.05	0.71	0.18	0.24
molybdenum	5	28	18%	0.11	3.09	1.37	3.09
nickel	28	28	100%	20.61	91.01	47.64	54.82
selenium	14	28	50%	0.28	18.02	1.14	1.01
silver	2	28	7%	0.28	0.57	0.44	0.50
thallium	12	28	43%	0.28	42.98	2.21	1.90
vanadium	28	28	100%	18.26	71.72	35.25	40.08
zinc	28	28	100%	19.34	123.69	57.02	69.77

Notes:

[a] units are mg/kg

[b] summary statistics were compiled from Table B-28 of Appendix B of Operable Unit 5 Remedial Investigation Report, Alameda Point, Alameda, California (Neptune 2002)

Acronyms/Abbreviations:

EPC – exposure point concentration
IR – Installation Restoration (Program)
max – maximum concentration reported
mg/kg – milligrams per kilogram
min – minimum concentration reported

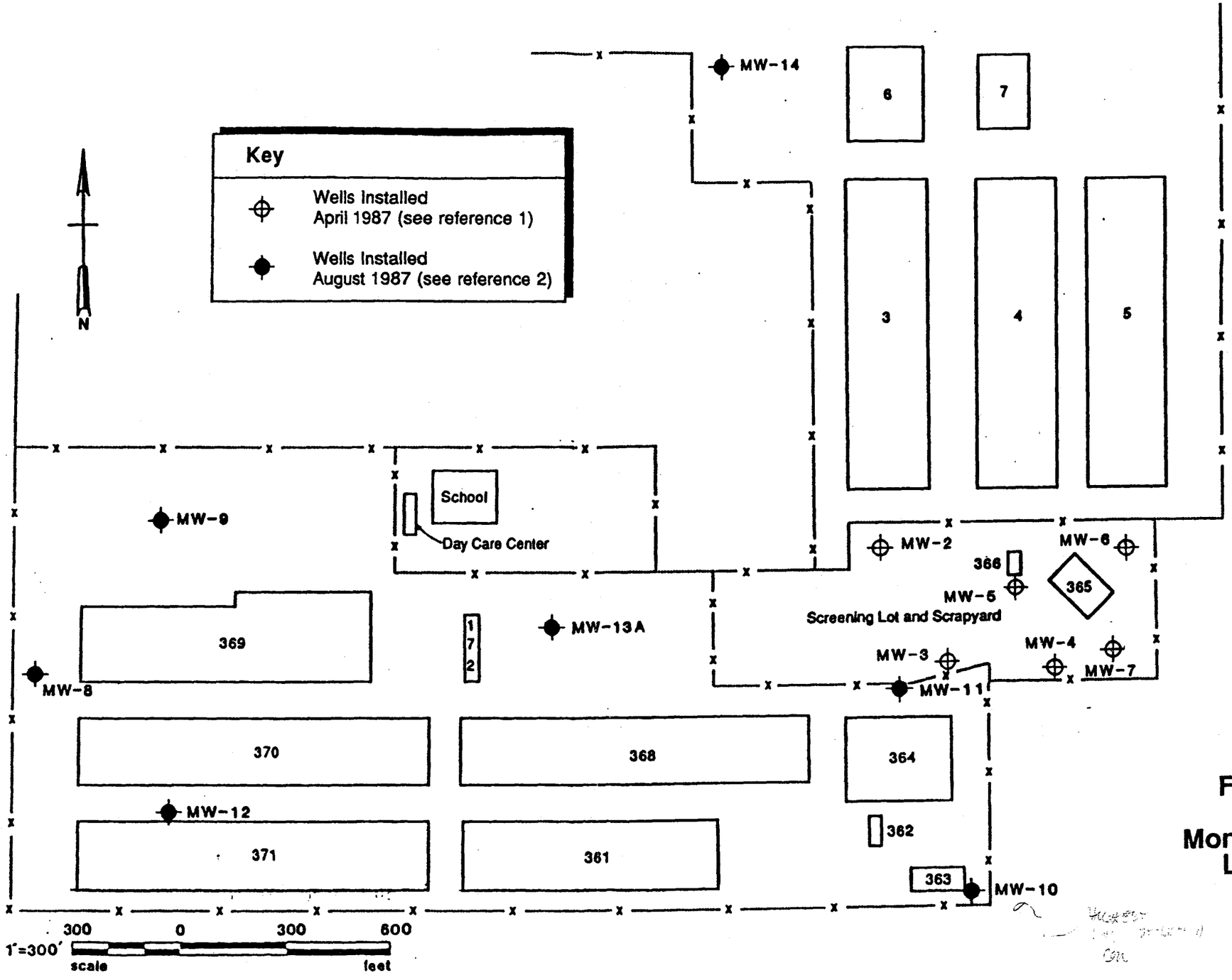


Figure 3-2

Monitoring Well Locations

ERM-West 3/88
Job #400.62

ATTACHMENT C

BORING LOGS

TABLE OF CONTENTS

Attachment

C1 BORING LOGS FOR IR SITE 25

C2 BORING LOGS FOR IR SITE 30

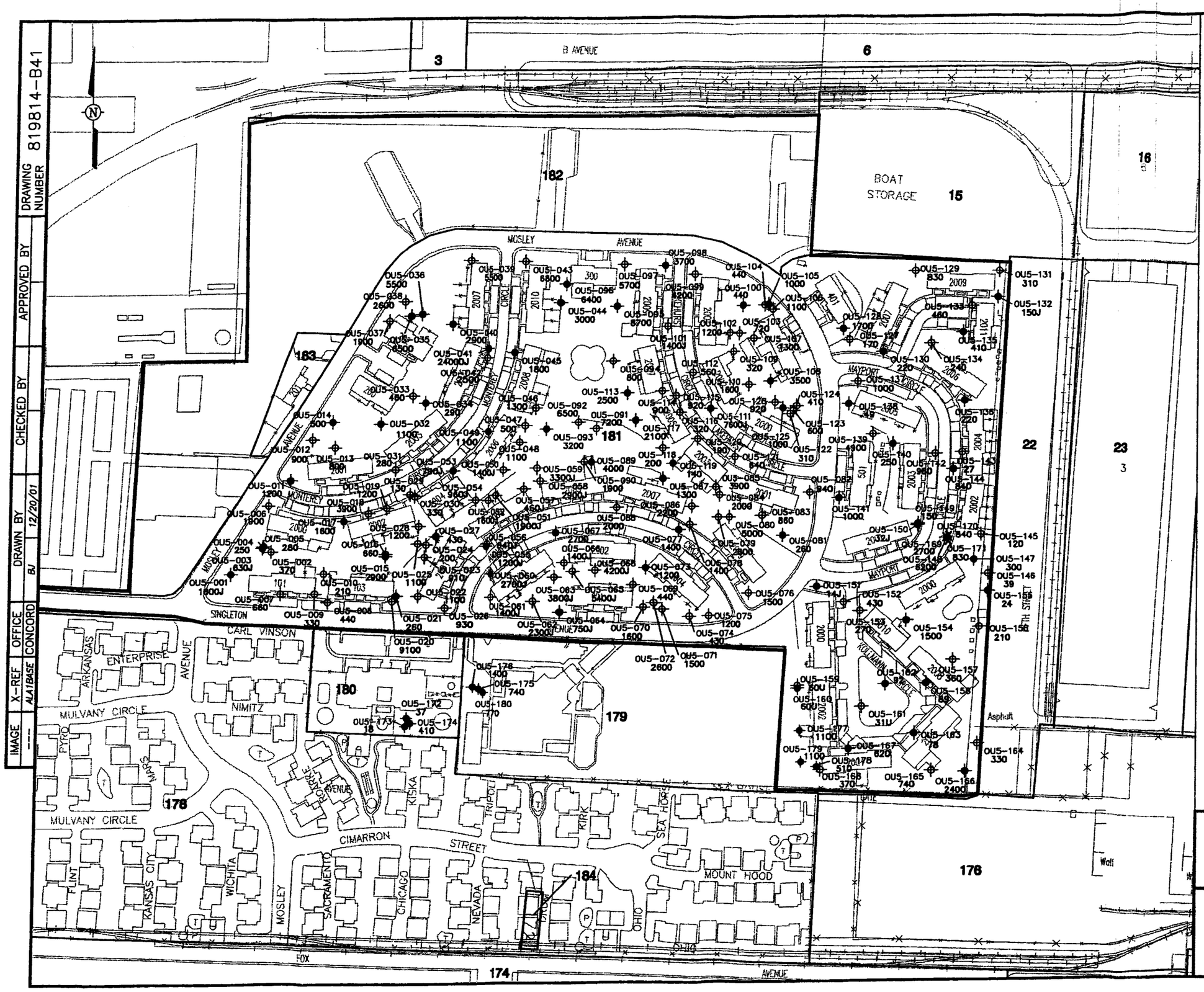
C3 BORING LOGS FOR EAST HOUSING AREA

C4 BORING LOGS FOR FISCA (Including College of Alameda)

C5 ADDITIONAL BORING LOGS FOR FISCA WAREHOUSE AREA

ATTACHMENT C1

BORING LOGS FOR IR SITE 25



LEGEND

▬▬	OU5 BOUNDARY
181	PARCEL NUMBER
———	PARCEL BOUNDARY
X OU5-169	SOIL BORING LOCATION (0–0.5 FT. BGS)
⌖ OU5-139	SOIL BORING LOCATION (0–4 FT. BGS)
✦ OU5-138	SOIL BORING LOCATION (0–8 FT. BGS)
260	BaP EQUIVALENT CONCENTRATION IN MICROGRAMS PER KILOGRAM
120J	ESTIMATED VALUE
60U	NOT DETECTED ABOVE LISTED VALUE

SCALE

0 200 400 FEET

OPERABLE UNIT 5
REMEDIAL INVESTIGATION REPORT
ALAMEDA POINT
ALAMEDA, CALIFORNIA

FIGURE 4–7

BaP EQUIVALENT CONCENTRATIONS
0–0.5 FEET DEPTH INTERVAL

DRAWING NUMBER	819814–B41
APPROVED BY	
CHECKED BY	
DRAWN BY	BJ 12/20/01
OFFICE	CONCORD
X–REF	ALA1BASE
IMAGE	---

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-37 Alameda	
BORING NUMBER: CH-1	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (')	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (')	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Topsoil 6"				
2	TB1-438 TOC		100%	silty sand med dense - dense fine - dry-moist dk grayish brown 10YR 4/2 ↓ dk yellowish brn 10YR 5/6	SM			-Trace of shells
4								
6			85%					-Trace wood
	TB1-479 TOC			7' sand - silty clay wet - soft/loose dk grayish brn 10YR 4/2 8'	SC			
8				9'				
			100%	sand moist - wet - fine loose med dense dk grayish brn 10YR 4/2	SW			-Trace of shells

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Push 9600

Steve Truman

MUC 839-841
842-844
848-850
851-853

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 81984	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH-1	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: McDellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				(cont'd from prev. page				
14			100%		SP			- very wet
16								
				17.5'				
18			60%	clay soft, moist v. dark gray 2.5Y N3/	CH			- some organics - odor
20				TD = 20 ft				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Direct Push 9600

Driller: Steve Trumm

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Abmech	
BORING NUMBER: CH 2	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT RIG		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOPSOIL 6"				
2	TBI-480 TOC		80%	Sand loose-med dense moist Fine lt brownish gray 2.5Y 6/2	SP			
4								
6	TBI-481 TOC		60%					
8								
10			90%					

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power Probe 9600

Driller: Steve Turman

MVC 51-53
54-56
57-59
60-62
63-65

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 817814	PROJECT NAME: CTO-81 Alameda	
BORING NUMBER: C12	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				(cont'd) from pg 1				
14			100%	clay dk gray soft moist 2.5Y N4/ 14'	CH			
				Sand Moist - wet loose brown 10YR4/3 ↓ Gray 2.5YR N5/	SP			
16								
18			100%					
20				TD 20'				

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9600

Driller: Steve Truman

MVC-

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH3	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Topsoil 6"				
			40%	Sand fine med dense moist brown 10YR 5/3	SP1			- some silty sands
2	TBT-4B2 TOC							
4			100%	4'6" silty clay black hard 5'	OL			
				Sand loose-med dense moist brown 10YR 4/3	SP			
6	TBT-4B3 TOC							
8			100%					
10								
12								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC- 98-99
100-102
103-105
106-108
109-111

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 3	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			100%	(cont'd from pg 1)	SP			- Becoming wet
16								
18			100%					
				18.5' silty clay firm-hard moist brn-black	OH			- marsh crust - odor → organic debris
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 817814	PROJECT NAME: CTO-37 Alameda	
BORING NUMBER: CH4	COORDINATES:	DATE: 6-6-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Gettman	Depth Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL .25'				
				silty clay firm moist dk grayish brown 2.5YR 4/2	CL			
2	181-707	TOC	70%					
4								
6			70%					- some organic debris
	181-708	TOC						
				7'10"				
8				sand loose fine moist-wet dk Gray 2.5YR N4/	SP			
10			70%					
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Turner

MUC 212-214
215-217
218-220
221-222
223-224

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda	
BORING NUMBER: CH 4	COORDINATES:	DATE: 6-6-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				?				
14			10%					
				silty clay silt, moist. dk gray 2.5 ~~YR N4/~~	CL			
16								
			10%	18'				
16				silty clay ~~silt~~ moist olive gray 5Y 4/2	OH			- organic debris - odor
20								
				↓				- some odor
22			30%	dk gray 2.5YR N4/				
				TD 24'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Pull 9600

Driller: Steve Tirman

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-5	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zill mc	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Cig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL 6"				
				silty sand firm dry - moist Dark Brn. 7.5 YR 3/2	SM			- crushed Rock
2	181-484 TOC		no 8					
4								
			60%					
6					SM			
	181-485 TOC			Sand Med dense moist brown 10YR 5/3 ↓ Gray 10YR 5/1	SP			
8								
			100%					
10								
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Tinma

MVC 863 - 865
866 - 867
874 - 876
877 - 879
880 - 882

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-5	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: N. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14					SP			
16								
18				19'				
				Clay moist, soft v. dk gray 10YR 3/1	Cl			
20				TD-20'				

NOTES:

Drilling Contractor: Kehe

Drilling Equipment: Power Push 9610

Driller: Steve Turner

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: E19814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-6	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Topsoil 6"				
2	181-486 TOC		70%	Sand loose fine dry-moist lt brownish gray 10YR 6/2 5'	SP			
4								
6	181-487 TOC		100%	clay soft moist dk gray 2.5Y N3/ 7'	CH			
8				clayey Sand loose, fine, moist brown 7.5YR 5/4 9'	SC			
10			90%	Sand med dense moist fine gray 2.5YR N4/	SP			
12								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power Probe 9100

Driller: Steve Truman

MVC- 124-125
126-128
129-131
132-134
135-~~137~~ 136 RAC 6/25/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 6	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				P				
				Sand from 13'				
14			100%		SP			
16								- odor - dark sediment - black
18			100%	18'				- organic debris - odor
				clay firm moist very dk gray 7.5YR N3/	CH			
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: RTO-37 Alameda	
BORING NUMBER: CH8	COORDINATES:	DATE: 6-6-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: HPT Rig		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL 6"				
				silty Sand				
				fine - fine Gravel	GM			-crushed Rock
				loose - med dense				
2	178-0018 TOC		100%	dry - moist				
				v dark grayish brn				
				layer 3/2				
4								-some clay
				5'				
				silty clay -> clay w/ depth	ML/CH			
				firm				
6			100%	moist				
				wetter + softer w/ depth				
	178-0019 TOC							
8								
								-some sandy clay
			60%					
10				clay				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Truman

MVC - 225 - 228
229 - 232
233 - 235
236 - 238
239
240 - 241

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 8	COORDINATES:		DATE: 6-6-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT R16			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			60%	Clay from B1				
				15'6"				
16				Sand fine wet loose dk gray 2.5Y N4/	SP			
18			10%					
20								
22			20%	Silty clay moist soft dk greyish brn 10YR 4/2	OL			organic debris
24				TD 24'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Truman

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-9	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL .5'				
			90%	silty sand med-dense dry-fine brown 7.5YR 4/4	SM			
2								
	181-704	TOC		Sand loose dry-moist fine lt brownish Gray 10YR 6/2	SP			-Trace Crushed Rock
4								
			60%					
6	181-705	TOC						
8				8.6'				
			100%	Silty Clay soft, moist Gray 7.5YR N5/ 10'	CL			
10				Clay soft, moist dk gray 7.5YR N4/	CH			
12								

NOTES:

Drilling Contractor Geoprobe

Drilling Equipment Power Push 9610

Driller: Steve Truman

MUC-~~885~~ 886-888

892 - 894

901 - 903

904, 0013, 0025

003 - 005

006 - 008

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 814815	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-9	COORDINATES:		DATE: 6-4-01
ELEVATION: ---	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellmer	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				sand loose fine, moist yellowish brn 10YR 5/4 12'6	SP			
				clay soft, moist gray 2.5Y N5/1 13'	CH			
14			60%	sand gray 10YR 5/1 14'6	SP			
				Clayey sand soft moist gray 10YR5/1	SC			
16								
			80%					
18				sand fine, moist brown - gray 19'6"	SP			
20				clay soft moist dark gray	OH			organics
				TD = 20'				

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Rush 9600

Driller: Steve Truman

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda	
BORING NUMBER: CH-10	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
2	181-702	TOC	90%	Clayey sand / moist, loose, fine grayish brn 10YR 5/2 3.5'	SC			
4				Clay moist, firm v. dark gray 2.5YR N3/ 7'	CH			
6	181-703	TOC	80%					
8				SAND fine, moist, firm v. dark gray 2.5YR N3 ↓ to dark gray 5Y 4/1	SP			
10			100%					
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Pace Rich 9600

Driller: Steve Tivra

MUC-813s - 815
819s - 821s
822 - 823
827 - 829
830 - 832

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 10	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				cont from previous page				
14			100		SP			
16								
18			50%	18.5'				
				Clay soft, moist v. dark gray 2.5Y N3/ 19'	OH			Trace organics - slight odor
20				silty clay firm, moist v. dark grayish brown 2.5Y 3/2	CL			
				TD 20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Truman

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-11	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOPSOIL 1'				
2			100%	silty clay moist, firm very dark gray 10YR 3/1 3.5'	CL			
4			100%	SAND Dry-moist LOOSE Brown 10YR 5/3 6.5'	SP			
6				clay moist - firm v. dark gray 2.5Y N/3 7'	OH			
8			100%	sand Dry-moist, firm dark yellow brn 10YR 4/6 to grayish brn 10YR 5/2 11'6"	SP			-Trace of Shells
10				clay moist. firm v-dark gray 2.5Y N3/	OH			
12								

NOTES:

Drilling Contractor Kehoe

ing Equipment Power Push 9610

er: Steve Terman

MWC 787.5 - 789.5
793 - 795.5
796.5 - 798.5
799.5 - 801.5
805 - 806

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-11	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12			100%	sand med dense - dense moist - wet well graded dark Gray 5YR 4/1 16'	SW			
14								
16				silty clay dk. grey firm 5YR 4/1 moist 17'	CL			
18			50%	Clay soft - firm moist V. dark gray 2.5YR N3/ 20'	OH			
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Steve Inman

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 818814	PROJECT NAME: C10-31 Alameda		
BORING NUMBER: CH 12	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL 1'				
2			80%	clayey silt firm moist dk brown 10YR 3/3	OL			- some concrete + crushed rock
4								
6			90%	6' clay firm moist dk gray 2.5YR N4/ 7'6"	OH			- some organics
8				sand Med dense - dense moist wet fine gray 2.5Y N5/	SP			
10			100%					

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC- 66-67, 68-70, 71-73, 74-76, 77-79

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: EM814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 12	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			100%	SW	SP			-some shells
16				Cont'd from pg 1				
18			100%					
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

2436-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH-13	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				Topsoil 1'				
2			90%	silty clay firm - moist dk Grayish brn. 2.5Y 4/2	ML			Trace of crushed Rock
4				5'				
6			90%	sand med dense, fine, moist dk Grayish Brn. 2.5Y 4/2	SP			
8								
10			90%		SP			
12								

NOTES:

Drilling Contractor Kehoe

ing Equipment Power Push 9600

er: Steve Turner

774S
775S
776S
783S - 784S
785S - ~~786S~~ RCC 6/25/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CO 31 Alameda		
BORING NUMBER: CH-13	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellma	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				sand				
				fine, med dense, moist				
				dk grayish Brn.				
14			50%	2.5Y 4/2	SP			
16								
18			60%					
				16.5'				
				silty clay - clay soft - moist v. dark gray 2.5Y N/3 18.5'	CL			
				silty clay firm - moist v. dark grayish Brn	CL			
20								
				TD 20'				
				2.5YR 3/2				

NOTES:

Drilling Contractor: Cahoe

Drilling Equipment: Power Push 7600

Driller: Steve Truman

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 898M	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-14	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellmer	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DIRECT PUSH			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
2			80%	SILTY SAND - SAND FINE, DRY - MOIST MED DENSE - DENSE DK. GRAY 10YR 4/2	SM			
4								
				5'				
6			80%	CLAY, MOIST, FIRM	CL			
				7'				
8				SAND, MOIST LOOSE - MED DENSE dark gray 7.5YR N4/ 8'	SP			- w/ clay lenses
10			100%	SAND, MOIST, FIRM WELL SORTED GRAY 10YR 5/1	SP			
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Rod 7610

Driller: Steve Tiemann

MUC - 4745
MUC - 4785
MUC - 4825
4865
4875

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-14	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zettner	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
			100%	Clayey SAND GRADING TO SAND LOOSE, MOIST-WET FINE GRAY 10YR 5/1	SC			
14								
16								
18			80%					
				20'				
20								
				TD-20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Prowler 7610

Driller: Steve Tirna

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CH-31 Alameda	
BORING NUMBER: CH-15	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOPSOIL 1'				
2			100%	SILTY SAND very fine - dry dense Brown 10YR 5/3 3'	SM			
				clay - firm, MOIST v DARK GRAY 10YR 3/1 3.5'	CL			
4				SAND - fine - loose DK Gray 5Y 4/1 Grading to Clay - Soft DK Gray 5Y 4/1 5'	SP			
6			100%	silty clay - clay loose - moist v. dark Gray 7.5 YR N3/1 8'	ML			
8				SAND - FINE soft - firm, moist - wet DK Gray 5Y 4/1	SP			
10			100%					
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

: Steve Truman

MUC - 7605
7615
7623
7665
7675

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 8984	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH15	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				SAND - FINE SOFT, FIRM, MOIST - wet DK GRAY 5Y 4/1				
14			80%		SP			
16								
18			80%	18.5'				
				Clay FIRM, MOIST VR. DK. GRAY 7.5YR N3/ 20'	CL			
20				TD 20'				

NOTES:

Drilling Contractor Geline

Drilling Equipment Power Push 7610

Driller: Steve Truman

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH 116	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL 6"				
2			90%	silty sand v. fine - coarse dry - moist loose - dense brown 7.5YR 5/2 3'	SM			-some rock
4				sand moist fine loose lt brownish gray 10YR 6/2	SP			
6			90%	8'				
8			80%	silty clay soft moist very dk gray 2.5Y N3/1 11.5'	ML			
10				sand wet, fine, loose grayish brown -10YR 5/2	SP			
12								

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

Steve Truman

MVC- 163-165
166
167-169
170-172
173-175

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 684814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-16	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				Sand fine moist loose grayish brown 10YR 5/2	SP			
14			66%					
16								
18								some clay
				19'				organic debris marsh crust
				Silty clay soft - firm moist brown 7.5YR 4.2	CL			Bay mud
20								
				TD 20'				
7								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9600

Driller: Steve Truman

MVC-

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 ALAMEDA	
BORING NUMBER: CH-17	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT 2.17		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
2			80%	SILTY SAND - SAND, FIRM, DRY-MOIST, FINE BROWN 10YR 4/3	SM			
4								- TRACE GRAVEL
				5'5"				
6			100%	SILTY SAND - CLAY FIRM ~~Wet~~-MOIST DARK GRAY 2.5Y N 4/ 7'	SC			
8				SAND, FINE, Med dense, MOIST Well sorted GRAY 7.5YR N5/	SP			
10								
12								

NOTES:

Drilling Contractor Cehse

Drilling Equipment Power Push 9600

Driller: Steve Trina

MUC - 750S
751S
752S
753S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-17	COORDINATES:	DATE: 6-4-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				SAND FINE MOD DENSE, MOIST-WET well sorted GRAY 7.5YR N5/				
14			100%		SP			
16								
18			100%					
20				TD 20'				

NOTES:

Drilling Contractor: Cline

Drilling Equipment: ~~DPT Rig~~ Power Push 5600

Driller: Steve Truma

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: Alameda CTO - 31		
BORING NUMBER: CH-18	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL .5'				
				sand, fine, medium, moist dark yellowish Brn. 10YR 3/4 1.5	SP			Trace crushed Rock
2	CH		80%	sand - fine, moist dark grayish Brn 10YR 4/2	SP			
4				5'				
				sandy clay - clay, moist, firm 7.5YR N14 6'	CL			
6			90%	SAND - FINE, MOIST yellowish Brown 10YR 5/4	SP			
8				8'				
				silty sand - fine, moist, firm BRN - DK. GRAY 10YR 5/4 10YR 4/2 9'	SM			
10			100%	SAND - FINE, moist, FIRM yellowish Brn 10YR 5/4	SP			
12								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 4610

Driller: Steve Truman

MVC - 4665
MVC 4675
MVC 4685
MVC [illegible] ?
4695
4705

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 81984	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-1B	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth .	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				SAND - FINE · MOIST GRAY 10 YR 5/1				
14			90%	14'	SP			
16				SAND, MOIST-WET, FINE yellowish BRN 10YR5/4				~~TRACE~~ CLAY (Gray) 3" of
18			100%	18.5'				-TRACE ORGANIC (MARSH CRUST
				CLAY - MOIST - FIRM dk. GRAY 7.5YR N/4	CH			
20				TD 20'				

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Rod 9600

Driller: Steve Trima

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER: 819814	PROJECT NAME: CTO-81 Alameda		
BORING NUMBER: CH 19	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				silty sand yellowish brn 10YR 5/4 dense fine dry-moist 1'	SM			- Crushed Rock
2			80%	Sand - silty sand dense dry - moist fine gray 10YR 5/1	SP/SM			
4								
6			100%	7'				
				clay soft firm moist	CH			
8								
10								
12								

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

Driller Steve Truman

MVC- 80S- 82S
86 - 88
89-91
92-94
95-97

2438-3-98

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: EM814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 19	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			100%	Clayey sand very soft wet v. dark gray 2.5YR N3/ 15'	SC			
16				sand - clayey sand w/ depth med dense - dense moist dk. gray 2.5YR N4/ 19'	SP/SC			
18			100%					
20				sand fine moist med dense dk gray 2.5YR N4/	SP			
				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9600

Driller: Steve Truman

MVC-

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-20	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Sand med dense - dry Fine - coarse light gray 10YR 6/1 3'	SW			- poorly sorted
2			100%					
4				Sand brown loose 10YR 4/3 moist 5'	SW			
6			100%	Clay soft moist/wet gray 7.5YR N5/ 7'	CH			- shells
8				Sand loose moist gray 7.5YR N5/	SP			
10			8%	NR				
12								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

r: Steve Truman

MVC- 112-114
115-117
118-120
121-123

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: EM814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 20	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			0%	NR 19'				
16				Sand				
				grading to				
18			80%					
20				Clayey sand	SC			
			100%	Sand loose wet ~~moist~~ gray 7.5YR N5/	SP			
22								
24								

TD 24'

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

Driller: Steve Truman

MVC-

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: C11-21	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOPSOIL .75'				
2			100%	silty sand - sand fine, dry-moist. loose-med dense Dark Gray 5YR 4/1	SM			
4								
6			50%					
8								
10			100%	9.5' silty clay v. soft, gray 7.5YR N 5/1 10.5'	CL			
				sand fine, moist, loose gray 10YR 5/1	SP			

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Push 9610

Driller: Steve Turner

MUC - 37S-39
40-41
42-44
45-47
48-50

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda	
BORING NUMBER: CH-21	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellmer	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: ODT		PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				(cont'd from PS 1	SP			
14			100%	silty clay very soft wet gray 7.5YR N5/ 15'	CL			
16				Clayey sand very soft wet fine dk gray 5Y 4/1	SC			
18			100%	19'6"				
20				sand moist fine loose - mod dense gray 7.5YR N/5 20'	SP			
				TD 20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9610

Driller: Steve Truman

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 684814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 22	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOPSOIL				
2			60%	Sand dry - moist Fine - med grain v. dense Pale Brn 10YR 6/3 3.5'	GC			- Crushed Rock
4			50%	silty clay dry - moist firm - hard	CH			
6				Sand dry - moist Fine w/ some med grain dense - v. dense Pale Brn 10YR 6/3 9'	SP			
8								
10			100%	clay moist soft - firm gray 2.5Y N5/ 10'	OH			
				Sand moist fine gray 2.5Y N5/ 10'6"	SP			
12				Clay	OH			

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9610

Driller: Steve Tr--

MWC - 021S - 023S
028 - 029
30 - 32
33 - 36

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 37 Alameda		
BORING NUMBER: CH-22	COORDINATES:		DATE: 6-4-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-4-01
ENGINEER/GEOLOGIST: M. Zellmer	Depth	Date/Time	DATE COMPLETED: 6-4-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				silty clay wet, very soft gray 7.5YR N/5 13'	OL			
14			80%	sand wet, fine, med dense gray 7.5 YR N/5 16'6"	SP			
16				silty clay wet soft gray 7.5YR N/5 17'6"	OL			
18			100%	sand wet fine...	SP			
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Puch 9600

Driller: Steve Trump

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: E19814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH-23	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0			60%	- silty sand med dense dry fine-coarse pale brn 10YR 6/3	SM			- crushed Rock - poorly sorted
2								
4								
6				7'				
				clay Hard dry-moist 8'	OH			
8				silty sand	SM			
			60%	10'				
10				silty clay soft moist 7.5YR 4/2	CL			
12								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

: Steve Truman

MVC- ~~138 - 140~~ 2 RDC 6/05/01

141 - 143

144 - 146

147 - 149

150 - 152

damaged files

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: EM814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-23	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				clayey silt from 15'	ML			
14			100					
16								
18								
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: SA814	PROJECT NAME: CTO-31 Alameda		
BORING NUMBER: CH 24 P175	COORDINATES:		DATE: 6-6-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zollinger	Depth	Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0								
2			60%	silty sand dry - moist fine - coarse sand; med dense grey - reddish yellow 2.5YR 6/8 5'	SM			
4				Sand loose moist fine lt brownish gray 2.5Y 6/2	SP			
6			90%	Clay soft - firm moist 6'	CL			} some clay
8				Sand loose, moist, fine lt. brownish gray 2.5Y 6/2	SP			
10			100%					
12								

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Home: Push 9600

Driller: Tyler Deets

MUC - 256-258
259-262
263-265
266-268
269-272
273-276

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 8918H	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 24 P175	COORDINATES:		DATE: 6-6-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				sand from PD 1				
14			100%	grading to gray sand 2.5Y 5/N	SP			shells
16								
18			100%	silty clay soft fine gray 2.5Y 5/N 19.5'	CI			wet
					OI			marsh crust - dk. organics
20				silty clay soft moist dk grey/brown 2.5Y 4/2	CI			
22								
24								

NOTES:

TD 24'

Drilling Contractor: Kehoe

Drilling Equipment: Powerpush 9600

Driller: Tyler Deets

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: E9814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 25	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL .5'				
2			50%	clayey sand moist - wet soft reddish brown 5YR 5/3 3'	SC			
4				silty sand loose fine - medium very pale brown 10YR 7/4 7'	SM			- some crushed Rock
6			90%					
8			60%	silty clay soft moist gray 2.5YR N5/	CL			
10								
12								

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

Steve Truman

MVC- 185 - 187
188 - 189
190 - 192
193-195

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: E19814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-26	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				silty clay ↓ pg 1.	CL			
14			60%	14.5'				
				Sand very wet loose dk. gray 2.5Y 4/1	SP			
16								
18			0%	no Recovery - sample stuck				
20				TD. 20'				

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

Driller: Steve Truman

MVC-

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 614814	PROJECT NAME: CTO-81 Alameda	
BORING NUMBER: CH26	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Silty sand dense dry fine-coarse yellowish Brn 10YR 5/4	SM			- some clay
2			50%					
4				Clay soft moist Dk. Gray 2.5Y N/4	CH			- some fines
6			40%					
8								
10								
12								

NOTES:

Drilling Contractor Kehoe Drilling

Drilling Equipment Power probe 9100

: Steve Truman

MVC-

153-155
156-157
158-159
160-162

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-81 Alameda	
BORING NUMBER: CH 26	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
14			0%	NR				
16				silty clay very soft wet Dk Gray 2.5Y N/4	CL			
18			100%					-shells
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 619814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH-27	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0								
2			0%	?				
4				silty sand dry, loose, fine-coarse ltbrn - yellowbrn. 5'	GM			- crushed Rock - crushed shells
				Clay silt - firm, moist, dk gray 7.5YR N4/	CH			
6			70%	silty sand dry loose - dense fine - coarse brown 7.5YR 5/2 9'	SM			
11				silty clay soft moist dk gray 7.5YR N4/	CL			
12								

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9600

Driller: Steve Truman

MVC- 176-177
178-180
181-182
183-184

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: EM814	PROJECT NAME: CTO-31 Alameda	
BORING NUMBER: CH 27	COORDINATES:	DATE: 6-5-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				silty clay PG 1				
14			50%		CL			
16								
18			50%	18.5'				- marsh crust
				silty clay soft - firm moist brown 7.5 YR 4.2	CL			
20				TD 20'				

NOTES:

Drilling Contractor: Kehoe Drilling

Drilling Equipment: Power probe 9100

Driller: Steve Truman

MVC-

2438-3-96

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO -31 Alameda		
BORING NUMBER: CH 28	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Dillman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0								
2			60%	very silty sand loose - med dense dry - moist fine - coarse olive gray 5Y 5/2 3'6"	GM			- poorly graded - Rocky - crushed shells
4				Clay soft - Firm moist dk gray 2.5Y N4/	CH			
6			60%					
8								
10								
12								

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Push Rig

Driller: Steve Truman

MUC 196-197
198, 199
200-202
203-205
206-208
208-211
AOC 6/25/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 87 Alameda		
BORING NUMBER: CH 28	COORDINATES:		DATE: 6-5-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-5-01
ENGINEER/GEOLOGIST: M. Zettman	Depth	Date/Time	DATE COMPLETED: 6-5-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
				Clay from PS 1				
14								- Some organic debris
16					CH			
18								- no ~~bay~~ marsh crust
20				TD-20'				

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9610

Driller: Steve Truman

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda	
BORING NUMBER: CH 29 P178	COORDINATES:	DATE: 6-6-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Topsoil 6"				
2			80%	Silty clay soft-firm moist strong Brown 7.5YR 4/6	GC			Crushed Rock
4				?				
6			20%					
8				Clay soft moist 2.5GY 4/1	CH			
10								
12								

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Push 9600

Driller: Tyler Deets

242-244
245-248
249-252
253
254-255

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda	
BORING NUMBER: CH 29 P178	COORDINATES:	DATE: 6-6-01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT - Rig		PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12				↓ PS 1 13'				
14			100%	Sand wet fine loose dk gray 7.5Y N4/ 15'6"	SP			3 clay lense 1"
16				very silty clay moist soft dk gray 7.5Y N4/	CL			16' dark organics odor
18			10%					
20								
22			90%	Sand wet loose fine dk gray 7.5Y N4/	SP			
24								

NOTES:

Drilling Contractor: Kehoe

Drilling Equipment: Power Push 9600

Driller: Tyler Deets

TD 24'

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 30 P184	COORDINATES:		DATE: 6-6-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT - Rig			PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				Topsoil 6"				
2			70%	Silty sand loose - med dense moist fine - med coarse St. brown 7.5YR 5/8 - 3'	GM			- crushed Rock
4				Silty clay soft - firm moist St brown 7.5YR 5/8 7'	CL			- some sand
6			100%					
8				silty clay soft moist Gray 7.5YR N5/	CL			- some silt - some sand
10			100%					
12								

NOTES:

Drilling Contractor Kehoe

Drilling Equipment Power Probe 9600

Driller: Tyler Beath

MUC - 277 - 279
280 - 282
283 - 285
286 - 288
289 - 291
292 - 293

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 Alameda		
BORING NUMBER: CH 30 P 104	COORDINATES:		DATE: 6-6-01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-6-01
ENGINEER/GEOLOGIST: M. Zellman	Depth	Date/Time	DATE COMPLETED: 6-6-01
DRILLING METHODS: DPT Rig			PAGE 2 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
12								
			100%	Sand moist-wet fine loose } very wet	SP			-some clayey sand
14				Gray 75 YR N5/				
16								
18			100%					-some clayey sand
20								
22			100%					
24								

NOTES:

Drilling Contractor: Geoloc

Drilling Equipment: Power Push 9600

Driller: Tyler Deets

TD 24'

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-001	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 2001
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 2001
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
			100%	CLAY, MOIST, FAT, DARK GRAYISH BROWN, 10YR 4/2, ROOTS	CL			
2								
4				TRACE 1/4" GRAVEL	CL			
6			100%	CLAY, MOIST TO SATURATED, PLASTIC, DARK GRAY, 2.5Y 4/0	CL			
8				SAND, FINE, WELL GRADED, SATURATED DARK GRAY 2.5Y 4/0	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING AND ENG.

Drilling Equipment

: TYLER DEEDS

PHOTOS ~~[illegible]~~ MVC-841S TO MVC-846S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-002	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 2001
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 2001
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			75% (COMPACTED)	GRAVELLY SAND, FINE TO COARSE MOSTLY FINE, SILT (5-10%) GRAVEL (5-10%) CLAY (0-5%), DRY TO SLIGHTLY MOIST, DARK GRAY 10YR 4/1	SP			
2								
3				SILTY CLAY, PLASTIC, SLIGHTLY MOIST, SILT (10-15%) SAND (0-5%) DARK GRAY, 10YR 4/1	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING AND DRILLING

Drilling Equipment

Driller: TYLER DEEDS

PHOTO No. MVC-847S
MVC-848S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-003	COORDINATES:		DATE: 23 MAY 2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 23 MAY 2001
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE TO COARSE MOSTLY FINE POORLY GRADED SILT (5-10%) GRAVEL (0-5%) CLAY (0-5%) SLIGHTLY MOIST, 10YR 4/1, DARK GRAY	SP			
2								
3				SILTY CLAY, SLIGHTLY PLASTIC, SLIGHTLY MOIST 10YR 4/1 DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING AND DRILLING

ing Equipment

ler: TYLER DEEDS

PHOTO NO MVC-849S
MVC-850S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31-ALAMEDA	
BORING NUMBER: OU5-004	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 2001
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				CLAYEY SAND, FINE SAND, ROOT MATTER, WET, DARK GRAY 10YR 4/1 CLAY (5-10%)	SM			
4				SILTY CLAY, TRACE GRAVEL ROOT MATTER, SLIGHTLY PLASTIC, SILT (10-15%) GRAVEL (0-5%)	CL			
6				SAME AS ABOVE, ~~MORE~~ LESS COMPACT GRADES TO WET PLASTIC LESS COMPACT CLAY, 2.5YR 3/0 VERY DARK GRAY	CL			
8								

NOTES:

Drilling Contractor KEHOE TESTING AND ENG.

Drilling Equipment

Driller: TYLER DEEDS

PHOTO No.

MVC-851, MVC-852 > 0-4'

MVC-853, MVC-854, MVC-855 > 4'-8'

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: SU5-005	COORDINATES:		DATE: 23 MAY 01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 23 MAY 01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SAND, FINE, WELL GRADED WET, 10YR 3/2 VERY DARK ~~REDDISH~~ GRAYISH BROWN	SW			
2								
3				SAME AS ABOVE				
4				~~SILTY, CLAY~~ AP SILTY CLAY NON PLASTIC, SLIGHTLY MOIST, SILT (10-15%) 10YR 3/2 VERY DARK GREYISH BROWN	CL			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWERPROBE 9600

Driller: TYLER DEEDS

NO PHOTOGRAPHS

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-006	COORDINATES:	DATE: 23 MAY 01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE TO MEDIUM, MOSTLY MEDIUM, SILT (5-10%) GRAVEL (5-10%) DRY TO SLIGHTLY MOIST, POORLY GRADED, 10YR 4/2, DARK GRAYISH BROWN	SP			
2								
3				SILTY CLAY, SLIGHTLY PLASTIC DRY TO SLIGHTLY MOIST, SILT (10-15%) 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TDF 4				

NOTES:

Drilling Contractor ~~8148~~ KEHOE TESTING

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

PHOTOS MVC - 8565
MVC - 8573
MVC - 8585 LDL 6/20/01

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-007	COORDINATES:		DATE: 23 MAY 2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 23 MAY 01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY GRAVEL, UP TO ½" SA-SR, SILT (5-10%) SAND (0-5%), DRY, 10YR 4/2 DARK GRAYISH BROWN	GM			
2								
3				SILTY CLAY WITH TRACE GRAVEL, SILT (10-15%) GRAVEL (0-5%) DRY, 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

ng Equipment POWER PROBE 9600

er: TYLER DEEDS

MVC-8595

MVC-8605

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-008	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23MAY01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23MAY01
DRILLING METHODS:		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				CLAYEY SILT, NON-PLASTIC, CLAY (0-5%) 10YR 4/2 DARK GRAYISH BROWN, MOIST	~~SM~~ ML			
2								
3				SILTY CLAY, PLASTIC, MOIST SILT (10-15%) 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-861S

MVC-862S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-009	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23MAY01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23MAY01
DRILLING METHODS:		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY GRAVEL, UP TO 1/2" SILT (20-25%) FINE SAND (10-15%) DRY, DARK GRAYISH BROWN 10YR 4/2	GM			
3				CLAY, MOIST, PLASTIC, DARK GRAY ~~10YR~~ 5YR 4/1 ~~10YR~~	CL			
4								

NOTES:

Drilling Contractor KEHOE DRILLING/ENG

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-8635
MVC-8645
MVC-8655

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-010	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL GRADES TO SANDY GRAVEL WITH CLAY TO SANDY CLAY				
1								
2			<50%					
3								
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWERPROBE 9600

Driller: TYLER DODDS

PHOTO. NO. MVC-8665

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-011	COORDINATES:	DATE: 23 MAY 2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 23 MAY 01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 23 MAY 01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				SANDY SILT, FINE SAND (10-15%) GRAVEL (0-5%) SLIGHTLY MOIST, LOOSE 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
4				CLAY, PLASTIC, TRACE FINE SAND (0-5%) TRACE SILT (0-5%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
6								
8				SAME AS ABOVE 10YR 2/2 VERY DARK BROWN				
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

g Equipment POWERPROBE 9600

er: TYLER DEEDS

PHOTOS MVC-8675
MVC-8685
MVC-8695

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-012	COORDINATES:	DATE: 5/23/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT R16		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			75%	SANDY CLAY, FINE SAND (20-25%) PLASTIC, WET, TRACE GRAVEL LENSE, 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
2				CLAY, PLASTIC, TRACE FINE SAND (0-5%) TRACE SILT (0-5%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
3								
4				SAME AS ABOVE TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment

Driller: TYLOR DEEDS

PHOTOS MVC-8705
MVC-8715

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31-ALAMEDA	
BORING NUMBER: OUS-013	COORDINATES:	DATE: 5/[redacted]/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/[redacted]/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/[redacted]/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			75%	CLAYEY SAND, FINE SAND, CLAY (15-20%) WELL GRADED, MOIST TO WET, VERY DARK GRAYISH BROWN, 10YR 3/2	~~SM~~ SC			
1.5								
3				SILTY CLAY, PLASTIC, MOIST, SILT (10-15%) DARK BROWN, 10YR 4/3	CL			
4				GRADES TO CLAY, PLASTIC, SILT (0-5%) TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-8725
MVC-8735

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-14	COORDINATES:		DATE: 5/23/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				GRAVELLY CLAY, (5-10 %) GRAVEL, SAND (0-5 %) FINE	CL			
4				CLAY, PLASTIC, TRACE FINE SAND (0-5 %) TRACE SILT (0-5 %) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
6				SAND, FINE, WELL GRADED WET, 10YR 3/2 VERY DARK GRAYISH BROWN	SP			
8				CLAY PLASTIC, SATURATED 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-8745
MVC-8755
MVC-8765
MVC-8775

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: SUS-15	COORDINATES:		DATE: 5/23/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				SANDY CLAY, FINE SAND (20-25%) PLASTIC, MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
4				CLAY, PLASTIC, TRACE FINE SAND (0-5%) TRACE SILT (5-10%) MOIST DARK GRAYISH BRN 10YR 3/2	CL			
6				SAME AS ABOVE GRADES TO 7.5YR 4/0 DARK GRAY, MOIST TOP	CL			
8				SAND, FINE, WELL GRADED, SILT (0-5%) SATURATED 7.5YR 4/0 DARK GRAY	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

ng Equipment POWER PROBE 9600

er: TYLER DEEDS

MVC-883S
MVC-884S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-16	COORDINATES:		DATE: 5/1/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/1/2001
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/1/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				CLAYEY SAND, FINE SAND, CLAY (10-15%) GRAVEL (0-5%) SILT (5-10%) COMPACT, DARK BROWN 10YR 4/3	SM SC			
2								
				CLAY PLASTIC, MOIST COMPACT, FINE SAND (0-5%) 10YR 4/3 DARK BRN				
3				SAND, FINE, WELL GRADED, MOIST DARK BROWN, 10YR 4/3	SW			
				CLAY, PLASTIC, MOIST, 10YR 4/3 DARK BROWN	CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

8885
8895

2439-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-17	COORDINATES:		DATE: 5/23/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75%	SILTY GRAVEL, SILT (10-15%) FINE SAND (5-10%) COMPACT DRY DARK GRAYISH BROWN 10YR 4/2	GM			
4			100%	CLAY, PLASTIC MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
6				GRADES TO 7.5YR 4/0	CL			
8				CLAY PLASTIC, WET, 7.5YR 4/0 DARK GRAY	CL			
				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-890S
MVC-891S
MVC-892S
MVC-893S
MVC-894S
MVC-895S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-18	COORDINATES:	DATE: 5/23/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SILT, GRAVEL (5-10%) SAND, FINE, (0-5%) COMPACT, DRY 10YR 4/2 DARK GRAYISH BROWN	ML			
2								
3				CLAY PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
4				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BRN	SW			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE ENG/TESTING

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-8965

MVC-8975

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-19	COORDINATES:	DATE: 5/23/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SANDY SILT, FINE SAND (10-15%) GRAVEL (10-15%) CLAY (0-5%) 10 YR 4/2 DARK GRAYISH BROWN, DRY	ML			
2								
3				SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
				CLAY, PLASTIC WET 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

r: TYLER DEEDS

MVC-898S
MVC-899S
MVC-900S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-020	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	~~SILT~~ CLAYEY SILT, COMPACT NON-PLASTIC, CLAY (5-10%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	ML			
2								
3				CLAY, PLASTIC, MOIST TRACE SAND (0-5%) TRACE SILT (0-5%) 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

~~HW~~ MVC-001S
MVC-002S
MVC-003S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-021	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				GRAVELLY SILT W/CLAY GRAVEL (5-10%) CLAY (0-5%) COMPACT, 10YR 4/2 DARK GRAYISH BROWN, MOIST	ML			
2				SILTY GRAVEL, SILT (20-25%) SA-SR, SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN	GM			
4				CLAY PLASTIC, MOIST, SILT (0-5%) 10YR 4/2 DARK GRAYISH BROWN MOIST	CL			
6				GRADES TO WET/SATURATED 7.5YR 3/0 VERY DARK GRAY	CL			
8				SAND, FINE, BLACK W/ SATURATED TPH ODOR	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

ng Equipment POWER PROBE 9600

r: T. DEEDS

MVC-004S
MVC-005S
MVC-006S
MVC-007S
MVC-008S
MVC-009S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-022	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	SILT, NON-PLASTIC, SLIGHTLY MOIST, CLAY (5-10%) GRAVEL (10-15%) 10YR 4/2 DARK GRAYISH BROWN	ML			
2								
3				GRADES TO 0% GRAVEL AND 10-15% CLAY	ML			
4				SAME AS ABOVE	ML			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-0105
MVC-0115

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-023	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILT, NON-PLASTIC, SAND (5-10%) GRAVEL (5-10%) CLAY (5-10%) 10YR 4/2 DARK GRAYISH BROWN SLIGHTLY MOIST	ML			
2								
3				FINE SAND LOOSE, MOIST, 10YR 4/2	SW			
				CLAY, PLASTIC, MOIST, SILT (0-5%) 10YR 4/2 DARK GRAYISH BROWN, MOIST	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

er: T. DEEDS

MVC-0125
MVC-0135
MVC-0145

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-024	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	SILT, NON-PLASTIC, SAND (5-10%) GRAVEL (5-10%) CLAY (5-10%) 10YR 4/2 DARK GRAYISH BROWN, SLIGHTLY MOIST	ML			
2								
3				CLAY, PLASTIC, MOIST, SILT (0-5%) 10YR 4/2 DARK GRAYISH BROWN, MOIST	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

ler: T. DEEDS

MVP-015S
MVP-016S
MVP-017S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-025	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	SILT, NON-PLASTIC, LOOSE, MOIST, SAND (5-10%) GRAVEL (0-5%) CLAY (5-10%)	ML			
2								
3				SILTY CLAY, PLASTIC, MOIST SILT (10-15%) 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

ng Equipment POWER PROBE 9600

er: T. DEEDS

MVC-018S
MVC-019S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS - 026	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			80%	CLAYEY SILT, NON-PLASTIC SLIGHTLY MOIST, FINE SAND (5-10%) CLAY (10-15%) 10YR 4/2 DARK GRAYISH BROWN	ML			
2								
3								
				INCREASED CLAY CONTENT 25-30%	ML-CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-020S
MVC-021S
MVC-022S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-027	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			80%	SILTY SAND, FINE, WELL GRADED, SILT (10-15%) DRY 10YR 4/2 DARK GRAYISH BROWN	~~SW~~ SM			
4				CLAY, PLASTIC, MOIST, VERY DARK GRAYISH BROWN 10YR 3/2	CL			
			55%	SAND, FINE, WELL GRADED WET TO SATURATED, 10YR 4/2	SP			
6				GRADES TO 7.5YR 4/0 DARK GRAY				
8				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MKC-023S
MVC-024S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-28 (REDRILL)	COORDINATES:		DATE: 06/05/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/05/01
ENGINEER/GEOLOGIST: D. PGLEY	Depth	Date/Time	DATE COMPLETED: 06/05/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, SILT (20-25%) FINE SAND, TRACE GRAVEL, 10YR 4/2 DARK GRAYISH BROWN DRY	SM			
2				SAME AS ABOVE, NO GRAVEL	SM			
3				COBBLE, ROUNDED				
				SILTY CLAY, COMPACT, DRY 10YR 4/2	CL			
4				SANDY CLAY, MOIST, FINE SAND (10-15%) MOIST, 10YR 4/2	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-~~865~~ 0835
0845
0855

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31- ALAMEDA		
BORING NUMBER: OU5-028	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SILTY SAND, FINE POORLY GRADED, SILT (10-15%) GRAVEL (0-5%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				CLAYEY SILT, PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	ML			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

ler: T. DEEDS

MVC-025S
MVC-026S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-029	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				CLAYEY SAND, FINE, POORLY GRADED, CLAY (10-15%) SILT (5-10%) GRAVEL (0-5%)	SM			
2								
3				SAME AS ABOVE ~~GRAVEL~~ (5-10%)	SM			
				SILTY CLAY, PLASTIC, MOIST, SILT (10-15%) FINE SAND (0-5%) 10YR 4/2 DARK GRAYISH BROWN	CL			
4				SAND FINE, WELL GRADED, ~~WET~~ MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Logger: T. DEEDS

MVC - 027S
MVC - 028S
MVC - 029S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-030	COORDINATES:	DATE: 5/24/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER. ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			85%	GRAVELLY CLAY, MOIST, GRAVEL (20-25%) SAND (5-10%) SILT (5-10%) 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
2								
3				SILTY CLAY, PLASTIC, MOIST SILT (10-15%) 10YR 3/2	CL			
4				FINE SAND, MOIST, 10YR 3/2	SP			

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 030S
MVC - 031S
MVC - 032S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-031	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	CLAYEY SAND, FINE TO COARSE POORLY GRADED CLAY (5-10%) COMPACT, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM SP			
2				LESS CLAY (0-5%) COMPACT	SP			
3				CLAYEY SILT, PLASTIC, MOIST SILT (10-15%) 10YR 4/2	ML			
4								

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

er: T. DEEDS

MVC-033S

MVC-034S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-32	COORDINATES:	DATE: 5/23/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/23/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/23/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			2.5'	SANDY SILT, TRACE GRAVEL (0-5%) SAND (5-10%) LOOSE DRY 10YR 3/2 DARK BROWN	ML			
2				SILTY SAND, FINE, SILT (15-20%) DRY 10YR 3/2 DARK BROWN	SP-SM			
			1.0'	SILT, COMPACT, SLIGHTLY MOIST 7.5YR 4/2 BROWN	ML			
4								
			2.0'	SILTY SAND 7.5YR 4/0	SM			
6				SAND, FINE, WELL GRADED SILT (0-5%) SATURATED 7.5YR 4/0 DARK GRAY	SW			
8				TD=8'				
10								

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: TYLER DEEDS

MVC-878S
MVC-879S
MVC-880S
MVC-881S
MVC-882S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OVS-033	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			70%	SILTY SAND, FINE, POORLY GRADED, SILT (15-20%) CLAY (5-10%) MOIST, 10YR 4/2	SM			
2								
3				SILTY CLAY, PLASTIC MOIST SILT (10-15%) 10YR 4/2	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

ler: T. DEEDS

MVC-035S
MVC-036S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-034	COORDINATES:	DATE: 5/24/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				CLAYEY SILT, NON-PLASTIC CLAY (15-20%) FINE SAND (5-10%) MOIST, DARK GRAYISH BROWN 10YR 4/2	ML			
				FINE CLAYEY SAND CLAY (5-10%)	SP-SC			
4				CLAY, PLASTIC, MOIST, SILT (5-10%) 10YR 4/2	CL			
6				GRADES TO 7.5YR 4/0 DARK GRAY				
8				SAND, FINE, SATURATED 7.5YR 4/0	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVP-037S
MVP-038S
-039S
-040S
-041S
MVP-042S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 ALAMEDA		
BORING NUMBER: OUS-035	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: DiPoley	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				CLAY, PLASTIC, MOIST SILT (5-10%) DARK GRAYISH BROWN 10YR 4/2	CL			
4								
6				SAND, FINE WELL GRADED SILT (5-10%) WET, DARK GRAYISH BROWN 10Y 4/2	SW			
8				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Equipment POWER PROBE 9600

T. DEEDS

MVC-0435
MVC-0445
MVC-0455
MVC-0465
MVC-0475

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-036	COORDINATES:		DATE: 05/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				SILTY SANDY CLAY, NON-PLASTIC, SLIGHTLY MOIST, SILT (5-10%) FINE SAND (5-10%) 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
4				GRADES TO 10YR 4/2 DARK GRAYISH BROWN				
6				SAND, FINE, WELL GRADED WET TO SATURATED, 10YR 4/2	SW			
				2" PLASTIC CLAY LENSES				
8				SAME AS ABOVE, SATURATED	SW			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-0485
MVC-0495
MVC-0505
MVC-0515

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-037	COORDINATES:	DATE: 05/24/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, POORLY GRADED SILT (20-25%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2								
3				CLAY, PLASTIC, MOIST SILT (10-15%) VERY DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-0525
MVC-0535

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-038	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY CLAY, COMPACT, SLIGHTLY MOIST TO MOIST NON-PLASTIC SILT (20-25%) FINE SAND (5-10%) 10YR 4/2 DARK GRAYISH BROWN	CL			
2								
3				SAME AS ABOVE				
4				SAND FINE DRY 10YR 4/2 TD=4'	SW			

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC - 0545

MVC - 0555

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-039	COORDINATES:		DATE: 05/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			2.08	SILTY CLAY, DENSE, NON-PLASTIC, SLIGHTLY MOIST SILT (10-15%) 10YR 4/2 DARK GRAYISH BROWN	CL			
2								
3				SAND, FINE, WELL GRADED SILT (5-10%), SLIGHTLY MOIST, 10YR 4/2, DARK GRAYISH BROWN	SW			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

r: T. DEEDS

MVC-056S
MVC-057S
MVC-058S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-040	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75%	SILY SAND, FINE, POORLY GRADED, SILT (20-25%) 10YR 3/2 VERY DARK GRAYISH BROWN	~~SP~~ SM			
4				GRADES TO 10YR 4/2 DARK GRAYISH BROWN	~~SP~~ SM			
				CLAY, PLASTIC, MOIST, SILT (0-5%) 10YR 4/2	CL			
6			80%	SAND, FINE, WELL GRADED, SILT (0-5%), WET, TO SATURATED 10YR 4/2	SW			
8				TD=8'				

NOTES:

Drilling Contractor: KEHOE TESTING/ENG

Drilling Equipment: POWER PROBE

er: T. DEEDS

MVC-059S
MVC-060S
MVC-061S
MVC-062S
MVC-063S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-041	COORDINATES:		DATE: 5/24/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, MOIST SILT (20-25%) 10YR 3/2 VERY DARK ~~BROWN~~ GRAYISH BROWN	SM			
2				SAME AS ABOVE				
6				CLAY, PLASTIC, MOIST SILT (0-5%)				
8				SAND, FINE, WELL GRADED SILT (5-10%) SATURATED 1.5YR 3/2 DARK GRAY				
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

.ner: T. DEEDS

MVC-0645
MVC-0655
0665
0675

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-042	COORDINATES:	DATE: 5/24/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			8/10	SANDY GRAVEL, SAND FINE TO COARSE SILT (10-15%) SILT (5-10%) MOIST 10YR 4/2 DARK GRAYISH BROWN	GM			
2				SAME AS ABOVE				
3				CLAY, PLASTIC, MOIST, SILT (0-5%) 10YR 4/2	CL			
				SAND, FINE, POORLY GRADED MOIST, 10YR 4/2 SILT (5-10%)	SP			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. TEEDS

MVC-068S
MVC-069S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-043	COORDINATES:	DATE: 5/25/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			85%	SANDY SILT, FINE SAND (20-25%) SLIGHTLY MOIST, 10YR 3/2 VERY DARK ~~BROWNISH GRAY~~ GRAYISH BROWN	ML			
2				SAND, FINE, WELL GRADED LOOSE, SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3				SILT, LOOSE, DRY, 10YR 8/1 WHITE	ML			
4				SAND, FINE, WELL GRADED, DRY 10YR 8/1	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MUC-0735
MUC-0745
MUC-0755

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-044	COORDINATES:	DATE: 5/25/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			85%	SILTY SAND, FINE TO COARSE MOSTLY FINE SILT (15-20%) GRAVEL (5-10%) VERY DARK GRAYISH BROWN 10YR 3/2 DRY	SM			
				SAND, FINE WELL GRADED	SW			
4				CLAY PLASTIC MOIST 10YR 4/2	CL			
			100%	SAND, FINE, WELL GRADED WET 10YR 4/2	SW			
6				TPH STAINED SOIL W/ODOR				
				SAME AS ABOVE, SATURATED	SW			
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-076S
MVC-077S
MVC-078S

2438-S-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-045	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			50%	SILTY SAND, FINE TO COARSE MOSTLY FINE, SILT (15-20%) GRAVEL (5-10%) 10YR 3/2 DRY TO SLIGHTLY MOIST VERY DARK GRAYISH BROWN	SM			
4				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
6			80%	CLAY PLASTIC MOIST 10YR 4/2	CL			
				BLACK STAINED SOIL				
8				SAND, FINE WELL GRADED SATURATED 10YR 4/2	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING / ENG

ing Equipment POWERPROBE 9600

Driller: T. DEEDS

MIC - ~~0785~~ 0795 6/25/01
0815
0825
0835
0845
0805

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-046	COORDINATES:	DATE: 5/25/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (10-15%) GRAVEL (5-10%) DRY 10YR 4/2 DARK GRAYISH BROWN	~~SP~~ SM			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SILTY CLAY, WET, SILT (20-25%) 10YR 4/2	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MUC-085S
MUC-086S
MUC-087S

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-047	COORDINATES:	DATE: 5/25/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			70%	SAND, FINE, POORLY GRADED, SILT (0-5%) CLAY (0-5%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SP			
2								
3				SAND FINE WELL GRADED MOIST, 10YR 4/2	SW			
4								

NOTES:

Drilling Contractor KEHOE TESTING/ENG

ng Equipment POWER PROBE 9600

..ller: T. DEEDS

MVC-0885
MVC-0895
MVC-0905

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-048	COORDINATES:	DATE: 5/25/2001
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SANDY SILT, FINE SAND (~~[illegible]~~ 5-20) GRAVEL (5-10%) MOIST VERY DARK GRAYISH BROWN 10YR 3/2	ML			
2				SAND FINE WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3				CLAY, MOIST, PLASTIC, 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

r: T. DEEDS

MUC-091S
-092S
-093S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5B49	COORDINATES:		DATE: 5/25/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			90%	SILTY SAND, FINE TO COARSE MOSTLY FINE, SILT (10-15%) GRAVEL (0-5%) 10YR 4/2	SM			
				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4				CLAYEY SAND, FINE, CLAY (20-25%), WET, 7.5YR 4/0 DARK GRAY	SM	SU		
			60%	SAND, FINE TO COARSE, MOSTLY FINE SILT (5-10%) GRAVEL (0-5%) 10YR 4/2 MOIST	SP			
				SAND, FINE WELL GRADED, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
6				CLAY, PLASTIC, MOIST, 7.5YR 3/2 DARK GRAY	CL			
8				SAND, FINE, WELL GRADED, SATURATED, 7.5YR 4/0 DARK GRAY	SW			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 10.25
- 10.35
- 10.45
- 10.55
- 10.65

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 879814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-050	COORDINATES:	DATE: 5/25/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SANDY SILT, FINE SAND (15-20%) GRAVEL (0-5%) SLIGHTLY MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3				SILTY CLAY, PLASTIC, MOIST 10YR 4/2	CL			
4				~~GRADES~~ TO CLAY, PLASTIC SILT (0-5%) MOIST	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-0945
MVC-0955
MVC-0965

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-051	COORDINATES:		DATE: 05/25/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100	SILTY SAND, FINE TO COARSE MOSTLY FINE, POORLY GRADED, SILT (15-20%) DRY TO SLIGHTLY MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SP			
2								
3				SANDY SILT, FINE SAND (25-30%) MOIST, LOOSE 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

er: T DEEDS

MVC-107S
MVC-108S
MVC-109S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-052	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0			6	TOP SOIL				
1				SANDY SILT - SILTY SAND (50%/50%) FINE SAND, MOIST, LOOSE TO COMPACT 10YR 3/2 VERY DARK GRAYISH BROWN -	ML-SM			
2								
3				SAND, FINE, MOIST, TRACE CLAY IN LENSES (0-5%) 10YR 3/2 VERY DARK GRAYISH BROWN	SP			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-1105
MVC-1115
MVC-1125

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31-ALAMEDA	
BORING NUMBER: OU5-053	COORDINATES:	DATE: 5/25/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
			75%	SILTY SAND, MOSTLY FINE, FINE TO COARSE SILT (15-20%) CLAY (0-5%) GRAVEL (5-10%) MOIST, 10YR 4/2 DARK GRAYISH BRN	SM			
2				CLAY, PLASTIC, MOIST, 10YR 4/2	CL			
				GRAVEL LENSE (FILL) SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
4			100%	CLAYEY SAND, FINE, CLAY (10-15%) WET TO SATURATED, 10YR 4/2	~~SM~~ SC			
6				CLAY, PLASTIC, WET TO SATURATED, 10YR 4/0 DARK GRAY	CL			
				SAND, FINE, WELL GRADED, WET TO SAT. 7.5YR 4/0 DARK GRAY	SW			
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

ng Equipment POWER PROBE 9600

.ller: T. DEEDS

MVC-097S
MVC-098S
MVC-099S
MVC-100S
MVC-101S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 054	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				SAND, FINE, WELL GRADED SILT (5-10%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
4				CLAY, PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
				TD=4'				
6								
8								

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Drillers T. DEEDS

MVC - 1135
MVC - 1145
MVC - 1155

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-055	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	GRAVELLY SILT, FINE SAND (5-10%) GRAVEL (15-20%) DRY 10YR 4/2 DARK GRAYISH BROWN	ML			
				SILT, COMPACT, DRY, 10YR 4/2				
4				SILTY CLAY, WET, 10YR 7.5YR 3/0 DARK GRAY SILT (20-25%)				
				SAND, FINE, WELL GRADED, MOIST 10YR 4/6 DARK YELLOWISH BROWN	SW			
6				GRADES TO 7.5YR 4/0 DARK GRAY				
				SATURATED				
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1165
MVC-1175
MVC-1185
MVC-1195
MVC-1205
MVC-1215

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-056	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SILT, COMPACT, GRAVEL (10-15%) DRY 10YR 4/2 DARK GRAYISH BROWN	ML			
2			100%					
3				SILT, MOIST, COMPACT, DARK GRAYISH BROWN	ML			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MUC-1235
MUC-1245
MUC-1255

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 057	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SILT, LOOSE, GRAVEL (20-25%) DRY, 10YR 4/2 DARK GRAYISH BROWN	ML			
2			90%	SAND, FINE, WELL GRADED, MOIST, 10YR 4/2	SW			
3				CLAY, PLASTIC, WET, 7.5YR 3/0 DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1265
MVC-1275
MVC-1285

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-058	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SILT, GRAVEL (15-20%) SLIGHTLY MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
2			95%					
3				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
4				SILTY CLAY, PLASTIC, MOIST SILT (20-25%) 10YR 4/2 DARK GRAYISH BROWN	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-1295
MVC-1305
MVC-1315

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-059	COORDINATES:		DATE: 5/ /2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/ /01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/ /01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SAND, FINE, WELL GRADED, SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
2								
3				SILTY SAND, FINE, DRY TO SLIGHTLY MOIST, SILT (15-20%) 10YR 4/2	SM			
				SILTY CLAY, DRY, NON-PLASTIC SILT (20-25%)	CL			
4								

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1325
MVC-1335
MVC-1345

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 060	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	GRAVELLY SILT, LOOSE, GRAVEL (15-20%) SLIGHLY MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
4				CLAY, PLASTIC, MOIST, SILT (0-5%) 10YR 4/2 DARK GRAYISH BROWN	CL			
6			40%	SAND, FINE, WELL GRADED MOIST TO WET, 7.5YR 3/0 DARK GRAY	SW			
				GRADES CLOSER TO 10YR 4/2 STILL DARK GREY, SHELL FRAGMENTS				
8				SANDY CLAY, PLASTIC, 7.5YR 3/0	CL			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

1355 1415
1365 1425
1375
1385
1395
1405

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-061	COORDINATES:		DATE: 5/1/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/1/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/1/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	GRAVELLY SILT, LOOSE, GRAVEL (10-15%) SLIGHTLY MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
2								
3				SILTY CLAY, PLASTIC, MOIST 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1435
MVC-1425
MVC-1455
MVC-1465

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 062	COORDINATES:		DATE: 5/25/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/25/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/25/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY GRAVEL, SILT (20-25%) LOOSE, DRY, 10YR 4/6 DARK YELLOWISH BROWN	GM			
2								
3				CLAY PLASTIC, MOIST, ~~10YR~~ 10YR 3/1 VERY DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC -147S
MVC -148S
MVC -149S
MVC 150S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-063	COORDINATES:		DATE: 5/ /2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/ /01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/ /01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILT, GRAVEL (5-10%) COMPACT SLIGHTLY MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
2				SILT, COMPACT, 10YR 4/2	ML			
3				SAND, FINE WELL GRADED, MOIST, 10YR 4/2	SW			
4				CLAY, PLASTIC, MOIST 10YR 4/2 DARK ~~BROWNISH GRAY~~ BROWN	CL			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1515
MVC-1523
MVC-1535

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-064	COORDINATES:		DATE: 5/ /2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/ /01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/ /01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	SANDY SILT, FINE SAND (15 TO 20) SLIGHTLY MOIST 10YR 4/2 DARK GRAY, SH BROWN	ML			
				SAND, FINE, WELL GRADED 10YR 4/2 MOIST	SW			
4				CLAY PLASTIC, SILT (10-15%) DRY, 10YR 4/2	CL			
6			100%	SAND, FINE, WELL GRADED, WET TO SATURATED 7.5 YR 3/0 DARK GRAY	SM			
8				SAME AS ABOVE				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Drill T. DEEDS

MVC-1545
MVC-1555
MVC-1565
MVC-1575

MWC-1585
1595
1605
1615

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-065	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SANDY SILT GRAVEL (5-10%), FINE SAND (5-10%) SLIGHTLY MOIST 10YR 4/2 ~~VERY~~ DARK GRAYISH BROWN	ML			
2				SAND, FINE, WELL GRADED, MOIST, DARK GRAYISH BROWN 10YR 4/2	SW			
3								
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-162S
-163S
-164S
-165S

RDL 6/25/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 066	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE WELL GRADED, SLIGHTLY MOIST	SM			
2								
3				CLAY, PLASTIC, MOIST 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MUC - 166s
-167s
-168s

RDL 6/21/01

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-067	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
2			90%	SAND, FINE, WELL GRADED, SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				CLAY, PLASTIC, MOIST, 7.5YR 4/0 DARK GRAY	CL			
				SAND, FINE, WELL GRADED, 7.5YR 4/0 DARK GRAY	SW			
6			75%	CLAY, PLASTIC, SATURATED TO WET, 7.4YR 4/0 DARK GRAY	CH			
				SAND, FINE, WELL GRADED, SATURATED, 7.5YR 4/0 DARK GRAY				
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-169S MVC-172S
170S -173S
171S -174S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
RING NUMBER: OUS-068	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			80%	CLAYEY SAND, FINE, CLAY (10-15%) SILT (0-5%) 10YR3/2 DARK GRAYISH BROWN, SLIGHTLY MOIST TO MOIST	SM SC			
2				SAND, FINE, WELL GRADED, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3				SILT, LOOSE, SLIGHTLY MOIST, 10YR 4/2	ML			
				CLAY PLASTIC, SILT (5-10%), SLIGHTLY MOIST TO DRY 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 7600

Driller T. DEEDS

MWC-1755
-1765
-1775

2438-3-95

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-069	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SILTY SAND, FINE, SILT (10-15%) SLIGHTLY MOIST 10YR 4/2 DARK ~~BROWN~~ GRAYISH BROWN	SM			
2								
3				SILTY CLAY PLASTIC, SLIGHTLY MOIST, SILT (10-15%) 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED 10YR 4/2 SLIGHTLY MOIST	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-178S

-179S

-180S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-070	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SANDY CLAY, FINE SAND (10-15%) SILT (5-10%) MOIST 10YR 3/2 ~~DAR~~ VERY DARK GRAYISH BROWN	CL			
2			100%	~~SANDY CLAY~~ ~~GRAVEL~~ GRAVEL, SAND, FINE TO COARSE SILT ~~(15-20%)~~ 5-10 CLAY (10-15%) (5-10%) SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN (FILL MATERIAL)	GM			
3								
4				CLAY, PLASTIC MOIST, 10YR 4/2	CL			
				TD = 4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC 1815
1825
1835
1845

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
RING NUMBER: OU5-071	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SILT, GRAVEL (15-20%) FINE SAND (10-15%) DRY TO SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN (FILL MATERIAL)	ML			
2			90%					
3				SILTY CLAY, PLASTIC, SLIGHTLY MOIST SILT (10-15%) 7.5YR 3/2 DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-1855
-1865
-1875

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-072	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SANDY SILT, GRAVEL (10+5%) SAND (15-20%) FINE TO COARSE, SLIGHTLY MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
2			90%					
3				CLAY, PLASTIC, MOIST, 7.5 YR 3/2 DARK GRAY MIXED WITH 10YR 4/2 DARK BROWNISH GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-188S
189S
190S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-073	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
2			95%	GRAVELLY SANDY SILT, GRAVEL (5-10%) SAND, FINE TO COARSE (20-25%), DRY, 10YR 4/2 DARK BROWNISH GRAY	ML			
4				SAME AS ABOVE				
6			100%	CLAY, PLASTIC, WET, 7.5YR 4/0 DARK GRAY	CL			
				SAND, FINE WELL GRADED SATURATED, 10YR 4/2	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-191S -194S
-192S -195S
-193S -196S
-197S

6/25/01

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 074	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SANDY SILT, GRAVEL (5-10%) FINE TO COARS SAND (20-25%), DRY, 10YR 3/2 VERY DARK BROWNISH GRAY	ML			
2			95%					
3				CLAY, PLASTIC, MOIST, 10YR 3/2 VERY DARK BROWNISH GRAY	CL			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

By T. DEEDS

MVC-1985
1995
2005

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-075	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY CLAY, GRAVEL (5-10%) SILT (0-5%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN, NON-PLASTIC	CL			
			95%	CLAY, PLASTIC, MOIST, 10YR 3/2 V. DARK GRAYISH BROWN, SLIGHTLY MOIST	CL			
2				SILTY SANDY CLAY, SILT (10-15%) V. FINE SAND (10-15%), DRY TO SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
3								
4				SAME AS ABOVE				
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-2015
-2025
-2035

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-076	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY CLAY, SILT (10-15%) GRAVEL (0-5%) SAND (0-5%) DRY, COMPACT 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
2			95%	SAND, FINE, WELL GRADED, DRY 10YR 4/3 DARK ~~GRAYISH~~ YELLOWISH BROWN	SW			
				SILTY CLAY, NON PLASTIC, DRY 10YR 4/2 DARK BROWNISH GRAY	CL			
3				CLAY, PLASTIC, MOIST 7.5YR 3/2 DARK GRAY, MOIST	CL			
4				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-2045
2055
2065

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-077	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			75%	~~CLAY~~ SILTY SANDY CLAY, MOIST SILT (10%) SAND (5-10%) 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
2				SAND, FINE WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
				CLAY, PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
4								
			75%	SAND, FINE, WELL GRADED MOIST, 10YR 4/2, DARK ~~BROWNISH~~ GRAYISH BROWN	SW			
6				BLACK SILT (ASH?)				
				SOME 10S ABOVE				
				GRADES TO DARK ~~GRAY~~ 10YR 3/2				
8				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-206S
MVC-209S
MVC-208S

MVC-209S
-210S
-211S
-212S RA 6/21/01

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-078	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
1				SILTY SAND FINE SILT (15-20%) DRY 10YR 4/2 DARK GRAYISH BROWN	SM			
2			95%	SAND, FINE, WELL GRADED, SLIGHTLY MOIST, 10YR 4/2	SW			
				SAME AS ABOVE				
3				CLAY, PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Crew T. DEEDS

MVC - 2135
-2145
-2155

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-079	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (10-15%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2			85%	SAND, FINE, WELL GRADED SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3				SILTY CLAY, PLASTIC, SILT (15-20%) SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN	CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-216S
-217S
-218S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 080	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			85%	SILTY SAND, FINE, SILT (15-20%) CLAY (10-15%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED MOIST, 10YR 4/2	SW			
3				CLAY, PLASTIC, MOIST 10YR 4/2	CL			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-219S
220S
221S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 089	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			95%	SILTY SAND, FINE, SILT (15-20%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2				CLAYEY SILT, CLAY (5-10%) MOIST, 10YR 4/2 DARK GRAYISH BROWN	ML			
				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
4				CLAY, PLASTIC MOIST 7.5YR 3/2 DARK GRAY	CL			
			75	SAND, FINE, WELL GRADED, 10YR 4/2, WET	SW			
6				GRADES TO 7.5YR 3/2 DARK GRAY, SATURATED				
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MW-2225 MW-2225
-2235 -2235
-2245 -2245

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-082	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND FINE, SILT (20-25%) CLAY (5-10%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2			90%					
3				SILTY CLAY, PLASTIC MOIST 7.5YR 3/2 DARK GRAY	CL			
				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
4				CLAY, PLASTIC, MOIST 7.5YR 3/2	CL			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

2285
2295
2305

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 083	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) SLIGHTLY MOIST, 10YR 4/2	SM			
2			80%	SAND, FINE, WELLGRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE				
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC - 231S
- 232S
- 233S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5 - 084	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (15-20%) CLAY (5-10%) SLIGHTLY MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2			90%	SAND, FINE, WELL GRADED	SW			
3				SILTY CLAY, NON-PLASTIC, MOIST, 10YR 4/2 DARK GRAYISH BROWN	CL			
4				CLAY, PLASTIC MOIST, 7.5YR 3/2 DARK GRAY TD= 4'	CL			

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC — 2345
2355
2365

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-085	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			80%	SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2								
3				SAME AS ABOVE				
				SAND, FINE, WELL GRADED, WET 10YR 4/2 DARK GRAYISH BROWN	SW			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-237
238
239

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-086	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				SAND, WELL GRADED, MOIST 10YR 4/2	SW			
				CLAYEY SILT, MOIST, CLAY (5-10%) 2.5YR 3/2 DARK GRAY	ML			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-240S
-241S
-242S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-087	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	~~SAND~~ SILTY SAND, FINE, SILT (20-25%) CLAY (10-15%) GRAVEL (0-5%) SLIGHTLY MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2								
3				SILT, CLAY (5-10%) MOIST 10YR 4/2	ML			
4			100%	~~ID=Kipp~~ SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
6								
8				SAME AS ABOVE, SATURATED				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-2435 MVC-2465
2445 -2475
2455 -2485

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-088	COORDINATES:		DATE: 5/24/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/24/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/24/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2	SW			
3				SANDY SILT, VERY FINE SAND (15-20%), MOIST CLAY (5-10%) 10YR 4/2	ML			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

~~MVC-2465~~ MVC-2495
~~2479~~ 2505
~~2486~~ 2515
~~AP~~

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-089	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				TOP SOIL				
1			85%	SILTY SAND, FINE, MOIST SILT (~~5-10~~ 10-15%) 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				CLAY, PLASTIC, MOIST 10YR 4/2 DARK ~~BROWNIS~~ GRAYISH BROWN	CL			
4				SAME AS ABOVE				
6			80%	CLAY, SAME ~~TD=4 ft~~ AS ABOVE	CL			
8				SAND, FINE WELL GRADED WET TO SATURATED, 10YR 4/2	SW			

NOTES:

Drilling Contractor KEHOE TESTING/ENG TD=8

Equipment POWER PROBE 9600

T. DEEDS

MVC-252S
253S
254S

MVC-255S
-256S
-257S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS - 090	COORDINATES:		DATE: 5/29/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/29/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/29/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3								
4				SAME AS ABOVE				
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-258S
259S
260S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-091	COORDINATES:	DATE: 5/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			TD	~~SILTY~~ SANDY SILT FINE SAND (10-15%) LOOSE, 10YR 4/2 DARK GRAYISH BROWN, DRY TO SLIGHTLY MOIST	ML			
2								
3				SAME AS ABOVE	ML			
4				SAME AS ABOVE	ML			
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-2615
2625
2635

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-092	COORDINATES:	DATE: 5/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (15-20%) DRY, 10YR 3/2 VERY DARK ~~BROWN~~ GRAYISH BROWN	SM			
1				SILT, COMPACT, DRY 10YR 4/2 DARK GRAYISH BROWN	ML			
				CLAY, PLASTIC, MOIST, 10YR 4/2	CL			
2								
3								
				SAND, FINE, WELL GRADED 10YR 4/2	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-264
265
266

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-093	COORDINATES:	DATE: 5/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			2.00'	SILTY SAND, FINE, SILT (10-15%) DRY, 10YR 4/2 DARK GRAYISH BROWN	SM			
				SAME AS ABOVE SILT (5-10%)	SM			
6			2.00'	SAME AS ABOVE SMALL CLAY (PLASTIC) ZONE 2"				
8				SAME AS ABOVE, SATURATED				
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-2765
2775
2785

4-8 NO PICS

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: CTO 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: 005-094	COORDINATES:	DATE: 5/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (5-10%) SLIGHLY MOIST 10YR 4/2 DARK GRAYISH BROWN,	SM			
2			95%	SILTY GRAVEL, SILT (5-10%) LOOSE SLIGHLY MOIST 10YR 4/3 DARK YELLOWISH BROWN,	GM			
3				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
4				SILTY CLAY, PLASTIC, MOIST SILT (15-20%) 10YR 4/2	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Logger: T. DEEDS

MVC-267S
268S
269S

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-095	COORDINATES:	DATE: 05/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			06	SANDY SILT, LOOSE, FINE SAND (5-20%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	ML			
				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4			06	CLAY, PLASTIC, MOIST 10YR 4/2	CL			
				SILTY SAND, FINE, SILT (5-10%) MOIST, 10YR 4/2	SM			
6				CLAY, WET TO SATURATED TPH ODOR W/BLACK STAINING 7.5YR 3/2 DARK GRAY PLASTIC	CL			
8				SAND, FINE, WELL GRADED UPPER FOOT TPH ODOR W/BLACK STAINING, SATURATED, 7.5YR 3/2	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-2705 MVC-2735
-2715 2745
-2725 2755

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-016	COORDINATES:	DATE: 5/30/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			100	SILTY SAND, SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) MOIST 10YR 3/2 VERY DARK GRAYISH BRN	SM			
2				GRAVEL (10-15%)				
4				CLAYEY GRAVEL, LOOSE CLAY (10-15%) SILT (10-15%)	GC			
			100	SILTY SAND, FINE, SILT (10-15%) CLAY (5-10%) 10YR 4/2	SM			
6				SAND, FINE, WELL GRADED WET 7.5YR 3/2 DARK GRAY	SW			
				SOME PS ABOVE, 10YR 4/2				
8				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-2795
2805
2815

MVC-2825
-2835
-2845

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-097	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) DRY, 10YR 4/2 DARK GRAYISH BROWN	SM			
3				SAME AS ABOVE SLIGHTLY MOIST	SM			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller: T. REEDS

MVC- 2855
2865
2875

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 -ALAMEDA		
BORING NUMBER: OU5-098	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75%	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) CLAY (10%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
4				SILTY SAND, FINE SLIGHTLY MOIST 10YR 5/2 YELLOWISH BROWN, SILT (10-15%) GRAVEL (5-10%)	SM			
			90%	SAND, VERY FINE SILT (0-5%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SP			
6				CLAY, WET PLASTIC, 7.5 YR 3/2 DARK GRAY	CV			
8				SAME AS ABOVE, BLACK STRONG TPH ODOR	CL			
				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-2885 MVC-2915
2895 2923
2905 2935

243B-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-099	COORDINATES:		DATE: 5/30/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100 %	SILTY SAND, FINE, SILT (10-15%) GRAVEL (0-5%) DRY, 10YR 4/2 DARK GRAYISH BROWN				
3				SAME AS ABOVE (SILT 5-10)				
4				SAME AS ABOVE				
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: ~~KEHOE TESTING~~ T. REEDS

MVC -2945
-2955
-2965

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-100	COORDINATES:		DATE: 05/30/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75% 3.00 ft	SILTY SAND, SILT (15-20%) FINE SAND, CLAY (5-10%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
				SAND, FINE, WELL GRADED SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SAME AS ABOVE				
6				SAME AS ABOVE, SATURATED 7.5YR 4/0 DARK GRAY	SW			
8				TD=8'				

NOTES:

Drilling Contractor ILEHOE TESTING/ENGR

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 297S -300S
298S -301S
299S -302S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 719814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-101	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90-58	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2								
3				SILTY GRAVEL, SILT (10-15%) CLAY (5-10%) 10YR 4/5 YELLOWISH BROWN, MOIST	GM			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-3155
-3165
-3175

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-102	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2								
3								
4				SAME AS ABOVE	SM			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-318S
-319S
-320S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-103	COORDINATES:		DATE: 5/30/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SAND, FINE, WELL GRADED DRY 10YR 4/2	SW			
1				SILTY SAND, FINE, SILT (15-20%) MOIST	SM			
2			95%	SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				CLAY, PLASTIC, MOIST 10YR 4/2	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

~~MVC-308S~~ ~~-309S~~ ~~-304S~~

MVC-303S
-304S
-305S

TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-104	COORDINATES:		DATE: 5/30/2001
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (5-10%) MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2			90%	SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3				SAME AS ABOVE	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-306S
-307S
-308S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-105	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			75%	SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
2								
4				SAME AS ABOVE				
				CLAY, WET, PLASTIC 7.5YR 4/2 DARK GRAY	CL			
6				STRONG TPH ODOR (BLACK)				
				SAND, FINE, SATURATED, 7.5YR 4/2 DARK GRAY	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-3095 MVC-3125
3105 -3135
3115 -3145

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-106	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SAND, FINE, WELL GRADED, SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
2				SAME AS ABOVE, MOIST	SW			
3				SAME AS ABOVE	SW			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG MVC-321S

Drilling Equipment POWER PROBE 9600 322S

T. DEEDS 323S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-107	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			90%	SILTY SAND, FINE, SILT (10-15%) CLAY (0-5%), SLIGHTLY MOIST, 10YR 3/2 VERY DARK ~~BROWNISH~~ GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK ~~BROWNISH~~ GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-3245
-3255
-3265

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-108	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			60%	SAND, WELL GRADED, FINE SLIGHTLY MOIST, 10 4/2 DARK GRAYISH	SW			
				SAME AS ABOVE, MOIST				
4				SILTY CLAY, PLASTIC MOIST SILT (5-20%) 7.5 YR 4/2 DARK GRAY	CL			
6			75%	SAME AS ABOVE, WET				
				STRONG TPH ODOR				
				SAND, FINE, WELL GRADED SATURATED, 7.5 YR 3/2	SW			
8				CLAY, COMPACT, HARD, SLIGHTLY MOIST 7.5 YR 4/2				
				TD=8				
10								

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MUC-327 -330S

328 -331S

329 -332S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 719814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-109	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (10-15%) SLIGHTLY MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2			90%	SAND, FINE, WELLGRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-333S
334S
335S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314 RA 6/25/01	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-DP10 110	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (0-5%) GRAVEL (0-5%) DRY, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2			80%	SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

D. T. DEEDS

MW-336S
337S
338S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-111	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/30/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/30/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			95%	SILTY SAND, FINE, SILT (15-20%) CLAY (0-5%) MOIST, 10YR 3/2 VERY DARK ~~BROWNISH~~ GRAYISH BROWN	SM			
				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4			100%	SAME AS ABOVE				
6				SAME AS ABOVE GRADES TO 7.5YR 4/2 DARK GRAY				
				CLAY, PLASTIC, COMPACT HARD, MOIST 7.5YR	CL			?
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-3395 MVC-3425
3405 3435
3415

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-112	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (15-20%) CLAY (0-5%) GRAVEL (0-5%) SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2	SW			
3								
4				SAME AS ABOVE TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC - 3445
3455
3465

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-113	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
			70%	SILTY SAND, FINE, SILT (20-25%) CLAY (0-5%) GRAVEL	SM			
2				SAND, FINE, WELL GRADED, SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4			70%	CLAY, WET TO SATURATED, PLASTIC LOOSE, 7.5YR 4/0 DARK GRAY	CL			
6				BLACK STAINING w/STRONG TPH ODOR				
				SAND, FINE, WELL GRADED, SATURATED, 7.5YR 4/0 DARK GRAY BLACK STAINING WITH STRONG TPH ODOR	SW			
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-3475 MVC-3505
3485 -3515
3495 -3525

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-114	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) GRAVEL (0-5%) SLIGHTLY MOIST 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				SAND, FINE, SILT (5-10%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SP-SM			
4				GRAVELLY CLAY, GRAVEL (10-15%) SAND (5-10%) MOIST 10YR 4/5 YELLOWISH BROWN	CL			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MVC - 353S
354S
355S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-115	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	GRAVELLY SILT, LOOSE GRAVEL (20-25%) DRY 10YR 4/2 DARK GRAYISH BROWN	~~SM~~ ML	NP		
2								
3				SAND, FINE, WELLGRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-356S
357S
358S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-116	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY CLAY, GRAVEL (15-20%) MOIST 10YR 4/2 DARK GRAYISH BROWN	CL			
2			90%	SAND, FINE, SILT (5-10%) MOIST 10YR 4/2	SM			
3				CLAY, PLASTIC, MOIST 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

D T. DEEDS

MVL - 359S
360S
361S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-117	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			90%	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) DRY 10YR 4/2	SM			
2				SAND, FINE, WELL GRADED, COAL LIKE MATERIAL, DRY, 10YR 4/2 NO ODOR	SW			
				SILTY CLAY, LOOSE, DRY, 10YR 4/2 DARK BROWNISH GRAY	CL			
				CLAY PLASTIC, MOIST, HARD, COMPACT 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED, MOIST	SW			
			90%					
6				BLACK STAINING W/HYDROCARBON ODOR				
				SAME AS ABOVE, SATURATED	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller T. DEEDS

MVC-3625 -3655
3635 -3665
3645 -3675

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-118	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			75%	SANDY CLAY, FINE SAND, PLASTIC, MOIST (5-10%) 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
2				SAND, VERY FINE, SILT (10-15%), MOIST 10YR 4/2 DARK ~~BR~~ GRAYISH BROWN	SM			
3				CLAY, PLASTIC, MOIST, SILT (10-15%)	CL			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

Driller T. DEEDS

MUC-3685
3695
3705

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-119	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			60%	SILTY SAND, FINE, SILT (20-5%) MOIST, 10YR 3/2 DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SAND FINE, WELL GRADED MOIST, 10YR 4/2	SW			
			50%	SOME COARSE SAND				
6				FINE SAND WELL GRADED				
				SAME AS ABOVE, 7.5YR 4/0 DARK GRAY				
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVL-371S
372S
373S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OVS-120	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) MOIST 10YR4/2 DARK GRAYISH BROWN	SM			
2			90%	SAND, FINE, WELL GRADED, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC - 3745
3755
3765

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-121	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (10-15%) GRAVEL (5-10%) DRY, 10YR 4/2 DARK BROWNISH GRAY	SM			
2			25%	SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
				CLAYEY GRAVEL, CLAY (10-15%) SAND (5-10%) MOIST 10YR 4/2	GM			
3				SAND, FINE, WELL GRADED MOIST, 10YR 4/2	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC-377S
-378S
-379S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-122	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%), DRY, 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
				SANDY GRAVEL, SAND (20-25%) FINE TO COARSE, LOOSE, SLIGHTLY MOIST, 10YR 4/3 YELLOWISH BROWN	GM			
2			80%	SAND, FINE, WELL GRADED WITH 1" CLAY ZONES, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

By T. DEEDS

MVC-3805
3815
3825

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: QU5-123	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE SILT (20-25%) GRAVEL (5-10%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
2			95%	SAND, FINE, TRACE SILT (0-5%)	SW SM			
3				SAME AS ABOVE, CLAY (5-10%)	SW SM	SW-SC		
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG.

Equipment POWER PROBE 9600

Driller T. DEEDS

MVC — 383S
384S
385S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-124	COORDINATES:		DATE: 05/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 05/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				GRAVELLY SAND, FINE TO COARSE, GRAVEL (5-10%) DRY 10YR 4/5 YELLOWISH BROWN	SW			10/90/0
2			50%	SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-386S
-387S
-388S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 719314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-125	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (20-25%) MOIST CLAY (0-5%) 10YR 3/2	SM			
2			20%	SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SAME AS ABOVE SATURATED	SW			
6			100	CLAY, SATURATED, PLASTIC 7.5YR 4/0 DARK GRAY	CL			
8				TD = 8'				

NOTES:

Drilling Contractor: KEHOE TESTING/ENG

Drilling Equipment: POWER PROBE 9600

Driller: T. DEEDS

MVC - 3895
3905
3915

MVC = 3925
- 3935
- 3945

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-126	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (20-25%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SM			
1				GRAVELLY SAND, FINE TO COARSE GRAVEL (5-10%), DRY, 10YR 4/5 YELLOWISH BROWN	SP			
			70%	SAND, FINE, WELL GRADED, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
2								
3								
				SAME AS ABOVE	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-3925
3935
3945

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-127	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			3.5'	SAND, FINE, WELL GRADED DRY, 10YR 4/2 DARK ~~BROW~~ GRAYISH BROWN	SW			
2				SAME AS ABOVE, MOIST	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. REEDS

MVC-3955
-3965
-3975

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-128	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				CLAY, PLASTIC, MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN	CL			
				SAND, FINE, WELL GRADED MOIST	SW			
2								
4				SAME AS ABOVE	SW			
6								
				SAME AS ABOVE, 7.5YR3/2 DARK GRAY, SATURATED	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-398S MVC-401S
399S -402S
400S -403S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-129	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	GRAVELLY SAND, FINE TO COARSE SAND, SILT (5-10%) GRAVEL (20-25%) MOIST 10YR 4/3 YELLOWISH BROWN	SP	SP	STEEL	
2				SAND FINE, WELL GRADED, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
3								
4				SAME AS ABOVE	SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 4045
4055
4065

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-130	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			90%	SANDY SILT, SAND (30-35%) CLAY (10-15%) MOIST, 10YR 4/2 DARK GRAYISH BROWN	ML			
4				SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK ~~BROWNISH~~ GRAYISH BROWN	SW			
6			100%					
8				SAME AS ABOVE 7.5YR 4/0 DARK GRAY	SW			
				TD = 8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-408S, 408S, 409S } 4-8

MVC-410S -411S -412S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 719314	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-131	COORDINATES:		DATE: 5/30/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	GRAVELLY SAND, FINE TO COARSE, GRAVEL (15-20%) SILT (10-15%), SLIGHTLY MOIST 10YR 4/5 YELLOWISH BROWN	SP			
2								
3				SILTY SAND, FINE, SILT (15-20%) MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-4135
-4145

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-132	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			60%	~~CLAYEY GRAVEL~~, GRAVELLY CLAY, GRAVEL (20-25%) MOIST, 10YR 3/2 VERY DARK GRAYISH BROWN GRADES TO 10YR 4/5 YELLOWISH BROWN	CL			
				CLAY PLASTIC, MOIST, 7.5 4/2 4/0 DARK GRAY	CL			
4				SAND FINE WELL GRADED, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
6								
8				SAME AS ABOVE SATURATION	SW			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-4155 NO 4-8 PICS
-4165

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-133	COORDINATES:		DATE: 5/31/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5/31/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 5/31/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				CLAYEY SAND FINE, CLAY (20-25%) MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				SANDY CLAY, PLASTIC, MOIST ~~SAND~~ FINE SAND (15-20%) 7.5YR 4/0 DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-417S
-418S
-419S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319314	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-134	COORDINATES:	DATE: 6/01/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SANDY SILT ~~RAND~~ SAND (10-15%) DRY 10YR 4/2 DARK GRAYISH BROWN	ML			
2				GRAVELLY CLAY, DRY GRAVEL (15-20%) 10YR 4/5 YELLOWISH BROWN	CL			
3				CLAY PLASTIC MOIST 10YR 4/2, MOIST	CL			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-~~4495~~ Rel 6/25/01
-4205
-4215
-4225

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-135	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75%	SILTY SAND, FINE SILT (15-20%), 10YR 4/2 DARK GRAYISH BROWN	SM			
4				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2	SW			
				SILTY SAND, FINE, SILT (15-20%) GRAVEL (5-10%) 10YR 4/2	SM			
6				SILTY SAND, FINE, 10YR 4/2 WITH 7.5YR 8/0 STRIATIONS MOIST	SM			
8				SAND, FINE, WELL GRADED 7.5YR 4/0 DARK GRAY, SATURATED	SW			
				TD = 8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

Inst: T. DEEDS

MVC-423A MVC-426A
-424A -427A
-425A -428A

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-136	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. Foley	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				~~TOP~~ SOIL				
2			100%	GRAVELLY SAND, FINE, SILT (10-15%) GRAVEL (15-20%) DRY, 10YR 4/5 YELLOWISH BROWN	SP			
				SILTY CLAY, MOIST, PLASTIC, SILT (15-20%) 7.5YR 3/0 DARK GRAY	CL			
4				~~CLY~~ SAND, FINE CLAY (10-15%) MOIST 7.5YR 3/0	~~SM~~	SC		
				SAME AS ABOVE, 10 YR 4/2				
6				SAME AS ABOVE SATURATED	~~SM~~	SC		
8				CLAYEY GRAVEL, SAND (10-15%) CLAY (15-20%) SATURATED	GC			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVL 4295
-4305
-4315

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-137	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				CLAYEY SAND, FINE, WELL GRADED, CLAY (15-20%) MOIST 10YR 4/2 DARK GRAYISH BROWN	~~SM~~ SC			
2			70%					
3								
4				SAME AS ABOVE	~~SM~~ SC			
				TD=				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVR 432S

~~435S~~ 433S RAL 6/25/01

434S

~~435S~~

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 219814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: QU5-138	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			80%	SILTY SAND FINE, SILT (20-25%) MOIST 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SAME AS ABOVE				
6			60%					
8				SAME AS ABOVE 7.5YR 4/6 STRONG BROWN DARK GRAY	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC — ~~335~~ S435s

~~336S~~ 436s 4-8

~~337S~~ 437s NO PICS

~~338S~~

BOL 6/21/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-139	COORDINATES:		DATE: 8/01/07
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/07
ENGINEER/GEOLOGIST: D. Foley	Depth	Date/Time	DATE COMPLETED: 6/01/07
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			2.00'	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) SLIGHTY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Equipment POWER PROBE 9600

T. DEEDS

MVC — ~~3385~~ 438s RDL 6/25/01

~~3395~~ 439s

~~3405~~ 440s

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-140	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. FOLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (20-25%) DRY 10YR 4/2 DARK GRAYISH BROWN	SM			
2			2.0ft	SILTY CLAY, SILT (15-20%) PLASTIC MOIST, 10YR 4/2	CL			
				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
4				SATURATED				
				SAME AS ABOVE				
6				SAME AS ABOVE, 7.5YR 4/0 DARK GRAY	SW			
				CLAY 20-25%	SM			
8				SAME AS ABOVE, FINE SAND	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC - 4415 MVC 4455
4425 4465
4435 4475
4445

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-141	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	SILTY SAND, FINE SILT (30-35%) DRY, GRAVEL (0-5%) 10YR 4/2 DARK BROWNISH GRAY	SM			
				SILTY CLAY, PLASTIC, MOIST SILT (15-20%) 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
6				SILTY CLAY, SATURATED, PLASTIC, LOOSE, 7.5YR 4/0 DARK GRAY	CL			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

g Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC -448S -451S
-449S -452S
-450S -453S

BL 6/4/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-142	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 01 OF 01

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (25-30%) GRAVEL (5-10%) DRY, 10YR 4/2 DARK BROWNISH GRAY	SM			
2			100%					
				SAND, FINE, WELL GRADED 10YR 4/3 BROWN	SW			
3				CLAY, PLASTIC, COMPACT, S. MOIST 10YR 4/2	CL			
				SAND,	SW			
4				TD = 4'				

NOTES:

Drilling Contractor KEITUC TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - ~~4575~~ - 454s
~~4585~~ - 455s
~~4585~~ - 456s
PDL 6/25/01

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-143	COORDINATES:	DATE: 6/01/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, ~~SILT~~ (20-25%) GRAVEL (5-10%) DRY, 10YR 4/2 ~~DARK BROWN~~ GRAYISH BROWN	SM			
2			100%	CLAYEY SAND, FINE, CLAY (25-30%) COMPACT MOIST 7.5YR 4/0 DARK GRAY	SM SC			
3								
4				SAME AS ABOVE, CLAY (15-20%) TD=4'	SM SC			

NOTES:

Drilling Contractor KEHOE TESTING/ENG

ing Equipment POWER PROBE 9600

.ller: T. DEEDS

MVC-457S
458S
459S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-144	COORDINATES:		DATE: 6/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 6/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%) MOIST 10YR 4/2 DARK ~~BROWNISH~~ GRAYISH BROWN	SM			
4				SILTY SAND, FINE, SILT (5-10%) MOIST, 10YR 4/2 DARK ~~BROWNISH~~ GRAYISH BROWN	SM			
6			100%	GRADES TO 7.5YR 4/0 DARK GRAY, SATURATED	SM			
8				SAME AS ABOVE TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Dr: T. DEEDS

MVC — 460S -463S
461S -464S
462S -465S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5- ~~149~~ 145	COORDINATES:	DATE: 6/4/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			95%	SANDY GRAVEL SAND FINE, ~~MOIST~~ DRY, 10YR 4/2 DARK BROWNISH GRAY	GM			
2								
3				SILTY SAND, FINE, MOIST SILT (15-20%) 10YR 4/2	SM			
4				SAND, FINE, WELL GRADED, MOIST, 10YR 4/2,	SW			
				TD=4				

NOTES:

Drilling Contractor KENDE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-471
472
473

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 319814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-146	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. Poley	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS:		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, SILT (25-30%) GRAVEL (5-10%) FINE SAND	SM			
2								
3				SANDY CLAY, FINE SAND. (10-15%) MOIST	CL			
				SAND, FINE WELL GRADED, MOIST, 10YR 4/2	SW			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-475S
476S
477S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-146, 147	COORDINATES:	DATE: 06/01/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/01/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2				SILTY SAND, FINE TO COARSE, MOSTLY FINE SILT (15-20%) GRAVEL (0-5%) CLAY (10-15%) MOIST	SM			
					SW			
					SW			
4					SM			
				SAND, FINE, SILT (15-20%) 10YR 4/2 MOIST				
				SAND FINE, SILT (10-15%) 10YR 4/2 MOIST	SM			
6				CLAYS (10-15%)				
				SAND, FINE, WELL GRADED SATURATED 7.5YR 3/2, DARK GRAY	SW			
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. REEDS

MVC-4795 -4805 -4815

MVC-4833 4843 4853

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 51 - ALAMEDA		
BORING NUMBER: OU5-148	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100	SANDY CLAY, PLASTIC, MOIST 10YR 4/2, FINE SAND (20-25%)	CL			
				GRADES TO FINE SAND (5-10%)	CL			
4				SAND FINE, WELL GRADED 10YR 4/2 MOIST	SW			
6				CLAYEY SAND, FINE, CLAY (15-20%) MOIST	SM			
8				CLAY, LOOSE, SATURATED, PLASTIC 7.5YR 3/2, DARK GRAY	CL			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment PONDEL PROBE 9620

Driller: T. REDS

MVC - 754, 755, 756 } 4-8'

~~-489s~~ ~~-0~~ -488s -748s -749s

6/28/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-149	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SAND, FINE TO COARSE, SILT (5-10%) GRAVEL (0-5%) 10YR 4/2 DARK GRAYISH BROWN	SP			
2			90%	SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) 10YR 4/2	SM			
3				SAND, FINE, WELL GRADED MOIST	SW			
4				TD = 4'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

ing Equipment POWER PROBE 9600

.ller: T. REEDS

MVC-7575
7585
7598

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-150	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			75	SILTY SAND, FINE, SILT (20-25%) CLAY (5-10%) SLIGHTLY MOIST 10YR 4/2	SM			
4				SILTY SAND, FINE SILT (10-15%) CLAY (5-10%) MOIST	SM			
6			55%	SAND FINE, WELL GRADED, SILT (0-5%) 7.5 YR 3/2 DARK GRAY	SW			
8				SAME AS ABOVE				
				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - ~~[illegible]~~ 763 5 ~~7685~~

~~[illegible]~~ 7645 7605

~~[illegible]~~ 7655 7703

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: GTO 31 - ALAMEDA	
BORING NUMBER: OUS-151	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SAND, FINE SILT (0-5%) MOIST 10YR 4/2	SP			
2				CLAY, PLASTIC MOIST COMPACT, 10 YR 4/2	CL			
4				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
6			100	SAME AS ABOVE 7.5YR 3/0 DARK GRAY. SATURATED	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

Pole 6/25/01

MVC - ~~471S~~ -~~477S~~

-771S -777S - ~~472S~~ ~~478S~~

-772S -778S

-773S -779S - ~~473S~~ -~~479S~~

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU3-152	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE SILT (10-20%) CLAY (0-5%) GRAVEL (0-5%) SLIGHTY MOIST 10YR 4/2 DARK ~~BROWNISH GRAY~~ GRAYISH BROWN	SM			
2					SM			
3				SAND, FINE, WELL GRADED, MOIST 10YR 4/2	SW			
4				CLAY, MOIST PLASTIC 7.5YR 4/0 DARK GRAY TD=4	CL			

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

No photos BLL 6/25/01

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-153	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SAND, FINE, WELL GRADED, DRY, 10YR 4/2 DARK GRAYISH BROWN	SW			
2				SAME AS ABOVE SLIGHTLY MOIST				
3								
4				SAME AS ABOVE, MOIST TD=				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment

Driller: T. DEEDS

MVC ~~78~~ ~~78~~ RDL 6/25/01 ~~88~~ ~~81~~ -781 RDL 6/25/01 ~~82~~ 782 RDL 6/25/01 ~~83~~ RDL 6/25/01

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-~~155~~ 150	COORDINATES:		DATE: 06/04/07
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/07
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/07
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			0.01	SILTY SAND FINE, SILT (5-10%) GRAVEL (0-5%) 10YR 4/2 DARK BROWISH	SM			
2				SAND, FINE WELL GRADED MOIST 10YR 4/2, DARK ~~BROWN~~ GRAYISH BROWN	SW			
4								
			0.01	SAND AS ABOVE	SW			
6				CLAYEY SAND, FINE SILT (5-10%) CLAY (15-20%) 7.5YR 4/0 DARK GRAY	SM			
				SAND FINE WELL GRADED, SATURATED 7.5YR 4/0 DARK GRAY	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC -790S
-791S
-792S

MVC-802S
-803S
-804S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-155	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			95%	SILTY SAND, FINE TO COARSE, MOSTLY FINE SILT (10-15%) GRAVEL (0-5%) DRY 10YR 4/2	SM			
				CLAYS (5-10%	SM			
4				SAND FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
6								
8				SAME AS ABOVE, 7.5 YR 4/0 DARK GRAY, SATURATED, CLAYS (0-5%)	SM			
				TD = 8'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

g Equipment Dr POWER PROBE 9600

...er: T. DEEDS

MVC-8079 -8105
8085 -8115
8095 -8125

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-~~[illegible]~~156	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLET	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (15-20%) ~~SLIGHTLY MOIST~~ DRY 10 YR 4/2 DARK BRAYISH BROWN	SM			
2				SAME AS ABOVE				
3				SAND, VERY FINE, SILT (5-10%) DRY 10YR 4/2	SM			
4				SAME AS ABOVE TD=4'	SM			

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T DEEDS

MVC - 859S
858S
859S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-157	COORDINATES:		DATE: 06/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (5-10%) MOIST 10YR 4/2 DARK GRAYISH BROWN	SM			
1								
			90%					
2								
3								
4				SAME AS ABOVE	SM			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Logged by: T. DEEDS

MVC-816S
817S
818S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31-ALAMEDA		
BORING NUMBER: OU5-158	COORDINATES:		DATE: 06/01/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/01/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/01/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			2.0'	SAND, FINE, WELL GRADED, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SAME AS ABOVE				
6				SILTY CLAY, SILT (BLOCKS) WET TO SATURATED, PLASTIC LOOSE 7.5YR 4/0 DARK GRAY	CL			
8				SAND FINE, WELL GRADED, SATURATED, 7.5YR 4/0 DARK GRAY	SW			
				TD=8				

NOTES:

Drilling Contractor: KEHOE TEST/ENG

Drilling Equipment: POWER PROBE 9600

Driller: T DEEDS

MVC-8245
-8255
-8265

MVC-8335
8345
8355

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819816	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-159	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE TO COARSE MOSTLY FINE, SILT (15-20%) GRAVEL (5-10%) 10YR 4/2 DARK BROWNISH GRAY DRY	SM			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
3				SILTY CLAY, MOIST, COMPACT SILT (15-20%)	CL			
4				TD=4				

NOTES:

Drilling Contractor KEHOE TEST/ENG

ing Equipment

Driller: T. DEEDS

MVC - 836
837
838

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: DUS-160	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
2			100%	SILTY SAND, FINE TO COARSE MOSTLY FINE, SILT (15-20%) GRAVEL (0-5%) DRY 10YR 4/2 DARK GRAYISH BROWN	SM			
				CLAY, PLASTIC, MOIST, 10YR 4/2	CL			
4				SAND, FINE, WELL GRADED MOIST 10YR 4/2, DARK GRAYISH BROWN	SW			
				CLAY, PLASTIC, LOOSE, SILT (10-15%) WET, 7.5YR 4/0 DARK GRAY	CL			
6				SAND, FINE, WELL GRADED, WET TO SATURATED, 10YR 4/2	SW			
8				TD=8'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

T. DEEDS

MVC-845S
846S
847S

MVC-854S
855S
856S

2438-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-161	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (15-20%) GRAVEL (0-5%), DRY 10YR 4/2 DARK GRAYISH BROWN	SM			
1				SAND, FINE, WELL GRADED MOIST, 10YR 4/2	SW			
2			30%					
3								
				CLAY, PLASTIC, MOIST, 7.5 YR 4/0 DARK GRAY	CL			
4				TD=4'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

ng Equipment POWER PROBE 9600

er: T. DEEDS

8605
8615
8625

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OUS-162	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (20-25%) DRY 10YR 4/2 DARK GRAYISH BROWN	SM			
2			100	SAND, FINE, WELL GRADED, SLIGHTLY MOIST, 10YR 4/2	SW			
4								
			100	SILTY CLAY, WET, PLASTIC SILT (15-20%) LOOSE, 7.5 YR 4/0 DARK GRAY	CL			
6								
				SAND, FINE, WELL GRADED SATURATED 7.5 YR 4/0 DARK GRAY	SW			
8				TD=8				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 8685 -8715
8695 -8725
8705 -8735

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OU5-163	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: J. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
				SILTY SAND, FINE, SILT (20-25%) DRY, 10YR 4/2	SM			
2			90%	SAND, FINE, WELL GRADED MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SILTY CLAY WET TO SATURATED, LOOSE, PLASTIC SILT (15-20%) 7.5YR 4/0 DARK GRAY	CL			
6			90%					
8				SAND, FINE WELL GRADED SATURATED 7.5YR 3/0	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC - 8835 - 999s
-8845 - 890s
-8855 - 891s

Below 6'

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: ~~EB~~ OUS-164	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SILTY SAND, FINE, SILT (20-25%) DRY, 10YR 4/2 DARK GRAYISH BROWN	SM			
2								
3				SAND, FINE, WELL GRADED MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
4					SW			
				TD=4'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. REEDS

MIC-8955
8968
8975

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: 819814		
BORING NUMBER: OU5-165	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1				SAND, FINE, WELL GRADED SLIGHTLY MOIST, 10YR 4/2 DARK GRAYISH BROWN	SW			
2								
3								
4				SAME AS ABOVE, MOIST	SW			
				TD = 4'				

NOTES:

Drilling Contractor KEHOE TESTING/END

g Equipment POWER PROBE 9600

T. DEEDS

MVC-898S
899S
900S

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA	
BORING NUMBER: OU5-166	COORDINATES:	DATE: 06/04/01
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG		PAGE 1 OF 1

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
			95%	SAND SILT, SAND, MOIST, FINE SILT (20-25%) 10YR 3/2 VERY DARK GRAYISH BROWN	SM			
2				SAND, FINE, WELL GRADED, MOIST 10YR 4/2 DARK GRAYISH BROWN	SW			
4				SILTY CLAY, MOIST, PLASTIC, 10YR 4/2	CL			
6				SAME AS ABOVE				
				SAND, FINE, WELL GRADED SATURATED, 10YR 4/2	SW			
				SAME AS ABOVE, 7.5YR 3/0 DARK GRAY	SW			
8				TD = 8'				

NOTES:

Drilling Contractor KEHOE TESTING/ENG

Drilling Equipment POWER PROBE 9600

Driller: T. DEEDS

MVC-015S -018S
016S -019S
017S -020S

243B-3-86

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: CTO 31 - ALAMEDA		
BORING NUMBER: OUS-167	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOPSOIL				
			90%	SILTY SAND, FINE, SILT (20-25%) DRY, 10YR 4/2 DARK GRAYISH BROWN	SP			
2				SAND, FINE, WELL GRADED MOIST 10YR 4/2	SW			
4				CLAY, PLASTIC WET, SILT (10-15%) LOOSE, 7.5YR 4/0 DARK GRAY	CL			
6								
8				SAND FINE, WELL GRADED, SATURATED 7.5YR 4/0 DARK GRAY	SW			
				TD=8'				

NOTES:

Drilling Contractor KEHOE TEST/ENG

ing Equipment POWER PROBE 9600

er: T. DEEDS

MVC-~~008g~~
0095 -012S
010S -013S
011S -014S

2438-3-88

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 819814	PROJECT NAME: 819814 CTO 31 - ALAMEDA		
BORING NUMBER: OUS-168	COORDINATES:		DATE: 06/04/01
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 06/04/01
ENGINEER/GEOLOGIST: D. POLEY	Depth	Date/Time	DATE COMPLETED: 06/04/01
DRILLING METHODS: DPT RIG			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				TOP SOIL				
1			100%	SILTY SAND, FINE, SILT (20-25%) GRAVEL (0-5%), MOIST, 10YR 4/2 DARK GRAYISH BROWN				
2								
3				SAND, FINE WELL GRADED, MOIST 10YR 4/2	SW			
4				SAME AS ABOVE GRADES TO 7.5 4/0 DARK GRAY	SW			
				TD = 4'				

NOTES:

Drilling Contractor: KEHOE TEST/ENG

Drilling Equipment: POWER PROBE 9600

Driller: T. REEDS

MVC-0245
0255
0265
0275

243B-3-86

ATTACHMENT C2

BORING LOGS FOR IR SITE 30

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B050

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,857.2 E 6,045,024.8	E. Johansen	NA	8-15-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.01	Cathie Stumpenhaus RG 4451	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	1.0		C072S001 (0.0 - 0.5)				**Sandy silt (ML)**: very dark gray [5Y 3/1], moist, firm, organic, roots, trace gravel, 20% sand, 80% fines.	FID Background is 1.03 ppm No hardscape inside planter
1.42	77	3.0		C072S201 (Geotech) (1.0 - 2.0)	10.0	1		**Gravelly lean clay (CL)**: light olive brown [2.5Y 5/4], moist, firm-stiff, fine gravel, angular, 30% gravel, 10% sand, 60% fines.	planter area is higher than parking area (~ 1 foot)
				C072S002 (En Core) (2.5 - 2.5)	9.0	2 3		**Clayey gravel (GC)**: yellowish brown [10YR 5/6], angular, moist, dense, fine-coarse grain, angular with fine-medium sand, 60% gravel, 10% sand, 30% fines.	
1.53	100	3.0		C072S003 (En Core) (5.0 - 5.0)	7.0	4 5 6		**Fat clay (CH)**: dark bluish gray [5B 4/1], high plasticity, moist to saturated, soft to firm to stiff. (more stiff 4-5.5 ft), 100% fines.	
1.64	100	3.0				7 8 9			
					1.5 1.0	10		**Poorly graded sand (SP)**: dark greenish gray [5BG 4/1], loose, saturated, fine sand, loose, well sorted, 95% sand.	

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
1/5/05
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B050

Report form: CTO 070 LOG Time: 9:06:28 AM

BOREHOLE LOG

PROJECT and JOB NUMBER: CLEAN 3 23818-072		SHEET NO.: 1 of 1	HOLE NO.: C3S030B051
DRILLER: Precision Sampling, Inc.	SITE and LOCATION: IR Site 30 Alameda Point	OVERBURDEN: NA	BEGUN: 8-15-04
DRILL MAKE AND MODEL: Direct-Push XD-2	COORDINATES (NORTHING, EASTING): N 2,113,849.4 E 6,045,090.5 / LOGGED BY: E. Johansen	ROCK (FT): NA	COMPLETED: 8-15-04
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1 11/16	GROUND ELEVATION (FT MLLW): 10.15 / CHECKED BY: Cathie Stumpenhaus RG 4451	TOTAL DEPTH (FT BGS): 10.0	UPDATE: 12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	1.0		C072S004 (0.0 - 0.5)				**Gravelly lean clay (CL)**: dark olive brown [2.5Y 3/3], moist, low plasticity, firm, some organic debris, 20% fine gravel, 10% sand, 70% fines.	FID Background is 1.03 ppm No hardscape inside planter area
	67	3.0			9.2	1		**Fat clay (CH)**: dark greenish gray [5BG 4/1], moist, high plasticity, firm-stiff, black mottling, 100% fines.	
						2			
						3			
				C072S200 (Geotech) (3.0 - 4.0) C072S005 (En Core) (3.5 - 3.5)					
	83	3.0			6.2	4		**Fat clay (CH)**: Same as above.	
				C072S006 (En Core) (4.5 - 4.5)		5			
						6			
	100	3.0				7			
						8			
					1.2	9		**Poorly graded sand (SP)**: dark greenish gray [5BG 4/1], saturated, loose, fine grain.	
					0.2	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
1/5/05
STATE OF CALIFORNIA

SITE and LOCATION: IR Site 30 Alameda Point	HOLE NO.: C3S030B051

Report: CTO 070 LOG Time: 9:06:28 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B052

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,844.8 E 6,045,191.0 / E. Johansen	NA	8-15-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	9.72 / Cathie Stumpenhaus RG 4451	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	1.0		C072S007 (0.0 - 0.5)	9.4			**Organic soil (OL/OH)**: very dark gray [2.5Y N3/0], moist, organic silt and wood fragments, 10% sand, 90% fines.	FID Background is 1.02 ppm No hardscape inside planter area
					9.2			**Sandy lean clay (CL)**: olive brown [2.5Y 4/3], moist, low plasticity, firm, 10% gravel, 20% sand, 70% fines.	
	43	3.0		C072S008 (En Core) (1.5 - 1.5)	8.5	1		**Clayey gravel (GC)**: olive brown [2.5Y 4/3], moist, low plasticity, dense, 50% gravel, 10% sand, 40% fines. No recovery.	8/21/04 C072S008 1.5 feet bgs En Core resample.
						2			
						3			
				C072S009 (3.5' En Core) (3.5 - 4.0)	6.2			**Clayey gravel (GC)**: Same as above.	8/21/04 C072S009 3.5 feet bgs En Core resample.
	87	3.0		C072S010 (En Core) (4.0 - 4.0)	5.7	4		**Fat clay (CH)**: dark greenish gray [5G 4/1], moist to saturated, firm, high plasticity, orange and gray/black mottling, 100% fines..	8/21/04 C072S010 4.0 feet bgs En Core resample.
				C072S010 (4.5 - 5.0)		5			
				C072S011 DUP (5.0 - 5.5)					
						6			
	100	3.0			2.7	7		**Fat clay (CH)**: Same as above.	
						8			
					0.7	9		**Poorly graded sand (SP)**: greenish gray [5GY 5/1], loose, saturated, 95% fine grain sand, 5% fines.	
					-0.3	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST CATHIE L. STUMPENHAUS No. 4451 1/5/05 STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B052

Report form: CTO 070 LOG Time: 9:06:31 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B053

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,878.7 E 6,045,278.3	E. Johansen	NA	8-15-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	9.02	Cathie Stumpenhaus RG 4451	9.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	3.0			8.6			**Asphalt**	FID Background is 1.03 ppm
				C072S012 (1.5 - 2.0)		1, 2		**Well-graded sand with silt and gravel (SW-SM)**: dark gray [5Y 4/1], dense, moist, fine-coarse sand and gravel, some silt, 40% gravel, 50% sand, 10% fines.	
	83	3.0		C072S013 (En Core) (3.0 - 3.0)	6.0	3		**Fat clay (CH)**: greenish gray [5GY 5/1], high plasticity, moist to saturated, firm, 100% fines.	
				C072S014 (En Core) (4.5 - 4.5)		4, 5			
	100	3.0			3.5	6, 7, 8		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], saturated, fine grain, loose, fossiliferrous.	
					0.0	9		TOTAL DEPTH = 9.0 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · STATE OF CALIFORNIA
1/5/05

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B053

Report: CO 070 LOG Time: 9:06:32 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B054

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-14-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push GP-1	N 2,113,814.5 E 6,045,284.1	S. Quayle	NA	8-14-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	10.20	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	4.0		C072S015 (0.0 - 0.5)				**Well-graded sand with clay and gravel (SW-SC)**: yellowish brown [10YR 5/6], moist, fine to coarse sand and gravel, some clay, 20% gravel, 70% sand, 10% clay (FILL).	FID Background is 1.04 ppm
					8.2	2		**Lean clay (CL)**: dark greenish gray [5G 4/1], moist, with orange/brown mottling, medium plasticity, firm, 100% clay.	
				C072S016 (En Core) (3.0 - 3.0)		3			8/21/04 C072S016 3 feet bgs En Core resample
					6.7 ▽				
					6.5			**Well-graded sand (SW)**: black [5Y 2.5/1], wet, fine to coarse sand with hydrocarbon odor.	
	100	4.0				4		**Sandy lean clay (CL)**: dark greenish gray [5G 4/1], fine sand, medium plasticity, 35% sand, 65% clay.	
					5.9			**Fat clay (CH)**: dark greenish gray [5G 4/1], with black mottling, wet, high plasticity, firm to soft with depth, 100% clay.	
						5			
						6			
						7			
					2.7			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, homogeneous, fine sand, trace shells, 100% sand, trace fines.	
	100	2.0				8			
						9			
					0.2	10			
								TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B054

Report form: CTO 0701 LOG Time: 9:06:35 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B055

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-16-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,856.7 E 6,045,423.8	S. Quayle	NA	8-16-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	10.03	Eric Johansen RG 6643	10.0	12-21-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	2.0						**Asphalt**	FID Background is 3.58 ppm
				C072S018 (0.5 - 1.0)	9.6	1		**Well-graded sand with silt and gravel(SW-SM)**: olive brown [2.5Y 4/3], moist, fine to coarse sand, fine angular gravel, 40% gravel, 50% sand, 10% fines (FILL).	
	88	2.0			8.0	2		**Well-graded sand with silt and gravel(SW-SM)**: yellowish brown [10YR 5/6], moist, fine to coarse sand, fine angular gravel, 30% gravel, 60% sand, 10% fines (FILL).	
					7.3	3		**Fat clay (CH)**: dark greenish gray [5GY 4/1], moist to wet, high plasticity, stringers of fine sand with perched water 2 to 2.75 feet bgs, 100% clay.	
				C072S020 DUP (En Core) (3.5 - 3.5) C072S019 (En Core) (3.5 - 3.5)					
	73	3.0			6.0	4		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, fine sand, some shell fragments, 100% sand, trace fines.	
						5			
						6			
	92	3.0				7			
						8			
						9			
					0.0	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B055

Report: TO 070 LOG Time: 4:11:08 PM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B056

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-16-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,850.9 E 6,045,554.4 / S. Quayle	NA	8-16-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.24 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	55	2.0			9.9			**Asphalt**	FID Background is 3.58 ppm
				C072S022 (1.0 - 1.5)		1		**Well-graded sand with silt and gravel (SW-SM)**: olive brown [2.5Y 4/3], moist, fine to coarse sand, fine angular gravel, 40% gravel, 50% sand, 10% fines (FILL). At 1.25 feet bgs color changes to yellowish brown [10YR 5/6].	
				C072S021 DUP (1.5 - 2.0)	8.5			**Clayey sand (SC)**: olive brown [2.5Y 4/3], moist, fine sand, 80% sand, 20% clay.	
	88	2.0			8.0	2		**Fat clay (CH)**: dark greenish gray [5GY 4/1], moist, firm, high plasticity, 100% fines.	
					7.0	3		**Lean clay (CL)**: greenish gray [5GY 5/1], moist, low plasticity, firm, 100% fines.	
				C072S023 (En Core) (3.5 - 3.5)					
	100	3.0		C072S024 (En Core) (4.0 - 4.0)	6.2	4		**Fat clay (CH)**: dark greenish gray [5GY 4/1], soft, moist, high plasticity, 100% fines.	
						5			
						6			
					4.0			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, fine sand, some shell fragments, 100% sand, trace fines, homogeneous.	
	50	3.0				7			
						8			
						9			
					0.2	10			

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TOTAL DEPTH = 10.0 FEET

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B056

Report form: CTO 070 LOG Time: 9:06:39 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B057

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30	Alameda Point	NA	8-18-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,831.6 E 6,045,689.8	S. Quayle	NA	8-18-04
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.54	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	2.0			10.1			**Asphalt**	FID Background is 2.35 ppm
				C072S025 (0.5 - 1.0)		1		**Gravelly Sand (SW)**: Olive brown [2.5Y 4/4], fine to coarse grained sand, moist, 40% fine gravel, 50% sand, 10% fines.	
					9.0			**Sandy Gravel (GW)**: Yellowish brown [10YR 5/6], fine to coarse grained sand, moist, 25% gravel, 70% sand, 5% fines.	
	70	2.0				2			
						3			
				C072S026 (En Core) (3.5 - 3.5)					
				C072S027 (En Core) (4.0 - 4.0)	6.5	4		**Silt (ML)**: Dark greenish gray [5GY 4/1], moist, low plasticity, 100% fines.	
	67	0.0 3.0			5.5 ▽	5		**Sand (SP)**: Dark greenish gray [5GY 4/1], wet, homogeneous, 100% sand, trace fines.	
						6			
	67	3.0				7			
						8			
						9			
					0.5	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
Eric Johansen
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

Report ... TO 070 LOG Time: 9:08:41 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B058

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-19-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,818.4 E 6,045,884.7 / T. Takagi	NA	8-19-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.96 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	35	2.0						**Asphalt**	FID Background is 3.88 ppm
					10.6	1		**Well-graded sand with gravel (SW):** olive brown [2.5Y 4/4], moist, fine subrounded gravel, 15% gravel, 80% sand, 5% fines.	
				C072S028 (1.5 - 2.0)	9.2	2		**Well-graded sand with clay and gravel (SW-SC):** dark yellowish brown [10YR 4/6], moist, subangular coarse to fine gravel, 40% gravel, 40% sand, 10% fines.	
	63	2.0				3			
				C072S030 DUP (En Core) (3.5 - 3.5) C072S029 (En Core) (3.5 - 3.5)	7.7			**Poorly graded sand (SP):** olive brown [2.5Y 4/4], moist, 100% fine sand, homogeneous.	
	83	3.0			7.2	4		**Silt (ML):** dark greenish gray [5GY 4/1], very soft, wet, 100% fines, laminated.	
						5			
						6			
					4.7			**Poorly graded sand (SP):** dark greenish gray [5GY 4/1], soft, saturated, 100% fine sand, homogeneous, approximately 3% shell fragments up to 1/4 inch.	
	50	3.0				7			
						8			
						9			
					1.0	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B058

Report form: CTO 070 LOG Time: 9:06:43 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B059

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,795.0 E 6,045,028.1 / E. Johansen	NA	8-15-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	9.48 / Cathie Stumpenhaus RG 4451	9.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	3.0		C072S032 (0.0 - 0.5)				**Lean clay with sand (CL)**: dark yellowish brown [10YR 4/6], stiff, moist, low plasticity, some organics, roots, leaves, with sand and gravel, 10% gravel, 10% sand, 80% fines.	FID Background is 1.03 ppm Tan-bark at surface. Planter area, no hardscape
					8.5	1		**Fat clay (CH)**: black [2.5Y N2/0], moist, high plasticity, firm, 100% fines.	
						2			
	100	3.0		C072S202 (Geotech) (2.5 - 3.5) C072S033 (En Core) (2.5 - 2.5)	6.5	3			
						4			
						5			
				C072S034 (En Core) (5.5 - 5.5)					
	100	3.0				6			
						7			
						8			
					1.0			**Poorly graded sand (SP)**: dark bluish gray [5B 4/1], saturated, fine grain, loose.	
					0.5	9			
								TOTAL DEPTH = 9.0 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 1/5/05 · STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B059

TO 970 LOG Time: 8:08:45 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B060

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-14-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push GP-1	N 2,113,787.8 E 6,045,301.8	S. Quayle	NA	8-14-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	10.28	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	88	4.0			10.1			Concrete	FID Background is 1.04 ppm
				C072S035 (0.5 - 1.0)		1		Well-graded sand with clay and gravel (SW-SC): yellowish brown [10YR 5/6], moist, 70% fine to coarse sand and gravel, some clay, 20% gravel, 70% sand, 10% clay, sandy clay lense 2 to 2.2 feet bgs.	
				C072S036 (En Core) (2.0 - 2.0)		2			8/21/04 C072S036 2 feet bgs En Core resample
						3			
	100	4.0		C072S037 (En Core) (4.0 - 4.0)	6.3	4		Fat clay (CH): dark greenish gray [5GY 4/1], wet, high plasticity, with black mottling, firm to soft with depth, 100% clay.	8/21/04 C072S037 4 feet bgs En Core resample
						5			
						6			
						7			
	100	2.0			2.8	8		Poorly graded sand (SP): dark greenish gray [5GY 4/1], wet, fine sand, trace shells, 100% sand, trace fines, homogeneous.	
						9			
					0.3	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B060

Report form: CTO 070 LOG Time: 9:06:47 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 . 23818-072	1 of 1	C3S030B061

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30	Alameda Point	NA	8-16-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,774.7 E 6,045,361.9	S. Quayle	NA	8-16-04
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.32	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	1.0		C072S038 MS/MSD (0.0 - 0.5)				**Well-graded sand with silt and gravel(SW-SM)**: light olive brown [2.5Y 5/3], dry, fine to coarse sand, fine angular gravel (FILL), 50% gravel, 40% sand, 10% fines.	FID Background is 2.64 ppm No surface hardpan or cover (i.e. sand or tan bark)
	20	3.0				1			
					8.8			**Well-graded sand with clay and gravel(SW-SC)**: yellowish brown [10YR 5/6], dry to moist, fine to coarse sand, fine gravel, (FILL), 30% gravel, 60% sand, 10% clay.	
				C072S205 (Geotech) (2.0 - 3.0)	8.3	2		**Lean clay (CL)**: dark greenish gray [5GY 4/1], moist, medium plasticity, trace sand, 100% silt/clay.	
						3			
				C072S041 (3.5' En Core) (3.5 - 4.0)					
	17	3.0				4			
						5			
						6			
				C072S042 (6.5' En Core) (6.5 - 7.0)					
	67	3.0			3.3 ▽	7		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, fine sand, 100% sand, trace fines, homogeneous.	
						8			
						9			
					0.3	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION		HOLE NO.
IR Site 30	Alameda Point	C3S030B061

Report: O 070 LOG Time: 9:06:49 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B062

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-19-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,775.0 E 6,045,612.9 / T. Takagi	NA	8-19-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.90 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	2.0						**Wood Chips**	FID Background is 2.32 ppm Wood chips at surface removed before sampling
					10.1	1		**Asphalt**	
					9.6			**Well-graded sand with gravel (SW):** dark yellowish brown [10YR 4/6], moist, 30% subangular fine gravels, 65% coarse to fine sand, 5% fines.	
				C072S043 (1.5 - 2.0) C072S044 (En Core) (1.5 - 1.5)	9.1	2		**Poorly graded sand with silt (SP-SM):** olive brown [2.5Y 4/4], wet, 90% fine sand, 10% fines.	
	75	2.0							
					8.1	3		**Lean clay (CL):** dark greenish gray [5GY 4/1], medium stiff, wet, low plasticity, softens with depth, laminated layers less than 0.1 inch thick, 5% fine sand, 95% fines.	
				C072S045 (3.5' En Core) (3.0 - 3.5)					
	33	3.0				4			
						5			
						6			
	53	3.0			3.9	7		**Poorly graded sand (SP):** dark greenish gray [5GY 4/1], soft, saturated, homogeneous, 100% fine sand.	
						8			
						9			
					0.9	10			

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TOTAL DEPTH = 10.0 FEET

Report form: CTO 070 LOG Time: 9:06:51 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B063

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-17-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,722.5 E 6,045,781.7	T. Takagi	NA	8-17-04

HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2 / 1 11/16	11.38	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
1.05	80	2.0						Asphalt	FID Background is 1.05 ppm
				C072S047 (0.5 - 1.0)	11.0			Well-graded sand with gravel (SW): yellowish brown [10YR 5/6], moist, fine to coarse sand, fine gravel, 20% gravel, 75% sand, 5% fines.	
				C072S048 (En Core) (1.5 - 1.5)		1			
	85	2.0				2			
				C072S049 (2.5 - 2.5)					
				C072S049 (MS/MSD) (En Core) (3.0 - 3.0)	8.6	3		Fat clay (CH): dark greenish gray [5GY 4/1], firm to stiff, moist, black and orange oxidized mottling, high plasticity, 100% clay.	
					7.6	4		Silt (ML): greenish gray [5GY 5/1], moist, 100% silt, trace sand, homogeneous structure.	
	83	3.0		C072S050 (4.5' En Core) (4.0 - 4.5)					
				C072S051 (4.5' En Core) (4.5 - 5.0)		5			
						6			
					4.9			Fat clay (CH): dark greenish gray [5GY 4/1], firm to stiff, moist, high plasticity, black and orange oxidized mottling, 100% clay.	
	100	3.0			4.4	7		Poorly graded sand (SP): dark greenish gray [5GY 4/1], saturated, 100% sand, homogeneous.	
						8			
						9			
					1.4	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B063

Report CTO 070 LOG Time: 9:08:53 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B064

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-17-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,718.2 E 6,045,942.0 / T. Takagi	NA	8-17-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	11.92 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
1.15	70	2.0						**Asphalt**	FID Background is 1.15 ppm
					11.5			**Clayey sand with gravel (SC)**: olive brown [2.5Y 4/4], moist, fine to coarse sand, 15% gravel, 70% sand, 15% fines (FILL).	
				C072S052 (1.0 - 1.5) C072S053 (En Core) (1.5 - 1.5)	10.7	1		**Well-graded sand with gravel (SW)**: yellowish brown [10YR 5/6], dry to moist, fine to coarse sand and gravel, 30% gravel, 60% sand, 10% fines (FILL).	
	75	2.0		C072S054 (2.5' En Core) (2.0 - 2.5)		2			
				C072S206 (Geotech) (3.0 - 3.5)	8.7	3		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], moist, 100% fine sand, homogeneous.	
	60	3.0				4			
				C072S055 (4.5' En Core) (4.5 - 5.0)		5			
						6			
					5.7			**Fat clay (CH)**: dark greenish gray [5GY 4/1], soft, wet, high plasticity, 100% clay.	
	50	3.0				7			
						8			
					3.2	9		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	
					1.9	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B064

Report form: CTO 070 LOG Time: 9:06:56 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B065

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,732.3 E 6,045,027.1	E. Johansen	NA	8-15-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	9.45	Cathie Stumpenhaus RG 4451	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	60	1.0		C072S056 (0.0 - 0.5)				**Poorly graded sand (SP)**: light gray [2.5Y 7/2], moist, fine grained, note: mix of "playground" sand and native soil, 95% sand, 5% fines.	FID Background is 1.03 ppm Sandbox area, no hardscape
	50	3.0		C072S057 (En Core) (2.0 - 2.0)	8.5	1 2		**Sandy lean clay (CL)**: dark yellowish brown [10YR 4/6], moist, low plasticity, fine sand, firm-stiff, 15% sand, 85% clay.	
	50	3.0		C072S058 (3.5' En Core) (3.5 - 4.0)	7.0	3 4		**Fat clay (CH)**: black [10YR 2/1], high plasticity, moist to saturated, firm to stiff, 100% fines.	
	93	3.0		C072S203 (Geotech) (4.5 - 5.5) C072S059 (5.5' En Core) (5.0 - 5.5)		5 6 7 8 9			
					-0.3 -0.5	10		**Poorly graded sand with clay (SP-SC)**: grayish green [5G 4/2], saturated, loose, fine grain, 90% sand, 10% clay	

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 1/5/05 · STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B065

Report TO 070 LOG Time: 9:06:58 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B066

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30	Alameda Point	NA	8-14-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push GP-1	N 2,113,718.2 E 6,045,093.1	S. Quayle	NA	8-14-04
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.30	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	4.0		C072S060 MS/MSD (0.0 - 0.5)				**Well-graded sand with clay and gravel (SW-SC)**: yellowish brown [10YR 5/6], moist, fine to coarse grained sand and some clay, 20% gravel, 70% sand, 10% clay (FILL).	Bark at surface FID Background is 1.20 ppm
					9.0	1		**Lean clay (CL)**: black [5Y 2.5/1], moist, low plasticity, trace sand, 95% clay.	
				C072S062 DUP (1.5 - 1.5) C072S061 (En Core) (1.5 - 1.5)	8.5	2		**Fat clay (CH)**: dark greenish gray [5GY 4/1], moist, high plasticity, with black mottling and trace orange oxidized nodules, soft.	8/21/04 C072S061 1.5 feet bgs En Core resample 8/21/04 C072S062 DUP 1.5 feet bgs En Core resample
						3			
				C072S063 (3.5' En Core) (3.5 - 4.0)					8/21/04 C072S063 3.5 feet bgs En Core resample 8/21/04 C072S063 MS/MSD 3.5 feet bgs En Core resample
	100	4.0				4			
						5			
						6			
						7			
					2.8			**Lean clay (CL)**: dark greenish gray [5GY 4/1], wet, low to medium plasticity, 10% fine sand, 90% clay.	
	100	2.0				8			
					1.3	9		**Fat clay (CH)**: dark greenish gray [5G 4/1], high plasticity, trace orange oxidized nodules, moist to wet, soft.	
					0.3	10			

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TOTAL DEPTH = 10.0 FEET

Report form: CTO 070 LOG Time: 9:07:00 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B067

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-15-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,724.3 E 6,045,147.3	E. Johansen	NA	8-15-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.14	Cathie Stumpenhaus RG 4451	2.3	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	100	0.5		C072S065 (0.0 - 0.5)				**Silty gravel with sand (GM):** dark yellowish brown [10YR 3/4], dense, dry to moist, fine to coarse grained sand and angular gravel, 50% gravel, 30% sand, 20% silt/clay.	FID Background is 1.03 ppm Samples collected via hand slide hammer, limited access area
	100	0.5							
	80	0.5				1			
	80	0.5							
	40	0.5		C072S066 (En Core) (2.3 - 2.3)	8.9	2			Refusal at 2.25 feet bgs

TOTAL DEPTH = 2.3 FEET

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
1/5/05
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B067

Report: TO 070 LOG Time: 9:07:01 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B068

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-14-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push GP-1	N 2,113,719.5 E 6,045,217.7 / S. Quayle	NA	8-14-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.58 / Eric Johansen RG 6643	10.0	12-21-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	4.0		C072S068 (0.0 - 0.5)				**Lean clay (CL)**: olive brown [2.5Y 4/3], moist, low plasticity, with black mottling, some fine sand, 10% sand, 90% clay.	Grass at surface. FID Background is 1.04 ppm
					9.8	1		**Well-graded sand with clay and gravel (SW-SC)**: yellowish brown [10YR 5/6], moist, fine to coarse grained sand and gravel, some clay, 20% gravel, 70% sand, 10% clay.	
				C072S069 DUP (En Core) (2.0 - 2.0) C072S070 (En Core) (2.0 - 2.0)	8.6	2		**Lean clay with sand (CL)**: black [5Y 2.5/1], moist, low plasticity, 15% sand, 85% clay.	8/22/04 C072S069 2 feet bgs En Core resample 8/22/04 C072S070 DUP 2 feet bgs En Core resample
					8.1	3		**Lean clay (CL)**: dark greenish gray [5GY 4/1], moist, low to medium plasticity, with orange oxidized mottling, firm, trace fine sand, 5% sand, 95% clay.	
				C072S071 (4.0' En Core) (3.5 - 4.0)		4			
	70	4.0			6.3	5		**Fat clay (CH)**: dark greenish gray [5G 4/1], wet, high plasticity, soft, 100% clay.	8/22/04 C072S071 4 feet bgs En Core resample
						6			
						7			
	100	2.0				8			
						9			
					1.1			**Poorly-graded sand (SP)**: dark greenish gray [5GY 4/1], fine to medium grained sand, wet, homogeneous, 100% sand, trace fines.	
					0.6	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B068

Report form: CTO 070 LOG Time: 3:29:34 PM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B069

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-14-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push GP-1	N 2,113,712.9 E 6,045,286.9	S. Quayle	NA	8-14-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	10.66	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	60	4.0			10.5			**Concrete**	FID Background is 1.04 ppm
				C072S073 (0.5 - 1.0)		1		**Well-graded sand with clay and gravel (SW-SC)**: Yellowish brown [10YR 5/6], moist, fine to coarse grained sand and coarse gravel, some clay, 20% gravel, 70% sand, 10% clay.	
					9.2			**Fat clay (CH)**: dark greenish gray [5GY 4/1], moist, high plasticity, with black mottling and oxidized roots, trace fine sand, 100% clay.	
				C072S074 (En Core) (3.0 - 3.0)		2			
						3			8/21/04 C072S074 3 feet bgs En Core resample
				C072S075 (En Core) (4.0 - 4.0)	6.7	4			
	83	4.0						**Fat clay (CH)**: same as above, except becomes soft with depth and wet at 5 feet bgs.	8/21/04 C072S075 4 feet bgs En Core resample
						5			
						6			
						7			
	100	2.0				8			
						9			
					1.2			**Poorly-graded sand (SP)**: dark greenish gray [5GY 4/1], fine grained sand, wet, homogeneous, 100% sand, trace fines.	
					0.7	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TO 070 LOG Time: 9:07:08 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B070

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-18-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,625.4 E 6,045,463.2	T. Takagi	NA	8-18-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.35	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
3.25	60	2.0						**Asphalt**	FID Background is 3.25 ppm
				C072S076 (0.5 - 1.0)	10.8	1		**Well-graded sand with gravel (SW)**: yellowish brown [10YR 5/6], moist, fine to coarse sand and gravel, subangular gravel, 35% gravel, 60% sand, 5% clay.	
	60	2.0		C072S077 (En Core) (2.0 - 2.0)		2			
					8.6	3		**Asphalt** weathered asphalt with strong asphalt odor.	
	100	3.0			7.6	4		**Sandy lean clay (CL)**: dark greenish gray [5GY 4/1], soft, moist to wet, low plasticity, with black mottling, 70% clay, 30% sand.	
						5			
					6.1			**Lean clay (CL)**: dark greenish gray [5GY 4/1], moist, low to medium plasticity, firm to soft with depth, 100% clay.	
						6			
	28	10.0				7			
						8			
						9			
					1.6				
					1.3	10		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B070

Report form: CTO 070 LOG Time: 9:07:08 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B071

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-18-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,644.5 E 6,045,596.9	T. Takagi	NA	8-18-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.06	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
3.55	50	2.0		C072S079 (0.0 - 0.5)		1		**Well-graded gravel with sand (GW)**: dark yellowish brown [10YR 3/6], moist, fine to coarse subangular gravel, 80% gravel, 15% sand, 5% silt.	FID Background is 3.55 ppm Tan bark at surface; remove prior to sampling.
	75	2.0		C072S081 MS/MSD (En Core) (2.0 - 2.0) C072S080 DUP (En Core) (2.0 - 2.0)	9.3	2		**Clayey sand (SC)**: black [5Y 2.5/1], moist, 80% fine sand, 20% clay.	
				C072S082 (3.5' En Core) (3.0 - 3.5)	8.3	3		**Lean clay (CL)**: dark greenish gray [5GY 4/1], moist, low to medium plasticity, firm to soft with depth, 10% clay, 90% silt, homogeneous.	
	83	3.0		C072S083 (En Core) (4.5 - 4.5)		4			
				C072S083 (5.0 - 5.5)		5			
						6			
	83	3.0				7			
						8			
						9			
					1.6			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	
					1.1	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B071

TO 070 LOG Time: 9:07:10 AM

BOREHOLE LOG

PROJECT and JOB NUMBER: CLEAN 3 23818-072		SHEET NO.: 1 of 1	HOLE NO.: C3S030B072
DRILLER: Precision Sampling, Inc.	SITE and LOCATION: IR Site 30 Alameda Point	OVERBURDEN: NA	BEGUN: 8-18-04
DRILL MAKE AND MODEL: Direct-Push XD-2	COORDINATES (NORTHING, EASTING): N 2,113,628.6 E 6,045,680.5 / LOGGED BY: T. Takagi	ROCK (FT): NA	COMPLETED: 8-18-04
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1 11/16	GROUND ELEVATION (FT MLLW): 11.82 / CHECKED BY: Eric Johansen RG 6643	TOTAL DEPTH (FT BGS): 10.0	UPDATE: 12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
3.20	50	2.0			11.5			**Asphalt**	FID Background is 3.20 ppm
				C072S084 (0.5 - 1.0)		1		**Well-graded sand with gravel (SW)**: yellowish brown [10YR 5/6], moist, fine to coarse sand and gravel, 40% gravel, 55% sand, 5% clay, (FILL).	
	50	2.0				2			
						3			
				C072S085 (En Core) (3.5 - 3.5)	8.6			**Silt (ML)**: dark greenish gray [5GY 4/1], stiff, moist, low plasticity, with black mottling, 90% silt, 10% clay.	
	58	3.0			7.8	4		**Lean clay (CL)**: dark greenish gray [5GY 4/1], medium stiff, moist to wet, low to medium plasticity, homogeneous, 40% silt, 60% clay.	
						5			
						6			
	100	3.0				7			
						8			
					3.6			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	
					3.1	9		**Lean clay (CL)**: dark greenish gray [5GY 4/1], medium stiff, wet, low to medium plasticity, homogeneous, 40% silt, 60% clay.	
					2.1			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, trace fines, homogeneous.	
					1.8	10		TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

	SITE and LOCATION: IR Site 30 Alameda Point	HOLE NO.: C3S030B072

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BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B073

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-17-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,618.2 E 6,045,873.4	T. Takagi	NA	8-17-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	13.15	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
1.25	50	2.0			12.8			**Asphalt**	FID Background is 1.25 ppm
								Clayey sand with gravel (SC): olive brown [2.5Y 4/4], moist, fine to coarse grained sand, 70% sand, 15% fines, 15% clay (FILL).	
				C072S087 (En Core) (1.0 - 1.0)	12.1	1		**Well-graded sand (SW)**: yellowish brown [10YR 5/6], dry to moist, fine to coarse sand and subangular gravel, 30% gravel, 60% sand, 10% silt (FILL).	
	50	2.0		C072S087 (2.0 - 2.5)		2			
						3			
				C072S088 (En Core) (3.5 - 3.5)					
				C072S089 (En Core) (4.0 - 4.0)	9.4	4		**Sandy lean clay (CL)**: olive brown [2.5Y 4/4], stiff, moist, low plasticity, 40% fine sand, 30% silt, 30% clay.	8/19/04 C072S089 4 feet bgs En Core resample
	50	3.0				5			
						6			
					6.9			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	
	83	3.0				7			
					5.1	8		**Fat clay (CH)**: dark greenish gray [5GY 4/1], very soft, wet, high plasticity, 100% clay, homogeneous.	
						9			
					3.1	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B073

TO 070 LOG Time: 9:07:15 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B074

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-18-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,864.9 E 6,045,793.8 / T. Takagi	NA	8-18-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	10.17 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	2.0			9.8			**Asphalt**	FID Background is 3.14 ppm
				C072S090 (0.5 - 1.0)	9.2	1		**Well-graded gravel with clay and sand (GW-GC)**: olive brown [2.5Y 4/4], moist, 90% gravel, 5% fine sand, 5% clay.	
				C072S208 (Geotech) (1.0 - 2.0)				**Well-graded gravel with sand (GW)**: yellowish brown [10YR 5/6], fine to coarse grained sand, dry, 80% gravel, 20% sand.	
	100	2.0		C072S092 (En Core) (2.0 - 2.0) C072S091-DUP (2.0 - 2.5) C072S093 (En Core) (2.5 - 2.5)	7.9	2		**Lean clay (CL)**: dark greenish gray [5GY 4/1], soft, moist, low plasticity, 100% fines, homogeneous.	
					6.4 ▽	3			
	67	3.0				4		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, trace shell fragments, 100% fine sand, homogeneous.	
		3.0				5			
						6			
						7			
						8			
						9			
					0.2	10			
								TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B074

Report form: CTO 070 LOG Time: 9:07:17 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B075

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-19-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,785.8 E 6,045,992.4	T. Takagi	NA	8-19-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.40	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	2.0			11.1			**Asphalt**	FID Background is 4.70 ppm
						1		**Well-graded sand with gravel (SW)**: olive brown [2.5Y 4/4], moist, low plasticity, 15% fine subangular gravel, 80% sand, 5% fines.	
				C072S095 (1.5 - 2.0)	10.1	2		**Clayey sand (SC)**: dark yellowish brown [10YR 4/6], moist, 10% fine subrounded gravel, 70% coarse to fine sand, 20% fines, color changes at 2.8 feet bgs to dark olive brown [2.5Y 3/3], 50% fine sand, 50% fines.	
	50	2.0				3			
				C072S096 (En Core) (3.5 - 3.5)	8.1	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], wet, 100% fine sand, trace fines, homogeneous.	
	40	3.0				5			
					5.6	6		**Lean clay (CL)**: dark greenish gray [5GY 4/1], soft, 100% fines.	
	58	3.0			4.6	7		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], saturated, 100% fine sand, homogeneous, shell fragments at 9.5 feet bgs.	
						8			
						9			
					1.4	10			

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TOTAL DEPTH = 10.0 FEET

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B075

Report TO 070 LOG Time: 9:07:19 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B076

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-18-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)** / **LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,727.4 E 6,045,690.6 / T. Takagi	NA	8-18-04
HOLE SIZE DIAMETER (IN) / **CORE SIZE DIAMETER (IN)**	**GROUND ELEVATION (FT MLLW)** / **CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	11.13 / Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
3.40	70	2.0		C072S098 (0.5 - 1.0)	10.8			**Asphalt**	FID Background is 3.40 ppm
						1		**Well-graded sand with gravel (SW)**: dark yellowish brown [10YR 4/6], moist, 25% subangular gravel, 70% sand, 5% clay.	
	88	2.0			9.4	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], wet, 100% sand, homogeneous.	
				C072S207 (Geotech) (2.5 - 3.5) C072S099 (En Core) (3.0 - 3.0)	8.4	3		**Lean clay (CL)**: dark greenish gray [5GY 4/1], very stiff, moist, low plasticity, with black mottling, 100% fines.	
	100	3.0		C072S101 (DUP, MS/MSD) (En Core) (4.0 - 4.0) C072S100 (En Core) (4.0 - 4.0)	7.4	4		**Silt (ML)**: dark greenish gray [5GY 4/1], very soft, moist, low plasticity, 5% clay, 95% silt.	
					6.4 ▽	5		**Elastic silt (MH)**: dark greenish gray [5GY 4/1], very soft, high plasticity, 95% silt, 5% clay, laminated.	
						6			
	50	3.0			4.1	7		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], saturated, 100% fine sand, homogeneous.	
						8			
						9			
					1.1	10			

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

TOTAL DEPTH = 10.0 FEET

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B076

Report form: CTO 070 LOG Time: 9:07:22 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B077

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-17-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,720.7 E 6,045,867.5	T. Takagi	NA	8-17-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	11.75	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
1.34	35	2.0			11.4			**Asphalt**	FID Background is 1.34 ppm
				C072S102 (0.5 - 1.0)	10.7	1		**Clayey sand with gravel (SC)**: olive brown [2.5Y 4/4], moist, fine with coarse sand and gravel, 15% gravel, 70% sand, 15% clay (FILL).	
	90	2.0		C072S103 (En Core) (2.5 - 2.5)		2		**Well-graded sand (SW)**: yellowish brown [10YR 5/6], dry to moist, fine with coarse sand and gravel, 30% gravel, 60% sand, 10% clay (FILL).	
					9.0	3		**Fat clay (CH)**: dark greenish gray [5GY 4/1], firm, moist, high plasticity, with oxidized mottling, 100% clay, homogeneous.	
	33	3.0			8.2	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], moist to wet, 100% fine sand, homogeneous.	
						5			
						6			
					5.5			**Silt (ML)**: greenish gray [5GY 5/1], very soft, wet, low plasticity, 100% silt/fines, homogeneous.	
	50	3.0			5.0	7		**Fat clay (CH)**: dark greenish gray [5GY 4/1], very soft, wet, high plasticity, 100% fines, homogeneous.	
					3.7	8		**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	
						9			
					1.7	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B077

Report: O 070 LOG Time: 9:07:25 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B078

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30	Alameda Point	NA	8-17-04
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Direct-Push XD-2	N 2,113,598.3 E 6,045,788.1	T. Takagi	NA	8-17-04
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1 11/16	12.59	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	2.0			12.2			**Asphalt**	FID Background is 1.25 ppm
				C072S105 (0.5 - 1.0)		1		**Well-graded sand with gravel (SW):** olive brown [2.5Y 4/4], moist, fine to coarse sand and subangular gravel, 40% gravel, 60% sand.	
	50	2.0				2			
					9.3	3		**Fat clay (CH):** dark greenish gray [5GY 4/1], firm to stiff, moist, high plasticity, 5% sand, 95% clay, homogeneous.	
	67	3.0		C072S205 (Geotech) (3.0 - 4.0) C072S106 (En Core) (3.0 - 3.0)		4			
				C072S107 (En Core) (4.5 - 4.5)	8.1 ▽	5		**Poorly graded sand (SP):** dark greenish gray [5GY 4/1], wet, 100% fine sand, homogeneous.	8/19/04 C072S107 4.5 feet bgs En Core resample
						6			
	100	3.0			5.6	7		**Fat clay (CH):** dark greenish gray [5GY 4/1], very soft, wet, high plasticity, 100% fines, homogeneous.	
						8			
						9			
					2.6	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION		HOLE NO.
IR Site 30	Alameda Point	C3S030B078

Report form: CTO 070 LOG Time: 9:07:27 AM

BOREHOLE LOG

PROJECT and JOB NUMBER	SHEET NO.	HOLE NO.
CLEAN 3 23818-072	1 of 1	C3S030B079

DRILLER	SITE and LOCATION	OVERBURDEN	BEGUN
Precision Sampling, Inc.	IR Site 30 Alameda Point	NA	8-19-04

DRILL MAKE AND MODEL	COORDINATES (NORTHING, EASTING)	LOGGED BY:	ROCK (FT)	COMPLETED
Direct-Push XD-2	N 2,113,665.9 E 6,045,991.9	T. Takagi	NA	8-19-04

HOLE SIZE DIAMETER (IN)	CORE SIZE DIAMETER (IN)	GROUND ELEVATION (FT MLLW)	CHECKED BY:	TOTAL DEPTH (FT BGS)	UPDATE
2	1 11/16	12.85	Eric Johansen RG 6643	10.0	12-17-04

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	88	2.0			12.6			**Asphalt**	FID Background is 4.70 ppm
				C072S108 (0.5 - 1.0)	12.1			**Well-graded sand with gravel (SW)**: dark olive brown [2.5Y 3/3], moist, low plasticity, 35% fine subangular gravel, 60% coarse to fine sand, 5% fines.	
				C072S109 (1.0 - 1.5) C072S110 (En Core) (1.5 - 1.5)		1		**Well-graded sand with clay and gravel (SW-SC)**: dark yellowish brown [10YR 4/6], moist, 35% subangular fine gravel, 45% sand, 20% fines.	
	75	2.0			11.1	2		**Lean clay (CL)**: dark grayish brown [2.5Y 4/2], stiff, with oxidized layers, 100% fines, laminated.	
				C072S111 (3.5' En Core) (3.0 - 3.5)	9.6	3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], moist, 100% fine sand, trace fines, homogeneous.	
	67	3.0		C072S112 (En Core) (4.0 - 4.0)		4			
						5			
						6			
					6.1	7		**Elastic silt (MH)**: dark greenish gray [5GY 4/1], very soft, 100% fines, with black mottling.	
	73	3.0				8			
						9			
					3.1			**Poorly graded sand (SP)**: dark greenish gray [5GY 4/1], saturated, sand (100%), homogeneous.	
					2.8	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
ERIC A. JOHANSEN
No. 6643
Exp. 10/31/06
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
IR Site 30 Alameda Point	C3S030B079

Report: TO 0/0 LOG Time: 9:07:30 AM

Site 30 - PAH Study

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B001

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,873.1 E 6,045,064.1	9.1 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz.)	ABANDON DATE
▼ 6.0 ft / 3.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					8.9			**ASPHALT**	
C0592948		10:35:00 AM	NR					**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine and coarse gravel, angular, (FILL). 85/0/15	FID Background = 3 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0592949		10:40:00 AM	NR						
					7.1	2		**CLAY (CH)**: Dark greenish gray [5GY 6/1], stiff from 2-3', soft below 3', moist, high plasticity, laminated, black mottles from 2-3', marsh crust?? from 2-3'. (BAY MUD).	
						3			
C0592950		10:45:00 AM	NR						
						4			
						5			
				▽		6		at 6.0 ft.: saturated.	
C0592951		10:50:00 AM	NR						
						7		at 7.0 ft.: sandy.	
						8			
					0.9			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST CATHIE L. STUMPENHAUS No. 4451 STATE OF CALIFORNIA 2/5/04

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B001

Report form: CTO-059 ALAMEDA BORING LOG Time: 3:59:39 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B002

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,869.8 E 6,045,131.4	9.1 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 3.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					8.9			**ASPHALT**	
C0592952		11:10:00 AM	NR			1		**CLAYEY GRAVEL with SAND (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine and coarse gravel, angular, 50% gravel, 30% clay and silt, 20% sand. (FILL). ~~50/20/30~~ 50/20/30	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
C0592953		11:15:00 AM	NR						
					7.1	2		**CLAY (CH)**: Dark greenish gray [5GY 6/1], stiff in upper 12" to soft, moist, high plasticity, laminations throughout black mottles in upper foot, marsh crust?. (BAY MUD).	
C0592954		11:20:00 AM	NR			3			
						4			
						5			
C0592955		11:25:00 AM	NR	▽		6		at 6.0 ft.: saturated.	
						7		at 7.0 ft.: sandy.	
						8			
					0.9			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B002

Report form: CTO-059 ALAMEDA BORING LOG Time: 3:59:33 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B003

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,867.3 E 6,045,188.4	12.7 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 6.7ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					12.5			**ASPHALT**	
C0592957 C0592956		11:35:00 PM	NR					**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine and coarse gravel, angular, (FILL).	FID Background = 3 ppm
						1		85/0/15	Hole backfilled with bentonite-cement grout after completion
C0592958		11:40:00 PM	NR						
					10.7	2		**CLAY (CH)**: Dark greenish gray, stiff (upper 12") to soft, moist, laminated, high plasticity, black mottles upper 12", marsh crust @ 2 to 3 feet bgs. (BAY MUD).	
						3			
C0592959		11:45:00 PM	NR						
						4			
						5			
				▽		6		at 6.0 ft.: saturated.	
C0592960		11:50:00 PM	NR						
						7			
					4.9				
						8		**SAND (SP)**: poorly graded, (BAY SEDIMENT).	
					4.5				
								TOTAL DEPTH = 8.3 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B003

Report form: CTD-009 ALAMEDA BORING LOG Time: 3:59:35 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B004

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,864.9 E 6,045,260.5	9.4 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 3.4ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					9.2			**ASPHALT**	
C0592961		12:10:00 PM	NR					**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, (FILL).	
						1		85/0/15	Hole backfilled with bentonite-cement grout after completion
C0592963		12:20:00 PM	NR						
					7.4	2		**CLAY (CH)**: Dark greenish gray, soft, high plasticity, laminated, marsh crust @ 2 to 3 feet bgs?, Geofabric @ 2 feet bgs. (BAY MUD).	
						3			
C0592964		12:25:00 PM	NR						
						4			
						5			
				▽		6		at 6.0 ft.: saturated.	
C0592962		12:15:00 PM	NR						
					2.4	7		**SAND (SP)**: Dark gray, wet, poorly graded, fine grained sand, trace shells. (BAY SEDIMENT).	
						8			
					1.2			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 445 · 8/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B004

Report format: CTO-459 ALAMEDA BOREHOLE LOG Time: 3:09:39 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B005

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,849.7 E 6,045,340.4	9.5 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 4.5ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0592965		3:05:00 PM	NR					**CLAYEY GRAVEL with SAND (GC)**: Strong brown [7.5YR 5/6], dense, moist, fine and coarse gravel, angular, composed mostly of keratophyre, 60% gravel, 20% sand, 20% fines. (FILL). 60/20/20	FID Background = 0 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0592967 C0592966		3:10:00 PM	NR						
					7.7	2		**CLAY (CH)**: Brown [7.5YR 4/3], stiff to very stiff, moist, high plasticity, (FILL).	
					7.0			**SILT (ML)**: Pale brown [10YR 6/3], stiff, moist, no plasticity, (FILL).	
C0592968		3:15:00 PM	NR			3			
					6.0			**CLAY (CH)**: Greenish gray [10GB 5/1] to Very dark bluish gray [10B 3/1], soft, moist, high plasticity, (BAY MUD).	
						4			
				▽		5		at 5.0 ft.: saturated.	
C0592969		3:20:00 PM	NR		3.5	6		**SAND (SP)**: Dark gray [N4], dense, wet, fine grained sand, trace (<2%) shells. (BAY SEDIMENT).	
						7			
					1.5	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B005

Report form: CTO-059 ALAMEDA BORING LOG Date: 3:59:43 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B006

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,844.1 E 6,045,391.8	10.3 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 4.3ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.0			**ASPHALT**	
C0592970		1:20:00 PM	NR					**CLAYEY GRAVEL with SAND (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine to course gravel, 50% gravel, 25% sand, 25% fines, composed mostly of keratophere and graywacke sandstone. (FILL). 50/25/25	FID Backgroun = 0 ppm Hole backfilled with bentonite-cement grout after completion
						1			
C0592971		1:25:00 PM	NR						
					8.3	2		**SILTY CLAY (CH)**: Dark greenish gray [5G 4/1] Dark greenish gray [5G 4/1] to greenish gray [10GY 5/1] with black [N25] mottles, stiff to very stiff in upper 12" of unit, gradually decreasing in consistency to soft at bottom, high plasticity, laminated with occassional seams (<1/4") composed of silt, trace (<5%) sand. (BAY MUD).	
						3			
C0592972		1:30:00 PM	NR						
						4			
					6.1			**SAND (SP)**: Dark gray [N4], dense, moist, poorly graded, fine grained sand, some magnetite rich laminations. (BAY SEDIMENT).	
					5.5			**CLAY (CH)**: Dark greenish gray [10GY 4/1], soft, wet, high plasticity, laminated. (BAY MUD).	
						5			
				▽		6		at 6.0 ft.: saturated.	
C0592973		1:35:00 PM	NR		4.1			**SAND (SP)**: Dark gray [N4], dense, wet, fine grained sand, (BAY SEDIMENT).	
						7			
						8			
					2.0			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B006

Report form: CTI-059 ALAMEDA BORING LOG Time: 3:59:47 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B007

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,855.9 E 6,045,461.9	9.9 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz.)	ABANDON DATE
▼ 6.0 ft / 3.9ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					9.7			**ASPHALT**	
C0592976		2:30:00 PM	NR			1		**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine gravel, angular, 45% gravel, ~~35~~ 25% sand, and 30% fines. (FILL). 45/25/30	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
					8.7			**SILTY CLAY (CH)**: Greenish gray [5GY 5/1], stiff to very stiff, moist, (BAY MUD).	
C0592977		2:35:00 PM	NR			2			
						3		at 3.0 ft.: soft, laminated. (BAY SEDIMENT).	
C0592978		2:40:00 PM	NR						
					6.2	4		**SAND (SP)**: Greenish gray [5GB 5/1], dense, moist, poorly graded, fine grained sand, subrounded, (BAY SEDIMENT).	
					4.9	5		**CLAY (CH)**: Bluish gray [5B 5/1] to dark greenish gray [10G 4/1], wet, high plasticity, laminated, trace (<3%) organics. (BAY MUD).	
				▽		6		at 6.0 ft.: saturated.	
C0592979		2:45:00 PM	NR						
					3.2	7		**SAND (SP)**: poorly graded, (BAY SEDIMENT).	
						8			
					1.7			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST CATHIE L. STUMPENHAUS No. 4451 2/5/04 STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS

Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83)
Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929

HOLE NUMBER C3S030B007

Report form: CTD-459 ALAMEDA BORING LOG Time: 2:59:52 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B008

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geprobe 5400	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,851.6 E 6,045,529.7	10.2 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 4.0 ft / 6.2ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0592979 C0592978		4:10:00 PM	NR		9.7			**GRAVEL with SAND (GW)**: Brown [10YR 4/3], moist, well graded, 70% subangular to rounded gravel to 1-inch, 28% sand, 2% fines. (FILL). 70/28/2	FID background = 2.0 ppm
						1		**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 4/6], 60% subangular gravel to 1.5-inches, 35% sand, 5% fines. (FILL). 60/35/5	Hole backfilled with bentonite-cement grout after completion
C0592980		4:11:00 PM	NR						
					8.2	2		**CLAYEY SAND (SC)**: Dark olive gray [5Y 3/2], moist, poorly graded, 0% gravel, 80% sand, 20% fines. (FILL).	
					7.8			**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], medium stiff, laminated, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0592981		4:12:00 PM	NR			3			
				▽		4		at 4.0 ft.: saturated.	
						5			
C0592982		4:15:00 PM	NR		4.2	6		**SAND (SP)**: Dark greenish gray [5GY 4/1], saturated, heterogeneous, 0% gravel, 100% sand, 0% fines. (BAY SEDIMENT).	
						7			
					2.2	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 8/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B008

Report form: CTO-859 ALAMEDA BORING LOG Time: 3:09:55 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B009

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	3 in	N 2,113,832.3 E 6,045,588.8	10.9 ft	8.5 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 7.0 ft / 3.9ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.4			**CONCRETE**	FID Background = 1.80 ppm
C0592983		4:25:00 PM	NR			1		**GRAVELLY CLAY (CL)**: Yellowish brown [10YR 5/6], moist, fine to course gravel, angular to subangular, 35% gravel, 10% sand, 55% fines. (FILL). 35/10/55	Hole backfilled with bentonite-cement grout after completion
C0592984		4:28:00 PM	NR		8.9	2		**CLAY (CL)**: Dark greenish gray [GLEYl 4/1] with black [Gleyl 2.5/N4], stiff, moist, medium plasticity, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						3			
C0592985		4:30:00 PM	NR			4			
						5			
						6			
C0592987 C0592986		4:32:00 PM	NR						
				▽	3.9	7		**SAND with silt (SP-SM)**: Dark gray [GLEYl 4/N], saturated, fine grained sand, 0% gravel, 90% sand, 10% fines. (BAY SEDIMENT).	
						8			
					2.4			**TOTAL DEPTH = 8.5 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 8/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B009

Report form: CTD-659 ALAMEDA BORING LOG Time: 4/08/02 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B010

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geprobe 5400	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,831.1 E 6,045,656.2	10.7 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 5.7ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0592988		2:57:00 PM	NR					**SAND with GRAVEL (SW)**: Brown [10YR 4/3], moist, well graded, 30% subangular gravel to 0.75-inches, 68% sand, 2% fines. (FILL).	FID background = 2.0 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0592989		2:58:00 PM	NR					at 1.0 ft.: Dark yellowish brown [10YR 4/6], oxide staining. 30/68/2	
					8.7	2		**SILTY CLAY (CH)**: Dark greenish gray [5GY 4/1], stiff, laminated, with black stains throughout, 0% gravel, 0% fines, 100% fines. (BAY MUD).	
C0592990		2:59:00 PM	NR			3			
						4		at 4.0 ft.: strong hydrocarbon odor.	
				▽		5		at 5.0 ft.: saturated.	
C0592991		3:01:00 PM	NR		4.7	6		**SAND (SP)**: Dark greenish gray [5GY 4/1], poorly graded, 0% gravel, 100% sand, 0% fines. (BAY SEDIMENT).	
						7			
					2.7	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST CATHIE L. STUMPENHAUS No. 4451 2/5/04 STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B010

Report form: CTO-489 ALAMEDA BORING LOG Time: 4:08:05 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B011

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,831.3 E 6,045,728.2	10.6 ft	4.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.3			**ASPHALT**	
C0592992		10:30:00 AM	NR					**CLAYEY GRAVEL with SAND (GC)**: Brownish yellow [10YR 6/6], dense, moist, fine to course gravel, angular, 40% gravel, 20% sand, 40% silt and clay. (FILL).	FID Background = 3 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0592993		10:35:00 AM	NR					40/20/40	
						2		at 2.3 ft.: Dark greenish gray [10GY 4/1].	
						3			
C0592994		10:40:00 AM	NR		7.3			**CLAY (CH)**: Dark greenish gray [10GY 4/1], very stiff, moist, high plasticity, (BAY MUD).	LEL = 50% in borehole
						4			
					6.3			**TOTAL DEPTH = 4.3 FEET**	

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
2/5/04
STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B011

Report form: CTO-059 ALAMEDA BORING LOG Time 4:09:01 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B012

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,824.1 E 6,045,788.0	10.9 ft	4.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.6			**ASPHALT**	
C0592997 C0592996		10:55:00 AM	NR					**CLAYEY GRAVEL with SAND (GC)**: Brownish yellow [10YR 6/6], dense, moist, fine and coarse gravel, 50% gravel, 20% sand, 30% clay. (FILL).	FID Background = 3 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0592998		11:00:00 AM	NR					50/20/30	
						2			
						3			
C0592999		11:05:00 AM	NR						
					7.4			**CLAY (CH)**: Dark greenish gray [10Y 4/1], very stiff, moist, high plasticity, (BAY MUD).	LEL = 55% in borehole
						4			
					6.6				

TOTAL DEPTH = 4.3 FEET

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
2/5/04
STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B012

Report form: CTO-059 ALAMEDA DRILLING LOG Time: 4:06:11 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B013

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,820.7 E 6,045,853.9	11.0 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.0ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.7			ASPHALT	
C0593001		11:30:00 AM	NR					CLAYEY GRAVEL with SAND (GC): Brownish yellow [10YR 6/6], dense, moist, fine to course gravel, 60% gravel, ~~20%~~ 10% sand, 30% clay. (FILL). 60/10/30	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
						1			
C0593002		11:35:00 AM	NR						
						2			
					8.0	3		CLAY (CH): Dark greenish gray [10GY 4/1], soft, moist, high plasticity, (BAY MUD).	
C0593003		11:40:00 AM	NR						
					7.0	4		SAND (SP): Dark gray [N4], dense, moist, poorly graded, fine grained sand, (BAY SEDIMENT).	
					6.0	5		CLAY (CH): Gray [N5], soft, moist, high plasticity, (BAY MUD).	
				▽	5.0	6		SAND (SP): black, dense, saturated, poorly graded, fine grained sand, (BAY SEDIMENT).	
C0593004		11:45:00 AM	NR						
						7			
						8			
					2.7			TOTAL DEPTH = 8.3 FEET	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B013

Report form: CTO-469 ALAMEDA BORING LOG Time: 4:06:15 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B014

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,817.8 E 6,045,921.5	11.0 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.0ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.8			**ASPHALT**	
C0593005		2:00:00 PM	NR			1		**CLAYEY GRAVEL with SAND (GC)**: Brownish yellow [10YR 5/8], dense, moist, fine to course gravel, angular, 50% gravel, 20% sand, 30% fines. (FILL). 50/20/30	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
C0593007 C0593006		2:05:00 PM	NR		9.0	2		**CLAY (CH)**: Greenish gray [5GY 5/1], soft to stiff, high plasticity, laminated. (BAY MUD).	
C0593008		2:10:00 PM	NR			3			
						4			
						5			
				▽	5.0	6		**SAND (SP)**: Black [N2.5], medium dense, saturated, fine grained sand, angular to subrounded, (BAY SEDIMENT).	
C0593009		2:15:00 PM	NR			7			
						8			
					2.8			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 8/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B014

Report form: CTO-669 ALAMEDA BORING LOG Time: 4:08:18 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B015

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,814.6 E 6,045,984.5	11.1 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz.)	ABANDON DATE
▼ 6.0 ft / 5.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.8			**ASPHALT**	
C0593010		9:30:00 AM	NR			1		**CLAYEY GRAVEL with SAND (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine to coarse gravel, 60% gravel, 15% sand, 25% clay and silt. (FILL). 60/15/25	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
C0593011		9:35:00 AM	NR		9.6			**CLAY (CH)**: Very dark grayish brown [2.5Y 3/2], stiff, moist, high plasticity, (FILL).	
					9.1	2		**SAND (SP)**: Olive [5Y 5/3], medium dense, moist, poorly graded, fine grained sand, (FILL).	
C0593012		9:40:00 AM	NR			3			
					7.1	4		**CLAY (CH)**: Greenish gray [5GY 5/1], soft to medium stiff, moist, fine grained sand, fine laminations occassional seams (<1/2") of fine sand. (BAY MUD).	
						5			
				▽	5.1	6		**SAND (SP)**: Dark gray [N4], dense, saturated, poorly graded, fine grained sand, subrounded, (BAY SEDIMENT).	
C0593013		9:45:00 AM	NR			7			
						8			
					2.8			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST CATHIE L. STUMPENHAUS No. 4451 2/5/04 STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B015

Report form: CTO-009 ALAMEDA BORING LOG Time: 4:09:21 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B016

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	3 in	N 2,113,798.3 E 6,045,053.4	10.6 ft	12.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.0 ft / 2.6ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.4	0		**ASPHALT**	FID Background = 0 ppm
						1		**GRAVELLY CLAY with SAND (CL)**: Yellowish brown [10YR 5/4], moist, fine to coarse angular and subrounded gravel, 30% gravel, 15% sand, 55% fines. (ROAD BASE).	Hole backfilled with bentonite-cement grout after completion
						2		30/15/55	
					7.6	3		**CLAY (CL)**: Dark greenish gray [GLEY1 4/1] with black [GLEY1 2.5/N], soft, moist, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0593014		4:42:00 PM	NR						
						4			
C0593015		4:45:00 PM	NR						
						5			
C0593017 C0593016		4:48:00 PM	NR			6			
						7			
				▽		8		at 8.0 ft.: saturated.	
C0593018		4:52:00 PM	NR			9			
						10			
					-0.4	11		**SAND with SILT (SP-SM)**: Dark greenish gray [GLEY1 4/1], wet, 0% gravel, 90% sand, 10% fines, shell fragments. (BAY SEDIMENT).	
					-1.6	12			
								TOTAL DEPTH = 12.3 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B016

Report form: CTO-499 ALAMEDA DRILLING LOG: Time: 4:00:25 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B017

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	3 in	N 2,113,789.0 E 6,045,271.3	10.6 ft	12.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.0 ft / 2.6ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.3			**ASPHALT**	
						1		**GRAVELLY CLAY with SAND (CL)**: Yellowish brown [10YR 5/6], moist, fine angular and subrounded gravel, 30% gravel, 15% sand, 55% fines. (ROAD BASE).	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
						2		30/15/55	
					7.6	3		**SILTY CLAY (CL)**: Black [10YR 2/1], soft to medium stiff, 0% gravel, 0% sand, 100% fines. (FILL).	
C0593019		12:15:00 PM	NR		7.1			**CLAY (CL)**: Dark greenish gray [GLEY1 4/1] and black [GLEY1 2.5/N], soft, moist, (BAY MUD).	
						4			
C0593020		12:20:00 PM	NR						
						5			
C0593021		12:22:00 PM	NR			6			
						7			
				▽	2.6	8		**SAND with SILT (SP-SM)**: Dark greenish gray [GLEY1 4/1], saturated, fine grained sand, 0% gravel, 90% sand, 10% fines. (BAY SEDIMENT).	
C0593022		12:30:00 PM	NR			9			
						10			
						11			
					-1.7	12		**TOTAL DEPTH = 12.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B017

Report form: CTO-459 ALAMEDA BORING LOG Time: 14:00:29 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B018

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,778.2 E 6,045,331.1	10.2 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 5.2ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.0			**ASPHALT**	
C0593023		3:30:00 PM	NR			1		**CLAYEY GRAVEL with SAND (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine to course gravel, ~~30%~~ 50% gravel, 20% sand, ~~20%~~ 30% fines. (FILL). 50/20/30	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
					9.0			**CLAY (CH)**: Brown [7.5YR 5/4] to Gray [7.5YR 5/1], stiff, high plasticity, trace (<5%) sand, trace (<5%) gravel. (FILL).	
C0593024		3:35:00 PM	NR			2			
					7.7			**SILT (ML)**: Light brownish gray [10YR 6/2], stiff, moist, no plasticity, (FILL).	
						3			
C0593025		3:40:00 PM	NR		7.0			**CLAY (CH)**: Dark greenish gray [10GB 4/1], soft, moist, high plasticity, trace (<5%) organics (stems, leaves). (BAY MUD).	
						4			
				▽		5		at 5.0 ft.: saturated.	
						6			
C0593027 C0593026		3:45:00 PM	NR			7			
					2.7			**SAND (SP)**: Dark gray [N4], dense, wet, poorly graded, fine to medium grained sand, Trace (<1%) shells. (BAY SEDIMENT).	
						8			
					1.9			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · STATE OF CALIFORNIA · 2/5/04

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B018

Report form: CTO-059 ALAMEDA BORING LOG Time: 4/06/04 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B019

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,786.9 E 6,045,383.8	10.1 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 5.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593028		10:10:00 AM	NR		9.8			GRAVEL (GW): (FILL).	
								CLAYEY GRAVEL (GC): Yellowish brown [10YR 5/6], dense, moist, fine to course gravel, (FILL).	FID Background = 0 ppm
						1		85/0/15	Hole backfilled with bentonite-cement grout after completion
C0593029		10:15:00 AM	NR						
					8.1	2		CLAY (CH): Dark greenish gray [5GY 4/1], soft, moist, laminated, silty in top 12". (BAY MUD).	
C0593030		10:20:00 AM	NR			3			
						4			
				▽		5		at 5.0 ft.: saturated.	
C0593031		10:25:00 AM	NR			6		at 6.0 ft.: sandy in bottom 12".	
					3.1	7		SAND (SP): Dark gray [N3], dense, wet, fine grained sand, (BAY SEDIMENT).	
					2.1	8		TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
C. L. Stumpenhaus
No. 4451
8/5/04
STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B019

Report form: CTO-459 A1.AMPDA BORING LOG Time: 4/08/37 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B020

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,739.6 E 6,045,620.6	11.1 ft	4.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593032		3:32:00 PM	NR		10.6			**SAND with GRAVEL (SW)**: Dark grayish brown [10YR 4/2], moist, well graded, 40% rounded gravel to 0.5-inches, 55% sand, 5% fines. (FILL). 40/55/5	FID background = 2.0 ppm
						1		**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 4/6], moist, well graded, 55% subangular gravel to 1-inch, 43% sand, 2% fines. (FILL). 55/43/2	Hole backfilled with bentonite-cement grout after completion
C0593033		3:33:00 PM	NR						
					9.1	2		**CLAYEY SILT (ML)**: Black [2.5Y 2.5/1], 2% very rounded gravel to 0.33-inch, 10% sand, 88% fines. (FILL). 2 0/10/88	
					8.5			**SILTY CLAY (CH)**: Dark greenish gray [5GY 4/1], stiff, laminated, black staining, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0593034		3:34:00 PM	100			3			
					7.1	4		**TOTAL DEPTH = 4.0 FEET**	C0593035 not taken Abandon boring at 4-feet bgs due to LEL= 30% and FID>100 ppm down the hole

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2/5/04
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Report form: CTO-459 ALAMEDA BORING LOG Time: 4:00:40 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B021

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,765.2 E 6,045,652.7	11.1 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.9			**ASPHALT**	
C059036		3:50:00 PM	NR					**CLAYEY GRAVEL (GC)**: Strong brown [7.5YR 5/6], dense, moist, fine to course gravel, angular, 60% gravel, 10% sand, 30% fines. (FILL).	FID Background = 3 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C059037		3:55:00 PM	NR					60/10/30	
					9.1	2		**CLAY (CH)**: Dark greenish gray [5GY 4/1], stiff, laminated, black mottles in upper 12". (BAY MUD).	
						3			
C059038		4:00:00 PM	NR						
						4			
						5			
				▽		6		at 6.0 ft.: saturated.	
C059039		4:05:00 PM	NR						
					4.6			**SAND (SP)**: Very dark gray [N3], dense, moist, poorly graded, fine grained sand, (BAY SEDIMENT).	
						7			
						8			
					2.9			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 8/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B021

Report form: CTO-459 ALAMEDA BORING LOG Time: 4:08:43 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B022

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,761.6 E 6,045,718.6	11.1 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.1ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.8			**ASPHALT**	
C0593040 C0593041		3:05:00 PM	NR					**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine and course gravel, (FILL).	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
						1		85/0/15	
C0593042		3:10:00 PM	NR						
					9.1	2		**SILTY SAND (SM)**: black, dense, moist, fine grained sand, 70% sand, 30% silt. (FILL).	
						3			
C0593043		3:15:00 PM	NR						
					7.6			**CLAY (CH)**: greenish gray, soft, moist, high plasticity, (BAY MUD).	
						4			
						5			
				▽		6		at 6.0 ft.: saturated.	
C0593044		3:20:00 PM	NR						
						7			
					3.6			**SAND (SP)**: black, dense, moist, poorly graded, fine grained sand, (BAY SEDIMENT).	
						8			
					2.8			**TOTAL DEPTH = 8.3 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B022

Report form: C3S-059 ALAMEDA BORING LOG Time: 4:00:45 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B023

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,758.3 E 6,045,784.5	11.3 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ NA	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					11.0			**ASPHALT**	
C0593045		3:50:00 PM	NR					**CLAYEY GRAVEL (GC)**: brownish yellow, dense, moist, fine to coarse gravel, (FILL).	FID Background = 3 ppm
						1		85/0/15	Hole backfilled with cement grout after completion
C0593047 C0593046		3:55:00 PM	NR						
					9.3	2		**CLAY (CH)**: mottled gray and black, stiff to very stiff, 5% organics, marsh crust. (BAY MUD).	
						3			Not sampled below Marsh Crust.
					7.8			**SAND** dark gray, poorly graded, (BAY SEDIMENT).	
					7.3	4		**CLAY (CH)**: Gray [N5], soft to medium stiff, high plasticity, laminated. (BAY MUD).	
						5			
						6			
						7			
					3.8			**SAND (SP)**: Dark gray [N4], dense, wet, fine grained sand, (BAY SEDIMENT).	
						8			
					3.0			**TOTAL DEPTH = 8.3 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B023

Report form: CTU-659 ALAMEDA BORING LOG Time: 4:00:51 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B024

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,754.7 E 6,045,850.4	11.6 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 7.0 ft / 4.6ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					11.3			**ASPHALT**	
C0593050		3:20:00 PM	NR					**CLAYEY GRAVEL (GC)**: Brownish yellow [10YR 5/6], dense, moist, fine and coarse gravel, (FILL).	FID Background = 3 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0593051		3:25:00 PM	NR					85/0/15	
						2			
					9.1			**SAND (SP)**: Alternating brownish yellow and dark gray, poorly graded, fine grained sand, (FILL).	
						3			
C0593052		3:30:00 PM	NR						
						4			
					7.1			**CLAY (CH)**: gray, soft to medium stiff, high plasticity, fine luminations 1-5 mm (0.4 - 0.2 inches) apart, trace <1% organics. (BAY MUD).	
						5			
						6			
C0593054 C0593053		3:35:00 PM	NR						
				▽		7		at 7.0 ft.: saturated.	
					4.1			**SAND (SP)**: dark gray, poorly graded, fine grained sand, (BAY SEDIMENT).	
						8			
					3.3			**TOTAL DEPTH = 8.3 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B024

Report form: CTO-259 ALAMEDA BORING LOG Time: 4:00:56 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B025

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,749.6 E 6,045,916.1	11.6 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.6ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					11.4			**ASPHALT**	
C0593819		2:40:00 PM	NR					**CLAYEY GRAVEL (GC)**: Brownish yellow [10YR 5/6], dense, fine and coarse gravel, coursest upward. (FILL).	FID Background = 3 ppm
						1		85/0/15	Hole backfilled with bentonite-cement grout after completion
C0593820		2:45:00 PM	NR						
					9.6	2		**CLAY AND SILT (CH)**: gray, moist, low to high plasticity, laminations 1 mm (0.04 inches) apart. (FILL).	
						3			
C0593821		2:50:00 PM	NR						
						4			
						5			
C0593822		2:55:00 PM	NR						
				▽		6		at 6.0 ft.: saturated.	
					5.1			**CLAY (CH)**: black, high plasticity, organic-rich clay, organics mostly stems, marsh crust. (BAY MUD).	Exclude below 1.5 feet from sample for analysis
						7			
					4.1			**SAND** Black [N2 5/1], wet, fine grained sand, (BAY SEDIMENT).	
						8			
					3.4				
								TOTAL DEPTH = 8.3 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B025

Report form: CTO-059 ALAMEDA BORING LOG Time: 4:00:59 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B026

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,748.6 E 6,045,980.1	11.7 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.5 ft / 5.2ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					11.4			**ASPHALT**	
C0593823		9:50:00 AM	NR					**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine to course gravel, 60% gravel, 15% sand, 25% fines. (FILL).	FID Background = 3 ppm
					10.7	1		**SANDY CLAY (CL)**: Dark gray [N4], stiff, moist, fine grained sand, 70% fines 30% sand. (FILL). 0/30/70	Hole backfilled with bentonite-cement grout after completion
C0593824		9:55:00 AM	NR		10.2			**SAND (SP)**: Olive [5Y 5/3], dense, moist, poorly graded, fine grained sand, subrounded, (FILL).	
						2			
						3			
C0593825		10:00:00 AM	NR						
						4			
					7.2			**CLAY (CH)**: Greenish gray [5GY 5/1], soft, moist, fine laminations. (BAY MUD).	
						5			
						6			
C0593826		10:05:00 AM	NR	▽	5.2			**SAND (SP)**: Dark gray [N5], dense, saturated, poorly graded, fine grained sand, (BAY SEDIMENT).	
						7			
						8			
					3.4			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST
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2/5/04
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Report format: CTO-459 ALAMEDA BORING LOG Time: 4/8/04 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B027

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,731.6 E 6,045,065.0	10.6 ft	13.5 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.5 ft / 2.1ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
						1, 2		**GRAVELLY CLAY with SAND (CL)**: Yellowish brown [10YR 5/6], fine angular and subrounded gravel, 30% gravel, 15% sand, 55% fines. (ROAD BASE). 30/15/55	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion Direct push sampling begun at 1.5 feet bgs.
					8.1	3		**SANDY CLAY (CL)**: Dark brown [10YR 3/3], fine sand with some fine angular gravel. (FILL). 0/15/85	
C0593829 C0593828		4:00:00 PM	NR						
					7.1			at 3.4 ft.: greenish gray [GLEY 1 5/1].	
C0593830		4:04:00 PM	NR			4		**CLAY (CL)**: dark greenish gray [GLEY 1 3/1], soft, moist, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0593831		4:10:00 PM	NR			5, 6, 7, 8			
C0593832		4:15:00 PM	NR	▽		9, 10, 11, 12		at 8.5 ft.: saturated.	
					-1.9	13		**SAND with SILT (SP-SM)**: dark greenish gray [GLEY 1 4/1], wet, fine grained sand, (BAY SEDIMENT).	
					-2.9			**TOTAL DEPTH = 13.5 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B027

Report form: CTO-459 ALAMEDA BORING LOG Time: 13:07:17 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B028

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,725.6 E 6,045,127.3	10.5 ft	12.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.0 ft / 2.5ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
						1		**GRAVELLY CLAY with SAND (CL)**: Yellowish brown [10YR 5/6], moist, fine angular gravel, 30% gravel, 15% sand, 55% fines. (ROAD BASE). 30/15/55	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
					8.5	2		**SILTY CLAY (CL)**: Black [10YR 2/1], soft, moist, 0% gravel, 0% sand, 100% fines. (FILL).	
C0593832		2:26:00 PM	NR		7.8				
C0593833		2:32:00 PM	NR			3		**CLAY (CL)**: dark greenish gray [GLEY 1 4/1] and black [GLEY1 2.5/N], moist, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						4			
C0593834		2:33:00 PM	NR			5			
						6			
						7			
C0593835		2:40:00 PM	NR	▽		8		at 8.0 ft.: saturated.	
						9			
						10			
						11			
					-1.5	12			
								TOTAL DEPTH = 12.0 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/5/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B028

Report form: CTO-059 ALAMEDA BORING LOG Time: 4:01:11 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B029

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,722.4 E 6,045,189.0	10.7 ft	16.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.0 ft / 2.7ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.5			**ASPHALT**	
								GRAVELLY CLAY (CL): Yellowish brown [10YR 5/6], moist, fine to coarse angular and subrounded gravel, 35% gravel, 10% sand, 55% fines. (ROAD BASE). 35/10/55	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
					6.5			**NO RECOVERY** rock blocking recovery, 2 inches of soil recovered (type not noted on log).	
						5			
				▽	2.5			at 8.0 ft.: saturated.	
C0593836		10:40:00 AM	NR					**CLAY (CL)**: Very dark greenish gray [GLEY 1 3/1], soft, moist to wet, low to medium plasticity, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0593838 C0593837		10:41:00 AM	NR			10			
C0593839		10:42:00 AM	NR		-0.8			**SAND with SILT (SP-SM)**: Very dark greenish gray [GLEY 1 4/1], wet, 0% gravel, 90% sand, 10% fines, shell fragments. (BAY SEDIMENT).	
C0593840		10:56:00 AM	NR			15			
					-5.6			**TOTAL DEPTH = 16.3 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B029

Report form: CTO-059 ALAMEDA BORING LOG Time: 4/01:16 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B030

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Precision DA-2	IR Site 30	Alameda Point	8-23-03	8-23-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,719.8 E 6,045,255.8	10.8 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 8.0 ft / 2.8ft	Lynelle Onishi	C. Stumpenhaus, R.G. 4451	Vertical	8/23/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.6			**BARK**	
						1		**GRAVELLY CLAY with SAND (CL)**: Yellowish brown [10YR 5/6], moist, fine angular gravel, 30% gravel, 15% sand, 55% fines. (ROAD BASE). 30/15/55	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
						2			
					8.6				
C0593841		11:30:00 AM	NR		8.3			**SILTY CLAY (CL)**: Black [10YR 2/1], soft to medium stiff, moist, trace fine angular gravel, 10% sand, 90% fines. (FILL).	
						3		**CLAY (CL)**: Dark grayish brown [10YR 4/2], soft, moist, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
C0593842		11:34:00 AM	NR						
						4		at 4.3 ft.: dark greenish gray [GLEY1 4/1] with very dark gray [GLEY1 3/N].	
						5			
C0593843		11:35:00 AM	NR						
						6			
						7			
C0593844		11:39:00 AM	500						LEL = 33%, FID = 500 ppm at 8 feet bgs - stopped drilling
				▽		8		at 8.0 ft.: saturated.	
					2.6				
								TOTAL DEPTH = 8.3 FEET	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B030

Report form: CTO-689 ALAMEDA BORING LOG Time: 4/01/20 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B031

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-28-03	8-28-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,716.1 E 6,045,328.8	11.0 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.0ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/28/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.8			**ASPHALT**	
C0593845		8:45:00 AM	NR			1		**CLAYEY GRAVEL with SAND (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine to angular gravel composed mostly of mesozioc sedimentary and volcanic raock, ~60% gravel, 20% sand, 20% clay. (FILL).	FID Background = 0 ppm Hole backfilled with bentonite-cement grout after completion
C0593846		8:50:00 AM	NR		9.2	2		**CLAYEY SAND (SC)**: Dark greenish gray [5GY 4/1], dense, moist, fine grained sand, ~55% sand, 45% clay and silt. (FILL). 0/55/45	
C0593848 C0593847		8:55:00 AM	NR		7.3	3			
						4		**CLAY (CH)**: Dark greenish gray [5GY 4/1], soft to medium stiff, moist, high plasticity, trace (<2%) organics, occasional (5%) seams (0.25-inch) of silty and/or sand, laminated. (BAY MUD). 0/5/95	
						5			
C0593849		9:00:00 AM	NR	▽		6		at 6.0 ft.: saturated.	
						7		at 7.0 ft.: sandy (25% sand, 75% clay). 0/25/75	
					2.8	8			
								TOTAL DEPTH = 8.3 FEET	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B031

Report Form: CTO-029 ALAMEDA BORING LOG Time: 4:01:24 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B032

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-28-03	8-28-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,749.7 E 6,045,368.3	10.3 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz.)	ABANDON DATE
▼ 6.0 ft / 4.3ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/28/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					10.1			ASPHALT	
C0593850		9:20:00 AM	NR					CLAYEY GRAVEL (GC). 85/0/15	FID Background = 0 ppm
						1			Hole backfilled with bentonite-cement grout after completion
C0593851		9:25:00 AM	NR		8.6				
						2		CLAY (CH): gray, very stiff, moist, high plasticity, occasional seams (<5%) (0.25-inch) of silt. (FILL).	
						3			
C0593852		9:30:00 AM	NR						
						4			
					5.8			CLAY (CH): Dark greenish gray [5GY 4/1], stiff, moist, high plasticity, trace organics (<5%), laminated. (BAY MUD).	
						5			
				▽		6		at 6.0 ft.: saturated.	
C0593853		9:35:00 AM	NR						
						7			
						8			
					2.1				
								TOTAL DEPTH = 8.3 FEET	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B032

Report form: CTO-059 ALAMEDA BORING LOG Time: 4:01:35 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B033

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,706.3 E 6,045,587.0	10.7 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 5.7ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593854		9:20:00 AM	NR					**CLAYEY GRAVEL (GC)**: Dark yellowish brown [10YR 3/4], wet, 55% subangular gravel to 1.5-inches, 25% sand, 20% fines. (FILL).	
						1		55/25/20	Hole backfilled with bentonite-cement grout after completion
C0593855		9:21:00 AM	NR						
					8.7	2		**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], medium stiff, laminated. (BAY MUD).	
C0593856		9:22:00 AM	NR			3			
						4			
				▽		5		at 4.5 ft.: soft. at 5.0 ft.: saturated.	
C0593858 C0593857		9:25:00 AM	NR			6			
						7			
					2.7	8			

TOTAL DEPTH = 8.0 FEET

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B033

Report form: CTO-059 ALAMEDA BORING LOG Time: 4:01:31 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B034

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,699.2 E 6,045,649.2	11.6 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 3.0 ft / 8.6ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593859		2:28:00 PM	NR					**SAND with GRAVEL (SW)**: Dark yellowish brown [10YR 4/4], moist, well graded, 25% subangular gravel to 1-inch, 65% sand, 10% fines. (FILL). 25/65/10	FID background = 2.0 ppm
					10.8				
C0593860		2:29:00 AM	NR			1		**SAND with GRAVEL (SW)**: Dark yellowish brown [10YR 4/6], oxide staining, 40% gravel, 50% sand, 10% fines. (FILL). 40/50/10	Hole backfilled with bentonite-cement grout after completion
					9.9				
						2		**CLAYEY SAND (SC)**: Black [10YR 2/1], wet, abundant red staining from oxidized (organics?) matter throughout in long thin streaks reminiscent of rootlets, 0% gravel, 80% sand, 20% fines. (MARSH CRUST). 0/80/20	Marsh Crust from 1.7-3.2-feet bgs, material below 1.7-feet excluded from sampling
				▽		3		at 3.0 ft.: saturated.	
					8.4			**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], medium stiff, some oxide staining, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						4		at 4.0 ft.: laminated, black staining and a few bits of organic matter.	
						5			
						6		at 6.0 ft.: soft, laminated with black staining.	
						7			
					3.6	8		**TOTAL DEPTH = 8.0 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B034

Report format: CTD-459 ALAMEDA BORING LOG Time: 4/01:35 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B035

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,695.9 E 6,045,714.6	11.6 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 7.6 ft / 4.0ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593863		10:24:00 AM	NR					**GRAVEL with SAND (GW)**: Dark olive brown [2.5Y 3/3], moist, well graded, 60% angular gravel to 1.5-inches, 40% sand, 0% fines. (FILL). 60/40/0	Hole backfilled with bentonite-cement grout after completion
C0593864		10:25:00 AM	NR			1			
					10.0			**SANDY CLAY (CL)**: Very dark grayish brown [10YR 3/2], soft, (FILL). 0/15/85	
					9.4	2		**CLAY (CH)**: Black [5Y 2.5/2], stiff, 1% rootlets. (MARSH CRUST).	Marsh Crust 2.2 to 7.6 feet bgs, no samples taken
						3			
					8.2			**SAND (SP)**: Dark greenish gray [5GY 4/1], wet, poorly graded (0% gravel, 100% sand, 0% gravel, BAY SEDIMENT).	
					8.0			**CLAY (CH)**: Dark greenish gray [10GY 4/1], very stiff, mottled appearance and black staining. (BAY MUD).	
					7.6	4		**SILTY CLAY (ML)**: Dark greenish gray [5GY 4/1], soft, stiff interlayers of banded and mottled clays (black staining). (BAY SEDIMENT).	
						5			
						6			
						7			
				▽	4.0			**SANDY CLAY (CL)**: Dark greenish gray [5GY 4/1], soft, saturated, (BAY MUD).	
					3.6	8			

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TOTAL DEPTH = 8.0 FEET

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B035

Report form: CTO-059 ALAMEDA BORING.LOG Time: 4:01:59 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B036

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,692.3 E 6,045,781.1	11.8 ft	4.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593868 C0593867		11:05:00 AM	NR					**SAND (SW)**: Olive brown [2.5Y 4/4], wet, well graded, 10% subangular gravel to 0.67-inches, 85% sand, 5% fines. (FILL). 10/85/5	Hole backfilled with bentonite-cement grout after completion
						1			
C0593869		11:06:00 AM	NR						
					10.3			**CLAY (CL)**: Very dark gray [10YR 3/1], stiff, medium plasticity, (FILL).	
						2			
					9.4			**SANDY CLAY (CL)**: Olive [5Y 4/3], medium stiff, oxidized rock pieces (broken by drilling), 0% gravel, 40% sand, 60% fines. (FILL). 0/40/60	
C0593870		11:07:00 AM	NR		8.8	3		**CLAY (CL)**: Dark greenish gray [10GY 4/1], stiff, homogeneous, 0% gravel, 0% sand, 100% fines. (BAY MUD). 0/0/100	
					7.8	4		**TOTAL DEPTH = 4.0 FEET**	Abandon hole at 4-feet due to high LEL readings down the hole using tubing attachment

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B036

Report form: CTO-459 ALAMEDA BORING LOG Time: 4/9/03 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B037

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,688.8 E 6,045,847.0	12.1 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 7.5 ft / 4.6ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593872		2:02:00 AM	NR		11.6			**GRAVEL with SAND (GW)**: Olive brown [2.5Y 4/3], moist, well graded, 60% angular gravel to 1-inch, 37% sand, 3% fines. (FILL). 60/37/3	
						1		**CLAYEY GRAVEL (GC)**: Dark yellowish brown [10YR 4/4], moist, 60% subangular gravels to 1-inch, 25% sand, 15% fines. (FILL). 60/25/15	Hole backfilled with bentonite-cement grout after completion
C0593873		2:03:00 AM	NR						
						2			
					9.6			**SANDY CLAY (SC)**: Olive brown [2.5Y 4/3], moist, 0% gravel, 85% sand, 15% fines. (FILL). 0/85/15	
C0593874		2:04:00 AM	NR			3			
					8.1	4		**SILTY CLAY (CL)**: Dark greenish gray [10GY 4/1], stiff, homogeneous. (FILL).	
						5			
					6.5			**SAND (SP)**: Olive gray [5Y 5/2], wet, poorly graded, 0% gravel, 100% sand, 0% fines. (FILL).	
C0593875		2:07:00 AM	NR			6			
					5.7			**CLAYEY SAND (SC)**: Dark greenish gray [5GY 4/1], medium stiff, wet, fine grained sand, laminated, trace black staining, 0% gravel, 85% sand, 15% fines. (FILL).	
				▽		7		at 7.5 ft.: saturated.	
					4.1	8		**TOTAL DEPTH = 8.0 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B037

Report Name: CTO-029 ALAMEDA BORING LOG Time: 4/01/07 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B038

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,683.8 E 6,045,911.1	12.4 ft	4.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593876		2:30:00 PM	NR					**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 4/4], moist, well graded, 55% subangular to rounded gravel to 1-inch, 40% sand, 5% fines. (FILL).	
						1		at 0.7 ft.: Dark yellowish brown [10YR 4/6]. 55/40/5	Hole backfilled with bentonite-cement grout after completion
C0593878 C0593877		2:31:00 PM	NR						
					10.4	2		**SANDY CLAY (CL)**: Dark brown [10YR 3/3], medium stiff, 5% rounded gravel to 0.33-inches, 35% sand, 60% fines. (FILL). 5/35/60	
C0593879		2:32:00 PM	NR						
					9.6	3		**CLAY (CH)**: Dark greenish gray [5GY 4/1], high plasticity, silty, with rootlets, heterogenous with black mottles. (MARSH CRUST).	Material not sampled below 2.8-feet (Marsh Crust and Bay Mud)
					8.9			**SAND (SP)**: Dark greenish gray [10GY 4/1], wet, poorly graded, 0% gravel, 100% sand, 0% fines. (BAY SEDIMENT).	
					8.4	4		**TOTAL DEPTH = 4.0 FEET**	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B038

Report form: CTO-459 ALAMEDA BORING LOG Time: 4/01:51 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B039

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,682.2 E 6,045,975.0	12.5 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					12.3			**ASPHALT**	
C0593881		1:55:00 PM	NR			1		**CLAYEY GRAVEL (GC)**: Yellowish brown [10YR 5/6], dense, moist, fine and coarse gravel, 50% gravel, 20% sand, 30% fines. (FILL).	FID Background = 3 ppm Hole backfilled with bentonite-cement grout after completion
C0593882		2:00:00 PM	NR						
					10.5	2		**SAND (SP)**: Olive [5Y 5/3], dense, moist, fine grained sand, subrounded, occasional pockets of fat clay. (FILL).	
C0593883		2:05:00 PM	NR			3			
						4			
						5			
					7.0			**CLAY (CH)**: Dark greenish gray, stiff, moist to wet, high plasticity, laminated. (BAY MUD).	
C0593884		2:10:00 PM	NR			6			
						7			
						8			
					4.2			**TOTAL DEPTH = 8.3 FEET**	

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
2/9/05
STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B039

Report form: CTO-459 ALAMEDA DRILLING LOG Time: 4:01:54 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B041

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-27-03	8-27-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,634.0 E 6,045,446.5	11.3 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.3ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/27/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593890		2:02:00 PM	NR					Grand SAND with SAND (SW): Olive brown [2.5Y 4/4], moist, well graded, 30% angular gravel to 0.75-inches, 68% sand, 2% fines. (FILL). 30/68/2	FID background = 1.5 ppm Hole backfilled with bentonite-cement grout after completion
						1		at 1.0 ft.: Dark yellowish brown [10YR 4/6], moist, 40% subangular gravel to 0.75-inches, 55% sand, 5% fines. (FILL). 40/55/5	
C0593891		2:03:00 PM	NR						
						2			
					8.9			SAND (SW): Very dark grayish brown [10YR 3/2], 5% rounded gravel to 0.5-inches, 90% sand, 5% fines. (FILL). 5/90/5	
C0593892		2:04:00 PM	NR		8.3	3		CLAYEY SAND (SC): Black [2.5Y 2.5/1], fine grained sand, low plasticity, 0% gravel, 40% sand, 60% fines. (FILL).	
					7.8			SAND with CLAY (SP-SC): Dark greenish gray [5GY 4/1], 0% gravel, 90% sand, 10% fines. (FILL).	
					7.3	4		SILTY CLAY (CL): Dark greenish gray [5GY 4/1], soft, laminated with black stains throughout, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						5			
C0593893		2:06:00 PM	NR	▽		6		at 6.0 ft.: saturated.	
						7			
					3.3	8			

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/9/04 · STATE OF CALIFORNIA

TOTAL DEPTH = 8.0 FEET

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B041

Report form: CTD-059 ALAMEDA BORING LOG Time: 4:01:58 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B042

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,630.9 E 6,045,513.8	11.6 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 5.6ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593894		3:13:00 PM	NR					**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 4/6], moist, well graded, 60% angular gravel to 1-inch, 35% sand, 5% fines. (FILL). 60/35/5	Hole backfilled with bentonite-cement grout after completion
C0593895		3:14:00 AM	NR			1			
					9.6	2		**CLAYEY SILT (ML)**: Very dark gray [5Y 3/1], wet, low plasticity, slight hydrocarbon odor, 3% rounded coarse sand grains in a sand-silt-clay matrix. (FILL).	
C0593896		3:15:00 PM	NR			3			
					8.0			**SAND (SP)**: Olive [5Y 4/3], wet, poorly graded, 0% gravel, 100% sand, 0% fines. (FILL).	
					7.6	4		**SILTY CLAY (CH)**: Dark greenish gray [5GY 4/1], stiff, laminated, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						5			
C0593898 C0593897		3:18:00 PM	NR	▽		6		at 6.0 ft.: saturated.	
						7			
					3.6	8			
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · C.E.G. NO. 4451 · 2/9/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B042

Report form: CTD-059 ALAMEDA BORING LOG Time: 4:02:01 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B043

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,626.3 E 6,045,570.1	11.8 ft	7.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593899		2:43:00 PM	NR					**SAND with GRAVEL (SW)**: Dark brown [10YR 3/3], moist, well graded, 30% angular gravel to 0.75-inches, 70% sand, trace fines. (FILL). at 0.5 ft.: Dark yellowish brown [10YR 4/4]. 30/70/0	
C0593900		2:44:00 PM	NR			1, 2			Hole backfilled with bentonite-cement grout after completion
					9.6			**CLAYEY SAND (SC)**: Dark grayish brown [2.5Y 4/2], wet, fine to coarse grained sand, heterogeneous, multi-colored, 5% rounded gravel to 0.5-inches, 80% sand, 15% fines. (FILL). 5/80/15	
C0593901		2:45:00 PM	NR			3			Refusal, move to hand auger hole to drill 4-8 feet bgs interval
						4		at 4.0 ft.: Very dark gray [5Y 3/1], rootlets, 3% angular to rounded gravel to 0.5-inches, 77% sand, 20% fines. (MARSH CRUST). 3/77/20	Sample C0593902 not taken due to Marsh Crust
						5, 6			
					4.8	7			Refusal

TOTAL DEPTH = 7.0 FEET

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/9/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B043

Report form: CTO-059 ALAMEDA BORING LOG Time: 4/28/03 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B044

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,633.3 E 6,045,645.8	11.8 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 6.8ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593903		10:46:00 PM	NR					**SAND with GRAVEL (SW)**: Dark yellowish brown [10YR 3/6], moist, well graded, 20% subangular gravel to 0.75-inches, 78% sand, 2% fines. (FILL). 20/78/2	
C0593904		10:47:00 PM	NR			1			Hole backfilled with bentonite-cement grout after completion
					10.2			**SANDY CLAY (CL)**: Very dark grayish brown [2.5Y 3/2], medium stiff, 0% gravel, 40% sand, 60% fines. (FILL).	
					9.8	2		**CLAYEY SAND (SC)**: Black [N2], heterogeneous, 3% rootlets throughout, 0% gravel, 80% sand, 20% fines. (MARSH CRUST).	No sample taken past 2 feet bgs due to Marsh Crust
						3			
					8.4			**SAND with CLAY (SP-SC)**: Dark greenish gray [5GY 4/1], wet, poorly graded, 0% gravel, 90% sand, 10% fines. (BAY SEDIMENT).	
						4			
					7.6			**SILTY CLAY (CH)**: Dark greenish gray [5GY 4/1], stiff, laminated, slight hydrocarbon odor, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
				▽	6.8	5		**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], soft, saturated, laminated, 0% gravel, 0% sand, 100% fines. (BAY SEDIMENT).	
						6			
						7			
					3.8	8			

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/9/07 · STATE OF CALIFORNIA

TOTAL DEPTH = 8.0 FEET

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B044

Report form: CTU-059 ALAMEDA BORING LOG Time: 4/02/06 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B045

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,629.4 E 6,045,711.7	12.0 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 7.0 ft / 5.0ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593907 C0593908		11:29:00 AM	NR					**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 3/6], moist, well graded, 70% oxidized angular gravel to 1-inch, 28% sand, 2% fines. (FILL).	
						1		70/28/2	Hole backfilled with bentonite-cement grout after completion
C0593909		11:30:00 AM	NR						
					10.0	2		**NO RECOVERY**	Refusal, move to hand auger hole
						3			
					8.0	4		**SAND with CLAY (SP-SC)**: Olive [5Y 5/3], wet, poorly graded, fine grained sand, 0% gravel, 90% sand, 10% fines. (FILL).	Sample taken from hand augered hole at 4 feet bgs
					7.0	5		**CLAYEY SILT (ML)**: Olive gray [5Y 4/2], heterogeous with oxide staining and reddish mottles, 0% gravel, 0% sand, 100% fines. (FILL).	
C0593911		11:32:00 AM	NR			6			
				▽	5.0	7		**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], very soft, saturated, laminated, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
					4.0	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
CATHIE L. STUMPENHAUS
No. 4451
2/9/04
STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B045

Report Form: CTO-059 ALAMEDA Date/Time: 1/21/09 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B046

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,626.4 E 6,045,777.6	12.5 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 5.0 ft / 7.5ft	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593912		1:50:00 PM	NR					**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 3/4], well graded, 55% angular to subangular gravel to 1-inch, 45% sand, trace fines. (FILL). 55/45/0	Hole backfilled with bentonite-cement grout after completion
C0593913		1:51:00 PM	NR			1			
					10.5	2		**CLAYEY SAND (SC)**: Very dark grayish brown [10YR 3/2], wet, 0% gravel, 80% sand, 20% fines. (FILL).	
C0593914		1:52:00 PM	NR			3			
						4			
					7.9			**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], medium stiff, laminated, moderate hydrocarbon odor, 0% gravel, 0% sand, 100% fines, with poorly graded sand lenses. (BAY MUD).	
				▽		5		at 5.0 ft.: saturated.	
C0593915		1:54:00 PM	NR			6			
						7		at 7.0 ft.: soft.	
					4.5	8			
								TOTAL DEPTH = 8.0 FEET	

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SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B046

Report form: CTO-459 ALAMEDA BORING LOG Time: 4/02/11 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B047

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,622.9 E 6,045,843.5	13.0 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz.)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593916		10:02:00 AM	NR					**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 3/6], moist, well graded, 60% subangular to rounded gravel to 1-inch, 35% sand, 5% fines. (FILL). 60/35/5	Hole backfilled with bentonite-cement grout after completion
						1			
C0593918 C0593917		10:03:00 AM	NR		11.5			**CLAYEY SAND (SC)**: Dark brown [10YR 3/3], moist, coarse grained sand, 0% gravel, 85% sand, 15% fines. (FILL).	
						2			
					10.6			**GRAVEL with SAND (GW)**: Dark yellowish brown [10YR 3/6], moist, well graded, 60% subangular gravel to 1-inch, 35% sand, 5% fines. (FILL).	
C0593919		10:04:00 AM	NR		9.8	3		**SAND with CLAY (SP-SC)**: Olive brown [2.5Y 4/3], wet, poorly graded, 0% gravel, 90% sand, 10% fines. (FILL).	
					9.0	4		**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], very soft, homogeneous, 0% gravel, 0% sand, 100% fines. (BAY MUD).	
						5			
C0593920		10:06:00 AM	NR			6			
					6.0	7		**SAND (SP)**: Dark greenish gray [5GY 4/1], wet, poorly graded, 0% gravel, 100% sand, 0% fines. (BAY SEDIMENT).	
					5.0	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/9/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B047

Report form: CTO-469 ALAMEDA BORING LOG Time: 4:02:16 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B048

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Geoprobe 5400	IR Site 30	Alameda Point	8-25-03	8-25-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	2.5 in	N 2,113,619.5 E 6,045,909.4	13.3 ft	8.0 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ Not Encountered	Tina Takagi	C. Stumpenhaus, R.G. 4451	Vertical	8/25/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
C0593921		3:22:00 PM	NR					**SAND with GRAVEL (SW)**: Dark yellowish brown [10YR 4/6], moist, well graded, 30% rounded gravel to 0.5-inches, 65% sand, 5% fines. (FILL).	Hole backfilled with bentonite-cement grout after completion
						1			
C0593922		3:23:00 PM	NR		12.1			**CLAYEY SAND (SC)**: Olive brown [2.5Y 4/4], moist, 20% subangular to rounded gravel to 0.5-inches, 60% sand, 20% fines. (FILL). 20/60/20	
						2			
C0593923		3:24:00 PM	NR			3		at 2.7 ft.: sand-clay matrix, 3% gravel, 77% sand, 20% fines. 3.0 feet 3/77/20	
						4			
					8.8			**SILTY CLAY (CL)**: Dark greenish gray [5GY 4/1], medium stiff, 0% gravel, 0% sand, 100% fines. (FILL).	
						5			
C0593924		3:28:00 PM	NR		7.3	6		**SAND (SP)**: Olive brown [2.5Y 4/4], wet, poorly graded, 0% gravel, 100% sand, 0% fines. (FILL).	
						7			
					5.3	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 2/19/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B048

Report format: CTO-459 ALAMEDA BORING LOG Time: 4:02:19 PM

PROJECT	JOB NUMBER	SHEET NUMBER	HOLE NUMBER
CLEAN 3	23818-059	1 of 1	C3S030B049

DRILLING COMPANY	DRILLING RIG	SITE	LOCATION	BEGUN	FINISHED
Precision Sampling, Inc.	Truck Mounted Geoprobe	IR Site 30	Alameda Point	8-26-03	8-26-03

DRILLING METHOD	HOLE DIAMETER	COORDINATES	ELEVATION	TOTAL DEPTH
Direct-Push	1.5 in	N 2,113,603.4 E 6,045,969.6	13.8 ft	8.3 ft

DEPTH / ELEVATION TO WATER	LOGGED BY	REVIEWED BY	ANGLE (from Horiz)	ABANDON DATE
▼ 6.0 ft / 7.8ft	Pete Holland	C. Stumpenhaus, R.G. 4451	Vertical	8/26/2003

SAMPLE ID	SAMPLER ADVANCE INTERVAL/RECOVERY	SAMPLE TIME	PID READING (PPM)	WATER LEVEL ATD	ELEVATION IN FEET	DEPTH IN FEET	GRAPHICS SYMBOL	DESCRIPTION and CLASSIFICATION	NOTES
					13.6			**ASPHALT**	
C0593925		2:35:00 PM	NR					**CLAYEY GRAVEL (GC)**: yellowish brown, dense, moist, fine gravel, angular, (FILL).	FID Background = 3 ppm
						1		85/0/15	Hole backfilled with bentonite-cement grout after completion
C0593926		2:40:00 PM	NR						
					11.8	2		**CLAY (CH)**: greenish gray, stiff, moist, high plasticity, (FILL).	
						3			
C0593927		2:45:00 PM	NR						
						4			
					9.6			**SAND (SP)**: Olive [5Y 5/3], moist to wet, fine grained sand, subrounded, (FILL).	
						5			
				▽		6		at 6.0 ft.: saturated.	
C0593928		2:50:00 PM	NR						
						7			
						8			
					5.6			**TOTAL DEPTH = 8.3 FEET**	

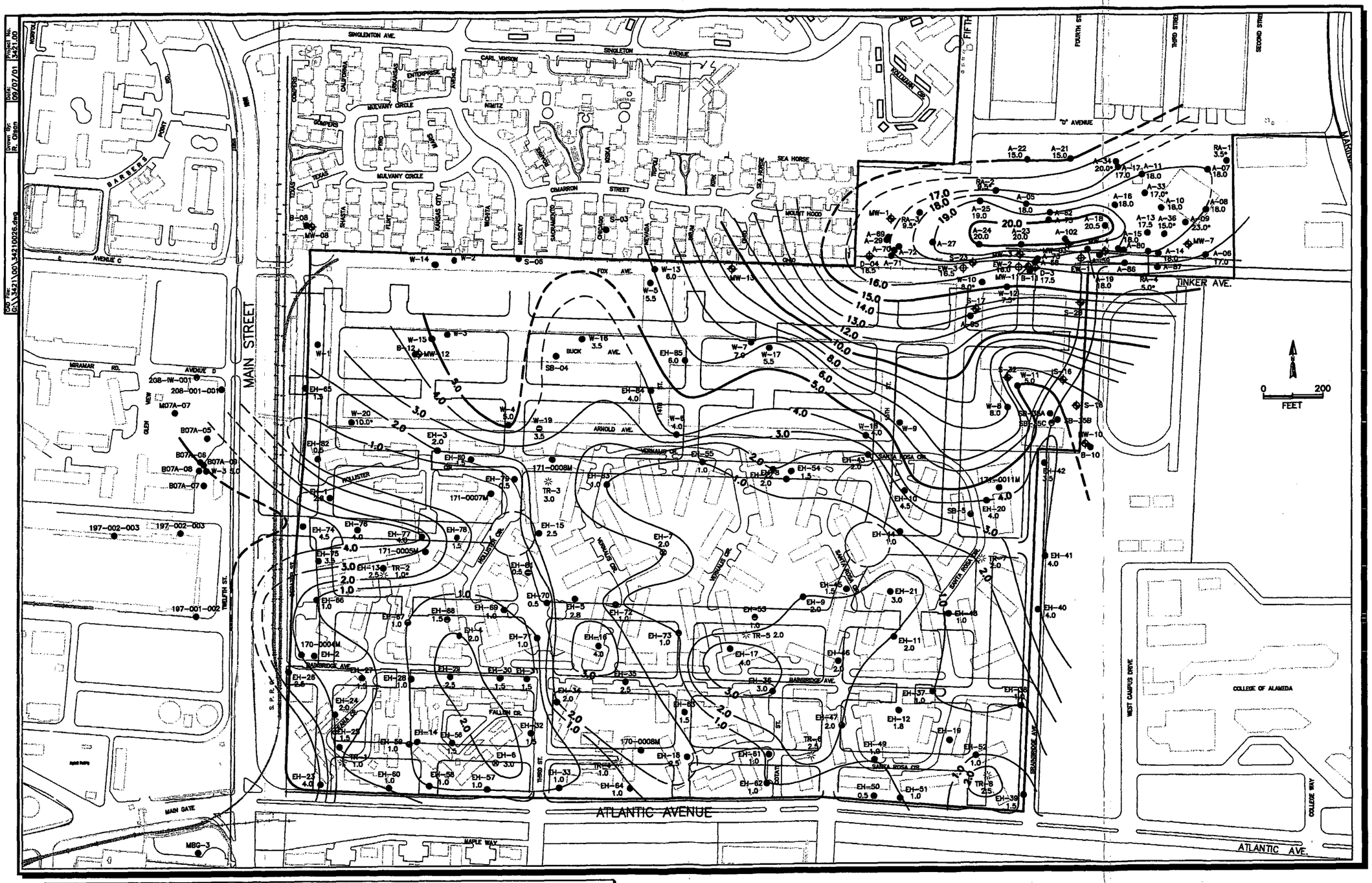
REGISTERED GEOLOGIST · CATHIE L. STUMPENHAUS · No. 4451 · 8/19/04 · STATE OF CALIFORNIA

SEE EXPLANATION FOR SYMBOLS AND ABBREVIATIONS	Horizontal Coordinates: CA State Plane Coordinate System Zone 5, NAD83 (1992) (CCS83) Vertical Coordinates: National Geodetic Vertical Datum (NGVD) 1929	HOLE NUMBER C3S030B049

Report format: CTO-459 ALAMEDA BORING LOG Time: 4:01:33 PM

ATTACHMENT C3

BORING LOGS FOR EAST HOUSING AREA



LEGEND

- Monitoring Well, Shallow Zone
- Monitoring Well, Deep Zone
- Aquifer Well, Phase 2
- Soil Boring
- Geotechnical Soil Boring

2.8 Depth to Artificial Fill/Bay Mud Interface (feet below ground surface)

5.0 Depth to Artificial Fill/Bay Mud Interface Contour (feet); Dashed Where Inferred

* Datum Not Used For Contouring

Proposed Street/Infrastructure Layout

Proposed Backbone Infrastructure Layout

Figure 2

Contour Map of the Depth to Artificial Fill/Bay Mud Interface
Alameda Point East Housing/FISC Warehouse Areas
Alameda, California

ERM 08/01

ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421.00

Boring Number: SB-T Total Depth of Auger: Auger Diameter:

Surface Elevation: EH-23 Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 ft Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Hand Auger

Driller: Paul Log By: BDM Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start: 0930
0			0		Dry sandy silt grainy
			0		Sandy gravelly silt dry
1			0		Gravelly silt very fine
			0		Gravelly Clay small gravel
2			0		Clay dry some organics no odor brown
			0		
3					
4					

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Environmental Resources Management

Drilling Log

Project: Alameda FESC Owner:

Location: East FESC W.O. Number: 3421

Well Number: SB1A Total Depth: 16 Diameter:

Surface Elevation: Water Level: Initial: 24-hrs.:

Screen: Dia.: Length: Slot Size:

Casing: Dia.: Length: Type:

Drilling Company: Greg Drilling Method: Direct Push

Driller: Paul Log By: neH Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				Dry sand w/ SILT
1				Dry clay w/no odor
2				
3				2" Gravel, dry
4			no	
5				Dry clay w/organics no odor
6				
7				
8			no	
9			no	
10			no	
11			no	
12			no	
13				fine sand moist no odor
14				
15				
16				fine sand moist no odor

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GWLOG

ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB-2 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 ft Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Hand Auger

Driller: Paul Log By: BDM Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start: 0950
0			0		Gravelly Silt dry grainy
			0		Gravelly Silt dry grainy
1	GM		0		Gravelly silt dry grainy
			0		Gravelly silt clay chunks
2			0		Silty Clay slightly moist rootlets lite brown no odor plastic
	CL		0		Same as above
3			0	No	
				No	
4					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421.00

Boring Number: SB-3 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 ft Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Hand Auger

Driller: Paul Log By: BDM Date Drilled: 8-1-01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start: 1010
0			0		Sandy, Silt, dry grainy
1			0		Sandy, Silt, dry, grainy
2			0		Gravelly Silt dry grainy light brown Clay dry some organics no odor
3					Same as above
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421.00

Boring Number SB-4 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 ft Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method DIRECT PUSH

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1120
0			0		Dry sandy SILT
					Sand with Gravel
1					Sand with Gravel some SILT
			0		Sand with Gravel
2					Sand with Gravel
			0		Clay Dry some organics no odor
3					
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421.

Boring Number SB5 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 ft Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1125
0		0			Dry sandy silt with gravel
					Dry sandy silt
1		0			Clay dry with organics no odor
2		0			
3					
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB-6 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

START 1130

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0					Dry sand with gravel
1		0			Dry clay with organics no odor
2		0			Same as above
3					
4					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421.00

Boring Number: SB-7 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 ft Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1135
0					Dry sand w gravel
			0		↓
1					Dry silty sand w gravel
			0		↓
2					Dry clay with organics no odor
			0		
3			0		↓
4					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: ~~SB-8~~ East Housing Project Number: 3421

Boring Number: SB-8 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUST

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1144
0					Dry sandy silt with Gravel
1			0		↓
2			0		Dry clay with organics no odor
3			0		↓
4			0		↓

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB9 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1149
0					Dry silty sand w gravel
1			0		↓
2			0		Dry Clay w interbedded sand w organics no odor
3			0		↓
4			0		

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB11 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1245
0					Dry silty sand with gravel
1			0		Dry clay w/organics no odor
2			0		
3					Dry clay w/organics and interbedded sand no odor
4			0		

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421.

Boring Number: SD12 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled:

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1257
0			0		DRY SAND WITH SILT
1			0		↓
2			0		DRY SAND WITH SILT and Gravel
3			0		DRY CLAY WITH ORGANICS, NO ODOR
4					

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Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB13 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1304
0			0		Dry silty sand
1			0		↓
					Dry silty sand w/gravel
2			0		↓
					Dry clay w/organics no odor
3					
4			0		

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB14 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1310
0					Dry sandy silt
1					↓ Dry sand w/Gravel
2					↓
3					↓ Dry clay w/Interbedded sand
4					no odor

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB16 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 8 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/11/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1335
0			0		Dry sandy silt w/gravel
1			0		Dry clay interbedded w/sand with organics no odor
2			0		
3			0		
4					without organics
5			0		
6					
7					
8			0		We moist clay without organics no odor

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB17 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1345
0					Dry Silty Sand
1			0		Dry Silty Sand w/Gravel
2			0		↓ Dry Clay w/Organics Interbedded with sand, no odor
3			0		
4					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB 18 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 8 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1350
0				0	Dry sandy silt
1					Dry sand w/ silt and Gravel
2				0	
3					
4					Dry clay w/ organics no odor
5				0	
6					
7					Dry clay no odor ~~wet~~ moist clay no odor
8				0	

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB19 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 8 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1409
0			0		Dry silty sand
1					Dry silty sand w/ Gravel
2					Dry sand
3					
4					Dry clay w/ organics - no odor
5					
6					moist clay
7					
8					

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Environmental Resources Management

Drilling Log

Project: Alameda FESC Owner:

Location: East FESC W.O. Number: 3421

Well Number: SB19A Total Depth: 16 Diameter:

Surface Elevation: Water Level: Initial: 24-hrs.:

Screen: Dia.: Length: Slot Size:

Casing: Dia.: Length: Type:

Drilling Company: Greg Drilling Method: Direct Push

Driller: Paul Log By: MCH Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1258
0				Dry sand w/ ~~Gra~~ silt
1				Dry sand w/ Gravel
2				Dry sand w/ Gravel
3			no	
4				Dry Clay w/ organic no odor
5			no	
6			no	
7			no	
8				
9				moist clay
10				
11				moist clay
12				
13				
14				moist clay w/o organic odor
15				moist clay w/ organic odor
16				

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GWLOG

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Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SP 20 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUSH

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Start 1416 Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0			0		DRY SILTY sand
1			0		↓
					DRY sand w/ Gravel
2			0		↓
					Dry sand w/ silt and Gravel
3					DRY sand w/ Gravel
			0		DRY clay w/ organics no odor
4					

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ERM

Drilling Log

Project Alameda EISC Owner

Location East Housing Project Number 3421

Boring Number SB23 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0			0		Dry silty sand
1					↓ Dry sandy/gravel
2			0		Dry clay interbedded with sand
3					↓
4			0		

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB24 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUSH

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1452
0			0		Dry sand w/ silt
1					↓ Dry sand w/ silt and gravel
2			0		↓ Dry clay interbedded w/ sand
3					no odor
4			0		

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421.

Boring Number SB 25 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1458
0					DRY SAND W/ SILT
1			0		↓ DRY SAND W SILT + GRAVEL
2			0		↓ DRY CLAY WITH INTERBEDDED SAND
3			0		NO ODOR
4			0		↓

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB26 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0			0		DRY SILTY SAND
1					DRY SILTY SAND W/GRAVEL
					DRY CLAY W/ORGANICS INTERBEDDED
2			0		W/SAND NO ODOR
3					↓
4			0		

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB32 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1350
0					Dry sandy silt
1					↓ Dry sand w/ silt and gravel
2					Dry clay w/ organics and odor
3					
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB37 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 0807
0					Dry sand w/silt
					Dry sand w/silt and gravel
1					Dry clay w/o organics no odor
2					Dry clay w/ organics no odor
3					Dry clay w/ organics
4					Interbedded sand

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB38 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 0905
0					Dry Sand w/ silt
1					Dry Sand w/ silt and Gravel
					Dry Clay w/ organics no odor
2					Dry Clay w/ organics some Gravel
3					Dry Clay w/ organics
				no	
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB39 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 0825
0					Dry sand w/silt
1					Dry sand w/silt and Gravel
					Dry clay w/organics no odor
2					Interbedded w/ sand
3					Dry clay no odor
4				no	

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: SB-4 East Housing Project Number: 3421.

Boring Number: SB40 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUSH

Driller: Paul Log By: Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0					Dry sand w/ silt
1					Dry sand w/ gravel
					Dry clay w/ organics, no odor
2					Dry sand w/ silt
					Dry clay w/ organics, no odor
3					
				no	
4					

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ERM

Drilling Log

Project Alameda East Housing Owner 8

Location _____ Project Number 3421.00

Boring Number SB41 Total Depth of Auger _____ Auger Diameter _____

Surface Elevation _____ Water Level: Initial _____ 24-hrs _____

Total Depth of Soil Sampler 4 ft Total Depth of Ground Water Sampler _____

Ground Water Sample Interval(s) _____

Drilling Company Paul Gregg Drilling Method Direct push

Driller Paul Log By _____ Date Drilled 8-1-01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					start @ 8:46
0					Dry sand w/ silt and gravel
1					Dry clay w/ organics no odor
2					Dry clay w/ organics interbedded w/ sand
3					
4				no	

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ERM

Drilling Log

Project Alameda FISC Owner

Location SB42 East Housing Project Number 3421

Boring Number SB-42 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START @ 8:48
0					Dry sand w/ silt
1					Dry sand w/ silt and gravel
					Dry clay w/ organics no odor
2					
					Dry clay w/ organics no odor
3					
4					

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Environmental Resources Management

Drilling Log

Project Alameda ~~EESC~~ Owner

Location EESC EESC W.O. Number 3421

Well Number SB43 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geeg Drilling Method Direct Push

Driller Paul Log By Mell Date Drilled 02/08/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1040
0				Dry sand w/gravel
1				
2				Dry clay w/organics
3				Dry gray clay
4				moist gray clay plastic

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB ~~SB~~ 34 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geoc Drilling Method Direct Push

Driller Paul Log By Mel Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1147
0				Dry sand w/ SILT
1				Dry sand w/ gravel
				Dry clay w/ organics no odor
2				
3				Slightly moist clay interbedded w/ sand
4			ND	

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GWLOG

Environmental Resources Management

Drilling Log

Project: Alameda FESC Owner:

Location: East FESC W.O. Number: 3421

Well Number: SB43 Total Depth: 4 Diameter:

Surface Elevation: Water Level: Initial: 24-hrs.:

Screen: Dia.: Length: Slot Size:

Casing: Dia.: Length: Type:

Drilling Company: Geoc Drilling Method: Direct Push

Driller: Paul Log By: Meff Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1214
0				Dry sand w/gravel
1				Dry sand w/ gravel
				Dry clay w/organics
2				
				Dry clay w/organic no odor
3				
4			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB47 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geoc Drilling Method Direct Push

Driller ~~Geoc~~ Paul Log By MEH Date Drilled 02/08/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1008
0				Dry Sand w/ Gravel
1				Dry Clay w/ organics no odor
2				
3				Dry Clay w/ organics no odor
4				

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB49 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Greg Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				START 0947
0				Dry sand w/ silt
1				Dry sand w/ silt and gravel
				Dry clay w/ organics
2				Dry gravel and sand
3				Dry clay w organics no odor
4				

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FISC Owner

Location East FISC W.O. Number 3421

Well Number SB56 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Greg Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				Dry sand w/silt and gravel
1				Dry clay w/organics no odor
2				
3				Dry clay w/organics no odor
4			no	

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GWLOG

ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB51 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method DIRECT PUSH

Driller SM ~~BM~~ Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 0919
0					DRY SAND W/ SILT
1					DRY SAND W/ SILT AND GRAVEL
					DRY CLAY W/ ORGANICS NO ODOR
2					
3					DRY CLAY W/ ORGANICS NO ODOR
4				✓	

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Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB-52 Total Depth 8 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geeg Drilling Method Direct Push

Driller Paul Log By BDM Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start: 1113
0	GM			Gravelly Silt unconsolidated brown dry
				Same
1				Clay with lines of silt interbedded. Hard dry light grey rootlets no odor
2				Same
				Same
3			No	Clay dark grey slightly moist plastic brown mottling
			No	
4				Silty Clay tan, brown, grey dry flaky
5				Grey clay soft moist plastic slight organic odor
				Same as above
6				Same as above
				Same as above
7			No	
			No	
8			No	

Environmental Resources Management

Drilling Log

Project: Alameda FISC Owner:

Location: East FISC W.O. Number: 3421

Well Number: SB54 Total Depth: 8 Diameter:

Surface Elevation: Water Level: Initial: 24-hrs.:

Screen: Dia.: Length: Slot Size:

Casing: Dia.: Length: Type:

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: mcH Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start: 1104
0				
1				Clay, Silty dark brown to green
				~~Same as above~~ BM Silty gravel large clasts angular lite brown
2			No	Clay with silty chunks and some lime dark brown/green
			No	moist.
3			No	
			No	
4				Clay dark green to black very soft/Plastic moist
5				Same as above
				Same as above
6			No	
			No	
7			No	
			No	
8			No	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FCSC Owner

Location East FCSC W.O. Number 3421

Well Number SB55 Total Depth 8 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geo66 Drilling Method Direct Push

Driller Paul Log By MeH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				start 1127
0				Dry sand w/ silt
1				Dry sand w/ Gravel
2				Dry sand w/ Gravel
			no	
			no	
3			no	
			no	
4				Dry clay with Interbedded sand
5				Local Black crust no odor
6				Dry clay w/ organics no odor
				moist clay Interbedded sand
7				
8				moist clay no odor

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FISC Owner

Location East FISC W.O. Number 3421

Well Number SB56 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company GEEC Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1137
0				Dry sand w/silt
1				Dry sand w/silt
				Dry sand w/gravel
2				Dry clay w/organics no odor
3				
				moist clay w/interbedded sand
4			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FISC W.O. Number 3421

Well Number SB58 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company GRE&C Drilling Method Direct Push

Driller Paul Log By Me H Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				START 1030
0				Dry sand w/ SILT
1				Dry clay w/ GRAVEL
				Dry clay w/ ORGANICS no odor
2				
3				Dry clay w/ ORGANICS no odor
4			~~no~~	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB59 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geoe6 Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 08/02/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1003
0				Dry sand w/silt
1				Dry clay w/sand and gravel
2				Dry clay w/organics
3				Dry clay w/organics
4			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FISC Owner

Location East FISC W.O. Number 3421

Well Number SB61 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Geeg Drilling Method Direct Push

Driller Paul Log By MeH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 0927
0				Dry sand w/ silt
1				Dry sand w/ gravel
				Dry clay w/ organics
2				Interbedded w/ sand no odor
3				Dry clay no odor
4			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FSC Owner

Location East FSC W.O. Number 3421

Well Number SB63 Total Depth 8 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Gree66 Drilling Method Direct Push

Driller Paul Log By MPH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	~~Well~~ PID Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Hand Auger to 2.5 ft bgs Start: 1400
0				TOP 6" CONCRETE SAND w/ SILT DRY
1				Silt and gravel Brown and grey dry
2				
		0		
3		0		Silty gravel very hard dry brown and grey
		0	No	Grey layer very platy like shells ~~or~~ black inclusions like
4				organic carbon similar to "marsh crust" but thinner
				Grey layer very platy ~2" thick then Silty Sand dry brown
5				Silty sand with thin (<1") grey platy layer as above
				Silty sand brown moist
6				Same
				Clay dark grey, soft, moist lite organic odor
7				
				Same as above some thin bands of sand.
8				

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GWLOG

ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB10 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 8 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1200
0					Dry sand w silt
1			0		↓
2			0		Clay Dry w organics no odor
					Dry sand
3			0		Dry clay w organics no odor
4			0		↓
5					↓
6					moist clay no organics no odor
7					↓
8					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB15 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 8 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
0			0		Dry sand with silt
1			0		Dry clay with organics no odor
2			0		Dry clay no organics
3			0		
4					Moist clay no organics
5			0		
6					
7			0		
8					

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB21 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUSH

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1429
0			0		SAND WITH SILT - DRY
1					↓
			0		
2					DRY CLAY WITH ORGANICS NO ODOR
					↓
3			0		
4					DRY CLAY WITH INTERBEDDED SAND

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB22 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1436
0			0		Dry Sand w Silt
1			0		Dry Clay w/organics and interbedded Sand w/organics
2			0		
3			0		
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB27 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 1504
0			0		DRY Sand w/ SILT
1					↓
			0		DRY Clay w/ organics
2					↓
3					
4			0		

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: East Housing Project Number: 3421.

Boring Number: SB28 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: DIRECT PUSH

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1515
0					Dry sand w/ silt
1			0		Dry clay w/ organics interbedded with sand no odor
2			0		
3			0		
4					

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ERM

Drilling Log

Project: Alameda EISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB29 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1523
0			0		DRY SAND W/ SILT
1					↓ DRY CLAY W/ ORGANICS
2			0		↓
3					↓
4			0		SATURATED CLAY

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB 30 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					start 1532
0					Dry sand w/ silt
1			0		↓ Dry clay w/ organics, no odor
2			0		↓
3					↓ Dry clay
4			0		↓

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ERM

Drilling Log

Project: Alameda EISC Owner:

Location: East Housing Project Number: 3421

Boring Number: SB30 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Gregg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1641
0			0		DRY SAND W/SILT
1					DRY CLAY W/ ORGANICS NO ODOR
2			0		
3			0		
4			0		SATURATED CLAY

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ERM

Drilling Log

Project: Alameda FISC Owner:

Location: SB-33 East Housing Project Number: 3421

Boring Number: SB-33 Total Depth of Auger: Auger Diameter:

Surface Elevation: Water Level: Initial: 24-hrs:

Total Depth of Soil Sampler: 4 Total Depth of Ground Water Sampler:

Ground Water Sample Interval(s):

Drilling Company: Greyg Drilling Method: Direct Push

Driller: Paul Log By: Date Drilled: 8/1/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 1557
0			0		Dry sand w/ silt
1					↓ Dry clay w/ organics no odor
2			0		
3					
4			0		

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ERM

Drilling Log

Project Alameda FISC Owner

Location East FISC Project Number 3421

Boring Number SB34 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 0740
0					Dry sand w/silt
1					Dry sand
2					Dry clay w/organics no odor
3					
4					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB 35 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 8 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					Start 0747
0					Dry sand w/ silt
1					Dry clay w/ organics no odor
2					
3					
4					moist clay no odor
5					
6					
7					
8					

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ERM

Drilling Log

Project Alameda FISC Owner

Location East Housing Project Number 3421

Boring Number SB36 Total Depth of Auger Auger Diameter

Surface Elevation Water Level: Initial 24-hrs

Total Depth of Soil Sampler 4 Total Depth of Ground Water Sampler

Ground Water Sample Interval(s)

Drilling Company Gregg Drilling Method Direct Push

Driller Paul Log By Date Drilled

Sketch Map

Notes

Depth (Feet)	Graphic Log and USCS Designation	FID (ppm)	PID (ppm)	Sample Interval	Soil Description and Observations (Color, Texture, Structures, Odor, Foreign Matter)
					START 0755
0					DRY SAND W/SILT
1					↓
					DRY CLAY W/ ORGANICS, NO ODOR
2					↓
3					↓
4				No	↓

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Environmental Resources Management

Drilling Log

Project: Alameda FESC Owner:

Location: East FESC W.O. Number: 3421

Well Number: SB46 Total Depth: 4 Diameter:

Surface Elevation: Water Level: Initial: 24-hrs.:

Screen: Dia.: Length: Slot Size:

Casing: Dia.: Length: Type:

Drilling Company: G&G Drilling Method: Direct Push

Driller: Paul Log By: RCH Date Drilled: 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				START
0				Dry sand w/ silt
1				Dry sand
2				Dry clay w/ organics
3				Dry clay w/ organics
4			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FISC Owner

Location East FISC W.O. Number 3421

Well Number SB48 Total Depth 4 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company GeoC Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 0959
0				Dry sand w/silt
1				Dry clay w/organics no odor
2				Dry clay w/ organics no odor
3				
4				Dry clay w/organics no odor

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location SB53 East FESC W.O. Number 3421

Well Number SB53 Total Depth 8 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Greeb Drilling Method Direct Push

Driller Paul Log By MPH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				Dry sand w/ silt
1				Dry clay w/ organic
2				
3				Dry marsh crust like material at ≈3.5
4			1 no	Moist clay
5				
6				moist clay w/ odor
7			no	
8			no	

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FISC Owner

Location ~~SB 57~~ East FISC W.O. Number 3421

Well Number SB 57 Total Depth 16 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Gr66 Drilling Method Direct Push

Driller Paul Log By Meth Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				Start 1020
0				Dry sand with silt
1				Dry clay with organics
2				Dry clay w/ organics
3				
4				Dry clay w/ organics
5				
6				Dry clay w/ organics
7				
8				
9				
10				Moist clay w/ organic odor
11				Moist clay w/ Petroleum odor
12				
13				T.D. 16'

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FESC Owner

Location East FESC W.O. Number 3421

Well Number SB60 Total Depth 8 Diameter 50

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company Greg Drilling Method Direct Push

Driller Paul Log By Mark Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
				START 1048
0				Dry sand w/ silt
1				Dry clay w/organics
2				Dry clay w/organics no odor
3				Dry clay w/organics no odor
4			NO	
8				
5				Moist clay no odor
6				
7				Moist clay no odor
8				Moist clay no odor

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GWLOG

Environmental Resources Management

Drilling Log

Project Alameda FCSC Owner

Location East FCSC W.O. Number 3421

Well Number SB 62 Total Depth 12 Diameter

Surface Elevation Water Level: Initial 24-hrs.

Screen: Dia. Length Slot Size

Casing: Dia. Length Type

Drilling Company GCEGC Drilling Method Direct Push

Driller Paul Log By MEH Date Drilled 8/2/01

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				Concrete
1				Dry sand w silt
2				Thin Band ≈ 2" of shell material
3			no	
4			no	moist clay w/ no odor
5				
6				
7			no	
8				moist clay w/odor
9				
10				
11			no	
12				

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GWLOG

ATTACHMENT C4

BORING LOGS FOR FISCA
(Including College of Alameda)

CTO 200 | DRILLING LOG | BORING NO. RB1

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.5 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
3.0		8 19 22	0			SM	Silty Sand: brown; damp; 30% silt; 60% sand; 10% gravel; fine to medium sand; fine, subangular to subrounded gravel (Fill)	
4.5		11 22 25	0	5		CL	Silty Clay: brown; damp; very stiff; 70% clay; 30% silt; low est K; low plasticity; shell fragments (Fill) Terminate borehole at 4.5'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB2

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		15 18 9	0			SM	Silty Sand: brown; damp to moist; 20% silt; 70% fine sand; 10% fine to coarse, subangular gravel; moderate est K (Fill)	
3.0		4	0			CL	Silty Clay: brown; damp; stiff; 85% clay; 15% silt; low est K; low plasticity (Fill)	
4.0		18 20					Terminate borehole at 4.0'	
				5				
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB3

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		17	0			SP	Poorly-graded Sand: brown; damp; 100% medium sand; moderate est K (Fill)	
2.5		25 22 16	0			SM CL	Silty Sand: brown; dry to damp; medium dense; 20% silt; 70% fine to medium sand; 10% fine, subangular gravel; moderate est K (Fill)	
4.0		18 19				SM	Silty Clay: brown; damp; very stiff; 60% clay; 40% silt; low est K; low plasticity (Fill)	
				5			Silty Sand: brown; wet; medium dense; 15% silt; 60% medium to coarse sand; 25% fine, subangular gravel; moderate est K; (Fill)	
							Terminate borehole at 4.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB4

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		19	0			SP	Poorly-graded Sand: brown; damp; 100% medium to fine sand; moderate est K (Fill)	
2.0		33 41	0			GM	Silty Gravel: yellowish brown; dry to moist; dense; 20% silt; 20% sand; 80% fine to coarse gravel; low est K (Fill)	
4.0		39 46 40					Terminate borehole at 4.0'	
				5				
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. RB5

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA			PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger		DATE (s) DRILLED 05/26/94
SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 4 inches	BORING DEPTH 4.0 feet	BORING LOCATION College of Alameda
LOGGED BY Aimee Chow	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.5 4.0		10 13 16 7 10 10	0 0			SC CL	Clayey Sand: brown; damp; 30% clay; 70% medium to fine sand; low est K (Fill) Silty Clay: brown; damp; stiff; 60% clay; 40% silt; low est K; low plasticity (Fill) Terminate borehole at 4.0'	

DEPTH (ft): 5, 10, 15, 20, 25, 30, 35

CTO 200 | DRILLING LOG | BORING NO. RB6

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alemeda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		8	0			SC	Clayey Sand: dark brown; damp to moist; 15% clay; 85% medium sand; low est K; semi-consolidated (Fill)	
		12				CL		
		13	0			ML	Silty Clay: brown; damp; stiff; 60% clay; 40% silt; low est K; shell fragments and roots; low plasticity (Fill)	
4.0		2				CH		
		3					Clayey Silt: gray; dry to damp; stiff; 40% clay; 60% silt; low est K (Fill)	
		6		5			Clayey Silt: gray with black mottling; moist to wet; 60% silt; 40% clay; low est K; high plasticity (Fill)	
							Terminate borehole at 4.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB7

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		13	0			SP	Poorly-graded Sand: brown; dry; 100% very fine to fine sand; low to moderate est K (Fill)	
2.5		25 21				CL	Silty Clay: brown; damp; very stiff; 60% clay; low est K; low plasticity (Fill)	
4.0		8 12 14				SC	Clayey Sand: brown; damp; 15% clay; 85% fine sand; low est K (Fill)	
				5			Terminate borehole at 4.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB8

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-802720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		10 16 19	0			SP	Poorly-graded Sand: brown; dry; 5% silt; 95% very fine to fine sand; moderate est K (Fill)	
2.5		5 6 8	.0			CL	Silty Clay: brown mottled reddish brown; damp; stiff; 60% clay; 40% silt; low est K; roots; shell fragments; low plasticity (Fill)	
4.0							Terminate borehole at 4.0'	
				5				
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB9

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		8 25 29	0			SM	Silty Sand: brown; dry; 20% silt; 75% medium sand; 5% fine, subangular gravel; moderate est K (Fill)	
4.0		10 25 34	0			CL	Silty Clay: brown; dry; very stiff; 60% clay; 40% silt; low est K; low plasticity (Fill)	
							Terminate borehole at 4.0'	
				5				
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. RB10

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-802720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	4.0 feet
BORING LOCATION	College of Alameda
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		6 15 19	0			SM	Silty Sand: brown; damp; 40% silt; 60% medium to fine sand; moderate est K (Fill)	
2.5 4.0		5 6 3	0			CL	Silty Clay: brown; damp to moist; 60% clay; 40% silt; low est K; low plasticity; semi-consolidated (Fill) Terminate borehole at 4.0'	

5
10
15
20
25
30
35

CTO 200 | DRILLING LOG | BORING NO. A05

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/16/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - Central Portion
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		70 22 14	0.4 1.6				Silty Sand: brown; damp; medium density; fine to medium sand; moderate est K; (Fill)	
2.0		9 12 11	0.9				Shell fragments below 1.5'	
3.5		4 5 7	2.5	5		SM	Wet below 5.0'	▽ 09/16/92
5.5		8 9 9						
		4 2 2	90					
		2 1 1	18	10		CH	Fat Clay: gray to dark gray; wet; soft; very low est K; vertical fractures with sand coating fractures (Fill)	
		2 1 1	100	15		SP	Poorly-graded Sand: gray; wet; very soft; <5% fines; medium sand; high est K; slight odor (Fill)	
		2 3 3	>1000	20		CH	Fat Clay: gray; wet; soft; very low est K; slightly sandy; heavy organics; rootlets; branches; moderate odor (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A06

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	7/17/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - Southeast Corner
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		16 65				GM	Silty Gravel: orangish-brown, moist, very dense, fine to coarse sand, subangular gravel, moderate est K, no odor (Fill)	
2.5		18 17 10	32			CL	Silty Clay: orangish-brown, moist, very stiff, fine to coarse sand, gravel to 1/4", low plasticity, very low est K, no odor (Fill)	
4.5		8 4 6	25					
		1 1 3	40	5		SM	Silty Sand: olive gray, moist to wet, very loose, fine to medium sand, subangular gravel, moderate est K, no odor (Fill)	▽ 7/17/92
		1 2 2	170	10		CL	Silty Clay: gray, wet soft, fine sand, low plasticity, very low est K, no odor (Fill)	
15.5		1 2 2	>1000	15			Organic material, HC staining below 15.0'	
		1 2 2	40	20		CH	Fat Clay: gray, wet, soft, fine sand, very low est K, shell fragments, high plasticity, no odor (Bay Mud) Borehole terminated at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A07

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/12/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	19.5 feet
BORING LOCATION	SWMU 1 - Northeast Portion
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		37 23 18	1			CL	Silty Clay: dark brown; moist; very stiff; very low est K; trace debris (metal, wood); minor rootholes; medium plasticity (Fill)	
2.5		8 9 13	3			SM	Silty Sand: dark olive; damp; medium dense; fine to medium sand; moderate est K; trace roots (Fill)	
4.0		11 13 15	0			CL	Silty Clay: dark brown; moist; very stiff; very low est K; trace debris (metal, wood); minor rootholes; medium plasticity (Fill)	▽ 7/12/92
		5 5 5	0	5		SM	Silty Sand: dark olive; damp; medium dense; fine to medium sand; moderate est K; trace roots (Fill)	
		3 2 2	0				Wet below 5.0'	
		1 1 1	0				Loose; shell fragments below 6.0'	
		1 2 3	0	10		CL	Silty Clay: dark olive; wet; soft; <5% fine sand; very low est K; rootlets; minor shell fragments; low to moderate plasticity (Fill)	
		1 1 2	2					
		1 2 3	1					
		1 1 8	2	15		SM	Silty Sand: olive gray; wet; very loose; low est K; trace odor; minor shell fragments; trace staining (Fill)	
		1 2 3	3					
		8 6 4	0			CL	Silty Clay: dark olive; damp; stiff; <5% fine sand; very low est K; trace organics; major rootlets; minor shell fragments; low to moderate plasticity (Bay Mud)	
		11 7 9	2	20			Terminate borehole at 19.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A08

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/14/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - East central portion
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		100/5.5	<1			GM	Silty Gravel: reddish brown; dry; very dense; poorly sorted; subangular to angular gravel; very high est K (Fill)	
						Con	Concrete layer	
2.5		5 6 6	75				Silty Clay: reddish brown mottled greenish gray; moist; firm; very low est K (Fill)	
4.0		4 3 2						
		4 3 2	72	5		CL	Wet below 5.0'	8/14/92
		5 2 2	4	10		SW	Well-graded Sand: greenish gray; wet; very loose; fine to medium sand; high est K; shell fragments (Fill)	
		3 3 3	250	15				
		1 2 4		20		CL	Silty Clay: gray to black; soft; very low est K; high organics; trace shell fragments (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A09

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/19/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	26.5 feet
BORING LOCATION	SWMU 1 - East central portion
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		100 111 17	<1			GW	Well-graded Gravel: reddish brown; very gravel dense; fine to coarse; very high est K; HC odor; trace staining (Fill)	
2.5		5 7 6	4			CL	Silty Clay: greenish gray; moist; stiff; <5% fine sand; very low est K (Fill)	
4.5		8 7 11 4 5 5	11 7	5		SM	Silty Sand: greenish gray to brown; medium dense; fine to medium sand; moderate est K (Fill) Minor shell fragments below 4.5' Wet below 5.0'	▽ 08/19/92
		3 5 9	100	10		CL	Silty Clay: gray; stiff; <5% sand; very low est K; trace organics; low plasticity (Fill)	
		2 1 2	390	15		SW	Well-graded Sand: greenish gray; wet; very loose; <5% fines; high est K (Fill)	
		1 2 2	2	20				
		1 1 3	100	25		CL	Silty Clay: gray; moist; soft; very low est K; heavy organics; trace shell fragments; low to moderate plasticity (Bay Mud) Terminate borehole at 26.5'	
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A10

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/14/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - East Central portion
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		53 41 52	5			GW	Well-graded Gravel: reddish brown; dry; very dense; <5% fines; fine to very coarse sand; very high est K; metal and wood fragments (Fill)	
2.5		15 14 11	35					
4.0		2 7 12	52				Silty Clay: gray; moist; stiff; very low est K; wood and shell fragments (Fill)	
5.0		7 12 13	75	5			Wet; HC odor below 5.0'	▽ 08/14.92
		4 7 13	500	10		SW		
		1 2 2	550	15			Well-graded Sand: greenish gray; wet; very loose; fine to medium sand; subangular; high est K; slight odor; staining (Fill)	
		1 1 2	600	20		CL	Silty Clay: greenish gray; wet; very soft; very low est K; hydrogen sulfide odor; low to medium plasticity (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A11

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/13/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	SWMU 1 - Northeast Corner of Bldg 366
LOGGED BY	Michael Sellens, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		22 13 19				GM	Silty Gravel: yellowish brown; dry to damp; medium dense; medium to very coarse subangular gravel; moderate est K (Fill)	
2.5		8 5 7	1 10			CL	Silty Clay: dark brown; moist; firm; very low est K; moderate plasticity; small sand lens; shell fragments >2" (Fill)	
4.0		2 3 3	0	5			Dark gray; wet; HC odor below 4.0'	▽ 8/13/92
		1 2 10	70				No odor below 7.0'	
		1 3 4	400	10		CH	Fat Clay: greenish gray; wet; firm; very low est K; high plasticity; shell fragments; iron staining (Fill)	
		2 3 3	150				Soft below 13.0'	
		5 8 9	500	15		SM	Silty Sand: greenish gray; wet; medium dense; moderate est K; shell fragments; HC odor (Fill)	
		2 3 3	500	20		CH	Fat Clay: greenish gray; wet; firm; high plasticity; organic material; shell fragments; iron staining (Bay Mud)	
							Terminate borehole at 20.5'	

25

30

35

CTO 200 | DRILLING LOG | BORING NO. A12

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/12/92 - 07/13/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	19.5 feet
BORING LOCATION	SWMU 1 - Northwest corner of Bldg 365
LOGGED BY	John Bird / Michael Sellens R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		33 25 31	5			GM	Silty Gravel: yellowish brown; damp to dry; very dense; fine to coarse sand; subangular gravel; very high est K (Fill)	
2.5		8 7 19	3			CL	Silty Clay: dark brown; moist; stiff; <5% sand; very low est K; trace shell fragments; moderate plasticity (Fill)	
4.0		16 15 12	2					
		5 5 6		5		SM	Silty Sand: light gray; wet; loose; moderately sorted; moderate est K; shell fragments (Fill)	▽ 07/12/92
		1 1 2						
		1 1 1	20					
		1 3 5	6	10		CH	Fat Clay: dark gray to greenish gray; wet; very soft; very low est K; high plasticity (Fill)	
		1 3 4	10				Minor shell fragments; spotty iron staining below 10.5'	
		11 2 2	45					
		18 12 15	500	15		SM	Silty Sand: gray; wet; medium dense; fine to medium sand; moderate est K; shell fragments (Fill)	
		5 7 8	60					
		5 8 9	500					
		2 3 3	300				Terminate borehole at 19.5'	
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A13

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/19/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - Southwest of Bldg 365
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		50				GM	Silty Gravel: yellowish-brown, moist, very dense, coarse angular gravel, asphalt pieces, moderate est K, no odor (Fill)	
1.5		17	<1					
2.5		1	110			SC	Clayey Sand: orangish-brown, moist, loose, low est K, no odor (Fill)	
4.0		5					Silty Sand: gray, moist to wet, loose, fine to medium sand, moderate est K, no odor (Fill)	▽ 8/19/92
		7						
		2						
		4						
		3	6.2					
		2		5			Clay lens approximately 2" thick at 5.0'	
		1	14.5					
		1						
		1		10		SM	Shell fragments below 10.0'	
		1	2.5					
		1						
15.5		1	>1000	15				
		1						
		1						
		1					Fat Clay: wet, very soft, organic material, very low est K, high plasticity, slight HC odor (Bay Mud)	
		1	180					
		2				CH		
		1		20			No odor below 20.0'	
		1						
		1					Borehole terminated at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A14

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/14/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - South of RR, eastern portion
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		19 36 44	0			GM	Silty Gravel: reddish brown; damp to moist; dense; fine to coarse sand; subangular to angular gravel; very high est K (Fill)	
2.5'		6 11 12	300					
4.0		2 4 5	>1000			CL	Silty Clay: gray; moist; firm; very low est K; minor shell and glass fragments (Fill)	
		1 3 5	36	5		SM	Silty Sand: gray; saturated; loose; medium sand; moderate est K (Fill)	▽ 08/14/92
		4 4 3	3	10		CL	Silty Clay: dark gray; wet; firm; <5% fine sand; very low est K; trace of shell fragments; low plasticity (Fill)	
		1 2 3	350	15		SM	Silty Sand: gray mottled olive brown; wet; very loose; fine to medium sand; organic material (Fill)	
		1 2 3	90	20		CL	Silty Clay: dark brownish gray; soft; <5% fine sand; very low est K; hydrogen sulfide odor; organic material; moderate plasticity (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A15

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/14/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - East of South gate
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5 2.5 4.0		22 45 36 19 37 37 7 7 7 3 5 9	9 4 48 80	5		GM SM	Silty Gravel: reddish brown; damp to dry; dense; fine to coarse sand; subangular gravel; very high est K (Fill) Silty Sand: gray; moist to wet; loose; fine to medium sand; moderate est K (Fill) Wet below 5.0'	▽ 08/14/92
		3 3 2	45	10		CL	Silty Clay: dark gray; wet; soft; <5% fine sand; very low est K; hydrogen sulfide odor; trace shell fragments; medium plasticity (Fill)	
		2 4 3	500	15		SM	Silty Sand: gray; very loose; fine to medium sand; moderate est K; HC odor; minor staining (Fill)	
		7 4 3	300	20		CL	Silty Clay: brownish gray; moist; firm; very low est K; hydrogen sulfide odor; minor organics; rootlets; medium plasticity (Bay Mud) Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A16

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/13/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	SWMU 1 - West of Building 365
LOGGED BY	Michael Sellens, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		47 50 48	5			GM	Silty Gravel: yellowish orange; dry; very dense; subangular to angular gravel up to 0.3"; very high est K; metal fragments (Fill)	
2.5		3 3 3	45			SM	Silty Sand: gray to dark gray; damp; very loose; moderate est K (Fill)	
						CL	Silty Clay: gray to dark gray; damp; soft; very low est K (Fill)	
4.0		3 3 3	45	5		SM	Silty Sand: gray to dark gray; wet; very loose; fine to medium sand; moderate est K (Fill)	▽ 08/13/92
		1 1 1	350			CL	Silty Clay : gray; wet; very soft; very low est K; medium plasticity (Fill)	
		1 2 2	450	10				
		1 2 2	350			CH	Fat Clay: gray; wet; very soft; very low est K; high plasticity (Fill)	
		1 2 3	100	15		SM	Silty Sand: gray; wet; loose; fine to medium sand; some shell fragments (Fill)	
		1 2 2	375	20		CL	Silty Clay: gray; wet; soft; <5% fine sand; very low est K; hydrogen sulfide odor; medium plasticity (Bay Mud)	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A17

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/12/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	SWMU 1 - West of Building 366
LOGGED BY	Michael Sellens, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		26 24 16	10			GM	Silty Gravel: dark brown to grayish brown; dry; medium dense; medium to very coarse sand, subangular to angular gravel up to 0.3"; very high est K; metal fragments (Fill)	
2.5		3 6 4	200			SM	Silty Sand: gray to dark gray; damp; loose; fine to medium sand; moderate est K (Fill)	
4.0		2 2 3	20	5			Wet below 5.0'	▽ 08/13/92
		1 1 1				CL	Silty Clay: gray; wet; firm; very soft; very low est K; medium plasticity (Fill)	
		1 1 2	100	10				
		1 1 2 1 2 5	400 >1000	15		SM	Silty Sand: gray; wet; very loose; fine to medium sand; moderate est K; some shell fragments (Fill)	
		4 5 7	>1000	20		CL	Silty Clay: gray; wet; firm; very low est K; medium plasticity (Bay Mud)	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A18

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/17/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - South central portion
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		24 62 61	1.6			GM	Silty Gravel: reddish brown; slightly damp; very dense; fine to medium sand; very high est K (Fill)	
2.0		24 19 12	2.0			SM	Silty Sand: brown; damp; medium dense; fine to medium sand; high est K; some metal pieces; shell fragments (Fill)	
3.5		2 1	70			CL	Sandy Clay: dark gray; damp; soft; fine to medium sand; shell fragments; very low est K (Fill)	
4.5 5.0		3 2 1 2	3.0	5		SM	Silty Sand: gray; wet; very loose; moderate est K; trace shell fragments; slight odor (Fill)	09/17/92
		1 1 1	480			CH	Fat Clay: gray to dark gray; wet; very soft; very low est K; slight odor; high plasticity (Fill)	
		1 1 1	10	10		SM	Silty Sand: gray; wet; very loose; moderate est K; slight odor (Fill)	
		1 2 2	250	15		CH	Fat Clay: gray; moist; very soft; vertical fractures filled with very fine sand; very low est K; high plasticity (Fill)	
						SM	Silty Sand: gray; wet; very loose; fine to medium sand; moderate est K; slight odor (Fill)	
		2 2 2	>1000	20		CH	Fat Clay: gray; wet; soft; very low est K; moderate odor; trace organic plant material and few thin laminae of brown organics (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A19

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/16/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - East of southgate
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.5		32 33 40	0.1			GM	Silty gravel: reddish brown; damp; dense; fine to medium; gravel very high est K (Fill)	
3.0		27 18 17	0.2			SM	Sand: brown; damp; medium dense; fine to medium sand; fine, subrounded gravel; moderate est K (Fill)	
4.5		11 11 7	0.4	5				
6.0		3 2 5	7.2			CH	Fat Clay: gray; wet; firm; very fine to medium sand; 2" shell fragments; very low est K (Fill)	▽ 09/16/92
		1 1 1	7.0					
		2 2 2	6.8	10			Slight odor below 10.0'	
		2 2 2		15				
						SM	Sand: dark gray to black; wet; loose; fine sand; moderate est K; slight odor (Fill)	
		2 1 2 2 2 4	700 >1000 >1000	20		CH	Fat Clay: dark gray mottled black; wet; very soft; very low est K; organics; moderate odor (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A20

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/16/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - Central portion
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		80 48 42	0.2			GM	Silty Gravel: yellowish red; damp; very dense; fine to medium sand (Fill)	
2.5		12 16 16	0.2			SM	Silty Sand: brown; damp; medium dense; fine to medium sand; moderate est K; trace shell fragments (Fill)	
4.0		5 11 4	0.2				Clay lens between 2.5' and 3.0'	
5.5		6 5 3	0.2	5			Wet below 5.5'	▽ 09/16/92
							HC odor below 6.0'	
		1 1 1	1.5				No HC odor below	
		1 1 2	15	10		CH	Fat Clay: dark gray; damp; very soft; trace shell fragments; very low est K; high plasticity (Fill)	
		5 14 18	20	15		SM	Silty Sand: gray; wet; medium dense; fine to medium sand; moderate est K (Fill)	
							HC odor below 16.5'	
		3 5 5	>1000	20			Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A21

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/17/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 2: North central
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0 1.5 2.5		32 21 13 13 16 14	2.2 1.0			SM	Sand: brown; slightly damp; medium dense; very fine to coarse sand; moderate est K (Fill) >5% pebbles; iron staining; shell fragments	
5.5		4 4 4 3 4 5	2.0 300 220	5			Silty; slight odor	▽ 09/17/92
		1 1 1				CL	Clay: gray to dark gray; very soft; medium dense; interbedded 2" very fine to fine sand; very low est K; slight odor (Fill)	
		1 1 1	750	10			Moderate odor; organics; trace rootlets	
		7 7 16	800	15		SM	Sand: gray; wet; medium dense; fine to medium sand; moderate est K; moderate odor; thin hard layer of organics-black; trace shell fragments (Fill)	
		2 2 2	580	20		CH	Fat Clay: gray; soft; very low est K; moderate odor; abundant organics and plant material; rootlets; high plasticity Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A22

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	9/16/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 2: North west
LOGGED BY	Jim Jensen R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		22 11 14	0.1				Sand: brown; slightly damp; medium dense; fine to medium sand; moderate est K (Fill)	
2.5		7 12 15	0.2				Grayish brown	
4.0		4 2 3	0.8	5		SM	Silty; wet below 5.0'	▽ 09/16/92
		2 2 1	80					
		7 14 15	>1000	10		CL	Clay: grayish brown; wet; stiff; very low est K; shell fragments (Fill)	
		2 3 4	>1000	15		SM	Sand: grayish brown; wet; loose; fine to medium sand; moderate est K; slight odor (Fill)	
		3 5 6	>1000	20			Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A23

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/16/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 2: South west
LOGGED BY	Jim Jensen R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		20 22 23	1.0			GM	Gravel: reddish brown; slightly damp; dense; fine to medium gravel >3"; very high est K (Fill)	
2.5		14 19 22	0.7			SM	Sand: brown; slightly damp; medium dense; fine to medium sand; discolored fractures (vertical, yellowish red); moderate est K (Fill)	
4.0		5 8 9	1					
4.5		3 2 2	12	5			Sand: brown; slightly damp; medium dense; fine to medium sand; pieces of clay (clay ball); moderate est K (Fill)	▽ 09/16/92
5.5			7					
		1 1 1					Clay: grayish brown; slightly damp; soft; interbedded 4" gray, fine to medium sand; very low est K (Fill)	
							Organics	
			2	10		CL		
		2 2 2					Slight odor	
		3 5 6	150	15		SM	Sand: gray; wet; loose; fine to medium sand; moderate est K; odor (Fill)	
		3 2 3	>1000	20		CH	Clay: gray; damp; soft; very low est K; moderate odor; moderate organic material in parts; some rootlets (Bay Mud)	
							Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A24

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	7/06/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	SWMU 1 - Southwest Section
LOGGED BY	K. Lyle Dokkin
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		22					Silty Sand: brown, dry to damp, medium dense, fine to medium sand, subrounded to subangular gravel, moderate est K, no odor (Fill)	
		14						
		10						
		4	2					
2.5		4						
		4				SM	Very loose below 1.5'	
		5						
		2						
		2	0	5				
5.5		4	25					
6.5		1					Fat Clay: olive-brown, moist to wet, very loose, fine sand, very low est K, high plasticity, slight odor (Fill)	7/6/92
		2						
		1					No odor below 9.0'	
		1						
		2		10		CH		7/6/92
							Silty Sand: olive-brown, wet, fine to medium sand, subrounded to subangular gravel, moderate est k, HC odor and staining (Fill)	
		6						
		9						
		10		15				
						SM		
		2						
		4						
		8		20		CH	Fat Clay: greenish-gray, wet, firm, very low est K, high plasticity (Bay Mud)	
							Borehole terminated at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A25

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	7/06/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	Area 1: North central
LOGGED BY	John C. Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
.5		28 24 20	1			GP	Sandy Gravel: brown (2.5Y5/3); damp; medium dense; fine to medium, small gravel; subrounded to subangular; high est K (Fill)	
2.5		17 16 14				SW	Sand: grayish brown (2.5Y5/1); damp to moist; medium dense; fine to medium sand; high est K (Fill)	
5.5		8 9 9	1	5				▽ 07/06/92
		1 2 2						▼ 07/06/92
		1 1 2		10		CL	Silty Clay: olive brown (2.5Y5/3); wet; very soft; <5% fine sand; very low est K; medium to high plasticity (Fill)	
		9 12 11		15		SW	Well-graded Sand: olive brown (2.5Y5/2); saturated; medium dense; sorted; fine to medium sand; high est K; HC odor; minor staining (Fill)	
		2 2 5		20		CH	Silty Clay: dark brown (2.5YN2/01); damp; firm; very low est K; slight hydrogen sulfide like odor; rootlets; medium to high plasticity (Bay Mud)	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A26

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	7/6/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	Area 1: North central
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		37 23 16	2			GP	Sandy Gravel: brown (2.5Y5/3); damp; medium dense; fine to coarse sand; subrounded small gravel; high est K (Fill)	
2.5		7 7 9				SW	Sand: grayish brown (2.5Y5/2); damp to moist; medium dense; fine to medium sand; high est K (Fill)	
5.5		3 4 4		5				
6.5		3 4 5						07/06092
								07/06/92
		3 4 4		10		CL	Silty Clay: olive brown (2.5Y5/3); moist; firm; fine sand; medium plasticity (Fill)	
15.5		8 10 8	15	15		SW	Well-graded Sand: olive brown (2.5Y5/2); saturated; medium dense; fine to medium sand; HC like odor; minor staining (Fill) Sheen observed	
		3 3 4		20		CH	Silty Clay: dark brown (2.5YN2/01); damp; firm; very low est K; slight hydrogen sulfide like odor; rootlets (Fill) Terminated borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A27

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	7/06/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	Area 1: South west corner
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		22 50				GW	Sandy Gravel: brown (2.5Y4/3); damp; dense; fine to coarse sand; subangular small gravel; high est K (Fill)	
2.5		16 7 7	50			CL	Silty Clay: mottled brown (2.5Y5/1); moist; stiff; <5% fine sand interfingered; very low est K; medium plasticity (Fill)	
5.5		4 5 6		5				
6.5		2 2 4	60				HC-like odor; staining	
								07/06/92
								07/06/92
		2 2 2		10		SM	Silty Sand: olive brown (2.5Y5/3); saturated; very loose; moderately sorted; fine to medium sand (Fill)	
		5 7 9		15				
		2 2 3		20		CH	Silty Clay: dark brown (2.5YN2/01); damp; soft; very low est K; slight hydrogen sulfide-like odor; trace rootlets; medium plasticity (Fill)	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A28

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/06/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	Area 1: South west corner
LOGGED BY	John C Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		17 14 29	0.5				Sand: olive brown (2.5Y5/1); damp; medium dense; <5% silt; fine to medium sand; small angular to subangular gravel; high est K (Fill)	
		6 9						
2.5		2	0.0					
		3 6 7	0.0	5		SW		
5.5								
6.5		6 5 4						07/06/92
								07/06/92
		2 2 2	30	10		CL	Silty Clay: dark brown (2.5YN2/01); damp; soft; very low est K; trace rootlets; medium plasticity (Fill)	
		7 9 15	0.0	15		SM	Silty Sand: olive brown (2.5Y5/3); saturated; medium dense; fine to medium sand; moderate est K; trace shell fragments (Fill)	
		2 3 4		20		CH	Silty Clay: dark brown (2.5YN2/01); damp; firm; very low est K; slight hydrogen sulfide like odor; trace rootlets (Fill)	
							Petroleum staining	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A29

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/06/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	25.5 feet
BORING LOCATION	Area 1: South west corner
LOGGED BY	John C Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
.5		47 27 27	0			GW	Sandy Gravel: reddish brown (slightly discolored); damp; dense; <5% silt; fine to medium sand; small angular to subangular gravel; high est K (Fill)	
2.5		12 9 10						
		8 10 12		5		SW	Sand: brown (2.5Y5/3); moist; medium dense; <5% silt; fine to medium sand; high est K (Fill)	
5.5		1 1 3	16	10		SM	Silty Sand: dark brown (2.5YN2/01); saturated; very loose; fine to medium sand; moderate est K; trace small shell fragments (Fill)	07/06/92 07/06/92
		6 8 12		15				
		2 3 5		20		CH	Silty Clay: dark brown (2.5YN2/01); damp; firm; very low est K; slight hydrogen sulfide-like odor; trace rootlets; medium plasticity (Fill)	
		2 3 5		25			Trace large shell fragments Terminate borehole at 25.5'	
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A30

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	07/07/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	22.0 feet
BORING LOCATION	Area 1: South west corner
LOGGED BY	K. Lyle Dokken
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		20 23 25	1			GW	Well-graded Gravel: brown (5YR4/4); moist; medium dense; fine to coarse gravel; very high est K (Fill)	
2.5		16 16 16					Silty Sand: brown (5YR4/4); moist; medium dense; fine to coarse sand; moderate est K (Fill)	
5.5		6 8 7	1	5				
		6 10 14	58	10		SW	Wet below 9.0'	07/07/92 ▽ ▼ 07/07/92
		2 3 3		15				
		2 3 5		20		CL	Silty Clay: trace large shell fragments	
							Terminate borehole at 22.0'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A31

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/19/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 3: Central
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		17	<1				Gravelly Sand: reddish brown to gray; moist; dense; fine to coarse sand; subangular gravel <5% debris and silt; moderate est K; minor HC-like staining (Fill)	
		34						
		22						
		26						
2.5		28					HC stained	
		9						
		3						
4.0		3						
		3						
		7	100	5				▽ 08/19/92
6.0		8						
		1	125	10		SM	Silty Sand: brownish gray (minor greenish discoloration); moist to saturated; very loose; fine to medium sand; low est K (Fill)	
		2						
		1						
		2	160	15			Saturated	
		3						
		6						
		1	250	20		CH	Silty Clay: gray; moist; very soft; very low est K; trace organics; low to medium plasticity	
		1						
		2					Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A32

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/19/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 3: East central
LOGGED BY	John Bird
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/8 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		55	5			GM	Sandy Gravel: reddish brown; moist; very dense; fine to coarse sand; very high est K (Fill)	
1.5		90						
		17						
2.5		6	8					
		10						
		6	0			SM	Sand: brownish gray; moist; very loose; <5% silt; fine to medium sand; moderate est K (Fill)	
4.0		4						
		3						
		4	0	5			Silty Clay: brownish gray to gray; moist to saturated; very soft; low est K (Fill)	8/19/92
		2						
		2						
		1		10			Minor fine sand lens <1" thick : trace organics with shell fragments; low plasticity	
		1						
		1				CL		
15.0		1	>1000	15			Increased organics; high carbon content	
		2						
		3						
		1	>1000	20				
		2						
		2					Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A33

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	9/17/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	SWMU 1 - South of Bldg 366
LOGGED BY	Jim Jensen, R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		58 32 55	18			GM	Silty Gravel: yellowish-brown stained black, damp, very dense, moderate est K, HC odor (Fill)	
2.0		10 8 7	17			SM	Silty Sand: gray, damp, loose, fine to medium sand, moderate est K, HC odor, shell fragments (Fill)	
3.5		2 1	18			CL	Sandy Clay: medium gray, moist, soft, very low est K, shell fragments, HC odor (Fill)	9/17/92
5.0		2 4 2 2	35	5		SM	Silty Sand: gray, moist to wet, very loose, fine to medium sand, moderate est K, HC odor (Fill)	
		1 1 1	520			CL	Silty Clay: dark gray, wet, soft, very low est K, HC odor (Fill) Gray mottled dark gray, very soft below 8.0'	
				10				
		2 4 7	220				Gray, soft below 12.0'	
						SM	Silty Sand: gray, wet, loose, fine to medium sand, moderate est K (fill)	
				15			Fat Clay: medium gray, wet, soft, very low est K, high plasticity, HC odor (Fill)	
		1 2 2	480				Dark gray, dark organic material, HC odor below 17.0' (Bay Mud)	
						CH		
		1 2 2	>1000	20			Medium gray mottled orangish-brown, shell fragments, HC odor below 20.0' below 20.0'	
							Dark organic layer below 21.25'	
							Borehole terminated at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A34

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/18/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 3: Central
LOGGED BY	Jim Jensen R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		24 4 4	0.6			GM	Gravel: gray; medium dense; clay and sand with shells to 1.5'; moderate est K (Fill)	
2.0		3 3 4	0.6			SC	Clay: gray; damp; firm; big burrow fill with silty sand (fine to medium; slight odor); very low est K; trace large shell fragments (Fill)	
3.5		4 2 2	200				Clayey Sand: gray; damp; loose; fine to medium sand; moderate est K; slight odor; abundant shells (Fill)	
5.0		3 2 2	500	5			Slight odor; some iron staining Slight sheen	▽ 09/18/92
		1 2 2	6	10		CL	Clay: dark gray mottled gray; moist; soft; very low est. K; slight odor; slight iron staining (Fill)	
		1 1 2	5.8				Black organic laminae	
		2 1 1	>1000	15			Moderate odor	
		2 1 3	950	20		CH	Fat Clay: gray; moist; soft; very low est. K; moderate odor; shell fragments near base (Bay Mud) Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A35

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/17/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	20.5 feet
BORING LOCATION	Area 3: North west
LOGGED BY	Jim Jensen R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		32 22 33	0.6			GM	Gravel: reddish brown; slightly damp; dense; fine to coarse, subangular pebbles (Fill)	
2.0		14 15	0.6				Clayey Sand: brown (some discoloration); slightly damp; medium dense; fine to medium sand; moderate est K; iron staining in a circular pattern (Fill)	
3.5		11 2 2	2.5 80				Gray; moist; very loose; fine to medium sand; slightly silty; moderate est K; slight odor	
5.0		1 2 2 3	92 90	5			Slight odor; trace shell fragments	
		1 1 1	58				Slight odor; trace rootlets; trace shell fragments	▽ 09/17/92
		1 1 2	360	10		SC		
		6 14 17	>1000	15				
		6 5 3	90	20		SM	Silty Sand: dark gray to dark brown; wet; loose; poorly sorted; fine to medium sand; moderate est K; slight odor; trace shell fragments; piece of coal (Fill)	
							Terminate borehole at 20.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A36

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/18/92
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	21.5 feet
BORING LOCATION	Area 3: Central
LOGGED BY	Jim Jensen R.G.
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		4	0.2			CL	Clay: gray; slightly damp; firm; very low est K; some fragments of large shells (Fill)	
2.5		9 14 7	2.2			GM	Gravel: reddish brown; slightly damp; loose; very fine to medium gravel; iron stained sand with patch of brown clay; very low est K (Fill)	
		6 6 2	1.0			SC		
		4 3 1 1 1	>1000	5			Clayey Sand: reddish brown; slightly damp; loose; fine to medium sand; slight odor; some shells (Fill)	▽ 09/18/92
		2 1 2	>1000				Clay: gray; moist; very soft; 1/2" sand filled fractures (wet; fine to medium sand); low est K (Fill)	
							Slight odor; trace of organic material	
				10		CL		
		1 1 2	400				Very fine silty layer (1/4"); slight odor; trace small shell fragments	
		1 2 2	>1000	15			Fat Clay: gray; moist; soft; very low est. K; moderate odor; black organic laminae; "fresh" organic plant material; large and small rootlets (Bay Mud)	
						CH		
		2 1 2	>1000	20			Terminate borehole at 21.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A37

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.5 feet
BORING LOCATION	Building 25
LOGGED BY	Terry Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		43 50	0.0			ML	Clayey Silt: yellowish brown; damp; gravelly; low est K (Fill)	
						GP	Sandy Gravel: yellowish brown; damp; dense; subangular to subrounded gravel; very high est K (Fill)	03/01/94 03/01/94
5.5		8 8 11	0.0	5		SM	Silty Sand: yellowish brown; moist; stiff to very stiff; moderate est K; clam shells in sand	
							Dark greenish gray; medium dense	
		8 13 6	1.0				Peat/organic lens	
				10			Terminate borehole at 9.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A38

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	North west corner Building 25
LOGGED BY	Terry Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: brown; damp; gravelly; low est K (Fill)	
1.5		50 6	2.0					
		30 32 19	2.0				Silty Sand: dark greenish gray; moist; dense; moderate est K; abundant shell fragments (Fill)	
4.0							Yellowish brown; moist; medium dense; large gravels; moderate est K	▽ 03/01/94
5.0		10 10 17	320	5		SM	Dark greenish gray at 5.5'; abundant shell fragments	
		9 14 10	2.0				1" peat/organic lens	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A39

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SW corner of bldg 13
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
2.0		50/6	0.0			ML	Clayey Silt: brown; damp; gravelly; low est K (Fill)	
							Shell fragments abundant below 3.0'; increasing clay content with depth	
4.0		18 16 27	0.0	5		SM	Silty Sand: dark grenish gray; moist; dense; minor clay; moderate est K (Fill)	
		10 10 11					1' peat/organic lens	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A40

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	W. of bldg 13
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: brown; damp; gravelly; low est K (Fill)	
		50/6				GM	Gravel: light brownish gray; damp; very dense; minor silt and fine sand; coarse gravel; very high est K (Fill)	
3.0		6 12 14				SC	Clayey Sand: brown; damp; very stiff; fine sand; very low est K (Fill)	
				5		SM	Silty Sand: fine; moderate est K	▽ 3/1/94
		9 8 28					Dark greenish gray	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A41

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	NE corner bldg 13
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: brown; damp; gravelly; low est K (Fill)	
2.0 2.5		28 29 30 5	2.0			GM	Silty Gravel: greenish black; damp; hard; minor fine sand; high est K (Fill) Abundant wood chips	
4.5		14 20 28	0.0	5		SM	Silty Sand: yellowish brown; saturated; hard; moderate est K; abundant shell fragments (Fill) Dark greenish gray	3/1/94
		18 20 19					Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A42

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	East of bldg 13
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 6"	
1.5	■	50/4	10			ML	Clayey Silt: brown; damp; gravelly; very low est K (Fill)	
							Grayish black; damp; hard; some gravels	
4.5	⊠	31 50 6	4.0	5			Silty Sand: yellowish brown; damp to moist; hard; medium sand; moderate est K (Fill)	
						SM	Dark greenish gray; wet below 8.0'	▽ 3/1/94
	⊠	29 30 32	<1000					
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A43

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/02/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	AOC 1 West of UST
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
1.5		12 28 27				ML	Clayey Silt: brownish gray mottled yellowish brown (oxidized); damp; hard; gravelly; very low est K; slight odor (Fill)	
3.5		21 14 14					Silty Sand: dark greenish gray; moist; medium dense; fine sand; minor gravels; moderate est K; odor; slightly stained (Fill) Stain/sheen on soil (Fill)	
5.0		6 6 8	40 500	5		SM		
8.5		5 5 6	600			ML	Sandy Silt: dark greenish gray; wet; stiff; fine; some clay; low est K; strong odor (Fill)	
							Some gravels present between 8.0 and 9.0'	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A44

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/02/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	South of UST / AOC1
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt=3"	
1.5		21 27 29	200			ML	Clayey Silt: brown; damp; hard; gravelly; low est K (Fill)	
		32 42 33					Greenish black; stained	
							Minor gravels	
4.5		20 23 27	20	5		SM	Silty Sand: greenish black; fine sand; moderate est K; strong odor/staining	
		6 7 8					Wet below 9.0'	▽ 3/2/94
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A45

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/2/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	AOC 1 North of UST gas station
LOGGED BY	3/02/94
APPROVED BY	Doug Bleakly, R.G.
NOTES	John Bird

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
2.0		25 19 11 10 8 6	50			ML	Clayey Silt: dark greenish gray; damp; hard; gravelly; low est K (Fill)	
4.0			<1000	5		SM	Silty Sand: dark greenish gray; moist; loose; fine sand; minor clay nodules; moderate est K; very strong odor (Fill)	
8.5		11 18 19	<1000				Wet; medium dense; some gravel between 8.0 and 9.0'	
							Terminate borehole at 9.0'	

10 15 20 25 30 35

CTO 200 | DRILLING LOG | BORING NO. A46

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/2/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	South of bldg 2 AOC3
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
		50/2				ML	Clayey Silt: yellowish brown; damp; hard; low est K (Fill)	
						CL	Brownish gray below 1.0'	
3.0		20 35 11 14 14 13	0.0 80				Silty Clay: grayish black; damp; very low est K; low plasticity (Fill)	
5.0				5		SM	Silty Sand: dark greenish gray; moist; dense; fine sand; moderate est K (Fill) Wet below 4.5'	3/2/94
		3 3 2	>1000					
				10		CL	Silty Clay: grayish black; moist; soft; very low est K; strong hydrogen sulfide odor; abundant in organic materials Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A47

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/2/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	South of bldg 2 at AOC3
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
3.0		35 43 38	2.0				Brownish gray at 1.0'	
5.0		19 19 19	60	5		SM	Silty Sand: dark greenish gray; moist; very dense; fine sand; moderate est K (Fill)	▽ 3/2/94
							Wet below 5.5'	
		3 3 6				CL	Silty Clay: grayish black; moist; firm; very low est K; slight hydrogen sulfide odor; abundant organic material (roots/grasses) (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A48

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/2/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	10 feet
BORING LOCATION	West of bldg 3 SWMU 3
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
3.0		10	0.0			SM	Silty Sand: dark yellowish brown; damp; medium dense; fine sand; moderate est K (Fill)	
3.5		12						
4.5		16	50					
		3					Greenish black; moist; soft; loose; shell fragments	
		3		5		CL		3/2/94
		4	0.0				Clay: medium plastic clay from 5.0 to 5.5'	
						SM	Sand: dark greenish black to dark greenish gray; wet; medium dense; moderate est K (Fill)	
		14						
		17						
		28		10			Terminate borehole at 10.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A49

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/3/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	West of bldg 3 SWMU 3
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
2.5		27 33 32	0.0				Silty Sand: yelowish brown to light yellowish brown; damp; dense; fine sand; moderate est K (Fill)	
4.5		15 9 7	0.0	5		SM		3/3/94
		13 7 9	0.0				Greenish black; wet; stiff; silty fine sand; shell fragments (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A50

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/3/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	SWMU 3 West side of bldg 3
LOGGED BY	Terry Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
						ML	Clayey Silt: yellowish brown; damp; gravelly; low est K (Fill)	
2.5		22	0.0			SM	Silty Sand: yellowish brown to light yellowish brown; damp; dense; moderate est K (Fill)	
4.0		20 14 6 7 4	4.0					
				5		CL	Clay: dark gray; firm; very low est K (Fill)	▽ 3/3/94
						SC	Silty Clay: dark gray; wet; very low est K (Fill)	
		8 12 17	2.0			CL	Clay: dark gray; wet; very stiff; very low est K (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A51

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/3/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SWMU 1 SE corner of scrapyard
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		10 13 12				ML	Clayey Silt: dark yellowish brown; damp; hard; low est K	
						ASP	Asphalt 5"	
2.0			42			CL	Silty Clay: greenish black; damp to moist; very stiff; very low est K; some shell fragments (Fill)	
3.5		4 4 4	120			SM	Silty Sand: brown (oxidized); damp; medium dense; silty; moderate est K (Fill)	▽ 3/3/94
5.0		1 2 2	16	5		CL	Silty Clay: greenish black; wet; soft; very low est K (Fill)	
		1 1 2	28				Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A52

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/3/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SWMU 1 scrapyard SE
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Sandy Silt: dark yellowish brown; damp; hard; gravelly; low est K (Fill)	
						ASP	Asphalt 6"	
2.0		8 12 11				CL	Silty Clay: black; damp; very stiff; very low est K; shell fragments (Fill)	
3.5		6	20					
4.0		8 9				SM	Silty Sand: dark greenish gray; saturated; loose; moderate est K; shell fragments (Fill)	
4.5		1 1 1		5				3/3/94
			300			CL	Silty Clay: black; wet; very soft; very low est K (Fill)	
		1 1 2						
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A53

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA		PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger	DATE (s) DRILLED 3/3/94

SAMPLER TYPE AND SIZE	BORING DIAMETER	BORING DEPTH	BORING LOCATION
2.5-inch CA Modified Split Spoon	8 inches	9.0 feet	SWMU 1 NE corner scrapyard

LOGGED BY	APPROVED BY	NOTES
Terrence Kinn	Doug Bleakly, R.G.	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Sandy Silt: brown; damp; hard; gravelly; low est K (Fill)	
2.5		8 8 8	26			CL	Silty Clay: greenish black; damp; stiff; interspersed sand stringers; very low est K; abundant shell fragments (Fill)	
4.5		8 8 4	700	5		SM	Silty Sand: dark greenish gray; saturated; stiff; moderate est K; abundant shell fragments (Fill)	▽ 3/3/94
		1 1 2	0.0			CL	Clay: greenish black; wet; very soft; very low est K (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A54

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/3/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	14.0 feet
BORING LOCATION	SWMU 4 gas station between pumps
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 6"	
						ML	Clayey Silt: dark yellowish brown; damp; hard; gravelly; low est K (Fill)	
2.0		21 25 45	100				Clayey Sand: dark greenish gray; damp; medium dense; well sorted; silty; very low est. K; odor; shell fragments (Fill)	
4.5		12 15 14	>1000	5		SC	Decreasing clay content Strong odor	
8.0		7 8 8	160					
				10			Silty Clay: greenish black; wet; soft; very low est K; abundant shell fragments (Fill)	
		3 3 3	40			CL	Silty Clay: greenish black; wet; soft (Fill) Terminate borehole at 14.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A55

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/4/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Scrapyard SWMU I North central West of ent. gate
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
2.5 3.0		16 19 20	0			SM	Silty Sand: dark yellowish brown; medium dense; hard; fine sand; moderate est K; abundant shell fragments (Fill) Thin clay lenses <2" Shell fragments	
4.5		10 7 8	0	5				
8.5		1 1 1	2			CH	Clay: grayish black; saturated; very soft; thin fine sand stringers; very low est K; high plasticity (Fill) Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A56

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/4/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SWMU scrapyard south of bldg 366
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Clayey Silt: brown; damp; hard; gravelly; low est K (Fill)	
3.5		47 17 11	6.0			SM	Silty Sand: greenish black; moist; hard; minor clay layers <3" thick; low est K; shell fragments (Fill)	
4.5		2 2 2	26.0	5		CH	Silty Clay: grayish black; soft; thin sand lenses; very low est K; high plasticity (Fill)	▽ 3/4/94
		1 1 1					Terminate borehole at 9.0'	

10, 15, 20, 25, 30, 35

CTO 200 | DRILLING LOG | BORING NO. A57

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/4/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SWMU 1 scrapyard East of bldg 366
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
2.0		15 16 13	14			SM	Silty Sand: dark greenish gray; moist; medium dense; clay lenses; moderate est K; shell fragments (Fill)	
3.0		4 5 4	160			CL	Silty Clay: brownish gray; moist; firm; thin sand lenses; very low est K; medium plasticity (Fill)	
5.0		2 3 5	200	5				▽ 3/4/94
		1 1 1				CH	Fat Clay: very soft; high plasticity	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A58

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/4/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	10.5 feet
BORING LOCATION	SWMU 1 scrapyard south central end of yard
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
1.5		13 15 15 10 12 11	0.0			SM	Silty Sand: dark yellowish brown; damp; medium dense; fine sand; moderate est K (Fill)	
5.0 5.5		28 7 10	2.0	5				
8.0 9.0		1 2 1 1 2 2	10 8.0			CL	Silty Clay: greenish black; moist; very soft; very low est K; medium to low plasticity (Fill)	
				10		CH	Fat Clay: high plasticity	
							Terminate borehole at 10.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A59

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA			PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger		DATE (s) DRILLED 3/4/94
SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 7.25 inches	BORING DEPTH 9.0 feet	BORING LOCATION SWMU 1 scrapyard next to south gate entrance
LOGGED BY Terrence Kinn	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
3.0		22 22 22	0.0			ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill) Bluish white, large gravels (crushed rock) from 1.0 to 1.5 feet. Yellowish brown; damp to moist; hard; gravelly silty clay	
5.5		12 11 7	2.0	5				
7.5		6 2 1	100			CL	Silty Clay: dark gray; saturated; firm; intermittent fine sand lenses; very low est K (Fill) Terminate borehole at 9.0'	▽ 3/4/94
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A61

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/07/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~ 200'WNW of main entrance to SWMU 1 scrapyard
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		50 40				GC	Clayey Gravel: reddish brown; damp; coarse to medium, subangular gravel to 1"; very high est K (Fill)	
2.0		50	2.0			SW	Gravelly Sand: brown; damp; dense; medium; high est K; shell fragments (Fill)	
3.0			3.0					
		8 8 8	5.5	5		SP	Sand: brown; moist; medium dense; medium; intermittant fine to medium sand lenses; moderate est K; low to moderate plasticity (Fill)	▽ 3/7/94
6.0							Gray; wet	
			20.0			CH	Fat Clay: grayish brown; wet; soft; medium, bluish brown sand lenses very low est K; high plasticity (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A62

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/07/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~ 200' west of main gate SWMU 1 scrapyard
LOGGED BY	Amiee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		25 25 47	1.0			GW	Sandy Gravel: reddish brown to brown; damp; very dense; medium sand; subrounded gravel to 2"; high est K (Fill)	
4.0		20 43 41	1.0	5		SP	Sand: light brown; dry to wet; very dense; sand fine to medium; moderate est K (Fill)	▽ 3/7/94
6.0		9 9 9						
		1 2 2	200			CH	Fat Clay: dark bluish gray; wet; very soft; very low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A63

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/07/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	9.0 feet
BORING LOCATION	150' WNW of main gate SWMU 1 scrapyard
LOGGED BY	Amiee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
							Asphalt 1"	
2.5		6 12 15	5.0			SC	Clayey Sand: reddish brown; moist to wet; medium dense; medium sand; subrounded gravel to 2.5"; low est K; shell fragments (Fill)	
4.0		7 12 17	1.0				Light brown	
5.5		8 7 4	30.0	5				3/7/94
		1 1 1	500			CH	Fat Clay (CH): bluish gray; wet; firm; thin fine sand lenses; very low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A64

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/07/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~ 200' W OF MAIN GATE swmu 1 scrapyard
LOGGED BY	Amiee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						GW	Asphalt 3"	
						GW	Sandy Gravel: reddish brown; poorly sorted; medium sand; subangular gravel to 1"; high est K (Fill)	
2.5		10 13 26	3.4			SC		
4.0		15 23 27					Sandy Clay: reddish brown; damp; stiff; medium sand; low est K; low plasticity (Fill)	
5.5		6 7 4		5		SP	Well-graded Sand: brown; damp; medium dense; medium; moderate est K (Fill)	▽ 3/7/94
		1 1 1	30			CH	Fat Clay: brownish gray; wet; firm; fine sand lenses; very low est. K; shell fragments; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A65

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/07/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	4 inches
BORING DEPTH	9 feet
BORING LOCATION	North end of enclosed vehicle storage area
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 2"	
						GP	Gravel	
		43 27 27	2.0			SW	Gravelly Sand: reddish brown; dense; medium to coarse sand; subangular gravel to 1.5" high est K (Fill)	
4.0		9 17 13	10.0	5		SC	Clayey Sand: brown; moist; medium dense; fine to medium sand; low est K (Fill)	3/7/94
5.5 6.0		6 8 10	800				Sand: brown; wet; medium dense; moderate sorting; medium sand; moderate est K (Fill)	
							Silt nodules and rust colored staining	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A66

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/8/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.0 feet
BORING LOCATION	NE corner of bldg 366 SWMU 1 Scrapyard
LOGGED BY	Terry Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		50/2				ML	Clayey Silt: dark yellowish brown; damp; hard; low est K (Fill)	
3.0		10 14 15				CL	Silty Clay: greenish black; damp; very stiff; very low est K (Fill)	
5.5		2 2 3	540	5		SM	Silty Sand: dark greenish gray; moist; very stiff; fine sand; minor clay lenses/nodules; moderate est K (Fill) Wet below 5.5'	3/8/94
		1 1 1	3.0			CL	Silty Clay: greenish black; wet; very soft; thin sand stringers/lenses; low est K (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A67

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	3/8/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.0 feet
BORING LOCATION	North west corner bldg 365
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION (USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES (water levels, with date/time, character of drilling, etc.)
						GW	Silty Gravel: light gray; damp; dense; coarse; high est K (Fill)	
		34 20 17				CL	Silty Clay: dark greenish gray; damp; very stiff; very low est K (Fill)	
3.5							Silty Sand: dark greenish gray; moist; hard; minor clay lenses; moderate est K; some shell fragments present	▽ 3/8/94
4.5		8 8 8	34	5		SM		
		3 1 1	660			CL	Clay: black; wet; very soft; minor sand lenses/stringers <.25"	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A68

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA		PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger	DATE (s) DRILLED 3/8/94

SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 7.25 inches	BORING DEPTH 9.0 feet	BORING LOCATION North of bldg 366 SWMU 1 scrapyard
LOGGED BY Terry Kinn	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.5		15 14 12	1.8			ML	Clayey Silt: brown; damp; hard; gravelly; moderate est K (Fill)	
5.5		4 4 9	100	5		SM	Silty Sand: greenish gray to moderate brown; damp; very stiff; well sorted; fine; moderate est K; dark greenish gray with increased moisture (Fill) Silty clay lens at 4.0' Abundant shell fragments below 4.5'	▽ 3/8/94
		1 1 1	320			CL	Silty Clay: greenish black; wet; very soft; minor sand stringers (<.25" thickness); very low est K; moderate to high plasticity (Fill) Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A69

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	03/08/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	11.5 feet
BORING LOCATION	SW corner scrapyard 80N, 77E of SW corner of y
LOGGED BY	Terry Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.5		20 37 28	1.8			ML	Clayey Silt: yellowish brown; damp; hard; gravelly; low est K (Fill)	
3.5		7 14 15	2.2			CL	Silty Clay: yellowish brown; damp; hard; very low est K; low plasticity (Fill)	
5.5		7 11 12	2.4 4.0	5		SM	Sand: yellowish brown to dark yellowish brown; moist; very stiff; fine sand; minor clay lenses; moderate est K (Fill)	
8.5		3 2 1					Dark greenish gray; silty	▽ 3/8/94
		1 1 2	14.0	10		CH	Fat Clay: greenish black; wet; very soft; minor sand stringers <.25"; very low est K; high plasticity	
							Terminate borehole at 11.5 feet.	
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A70

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA			PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger		DATE (s) DRILLED 3/8/94
SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 7.25 inches	BORING DEPTH 11.0 feet	BORING LOCATION SW corner of scrapyard SWMU 1 38N, 98E of SW c
LOGGED BY Terry Kinn	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		8 8 9	<1			ML	Clayey Silt: yellowish brown; damp; hard; low est K (Fill)	
4.0		11 14 15	<1			CL	Silty Clay: olive gray; moist; very stiff; minor gravel; very low est K (Fill)	
6.0		7 8 12	<1	5		SM	Silty Sand: yellowish brown; moist; very stiff; fine sand; moderate est K (Fill) Shell fragments Dark greenish gray; increased silt content	
9.0		1 1 3	5.0			CH	Fat Clay (CH): dark greenish gray; wet; very soft; very low est K; medium to high plasticity (Fill)	3/8/94
		1 1 2	2.0	10		SM	Silty Sand: wet	
						CL	Silty Clay: dark greenish gray; very low est K; medium plasticity Terminate borehole at 11.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A71

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.5 feet
BORING LOCATION	SW corner of scrapyard midway between
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						SM	Silty Sand: yellowish brown; dry; medium dense; <5% clay; 20% silt; 60% very fine to very coarse sand; 20% fine, sub-rounded gravel to 3/4"; moderate est K; shell fragments (Fill)	
2.5		7 10 9						
				5		CL	Lean Clay: yellowish brown; damp; firm; 50% clay; 40% silt; 10% very fine to fine sand; very low est K; low plasticity (Fill)	
5.5		4 5 7	0.0 2.0					
						SP	Sand: brown; moist; loose; <5% fines; 100% medium sand; high est K (Fill)	▽ 5/16/94
7.0		3 2 3	2.0			CH	Fat Clay: bluish gray mottled dark gray; wet; soft; 45% clay; 40% silt; 15% very fine to fine sand; very low est K; high plasticity (Fill)	
		1 3 3		10			Terminate borehole at 9.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A72

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Bet. s15 & s4~30' N of s fenceline
LOGGED BY	Amiee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0	■					SM	Silty Sand: yellowish brown; dry; medium dense; <5% clay; 20% silt; 60% very fine to very coarse sand; 20% fine, sub rounded gravel to 3/4"; moderate est K (Fill)	
2.5	☒	7 9 10	0.0				Reddish brown; damp; 10% clay; 20% silt; 60% very fine to very coarse sand; 20% fine, subrounded gravel to 1/2"	
				5		CL	Lean Clay: dark gray; moist; stiff; 60% clay; 40% silt; <5% very fine sand; very low est K; low plasticity (Fill)	
6.5	☒	8 9 7	0.0			SP	Poorly-graded Sand: brown; moist; loose; <5% fines; 100% medium sand; high est K (Fill)	▽ 5/16/94
	☒	1 1 2					Wet below 7.5'	
						CH	Fat Clay: dark gray; wet; soft; 60% clay; 40% silt; <5% sand; very low est K; high plasticity	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A73

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Southern portion of central site 15-20' NE of A56
LOGGED BY	Jeanne Wahler
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				GM	Sandy Gravel: reddish brown; dry; medium density; 5% clay; 15% silt; 20% very fine to very course sand; 60% fine, subrounded gravel to 3/4"; moderate est K (Fill)	
3.5		9 9 9				SP	Clean Sand: light brown; dry; medium density; <5% fines; 100% very fine to fine sand; high est K (Fill)	
				5			Damp; medium sand below 3.5'	
6.0		5 4 3					Fat Clay: dark gray; wet; soft; 60% clay; 40% silt; very low est K; high plasticity (Fill)	▽ 5/16/94
8.0		1 2 1				CH	Very soft below 7.5'	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A74

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	
LOGGED BY	Jeanne Wahler
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						SM	Silty Sand: brown; dry; medium density; 5% clay; 25% silt; 45% very fine to very coarse sand; 25% fine sub angular gravel to 1/2"; moderate est K (Fill)	
3.5		13 17 19					Damp; 5% clay; 25% silt; 70% very fine to very coarse sand (Fill)	
				5		SP	Clean Sand: light brown; damp; dense; <5% fines; 100% medium sand; high est K (Fill)	5/16/94
		10 9 8					Dark gray; shell fragments below 6.5'	
		2 1 1				CH	Clay: dark gray; wet; soft; 50% clay; 40% silt; 10% very fine to fine sand; very est K; high plasticity (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A75

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	
LOGGED BY	Jeanne Wahler
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		13 14 14				SM	Silty Sand: brown; dry; medium density; 5% clay; 25% silt; 45% very fine to very course sand; 25% fine, subangular gravel to 1/2"; moderate est K (Fill)	
4.5 5.0 6.0		4 4 6 9 9 9	0.0	5		SP	Silty Sand: brown mottled orangish brown; damp; medium density; 15% clay; 25% silt; 60% very fine to very coarse sand; moderate est K; semi-consolidated (Fill)	
		3 2 2				CH	Sand (SP): clean; brown; damp; moderate density; <5% fines; 100% medium sand; high est K (Fill) Wet below 6.0' Dark gray; shell fragments below 6.5' Fat Clay: dark gray; wet; soft; 60% clay; 40% silt; <5% sand; very low est K; high plasticity (Fill) Terminate borehole at 9.0'	5/16/94

10 15 20 25 30 35

CTO 200 | DRILLING LOG | BORING NO. A76

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Center of site btw A61, A62 & S5 scrapyard
LOGGED BY	Jeanne Wahler
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0		24 35 35				SM	Poorly-graded Silty Sand: brown; dry; medium density; <5% clay; 10-15% silt; 85-95% very fine to fine sand; <5% fine gravel to 1/8"; moderate to high est K (Fill)	
4.5		11 11 10 3 4 5		5		SP	Mottled orangish brown; very dense; 5% clay; 25% silt; 40% very fine to very course sand; 30% fine subangular, gravel to 1/4"; moderate est K; semi-consolidated (Fill)	5/16/94
						SP	Clean Sand: brown; damp; medium density; <5% fines; 100% medium sand; no gravel; high est K (Fill)	
		1 1 1				CH	Wet below 5.5 feet Dark gray; shell fragments below 6.0'	
				10			Fat Clay: dark gray; wet; very soft; 60% clay; 40% silt; <5% sand; very low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A77

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/16/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Off of SW corner of Bldg 13
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
1.5			1.0			GW	Sandy Gravel: reddish brown; dry; 10% silt; 20% very fine to medium sand; 70% fine, subangular to subrounded gravel; moderate est K (Fill)	
						SC		
						GW		
						SM	Clayey Sand: dark brown; moist; dense 25% clay; 75% medium sand; low to moderate est K; wood debris (Fill)	
5.0		9 16 19 4 8 11	0.5 1.0	5		SP	Sandy Gravel: dark brown; moist; 15% medium to coarse sand; 85% coarse, subangular gravel; high est K (Fill)	5/16/94
		4 5 4	1.0				Silty Sand: brown; moist; 30% silt; 70% medium to coarse sand; moderate est K (Fill)	
						CH	Sand: gray; wet; medium dense; moderate sorting; coarse; high est K; shell fragments (Fill)	
				10			Peat: reddish brown; wet; moderate est K	
							Fat Clay: grayish green; wet; firm; low est K (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A78

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/17/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SE corner of bldg 365 N of s10 scrapyard
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5						GW	Sandy gravel: brown; dry; 5% silt; 25% medium to coarse sand; 70% fine, sub-angular gravel; moderate est K (Fill)	
3.0		8 7 5				SP	Sand: gray; moist; medium to coarse; moderate to high est K (Fill)	
5.5		2 2 2		5		CH	Sandy Clay: bluish gray; wet; 5% silt; 85% clay; 10% medium to fine sand; very low est. K (Fill)	
		2 3 2					Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A79

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/17/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.5 feet
BORING LOCATION	E. side of screening lot & scrapyard
LOGGED BY	
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.0 2.5		6 1 1	0.0			SM	Silty Sand: brown; dry to damp; medium density; 5% clay; 20% silt; 45% very fine to very coarse sand; 30% fine, subangular gravel to 3/4"; moderate est. K; wood chips; cardboard pieces (Fill)	
						CH		
4.0		3 3 2 1 1 1	0.0 0.0	5		SW	Fat Clay: dark gray; damp; stiff; 60% clay; 30% silt; 10% very fine to medium sand; shell fragments; very low est K; high plasticity (Fill)	▽ 5/17/94
						CH	Clean Sand: gray; moist to wet; very loose 5% fines; 95% fine to medium sand; high est K (Fill)	
		1 2 1					Fat Clay: dark gray; wet; very soft; 60% clay; 40% silt; <5% sand; shell fragments; low est K (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A80

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA		PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger	DATE (s) DRILLED 5/17/94

SAMPLER TYPE AND SIZE	BORING DIAMETER	BORING DEPTH	BORING LOCATION
2.5-inch CA Modified Split Spoon	8 inches	5.0 feet	Central S side of screening lot & scrapyard

LOGGED BY	APPROVED BY	NOTES
Jeanne Wahler	Doug Bleakly, R.G.	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
		25				SM	Silty Sand: reddish brown; damp; dense; 5% clay; 15% silt; 60% very fine to very coarse sand; 20% fine to coarse, subrounded gravel to 1"; moderate est K (Fill)	
2		31						
2.5		18				GM		
3.5		8				SM	Silty Gravel: reddish brown; damp; medium dense; 10% clay; 15% silt; 15% very fine to very coarse sand; 60% fine to coarse, sub-angular gravel to 6"; moderate est K (Fill)	
4		10						
		10						
		10		5			Silty Sand: brown; moist; medium dense; 20% clay; 25% silt; 35% very fine to very coarse sand; 20% fine, subrounded gravel to 3/4"; moderate est K (Fill)	
							Concrete	
				10			Terminate borehole at 5.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A81

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/17/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Bet bldg 365 & 366 just E overhang (ctr)
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5		16 26 17				GW	Sandy Gravel: brown; dry; 10% silt; 15% medium to coarse sand; 75% fine to coarse, angular to subangular gravel; moderate est K; HC odor (Fill)	
							Reddish brown.	
3.5 4.5		2 5 9		5		CH	Sandy Clay: gray; damp; very stiff; 80% clay; 20% medium to coarse sand; low est K; shell fragments medium to high plasticity (Fill)	
		2 3 2 2 3 3				SM	Silty Sand: gray; damp; 20% silt; 80% medium to coarse sand; lenses of sandy clay moderate est K (Fill)	▽ 5/17/94
						CH	Fat Clay: gray; wet; soft; low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A82

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/17/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	20' West of Bldg 366 scrapyard.
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
	⊠					GW	Gravelly Sand: brown; damp; 10% silt; 70% medium to coarse sand 20% coarse to fine, subangular gravel; moderate est. K (Fill)	
2.5		16				CL	Sandy Clay: brown to dark brown; damp; 80% clay; 20% fine to medium sand; low est K; HC odor; low plasticity (Fill)	
3.5		36						
4.5		35						
		12						
		11						
		8				SP	Sand: bluish gray; moist; medium dense; low est K; low plasticity (Fill)	
				5				▽ 5/17/94
						SM	Silty clay lens at 5': gray; moist to wet; 80% clay; 20% silt	
	⊠	0				CH	Silty Sand: gray; wet; 15% clay; 25% silt; 60% fine to medium sand low to medium est K; high plasticity (Fill)	
		1						
		1					Fat Silty Clay: gray; wet; 85% clay; 15% silt; low est K; high plasticity (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A83

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/19/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.5 feet
BORING LOCATION	80' South of bldg 366 & West ~ 40'
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						GW	Sandy Gravel: reddish brown; damp to moist; 15% coarse sand; 85% fine to coarse, angular to subangular gravel; moderate est K (Fill)	
						CH		
		5	0.0			SP	Sandy Clay: reddish brown to gray; 80% clay; 20% medium to coarse sand; low est K; shell fragments; low plasticity (Fill)	
3.5		6						
4.5		5					Sand: bluish gray; moist; medium dense; fine to medium; moderate est K (Fill)	
5.0		2	0.0	5				5/19/94
		2				CH	Silty Clay: gray; wet; firm; 70% clay; 20% silt; 10% fine sand; low est K; high plasticity silty sand lenses (gray; wet; 90% medium to fine sand) shell fragments; (Fill)	
		7						
		10						
			0.0				Terminate borehole at 8.5'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A84

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/18/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	Off of NW corner of bldg 365
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						GP	Gravel: white; dry; coarse gravel; high est K; unconsolidated (Fill)	
3.5		5 7 6				ML	Sandy Silt: brown; damp; 60% silt; 25% clay; 15% fine sand; low est K; low plasticity (Fill)	
5.5		3 7 10		5		ML	Gray; moist; 15% clay; 55% silt; 30% fine sand; low est K; shell fragments moderate to high plasticity; silty sand lenses (Fill)	▽ 5/18/94
		2 2 3				CH	Fat Clay: gray; wet; soft; low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A85

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/18/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.5 feet
BORING LOCATION	~60' East of AST & 120' SW of guard shed
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0	■					SW	Gravelly Sand: reddish brown; dry; 75% fine to very fine sand; 20% fine, angular to subangular gravel; moderate est K; semi-consolidated (Fill)	
						SM	Silty Sand: brown; damp; 5% clay; 15% silt; 80% medium sand; moderate to low est K (Fill)	
3.5	⊠	9 17 30						
				5		SP	Sand: brown; damp; moderate sorting; fine to medium; low to moderate est K (Fill)	
5.5	⊠	14 9 8					Clayey sand lens below 4.0 feet: brown; damp to moist; 5% clay; 5% silt; 90% medium sand; low est K (Fill)	▽ 5/18/94
	□	3 2 1				ML	Sandy Silt: gray; wet; soft; 15% clay; 55% silt; 30% fine to medium sand; moderate est K (Fill)	
				10			Terminate borehole at 8.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A86

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/18/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	10.0 feet
BORING LOCATION	146'E of Dyn Corp guard shack 12' SofS scrapyar
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 4"	
	☒	0				SW	Gravelly Sand: reddish brown; damp; 10% silt; 75% medium to coarse sand; 15% fine gravel; moderate est K (Fill)	
		12 9 5				ML	Sandy Silt: reddish brown to brown; damp to moist; 10% clay; 50% silt; 40% medium sand; low est K (Fill)	
4.5						SC	Clayey Sand: gray; moist; 5% clay; 15% silt; 80% medium to coarse sand; low to moderate est K (Fill)	
		4 4 5		5		SM	Silty Sand: gray; moist; 5% clay; 10% silt; 85% medium to fine sand; moderate est K (Fill)	
						ML	Clayey Silt: gray; wet; 20% clay; 80% silt; low est K; high plasticity (Fill)	
				10			Terminate borehole at 10.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A87

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/19/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.5 feet
BORING LOCATION	~25 W of s19 along road to Dyn Corp main gate
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						ASP	Asphalt 4"	
						SM	Gravelly Sand: green; damp; 10% silt; 75% medium to coarse sand; 15% fine, subangular gravel; moderate est K (Fill)	
4.5		20 28 14				ML	Sandy Silt: greenish brown; moist; 5% clay; 60% silt; 25% medium to fine sand; 10% fine, subangular to subrounded gravel; low est K (Fill)	
		7 5 4		5		SM	Grayish green; very stiff; 15% clay; 85% silt	5/19/94
6.5		1 3 2				ML	Silty Sand: gray; wet; medium dense; 20% silt; 80% medium to coarse sand; medium to high est K (Fill)	
						CH	Clayey silt: gray; wet; firm; 15% clay; 85% silt; low est. K; medium plasticity (Fill)	
						CL	Fat Clay: bluish gray; wet; soft; low est. K; high plasticity (Fill)	
				10			Clay: gray; dry; very soft; low est. K; low plasticity (Fill)	
							Sand lense at 8.5': gray; wet; medium to coarse sand	
							Terminate borehole at 8.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A88

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/19/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SW corner of bldg 13 30' W; 10' N
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				ASP	Asphalt 3"	
			0.0			SM / GP	Gravelly Sand: orangish brown; damp; 15% silt; 70% medium to coarse sand; 15% coarse, subangular to subrounded gravel; moderate est K (Fill)	
4.5		8 12 12	0.0	5		SM	Sandy Gravel: brown to dark brown; damp; 5% clay; 35% medium to coarse sand; 60% coarse gravel; moderate est K (Fill)	5/19/94
		2 2 5 2 2 3	0.0				Silty Sand: gray; damp to wet; medium dense; 20% silt; 80% medium to coarse sand; moderate to low est K;	
							Peat layer at 7.5'	
						CH	Clay: gray; damp to moist; firm; low est K	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A89

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/19/94 - 5/24/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	~70 N of SW corner bldg 13
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5						ASP	Asphalt 0.2"	
						GP	Sandy Gravel: dark brown to reddish brown; damp to dry; 30% fine to coarse sand; 70% coarse, angular to subangular gravel; moderate est K; (Fill)	
3.5		17 24 28 9 13 19				SM	Silty Sand: reddish brown; damp; medium dense; 5% clay; 30% silt; 65% medium to coarse sand; low est K; semi-consolidated (Fill)	
5.0		10 7 6 12 12 8		5		SW	Sand: reddish brown and gray; damp to wet; <5% fines; medium dense; medium to coarse sand; moderate est K (Fill)	▽ 5/19/94 - 5/24/94
							Wood debris at 7.5 to 8.5'; shell fragments	
							Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A90

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/19/94 - 5/20/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	feet
BORING LOCATION	Se corner of electric transformer
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 0.3"	
1.0						SP	Gravelly Sand: dark brown to brown; dry; 80% medium to coarse sand; 20% coarse to fine; subangular gravel; moderate est K (Fill)	
		88 64				GP	Sandy Gravel: dark brown to brown; very dense; 25% coarse sand; 75% coarse, subrounded gravel; very high est K (Fill)	
4.0				5		SP	Sand: brown; moist to wet; 100% medium to fine; angular sand; moderate est K (Fill)	
		11 24 27						5/19/94 - 5/20/94
6.5						SM	Silty sand: gray; wet; 15% silt; 85% medium to fine sand; moderate est K (Fill)	
		9 10 4				CH	Clay: gray with black mottling; firm; 100% clay; low est K, high plasticity (Fill)	
				10			Terminate borehole at 9.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A91

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/19/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.5 feet
BORING LOCATION	6' E of NE corner bldg 13
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						ASP	Asphalt 3"	
						GP	Sandy Gravel: reddish brown; damp; 5% silt; 20% medium to coarse sand; 75% fine to coarse, subangular to subrounded gravel; moderate est K (Fill)	
4.0		30 28 25				SP	Gravelly Sand: dark brown; damp to moist; 5% silt; 80% medium sand; 15% fine to coarse gravel; low est K (Fill)	
5.5		12 24 20		5			Brown; damp; dense; moderate sorting; fine to medium; 100% sand; moderate est. K	5/19/94
		9 19 19					Gray; moist; medium dense; moderate sorting; fine to medium; 100% sand	
							Terminate borehole at 8.5'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A92

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/20/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	S side of bldg 13 40' S of NE corner
LOGGED BY	Amie Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						ASP	Asphalt 3"	
3.0		30 56 54				SP	Gravelly Sand: reddish brown; dry to damp; 65% fine to medium sand; 35% fine to coarse, subangular gravel; low to moderate est K (Fill)	
5.0 5.5		14 23 21		5		MH	Dark brown to black; damp; 5% silt; 75% medium to coarse sand; 20% subangular to subrounded gravel; moderate est K; low to medium plasticity (Fill)	5/20/94
		10 14 13				SW	Sandy Silt: brown; damp to moist; 5% clay; 75% silt; 20% fine to medium sand; low est K; low plasticity (Fill)	
						SM	Sand: brown; moist to wet; 100% medium sand; low to moderate est K; low to medium plasticity (Fill)	
				10		CL	Silty Sand: gray; wet; 15% silt; 85% fine to medium sand; clay nodules; moderate est K; medium plasticity (Fill) HC odor	
							Silty Clay: gray to dark gray; wet; firm; low est K; low plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A93

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/20/94 - 5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	Mid way along E side of bldg 13
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0						ASP	Asphalt 2"	
						GW	Sandy Gravel: reddish brown; dry to damp; 25% medium to coarse sand; 75% fine to coarse, subangular gravel; high est K; medium plasticity (Fill)	
3.5		27 45 68	36.5 19.5			SM	Brownish yellow; 20% medium to coarse sand; 80% fine, angular gravel; sand lenses	
5.5		10 11 11	349.0	5			Silty Sand: brownish yellow; dry; 25% silt; 65% medium sand; 10% fine, subangular to subrounded gravel; moderate est K; low to medium plasticity (Fill)	▽ 5/20/94 - 5/25/94
		8 16 12	276.0 76.9			SP	Moist; very dense; 15% silt; 85% medium sand; sheen observed	
				10			Sand: greenish gray; wet; <5% fines; 100% medium sand; high est K; sheen observed; medium plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A95

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA			PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger		DATE (s) DRILLED 05/23/94
SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 10 inches	BORING DEPTH 8.5 feet	BORING LOCATION NW corner of bldg 364
LOGGED BY Jeanne Wahler	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
		17 29 26				SM	Silty Sand: brown mottled orange brown; damp; dense; 5% clay; 15% silt; 65% very fine to very coarse sand; 15% fine subangular gravel to 1/2"; moderate est K (Fill)	
2.5		9						
3.5		13 24				CH	Fat Clay: dark brown; moist; stiff; 70% clay; 30% silt; <5% sand; no gravel; no odor; very low est K; high plasticity (Fill)	
		11 14		5		SP		
5.5		11				CH	Poorly-graded Sand: brown; moist; medium density; <5% fines (Fill)	5/23/94
		1 1 1					Wet below 5.5'	
							Fat Clay: gray; wet; very soft; 60% clay; 40% silt; <5% sand; high plasticity (Fill)	
							Terminate borehole at 8.5'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A96

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA		PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger	DATE (s) DRILLED 05/26/94

SAMPLER TYPE AND SIZE	BORING DIAMETER	BORING DEPTH	BORING LOCATION
2.5-inch CA Modified Split Spoon	7.25 inches	4.0 feet	50' Of bldg 2 80' W of fire hydrant

LOGGED BY	APPROVED BY	NOTES
Aimee Chow	Doug Bleakly, R.G.	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt/roadbase 8"	
1.0						SW	Gravelly Sand: brown to reddish brown; dry to damp; 75% fine to coarse sand; 25% fine, sub angular to angular gravel; moderate est K (Fill)	
2.5		15 23 12 14 23 21				DM	Silty Sand: green; damp; 15% silt; 85% fine to medium sand; low est K (Fill)	5/26/94
				5		DP	Sand: greenish gray; moist to wet; medium dense; 100% medium sand; moderate est K (Fill) Clay lenses below 4.5'	
		2 1 2				CH	Silty Clay: gray mottled black; wet; 60% clay; 40% silt; low est K; organic odor; rust; grass blades; high plasticity (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A97

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	10 NW of S7
LOGGED BY	Phil Cox
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				ASP	Asphalt 3"	
		21 30 36				SW	Sand: brownish green; moist; 20% fines; 50% fine to medium sand; 30% fine, sub angular to angular gravel up to 3/4"; moderate est K (Fill)	
3.0 3.5		11 17 18 8 7 6		5		SM	Sand: dark brownish gray; dense; 15-20% silt; 80% medium sand; <5% gravel; moderate est K (Fill)	
5.0							Medium dense; some odor; shell fragments	5/25/94
						CH	Brownish green; wet below 8.0'; slight odor	
		42 22 5				SM	Clay: gray; wet; firm; very low est K; high plasticity (Fill)	
						SP	1" peat at 8.8'	
				10		CL	Sand: light brownish green to dark brownish green; very dense (Fill)	
							Sandy gravel: medium dense; <5% fines; fine to medium sand; gravel up to 2"	
							Fat Clay: gray to dark gray; very low est K; medium plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A98

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	20' east of S7
LOGGED BY	Phil Cox
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				ASP	Asphalt: aggregate fill; dry; light brown; odor	
		10 11 7	236			SP	Silty Sand: dark brownish green; moist; 20% fines; 80% fine to coarse sand; <5% gravel up to 1"; moderate est K; HC odor; trace amount of shells (Fill)	
4.0		5 8 5	51	5			Wet; clean medium sand; HC odor	▽ 5/25/94
5.5		36 23 4	12			SM	Silty Sand: 10% silt; 80% fine to coarse sand (Fill)	
						GP	Sandy Gravel: wet; dense; <5% fines; 20% fine sand; 80% subangular to subrounded gravel up to 1.5"; (Fill)	
				10		CH	Fat Clay: gray; wet; very stiff; moderate to high plasticity	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A99

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	Gas sta. ~ 80' east of shack SE of UST
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				ASP	Asphalt 2"	
						GW	Sandy Gravel: brown to dark brown; dry; 25% coarse sand; 75% coarse, subangular gravel; moderate est K (Fill)	
3.0		22 33 22	1.4			SM	Silty Sand: dark green; damp; 15% silt; 75% coarse to medium sand; 10% fine, sub-angular gravel; low to moderate est K (Fill)	
5.5		18 11 16	.9	5		SP	Bluish gray; damp; dense; 10% clay; 20% silt; 70% medium, subangular sand; shell fragments; semi-consolidated (Fill)	5/25/94
		31 24 21				SM	Sand: bluish gray; damp; medium dense; <5% fines; 100% sand; moderate est K (Fill)	
				10			Silty Sand: bluish gray to gray; 20% silt; 75% medium sand; 5% fine, subrounded gravel; low to moderate est K (Fill)	
							Gravel content increase at 8.0': 15% silt; 50% medium sand; 25% coarse, subangular to subrounded gravel	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A100

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9 feet
BORING LOCATION	35' E of SE corner of gas sta shack
LOGGED BY	Amie Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
1.0		0				ASP	Asphalt 2"	
						GW	Sandy Gravel: brown; dry to damp; 10% silt; 30% medium to coarse sand; 60% coarse, subrounded to subangular gravel; moderate est K (Fill)	
4.0		8 12 14	60				Silty Sand: reddish brown to dark brown; dry to damp; 30% silt; 60% medium to coarse sand; 10% fine, subrounded gravel; low est K (Fill)	
6.0		5 5 6	339	5		SM	Silty Sand: bluish gray; damp; medium dense; 25% silt; 70% medium sand; 5% fine subrounded gravel; low est K (Fill)	▽ 5/25/94
		4 2 2	5				Terminate borehole at 9.0'	
				10				
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A101

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/25/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~20 S & ctr from gas sta shack
LOGGED BY	Amie Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION (USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES (water levels, with date/time, character of drilling, etc.)
1.0						ASP	Asphalt 2"	
						SW	Gravelly Sand: yellowish brown; damp; 65% fine to coarse sand; 35% fine, subangular gravel; moderate est K (Fill)	
3.0		15 31 23	131.9			SM	Silty Sand: dark brown; 30% silt; 60% medium to coarse sand; 10% fine, subangular gravel; low est K; HC odor (Fill)	
		5 6 4	284	5			Green; damp; medium dense; 5% clay; 15% silt; 80% fine to medium, subangular sand	∇ 5/25/94
							Sweet odor (solvent or diesel?)	
		8 11 10	1.5			SP	Sand: greenish gray; wet; <5% fines; 100% fine sand; moderate est K; unconsolidated;	
							Fat Clay lens at 8.0': gray; wet; very low est K; high plasticity	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A102

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~40 N & 20' E of MW 3 scrapyard (near ramp)
LOGGED BY	Aimee Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
0.5						ASP	Asphalt 0.3"	
2.0		51 20 24				GW	Sandy Gravel: reddish brown; damp; 10% silt 25% fine to coarse sand; 65% fine to coarse, angular to subangular gravel; moderate est K (Fill)	
						SP	Black; damp; 15% silt; 30% medium to coarse sand; 55% fine, subangular gravel; low to moderate est K	
4.5		12 21 16	2.0	5			Shell fragments at 2.5'	
		6	108			SM	Sand: brown; damp; dense; 100% fine to medium sand; moderate est K (Fill)	5/26/94
7.0		17 15 4 2 2	6			CH	Silty Sand: gray; damp; medium dense; 15% silt; 85 to 100% medium sand; moderate est K; HC odor; sheen observed (Fill)	
				10			Fat Silty Clay: gray; wet; soft; 55% clay; 45% silt; low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A103

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	10.0 feet
BORING LOCATION	South of pump islands on W end of gas sta.
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						CON	Concrete 8"	
2.5		16 15 14 14 15 14	20			SM	Silty Sand: reddish brown; damp; dense; 5% clay; 20% silt; 50% fine to coarse sand; 25% angular to subangular gravel <1"; low to moderate est K (Fill)	
4.0			>1000 >1000				Poorly-graded Sand: dark greenish gray; moist; dense; <5% fines; 100% very fine sand; moderate to high est K; strong HCl odor (Fill)	
6.0		4 4 4		5			Abundance of shell fragments; strong HCl odor	▽ 5/26/94
		6 8 9					Soil becoming very moist; strong HCl odor; some interbedded clay	
			>1000	10		CH	Fat Clay: dark greenish gray; saturated; soft; 60% clay; 40% silt; low est K; some organic material present (Fill)	
							Terminate borehole at 10.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A104

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.5 feet
BORING LOCATION	North of pump island west side
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						CON	Concrete 8"	
3.0		7 13 19	650			SP	Poorly-graded Sand: dark greenish gray; moist; dense; <5% fines; 100% very fine to fine sand; moderate to high est K strong HCl odor (Fill)	
4.5		3 4 7	>1000	5		CH	Shell fragments present	
6.0		4 5 7	>1000			SP	Fat Clay: greenish gray; very moist; soft; 50%-60% clay; 40%-50% silt; low est K; high plasticity (Fill)	5/26/94
						CH		
		1 1 1	700			SP	Poorly-graded Sand: dark greenish gray; very moist; dense; <5% fines; 100% very fine to fine sand; moderate to high est K (Fill)	
						CH	Fat Clay from 6.0 to 6.5'	
				10			Poorly-graded Sand: wet; slight HCl odor (Fill)	
							Fat Clay: dark greenish gray mottled grayish black; saturated; soft; 60% clay; 40% silt; high plasticity; low est K; moderate odor; abundance of organic material (Fill)	
							Terminate borehole at 9.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A105

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	05/26/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	~15' w & 5' S of SW corner gas sta shack
LOGGED BY	Amie Chow
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						CON	Concrete 8"	
1.5		22 55 28	38			SM	Silty Sand: gravel; brownish yellow; dry; 30% silt; 55% fine to coarse sand; 15% fine, angular gravel; moderate est K (Fill)	
3.5							Brown; damp; dense; 20% silt; 65% medium sand; 15% coarse, subangular gravel; low est K (Fill)	
		5 8 7		5			Dark greenish gray; damp; 20% silt; 80% medium sand; low est K; semi-consolidated (Fill)	5/26/94
6.5								
		7 6 3	103			SP	Sand: gray; wet; loose; <5% fines; 100% medium sand; moderate est K (Fill)	
						CH	Fat Silty Clay: gray; wet; 60% clay; 40% silt; low est K; high plasticity (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A106

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	5/27/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	7.25 inches
BORING DEPTH	9.5 feet
BORING LOCATION	East side gas sta bldg next to vent pipe
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		10 11 12				SM	Silty Sand: brownish gray; damp; very dense; 5% clay; 25% silt; 50% very fine to coarse sand; 20% subangular to subrounded gravels up to 3/4"; moderate est K; strong HC odor (Fill)	
3.0		8 8 9	150			SC	Clayey Sand: brownish black; moist; dense; 15% clay; 5% silt; 60% very fine to medium sand; 10% angular to subrounded gravels up to 2"; moderate to low est K; strong HC odor (Fill)	
4.5		6 8 9	163	5			Less gravels observed	
6.0		4 3 2	348			CH	Fat Clay: brownish gray to dark greenish gray; very moist; soft; 60% clay; 40% silt; low est K (Fill)	▽ 5/27/94
		2 2 3	325 22	10		SC	Clayey Sand: brownish black; very moist to saturated; loose; 30% clay; 20% silt; 50% very fine to medium sand; <5% gravel; low to moderate est K; very strong HC odor (Fill)	
							Slight HC odor	
							Terminate borehole at 9.5'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A107

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	06/01/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Radiological area
LOGGED BY	Jeanne Wahler
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
2.5		13 18 21				SM	Poorly-graded Sand: brown; damp; medium density; 5% clay; 15% silt; 85% very fine to very coarse sand; 15% fine gravel to 1/2"; moderate est K (Fill)	
4.0		7 13 8				SP	Poorly-graded Sand: brown; damp to moist; medium brown; <5% fine; 100% very fine to medium sand; high est K (Fill)	▽ 6/1/94
		3 6 6		5			Wet below 4.0'	
							Gray; loose; shell fragments below 5.0'	
		1 1 1				SM	Silty Sand: gray; wet; loose; 5% clay; 15% silt; 80% very fine to medium sand; moderate est K (Fill)	
				10		CH	Fat Clay: gray mottled black; wet; very soft; 60% clay; 40% silt; <5% sand; very low est K; high plasticity (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A108

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	8/31/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	SWMU 1 - South Central portion
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		16 50/5				SM	Silty Sand: brown; damp; 30% silt; 50% very fine to tine sand; 20% fine to medium subangular gravel; moderate est K; semi-consolidated (Fill)	
						ASP	Asphalt 8" thick	
3.5		7 12 15				SM	Silty Sand: yellowish brown; damp to moist; medium dense; 20% clay; 20% silt; 60% fine to medium sand; moderate est K (Fill)	
5.5		7 11 10	23	5		SP	Poorly-graded Sand: yellowish brown; damp to moist; medium dense; moderate est K; shell fragments (Fill)	▽ 8/31/94
6.5		4 6 6 2 3 3	50 70			SC	Clayey Sand: olive gray to black; wet; firm; 10% clay; 90% fine to medium sand; moderate est K; HC odor; HC staining (Fill)	
				10			Terminate boring at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A109

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/31/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	NE of MW3 SLSA / SWMU 1
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						SM	Silty Sand: brown; damp 30% silt; 50% very fine to fine sand; 20% fine to medium, angular to subangular gravel; well graded; moderate est K (Fill)	
3.5		7 8	5.0			SP	Poorly-graded Sand: yellowish brown; damp; medium density; 15% silt; 5% clay; 80% fine to medium sand; moderate est K; Fe oxide layers throughout; abundant shell fragments (Fill)	
5.0		7 4 9 10	9.0	5			Increased moisture with depth.	
6.5		5 5 7	5.0				Strong HCl and HC odors below 6.0'	
		2 3 3	20				Olive gray; wet between 6.5 and 7.0'	
						CH	Fat Clay: brownish black; saturated; firm; 70% clay; 30% silt; very low est. k; high plasticity; moderate to strong HC odor (Fill)	
				10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A110

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	08/31/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.0 feet
BORING LOCATION	NE of MW3 SLSA /SMWU 1
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						SM	Silty Sand: yellowish brown; damp; 30% silt; 50% very fine to fine sand; 20% subangular gravel; moderate est K (Fill)	
3.0		21 7 8	3.0			CH	Fat Silty Clay: brownish gray; damp; stiff; 50% clay; 30% silt; 20% fine to coarse sand; low est K; medium plasticity (Fill)	
							Dense layer of crushed shell fragments at 2.5' (~3" thick) (Fill)	
			3.0	5		SC		
6.0		4 4 3 2 2 2	3.0 4.0			CH	Clayey Sand: dark yellowish brown; damp to moist; loose; 15% clay; 5% silt; 80% sand; moderate to high est K (Fill)	
							Fat Clay: brownish black; moist; firm; 60% clay; 30% silt; 10% fine to medium sand (sand mostly present in thin lenses <.25"thick); low est K; high plasticity (Fill)	
				10			Wet below 7.0'	
							Terminate borehole at 8.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A111

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/02/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	18.5 feet
BORING LOCATION	SWMU 1 South Central
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
		15 18 25 9 15 8 6 6 5 3	21	5		ML	Sandy Silt: yellowish brown; damp; 5% clay 65% silt; 20% very fine to medium sand; 10% subrounded to subangular gravel; moderate to low est K (Fill)	
						SP	Poorly-graded Sand: light to moderate yellowish brown; damp; dense; 100% very fine to medium sand; moderate to high est K (Fill)	
							Brownish gray; very moist; minor clay lens (<3" thick); wet below 6.0'	
		3 2 3 3 4 2 3 5 2 2 3 14 21 22 4 8 9 5 5 6 2 3 3	2.5	10		CH	Fat Clay: brownish black; soft; wet; 55% clay; 45% silt; low est K; high plasticity (Fill)	
							Strong odors; minor staining; chips of tarpitch-type material present	
			20	15		SM	Silty Sand: brownish gray; wet; medium density (Fill)	
						CH	Fat Clay: brownish green to brownish black; soft; wet; 65% clay; 35% silt; very low est K; odorous; minor staining high plasticity; grass/organic material present (Fill)	
				20			Terminate borehole at 18.5'	
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A112

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/02/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.0 feet
BORING LOCATION	SWMU 1 South Central
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Well-graded Silty Sand: yellowish brown; damp; very dense; 55% silt; 5% clay; 25% very fine to medium sand; 15% angular to subangular gravel up to 1.5" low est K (Fill)	
3.5		27 38 34	6.3			CH	Fat Sandy Clay: olive gray; damp; firm; 60% clay; 20% silt; 20% fine to medium sand; very low est K; moderate to high plasticity; abundance of shell fragments (Fill)	
5.5 6.0 7.0		25 50 25 28 14 13 8 5	11.8 75	5		SP	Poorly-graded Sand: yellowish to dark yellowish brown; damp; very hard; 100% fine to medium sand; moderate to high est K (Fill)	
						CH	Olive black below 6.5'; wet; strong HCl odors; staining observed minor debris (glass and shells)	
				10			Fat Clay: olive gray; wet; soft; 70% clay; 30% silt; very low est K; high plasticity; grasses present in clay; odor (Fill)	
							Terminate borehole at 8.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200 | DRILLING LOG | BORING NO. A113

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/02/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	8.0 feet
BORING LOCATION	Swan 1 South Lawn
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ML	Silty Sand: yellowish brown; damp; very dense; 55-60% silt; 25% fine to medium sand; 15-20% gravel; 5% clay; low est K; low plasticity (Fill)	
						GM	Gravelly Sand: silt; light brown; damp; dense; <5% clay; 10% silt; 20% fine to medium sand; 70% angular to subangular gravel; moderate est K (Fill)	
						CH	Fat Sandy Clay: olive gray; damp; firm; 60% clay; 20% silt; 20% fine to medium sand; moderate to high plasticity; low est K; abundance of shell fragments in the upper layer of clay (Fill)	
7.5		14 22 15	6.7	5		SP	Poorly-graded Sand: moderate to dark brown; damp; dense; 100% fine to medium sand; moderate to high est K (Fill)	
				10			Olive grey below 7.5'; very moist to wet; abundance of shell fragments (Fill)	
							Terminate borehole at 8.0'	
				15				
				20				
				25				
				30				
				35				

CTO 200	DRILLING LOG	BORING NO. A114

SITE NAME AND LOCATION FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA		PROJECT NO. 1625-074
DRILLING CONTRACTOR AND LICENSE NO. Turner Explorations, Inc. C57-602720	DRILLING METHOD Hollow-stem Auger	DATE (s) DRILLED 09/06/94

SAMPLER TYPE AND SIZE 2.5-inch CA Modified Split Spoon	BORING DIAMETER 8 inches	BORING DEPTH 9.0 feet	BORING LOCATION Ground 4/4002
LOGGED BY Terrence Kinn	APPROVED BY Doug Bleakly, R.G.		NOTES

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES water levels, with date/time, character of drilling, etc.
						ASP	Asphalt 3"	
2.5		49 49 48				SM	Silty Sand: yellowish brown; damp; 5-10% clay; 25% silt; 60% very fine to medium sand; 10-15% subangular to angular gravel; well graded moderate to low est K (Fill)	
3.5		27 35 30	30					
5.0		16 16 14	24.0 20	5		SP	Olive gray to grayish black; moist; hard; <5% clay; 15% silt; 80% very fine to medium sand; 5% subrounded to subangular gravel; moderate to low est K; shell fragments present (Fill)	
		5 4 5	24			CH	Poorly-graded Sand: olive to grayish black; damp; hard; 95% very fine to fine sand; 5% silt; moderate to high est K; some shell fragments (Fill)	
				10			Wet to saturated below 5.5' Slight HCl odor.	
							Fat Clay: olive gray to dark gray; wet; soft; 70% clay; 30% silt; very low est K; high plasticity; abundance of wood fragments in the soil; trace of grasses (Fill)	
							Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

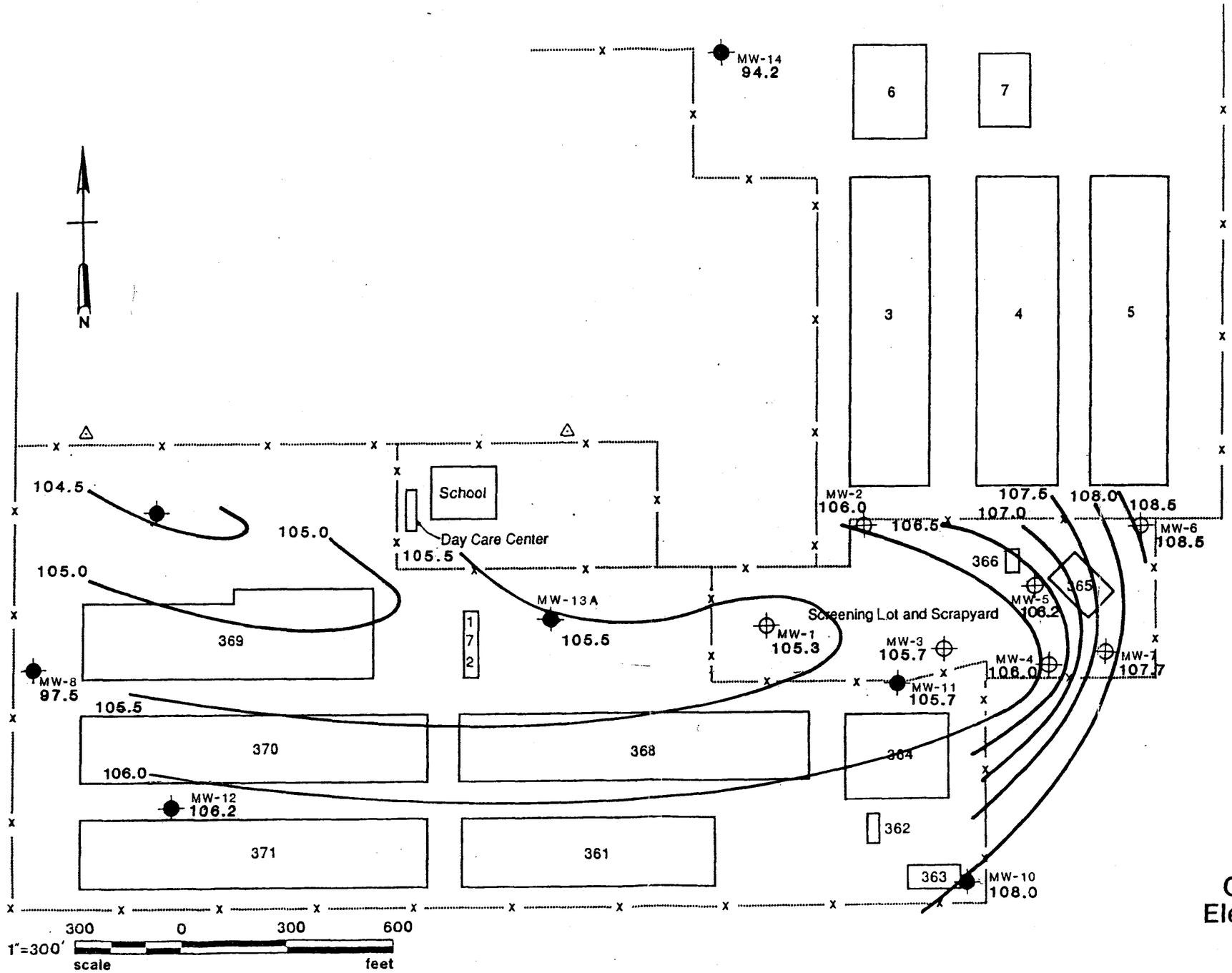
CTO 200 | DRILLING LOG | BORING NO. A115

SITE NAME AND LOCATION	FISCO - ALAMEDA FACILITY / ALAMEDA ANNEX SITE, CALIFORNIA
PROJECT NO.	1625-074
DRILLING CONTRACTOR AND LICENSE NO.	Turner Explorations, Inc. C57-602720
DRILLING METHOD	Hollow-stem Auger
DATE (s) DRILLED	09/06/94
SAMPLER TYPE AND SIZE	2.5-inch CA Modified Split Spoon
BORING DIAMETER	8 inches
BORING DEPTH	9.0 feet
BORING LOCATION	Parcel 1 South Central
LOGGED BY	Terrence Kinn
APPROVED BY	Doug Bleakly, R.G.
NOTES	

SAMPLE ID AND TIME	SAMPLING INTERVAL	BLOWS/6 in	FIELD READINGS (ppm)	DEPTH (ft)	GRAPHIC LOG	USCS SYMBOL	CLASSIFICATION AND DESCRIPTION (USCS classification, color, moisture, density/consistency, percentage of clay, silt, sand and gravel, grain size and shape, estimated permeability (k), odor, staining, misc. materials present, plasticity, consolidation (formation name)	DRILLING NOTES (water levels, with date/time, character of drilling, etc.)
						ASP	Asphalt 2"	
						SM	Silty Sand: yellowish brown; damp; 5-10% clay; 30% silt; 55% very fine to fine sand; 10-15% subrounded to subangular gravel; low to moderate est K (Fill)	
4.0		20 22 23	13.0			CL	Clay: dark yellowish brown; damp; hard; 40% clay; 30% silt; 30% fine to medium sand; very low est K; moderate plasticity; shell fragments (Fill)	
5.5		22 22 23	22.0	5		SP	Poorly-graded Sand: dark yellowish brown; damp; very dense; 100% very fine to medium sand; moderate to high plasticity (Fill)	
7.0		4 5 6	17.0			CH	Fat Sandy Clay: olive gray; wet; firm; 50% clay; 30% silt; 10% fine to medium sand; very low est K; high plasticity; slight HCl odor; minor shells present (Fill)	
		4 3 2	15.0	10			Terminate borehole at 9.0'	
				15				
				20				
				25				
				30				
				35				

ATTACHMENT C5

ADDITIONAL BORING LOGS FOR FISCA WAREHOUSE AREA



Key:

- Wells Installed April 1987 (See Reference 1)
- Wells Installed August 1987

Figure 4-1

Groundwater Surface Elevations and Contours

ERM-West 8/87

Job #400.30

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-8 Total Depth: 16' Diameter: 6" x 2"

Surface Elevation: 109.1' Water Level: Initial: 7.5' 24-hrs.:

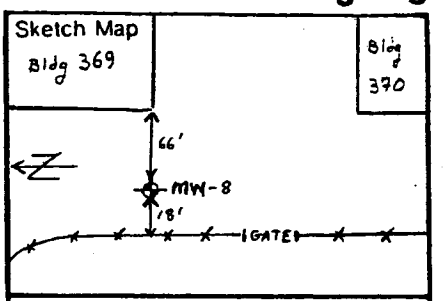
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Rudy Log By: CMH Date Drilled: 8-3-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				gravel, gravel sized asphalt pieces, serpentine chunks, 0" - 10"
1				clayey sandy silt, yellow brown, dry, slightly plastic
2			B-8 2.5-3	
3				serpentine gravel
4				
5				gravel mixed with yellow brown sandy silt and gray clay
6				
7				
8				clay, dark gray, moist, soft, micaceous
9				
10				clay, gray, very moist, soft, micaceous
11				
12				
13				
14				
15				
16				

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-9 Total Depth: 15.5' Diameter: 6" x 2"

Surface Elevation: 109.1' Water Level: Initial: 8' 24-hrs.:

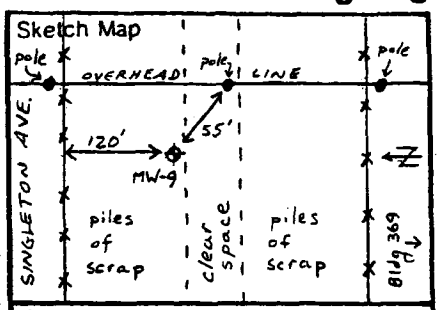
Screen: Dia. 2" Length 5' Slot Size .02"

Casing: Dia. 2" Length 10' Type PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Bill Log By: CMH Date Drilled: 8-3-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				0" - 4" ashpalt
				gravel, coarse sand, brown clayey silt
1				gray silty clay, dry, slightly stiff, micaceous, slightly plastic grading to black immediately
2				petroleum distillate odor just above concrete slab
				concrete slab, 4" thick, top at 28"
3			B-9 3.5-4	gray green silty clay, barely moist, soft, micaceous, plastic, petroleum odor
4				
5				
6				
7				
8				
9				olive gray silty clay, fat, saturated, plastic, soft, micaceous, no odor
10				
11				
12				

Environmental Resources Management

Drilling Log

Project Warehouse Area Owner USN

Location Supply Annex, Alameda W.O. Number 40033

Boring Number MW-9 Total Depth 15.5' Diameter 6" x 2"

Surface Elevation 109.1' Water Level: Initial 8' 24-hrs.

Screen: Dia. 2" Length 5' Slot Size .02"

Casing: Dia. 2" Length 10' Type PVC

Drilling Company Enexco Drilling Method hollow stem auger

Driller Bill Log By CMH Date Drilled 8-3-87

Sketch Map

Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
13				
14				
15				petroleum odor
16				very strong petroleum distillate odor while pulling augers

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-10 Total Depth: 15.5' Diameter: 6" x 2"

Surface Elevation: 113.8' Water Level: Initial: 5' 24-hrs.:

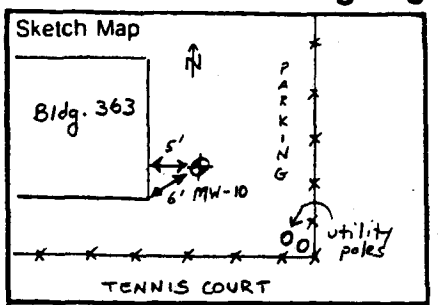
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Bill Log By: CMH Date Drilled: 8-24-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				asphalt
1				sandy clay, mottled brown and gray; sand portion is coarse; gravel, some cobble-sized pieces immediately under asphalt; slightly moist, moderately stiff
2				
3			B-10 3.3.5	
4				silty clay, blue gray, stiff, slightly moist, shell fragments (<1mm), (no mica)
5				
6				silty clay, blue gray, very moist, very soft, very plastic, very sticky, no shell fragments, no mica
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				blue-gray clay and gray-black peat, strong rotting eggs odor

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-11 Total Depth: 15.5' Diameter: 6" x 2"

Surface Elevation: 114.6' Water Level: Initial: 7' 24-hrs.:

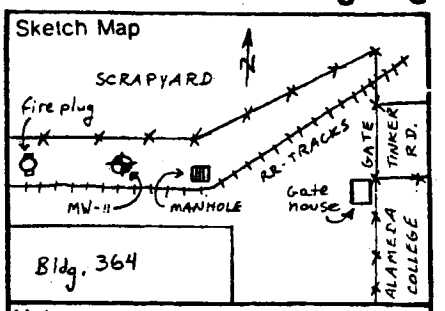
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Rudy Log By: CMH Date Drilled: 8-4-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				asphalt, 4"
1				brown sandy clay, slightly plastic, dry, medium to coarse grained, some gravel immediately under asphalt
2			B-11 2-2.5 & 2.5-3	
3				
4				
5				more brown clayey sand, medium grained, dry
6				
7				
8				saturated brown clayey sand
9				blue-gray sandy clay, saturated, moderately plastic, soft, slightly sticky
10				
11				
12				
13				
14				
15				
16				faint creosote-like smell
				strong H_2S smell noted before grouting

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-12 Total Depth: 15.5' Diameter: 6" x 2"

Surface Elevation: 111.6' Water Level: Initial: 7.5' 24-hrs.:

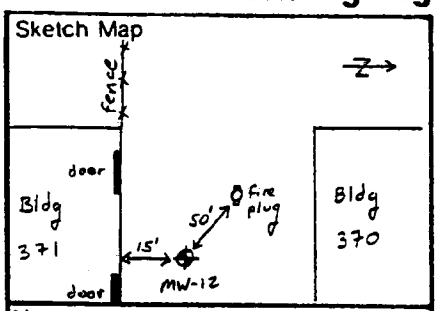
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem aguer

Driller: Rudy Log By: CMH Date Drilled: 8-4-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				6" concrete slab
1				gray-black silty clay, some gravel and brown/red sand, dry
2				sand, brown, dry, dead roots, gravel, gravel-sized chunks
3			B-12 4-4.5	silty sandy clay; gray-black, dry, moderately stiff, slightly plastic, some gravel
4				
5				
6				
7				
8				clay, dark gray, moist, soft, slight petroleum distillate odor
9				
10				
11				
12				
13				soft and very moist, still has odor
14				
15				color change to gray-black with streaks of black peat and black clay, rotton egg odor
16				

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-13 Total Depth: 20.5' Diameter: 6" x 2"

Surface Elevation: N/A Water Level: Initial 12.5' 24-hrs.

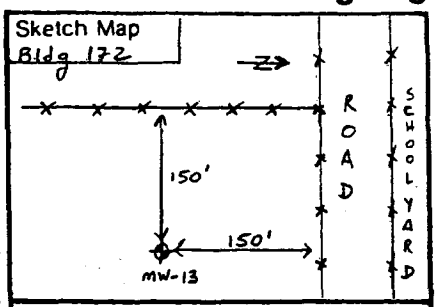
Screen: Dia. N/A Length N/A Slot Size N/A

Casing: Dia. N/A Length N/A Type N/A

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Rudy Log By: CMH Date Drilled: 8-5-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				gravel (paving surface of storage yard)
1				brown silty clayey sand, dry, much gravel
2			B-13 2-2.5	
3				
4				brown silty clayey sand, dry, fine to coarse and silty clay, blue-gray, slightly moist, plastic, slightly stiff, faint sweet odor
5				
6				
7				very stiff silty clay, brown-gray, very little extremely coarse sand, slightly moist
8				
9				
10				sand portion increasing
11				
12				
13				gray sandy clay, much very fine to fine sand, saturated, soft, strong odor at 12.5' to 15'
14				
15				
16				peat, brown streaked with gray clay, very strong rotten egg odor
17				
18				more of the same gray sandy clay (same as 12.5' - 15' interval)
19				
20				creosote-like odor
				augers won't stay unplugged - casing cannot be installed; formation collapsed to 12.5' upon pulling augers. Hole abandoned and backfilled with bentonite

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex; Alameda W.O. Number: 40033

Boring Number: MW-13A Total Depth: 20.5' Diameter: 6" x 2"

Surface Elevation: 113.1' Water Level: Initial: 12' 24-hrs.:

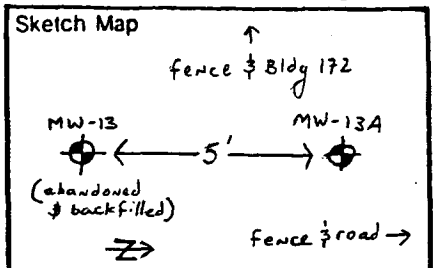
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Rudy Log By: CMH Date Drilled: 8-5-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				paving gravel
1				brown silty clayey sand, dry, gravel
2				
3				
4				brownish-gray silty very-sandy clay, slightly moist, slightly stiff, sand portion is coarse, faint odor of -?-
5				
6				silty clay, brown gray (more brown than above unit), rare coarse sand, slightly moist
7				
8				
9				
10				
11				
12				
13				gray, sandy clay, much fine to very fine sand and silt, saturated with interlaminated gray clayey sand
14				
15				
16				
17				gray-brown peat and gray clay mixed together, saturated, moderately stiff
18				
19				
20				
21				mild creosote-like smell at 12' getting stronger towards bottom of hole; smell at hole bottom very rotten. (rotten egg smell upon pulling augers)

Environmental Resources Management

Drilling Log

Project: Warehouse Area Owner: USN

Location: Supply Annex, Alameda W.O. Number: 40033

Boring Number: MW-14 Total Depth: 25.5' Diameter: 6" x 2"

Surface Elevation: 110.2' Water Level: Initial: 10' 24-hrs.:

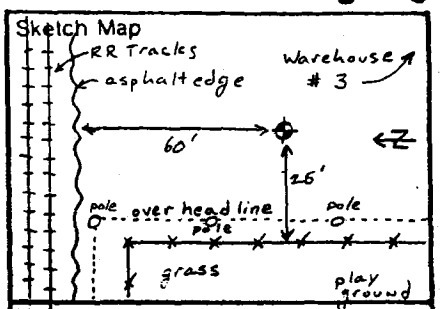
Screen: Dia. 2" Length: 5' Slot Size: .02"

Casing: Dia. 2" Length: 10' Type: PVC

Drilling Company: Enexco Drilling Method: hollow stem auger

Driller: Rudy Log By: CMH Date Drilled: 8-5-87

Sketch Map



Notes

Depth (Feet)	Graphic Log	Recovery	Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				asphalt, 4"
1				brown sand, fine to coarse, dry, slightly stiff, some small grave
2			B-14	brown clayey sand, fine to coarse, dry, slightly stiff
3			2.5-3	
4				
5				clayey sand, dark gray, fine to medium, dry, soft
6				brown-gray sand, silty, soft, slightly moist (sand is fine to med.
7				sandy silt, med. blue-gray, moist (sand is fine to medium)
8				silty clay, dark blue-gray, plastic, soft, very moist
9				
10				
11				clay, dark blue-gray, plastic, soft sticky, fat, saturated
12				
13				
14				
15				
16				increasing portion of fine sand
17				
18				
19				
20				
21				decreasing moisture content to very moist/moist
22				
23				
24				
25				

(2) MAY 88
PHASE II Tony T.
WAREHOUSE COPY
1988

DEPARTMENT OF THE NAVY
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CONTRACT N62474-85-D-5627

SITE INVESTIGATION AT THE WAREHOUSE AREA - PHASE II

ERM-West

TABLE 3-1
SOIL SAMPLING SITES AND DATA

SAMPLE LOCATION	INTERVAL	SOIL DESCRIPTION	COMMENTS
SB-1	0'-0.5' 1'-1.5' 4.5'-5'	Serpentine gravel & brown sand Brown sandy clay Brown grey sandy clay, saturated	20' northeast from the 4 cover rectangular sewer manhole (labeled IJJ on the public works utility map)
SB-2	0'-0.5' 1'-1.5' 4'-4.5'	Serpentine gravel, gravel-sized asphalt, brown coarse sand Brown sand, semi-consolidated Brown med. sand to brown clayey sand	280' south of northern scrapyard fence, 5' east of western scrapyard fence
SB-3	0'-0.5' 1'-1.5' 4.5'-5'	Brown clayey sand, serpentine gravel Brown clayey sand Fine sand, slight clay content, slightly moist	140' south of northern fence, 100' west of western scrapyard fence, 145' north of asphalt edge
SB-4	0.5'-1' 1.5'-2' 4.5'-5'	Gravel, brown sandy clay, shell fragments Blue-grey clay, brown coarse sand, shell fragments Blue-grey clay, moist, stiff	Top 6" concrete. 50' east of fence, 15' north of building 371
SB-5	0'-0.5' 1'-1.5' 4.5'-5'	Brown silty clay, livegrass, roots Dark brown clay, stiff & gravel Red silty clay, coarse sand, and small gravel at 4.5' Blue grey clay, stiff at 5'	20' west of tennis court fence, in Navy housing area

ATTACHMENT D

HISTORICAL MAPS AND PHOTOGRAPH

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D-2 1906 Historic Map

D-3 1915 Historic Map

D-4 1919 Historic Map

D-5 1927 Historic Map

D-6 1930 Historic Map

D-7 1930 Oblique Aerial Photograph

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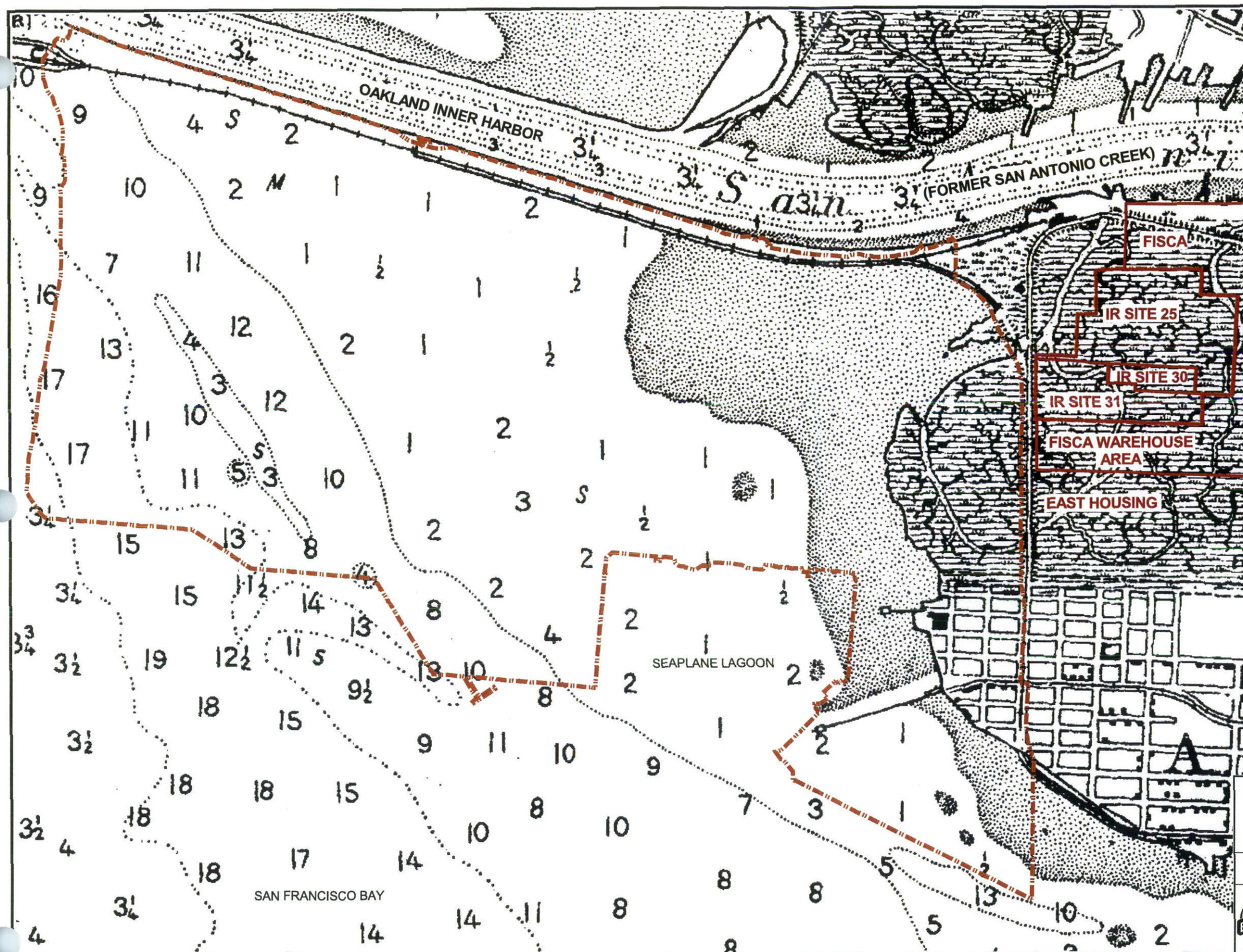


LEGEND

- NAVY BASE BOUNDARY
- HISTORIC ESTUARY
- TIDAL ZONE
- 5 — DEPTH OF BAY IN FATHOMS (ONE FATHOM EQUALS 6 FEET)

NOTE:

IR – INSTALLATION RESTORATION (PROGRAM)

SOURCE:

UNITED STATES COAST GEODETIC SURVEY 1903

N

1200 0 1200 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure D-1

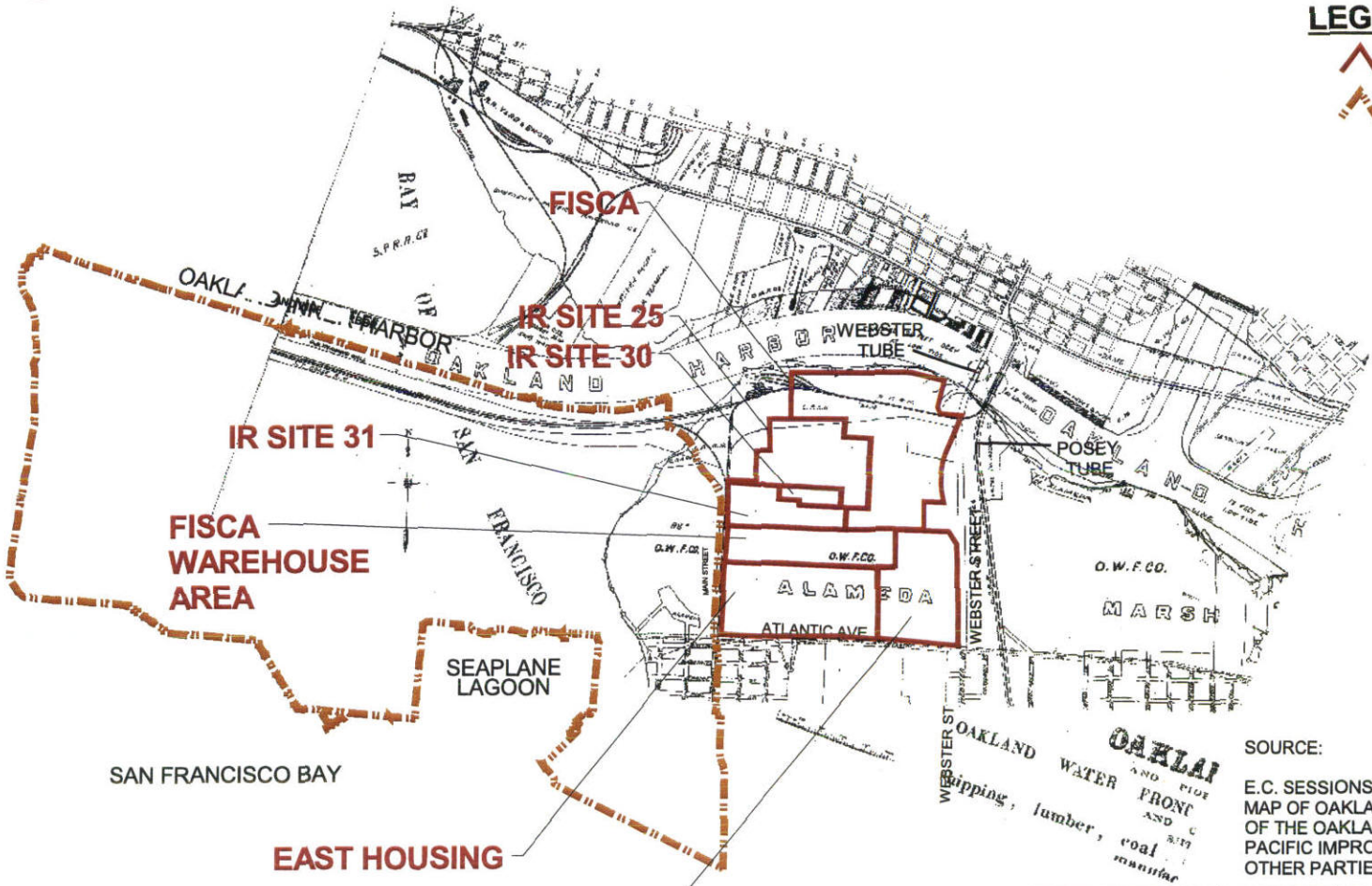
1903 Bathymetry for Alameda Point

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07
File No.: 089L15562
Job No.: 23818-089
Rev No.: D



LEGEND

SITE BOUNDARIES

ALAMEDA POINT

SOURCE:

E.C. SESSIONS, 1906
MAP OF OAKLAND HARBOR AND PROPERTIES OF THE OAKLAND WATER FRONT CO., PACIFIC IMPROVEMENT CO., AND OTHER PARTIES

3000 0 3000 Feet

N

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

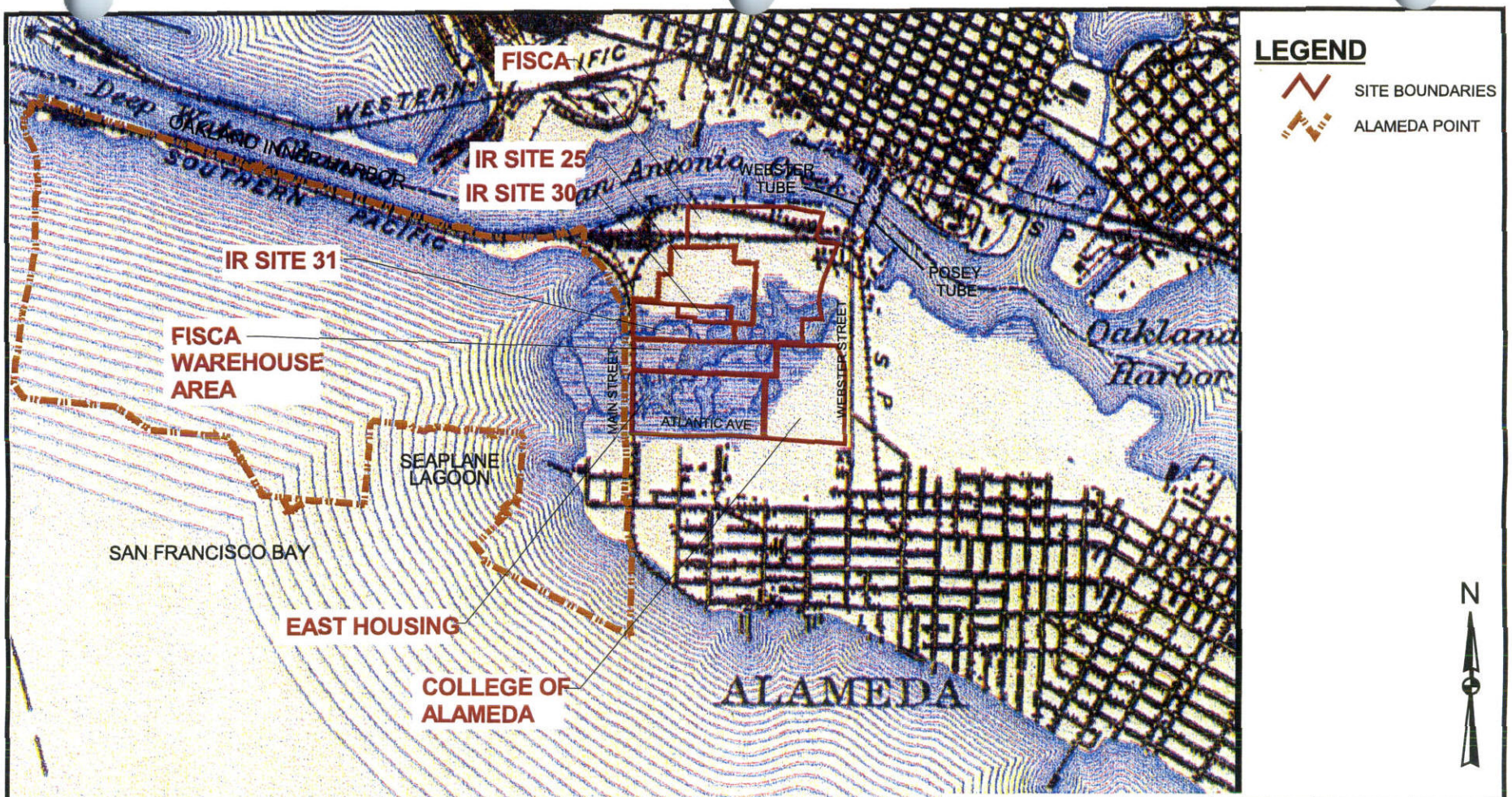
Figure D-2

1906 Historic Map

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/6/07
File No.: 089E15572
Job No.: 23818-089
Rev No.: D



SOURCE:

1915 QUADRANGLE MAP UNITED STATES GEOLOGIC SURVEY

3000 0 3000 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure D-3

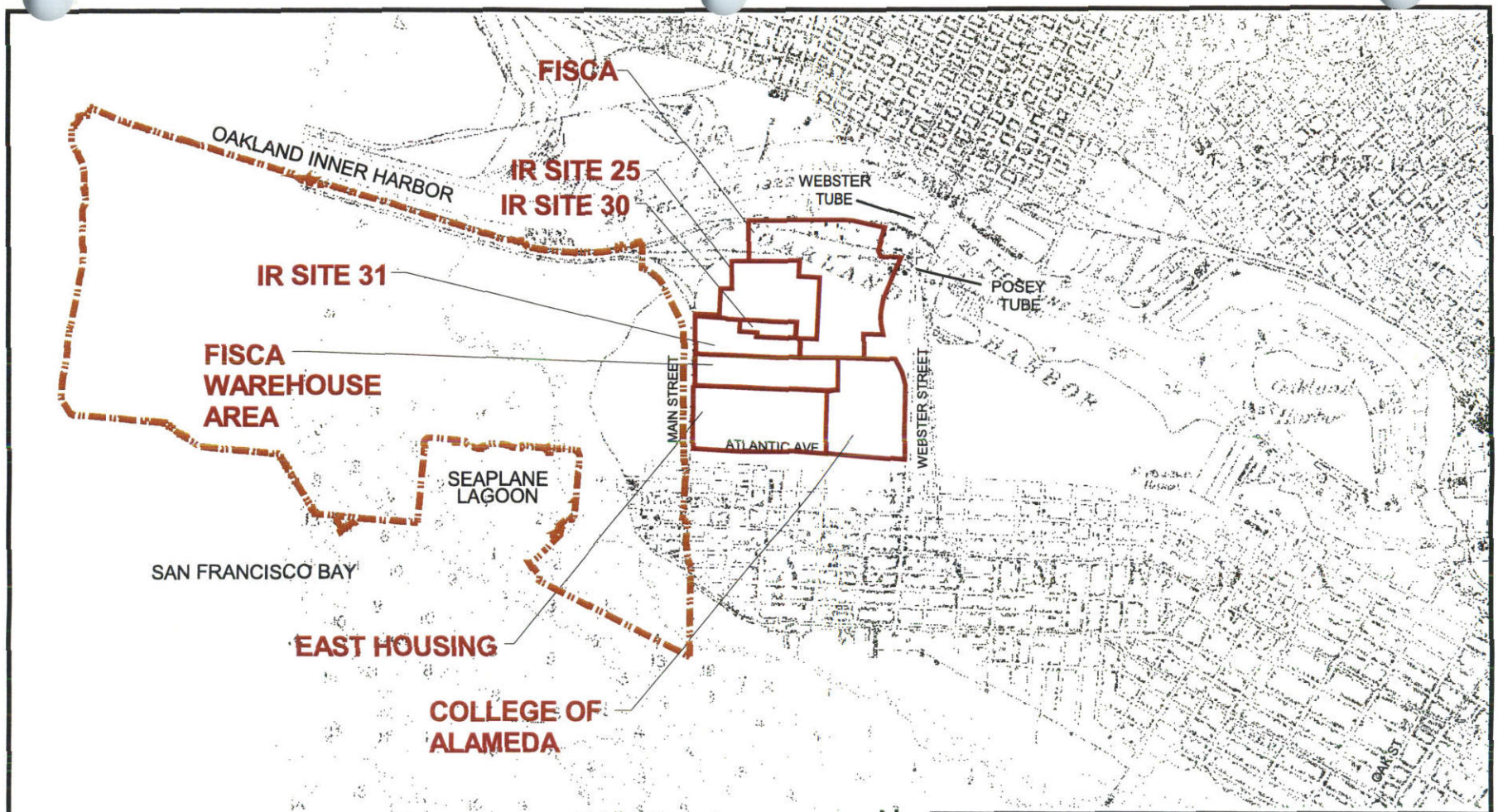
1915 Historic Map

Alameda Point, Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07
File No.: 089E15569
Job No.: 23818-089
Rev No.: D



LEGEND

SITE BOUNDARIES

ALAMEDA POINT

SOURCE:

UNITED STATES COAST GEODETIC SURVEY 1919

3000 0 3000 Feet

N

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure D-4

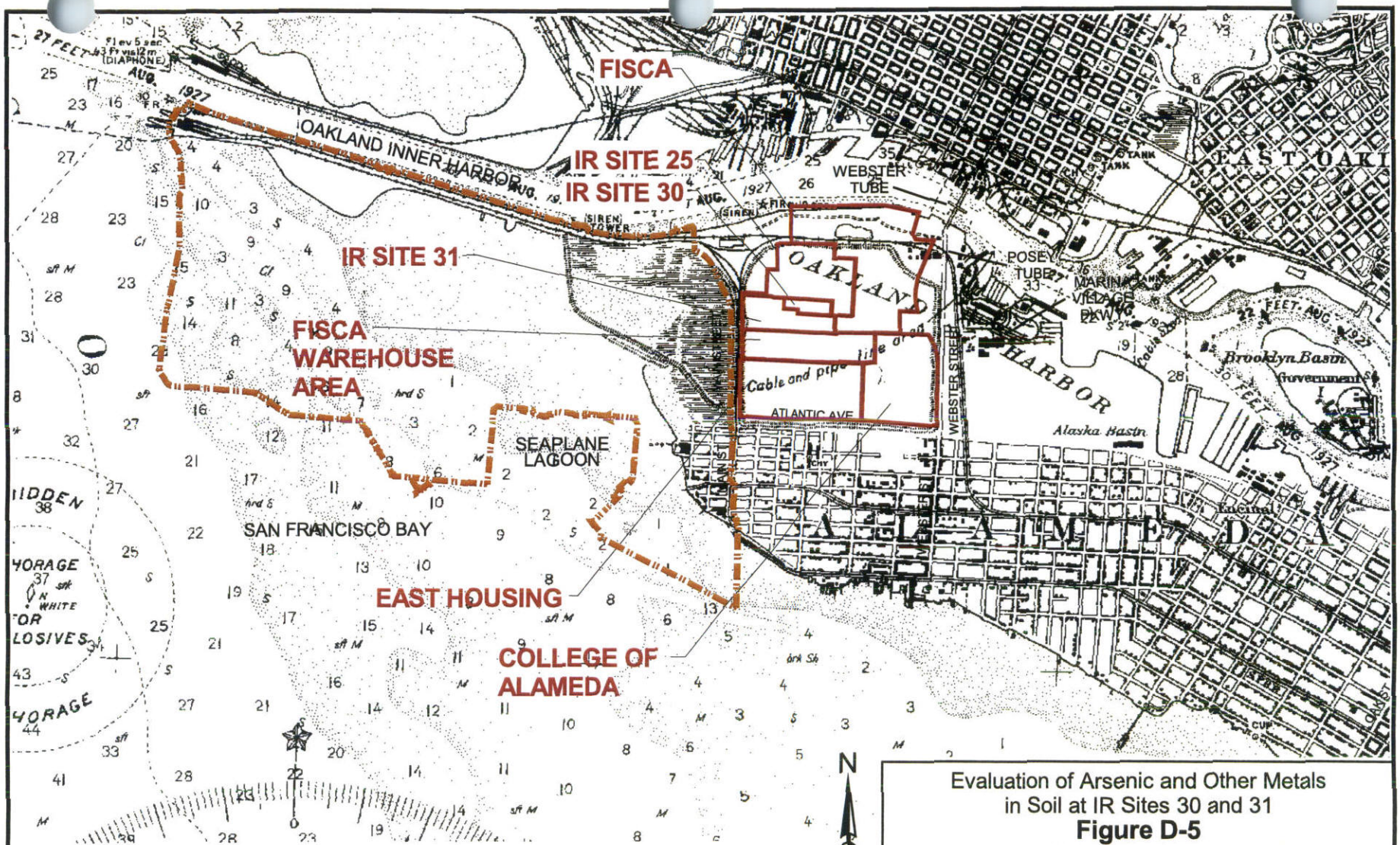
1919 Historic Map

Alameda Point, Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07
File No.: 089E15568
Job No.: 23818-089
Rev No.: D



LEGEND

SITE BOUNDARIES

ALAMEDA POINT

SOURCE:

UNITED STATES COAST GEODETIC SURVEY 1927

3000 0 3000 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure D-5

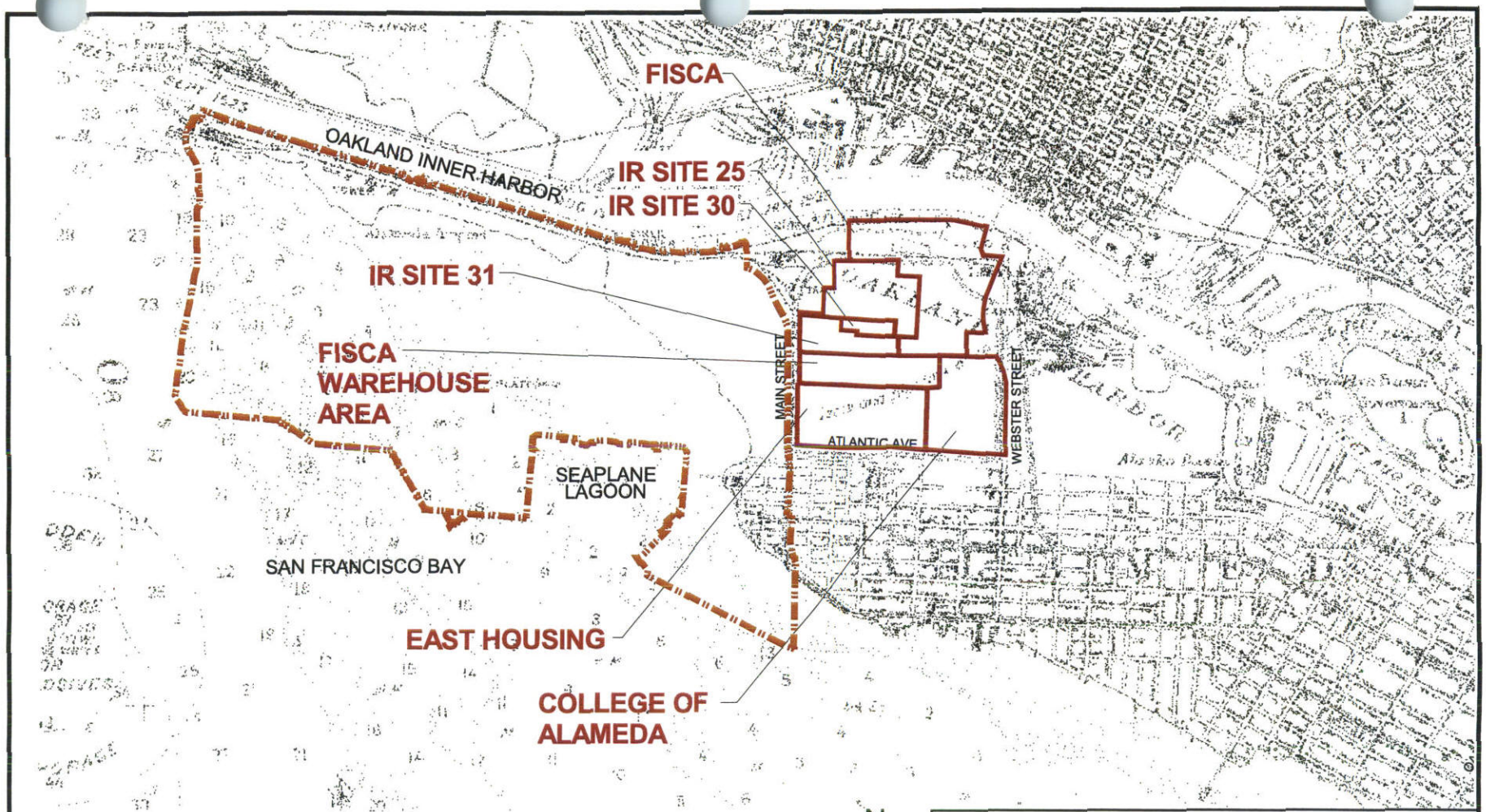
1927 Historic Map

Alameda Point, Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07
File No.: 089E15566
Job No.: 23818-089
Rev No.: D



LEGEND

SITE BOUNDARIES

ALAMEDA POINT

SOURCE:

UNITED STATES COAST GEODETIC SURVEY 1930

N

3000 0 3000 Feet

Evaluation of Arsenic and Other Metals in Soil at IR Sites 30 and 31

Figure D-6

1930 Historic Map

Alameda Point, Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/6/07

File No.: 089E15567

Job No.: 23818-089

Rev No.: D

A-21

Evaluation of Arsenic and Other Metals
in Soil at IR Sites 30 and 31

Figure D-7

1930 Oblique Aerial Photograph

Alameda Point, Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/6/07
File No.: 089E15570
Job No.: 23818-089
Rev No.: C

APPENDIX I

HUMAN HEALTH RISK ASSESSMENT

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I6-25 Calculation of Cancer Risks, Reasonable Maximum Exposure - U.S. EPA (Sitewide, Construction)

I6-26 Calculation of Cancer Risks, Reasonable Maximum Exposure - Cal/EPA (Sitewide, Construction)

I6-27 Calculation of Hazard Index, Reasonable Maximum Exposure - U.S. EPA (Sitewide, Construction)

I6-28 Calculation of Cancer Risks, Central Tendency Exposure - U.S. EPA (Sitewide, Construction)

I6-29 Calculation of Cancer Risks, Central Tendency Exposure - Cal/EPA (Sitewide, Construction)

I6-30 Calculation of Hazard Index, Central Tendency Exposure - U.S. EPA (Sitewide, Construction)

I6-31 Summary of Cancer Risk, Reasonable Maximum Exposure, All Chemicals with Associated Pathways - U.S. EPA (Sitewide, Construction)

I6-32 Summary of Cancer Risk, Reasonable Maximum Exposure, All Chemicals with Associated Pathways - Cal/EPA (Sitewide, Construction)

I6-33 Summary of Hazard Index, Reasonable Maximum Exposure, All Chemicals with Associated Pathways - U.S. EPA (Sitewide, Construction)

I6-34 Summary of Cancer Risk, Central Tendency Exposure, All Chemicals with Associated Pathways - U.S. EPA (Sitewide, Construction)

I6-35 Summary of Cancer Risk, Central Tendency Exposure, All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

I6-36 Summary of Hazard Index, Central Tendency Exposure, All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

I6-37 Human Health Risk Assessment Without Ambient Metals by Pathway Reasonable Maximum Exposure

ATTACHMENTS (On Attached CD)

Attachment

I1	Sampling Locations
	Sampling Information for Soil
	Sampling Information for Groundwater
I2	Exposure Point Concentration Calculations
I3	Air Modeling
I4	Toxicity Profiles
I5	Calculation of a Site-Specific DTSC Value for Lead

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ACRONYMS/ABBREVIATIONS

µg/L	micrograms per liter
95 percent UCL	95 percent upper confidence level
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
COPCs	chemicals of potential concern
CSF	cancer slope factor
CSM	conceptual site model
CTE	central tendency exposure
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERRG	Engineering/Remediation Resources Group, Inc.
g/kg-day	grams per kilogram per day
HHRA	human health risk assessment
HI	hazard index
HQs	hazard quotients
IR	Installation Restoration
IRIS	Integrated Risk Information System
IT	International Technology Corporation
mg/kg	milligrams per kilogram
MSL	mean sea level
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
RfD	reference dose
RI	remedial investigation
RI/FS	remedial investigation and feasibility study
RME	reasonable maximum exposure
RWQCB	Regional Water Quality Control Board
SVOCs	semivolatile organic compounds
TtEMI	Tetra Tech EM Inc.
VOC	volatile organic compound

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Appendix I
Human Health Risk Assessment

A baseline human health risk assessment (HHRA) was performed to assess potential impacts on human health from exposure to chemicals released from Installation Restoration Program (IR) Site 31 in Alameda, California. The HHRA evaluates current and future potential health risks if no remedial action takes place at the site. The results of the risk assessment provide information for making decisions concerning the necessity for remedial action to reduce any potential exposure.

This baseline HHRA was conducted in accordance with guidelines published by the U.S. Environmental Protection Agency (EPA) in the Risk Assessment Guidance for Superfund Part A (EPA 1989), Part B (EPA 1991), and Part E (EPA 2004a), and supporting documents, and guidelines published by the California Environmental Protection Agency (Cal/EPA).

Tables for this section can be found on the attached CD.

I1 Introduction

This section presents the regulatory framework for the Naval Air Station Alameda closure process, information on the background of IR Site 31, and the site description.

I1.1 Regulatory Framework

The Navy is responsible for environmental restoration at IR Site 31. Although EPA is the lead oversight agency, the Cal/EPA Department of Toxic Substances Control (DTSC) and the San Francisco Bay Regional Water Quality Control Board (RWQCB) must concur with all Navy property transfer decisions.

Alameda Point is on the EPA National Priorities List. Therefore, EPA and Navy remedial investigation (RI) protocols have been followed in conducting the fieldwork and the preparation of this RI report for IR Site 31. The RI/feasibility study (FS) process involves determining the nature and extent of contamination, the risks posed by hazardous waste sites, and options for their cleanup.

I1.2 Site Background and Description

IR Site 31 is a 24.9-acre residential development known as Marina Village Housing for the Coast Guard. IR Site 31 is adjacent to and south of IR Sites 25 and 30. In 1937, the location of IR Site 31 was an undeveloped tidal flat. In 1947, the northwest corner had

Coast Guard Housing, and in 1953 a warehouse was built. Warehouse and residential use continued until the current 160 housing units were built between 1985 and 1993.

In 1989, the Navy recommended installation of vapor barriers to mitigate the potential for benzene vapor migration from groundwater. In 1993, the Navy reported the Marina Village housing units were completed with an underlying barrier intended to be impermeable to volatile organic compound (VOC) vapors. The final approved drawings for the housing units, dated 29 March 1990, specify soil removal and placement of 4 feet of clean fill soil. There were also specifications for pre-conditioning soil beneath foundations and placement of a 40 mil vapor barrier.

The climate at Alameda Island is mild, with a monthly average maximum temperature of 66.9 degrees Fahrenheit. Annual rainfall is approximately 23 inches, with most rainfall occurring in winter. The topography of IR Site 31 is primarily flat and about 10 feet above mean sea level (MSL) (U.S. Geological Survey Topographic Map 7.5 Minute Quadrangle Oakland West 1993).

Alameda Point geology is characterized by sedimentary deposits that overlie a mixed layer of bedrock known as the Franciscan Formation. In the area of IR Site 31, the native sediments are overlain by fill material. This fill layer consists of dredge spoils from the surrounding San Francisco Bay and Oakland Inner Harbor. It is predominantly poorly graded, fine- to medium-grained sand, with silt and clay.

Regionally, Alameda Island is underlain by two primary aquifers, the shallow Merritt Sand aquifer that yields brackish-to-very-saline water (Tetra Tech EM Inc. [TtEMI] 2000a) and the deeper Alameda aquifer. Depth to the top of the Alameda aquifer is approximately 180 feet below Alameda Island ground surface (bgs) and up to 220 feet bgs beneath the Oakland Inner Harbor. The two primary aquifers are separated by the Yerba Buena Mud aquitard. Shallow groundwater is defined by the RWQCB as the water-bearing zones above the Yerba Buena Mud (up to 90 feet bgs) (RWQCB 2000).

I2 Conceptual Site Model

The conceptual site model (CSM) summarizes the physical characteristics, distribution of chemicals, and migration pathways at IR Site 31. This information is a summary of Sections 2 and 3 in the RI report.

The most frequently identified chemicals are metals and polynuclear aromatic hydrocarbons (PAHs). VOCs, semivolatile organic compounds (SVOCs) (other than PAHs), pesticides, and polychlorinated biphenyls (PCBs or Aroclors) were reported in 10 percent or fewer of the soil samples.

As reported in Section 4.1.4 and Appendix H2, statistical analysis using DTSC policy for arsenic, cadmium, chromium, and vanadium shows that these metals, and likely iron,

represent ambient populations. IR Site 31 was originally included in the area covered by the Alameda Point pink background (Tt EMI 2001). Therefore, in accordance with the typical process at Alameda Point, metal concentrations at IR Site 31 were also compared to those in the pink background. A total of 15 of 17 metals were found to exceed Alameda Point pink background population concentrations (Appendix H1). The evaluation in this report indicates that the Alameda Point pink background is not applicable at IR Site 31 as was also concluded for adjacent IR Site 25 in the 2002 final OU5 RI report (Appendix H2).

The finding that the metals are ambient is consistent with the absence of a pattern in the distribution of metals in soil related to former Navy activities as discussed in Section 4. There are elevated metals beneath the former warehouse as well as outside this footprint. The upper 2 to 4 feet is fill imported in the early 1990's for construction of the Marina Village housing. For PAHs, the concentrations above the guideline of 0.62 milligrams per kilogram (mg/kg) are found in the 4- to 8-foot interval, with a few exceptions (Bechtel Environmental, Inc. [BEI] 2004a and b). Also, the locations with elevated PAHs at depth are much more prevalent in the western half of IR Site 31.

The groundwater in the vicinity, and directly beneath IR Site 31, is impacted by VOCs, notably benzene and naphthalene. The nature and extent of VOCs in groundwater at the site is similar to the area-wide operable unit (OU) 5/Annex IR-02 groundwater plume. There is no evidence in soil or groundwater of a release specific to IR Site 31. As discussed in Section 4.2 of the RI report, the concentrations of VOCs in shallow groundwater are substantially lower than the concentrations in deeper water, probably due to natural degradation processes in shallow groundwater.

The chemical migration pathways include the migration of vapors from soil and groundwater into indoor and outdoor air. In addition, particles of soil could become airborne and be inhaled in outdoor air although there is a limited amount of exposed soil at IR Site 31.

I3 Data Evaluation

This section presents the data evaluation process used to select data for inclusion in the risk assessment and for identification of chemicals of potential concern (COPCs).

I3.1 Data Compilation

This section presents the data evaluation process used to select data for inclusion in the risk assessment. In addition to the data collected from this RI, the data from the following reports are also used in this baseline HHRA:

- VOCs, non-PAH SVOCs, PCBs, and pesticides from soil sample data at 50 soil sample locations for this RI (November 2005);

- VOCs from groundwater sample results from 11 temporary well locations for this RI (November 2005);
- PAH soil data from the 2002 PAH assessment (BEI 2004a);
- PAH soil data from the 2003 PAH assessment (BEI 2004b);
- PAH soil data from the OU-5 RI (Neptune et al. 2002);
- Surface soil sample data, from the 2001 parcel assessment (IT 2001) (3 locations); and
- VOC groundwater data from 5 hydropunch locations samples during the 2001 Parcel 178 assessment (International Technology Corporation [IT] 2001).

All validated and verified data from these investigations were used and are presented in Tables I3-1 through I3-5. In previous investigation data, there are 648 soil samples for PAHs from over 160 locations. From this RI, there are 120 samples for metals, VOCs, non-PAH SVOCs, PCBs, and pesticides from 50 locations (see Section 3 of the RI report for sample analyses summaries). There are three additional analyses of pesticides and PCBs from three surface soil samples collected as part of a Zone 16 – EBS Parcel 178 investigation (IT 2001). These three soil sampling locations are identified as 178-Z16-001 through 178-Z16-003 on Figure 4-1 of this RI.

There are 16 shallow groundwater samples from 16 locations with analyses for VOCs although some analytes had fewer samples. Note that for this HHRA, VOCs are defined in accordance with EPA Region 9 preliminary remediation goal (PRG) definitions. In the RI tables, VOCs are defined by EPA analytical method. Therefore, the chemicals classified as VOCs differ between the RI and the HHRA.

Six soil samples are not included in the HHRA because the data were received from the laboratory after the risk calculations for this HHRA were completed. However, the impact of these data on the risk calculations was determined, and this discussion is included in the Uncertainty Analysis, Section I7.

Manganese was not included in the work plan but was extrapolated by CDM from the raw data packages. The results are unverified by the laboratory and are estimated. The health risks associated with manganese are presented in Section 6.1.6.5.

I3.2 Selection of Chemicals of Potential Concern

All chemicals reported in at least one sample at concentration greater than the sample quantitation limit were included as COPCs. The chemicals selected as COPCs are summarized in Tables I3-1 through I3-3 for each medium being evaluated. The evaluation of usable data and the selection process are discussed below.

No chemicals were excluded based on comparison to Alameda Point background (Appendix H1) or the additional ambient evaluation for arsenic, cadmium, chromium, iron, lead and vanadium (Appendix H2).

The identification of COPCs in soil was based on the results from analyses of samples collected from 0 to 2 feet bgs to describe the surface soil (Table I3-1) and 0 to 7 feet bgs to represent the vadose zone soil (Table I3-2). A depth of 7 feet for soil represents a conservative depth for inclusion of risk assessment data. A depth of 7 feet means that all the soil data for IR Site 31 are included.

For estimating the migration of vapors from groundwater, the data from shallow groundwater collected in this RI and the OU-5 RI (Neptune et al. 2002) investigation are used. COPCs identified in groundwater are presented in Table I3-3. For estimating the risks for residential use of groundwater, completed risk calculations from the final groundwater RI/FS for Site 25/IR-02 are used (Engineering/Remediation Resources Group, Inc. [ERRG] 2004).

I4 Exposure Assessment

The objective of the exposure assessment is to evaluate the ways in which people may come in contact with COPCs at the site now or in the future. An exposure assessment is a multistage process. First, the human receptors (i.e., individuals using the site) are identified. Second, the complete exposure pathways by which these human receptors may be exposed are identified. Finally, the chemical concentrations at the point of exposure, the exposure point concentration (EPC), and the daily intake rates associated with each exposure pathway are quantified. The following sections describe the receptors, pathways, and the methodology used to calculate EPCs.

I4.1 Receptor Analysis

IR Site 31 is currently used for residences, and this use is likely to continue for the foreseeable future. The homes were constructed in the early 1990s, and vapor barriers were included to address any potential concerns with VOCs in the area-wide OU-5/ Annex IR-02 groundwater plume.

Currently, residents are supplied drinking water by the East Bay Municipal Utility District. It is unlikely that residents would drink groundwater in the future; however, to meet regulatory requirements, groundwater is included in the evaluation of future use of IR Site 31.

Also, in the future, new construction could result in deeper soil being brought to the surface, so future residents and construction workers are assumed to be exposed to deeper soil (0- to 7-foot depth) than current residents (0-to 2-foot depth).

I4.2 Exposure Pathways

An exposure pathway is the means by which a chemical moves through the environment from the source to a receptor. Exposure pathways are identified by analysis of the distribution of COPCs in the environment and the physical and chemical properties of each COPC. For an exposure pathway to be complete, there must be a chemical source, a mechanism for chemical release to the environment, an environmental transport medium (soil, groundwater, or air), and an exposure route (e.g., ingestion or inhalation). A scenario is a group of exposure pathways associated with a particular activity or land use.

I4.2.1 Complete Exposure Pathways

Several exposure pathways for current and future residential and construction scenarios at IR Site 31 are considered complete for this risk assessment.

- **Current Residential.** Residential exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, and ingestion of produce grown in local soil. Current exposure is assumed to occur to COPCs in the upper 2 feet of soil except for vapors to indoor air where all samples are included.
- **Future Residential.** Residential exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, ingestion of groundwater, inhalation while showering with groundwater, and ingestion of produce grown in local soil. Future exposure is assumed to occur to COPCs in soil from 0- to 7-foot depth. In the future, it is possible that deeper soil will be brought to the surface during construction.
- **Construction.** Construction exposure routes include incidental soil ingestion, dermal contact with soil, inhalation of particulates from soil in outdoor air, and inhalation of vapors in outdoor air. Construction worker exposure is assumed to occur to COPCs in soil from 0- to 7-foot depth.

The exposure pathway for inhalation of vapors from groundwater into outdoor air is considered a completed exposure pathway that will have lower risks than inhalation of vapors from groundwater in indoor air. This pathway was not evaluated quantitatively because the risks associated with indoor air are within the risk management range.

In addition, the risks for residential use of groundwater were taken from the final groundwater RI/FS for Site 25/IR-02 (ERRG 2004). The Site 25/IR-02 groundwater RI/FS document estimated concentrations of benzene, naphthalene, arsenic, and other chemicals in groundwater that would be captured by a drinking water well located in

the center of the area-wide OU-5/Annex IR-02 groundwater plume with a 500-foot radius of influence. These concentrations were input into standard exposure assessment equations for ingestion, inhalation while showering, and inhalation of vapors in indoor air. The relevance of including risks for vapors in indoor air twice, once as part of this HHRA for shallow groundwater and then as part of the total risk from area-wide OU-5/Annex IR-02 groundwater plume, is discussed in Section I7, Uncertainty Analysis.

I4.2.2 Incomplete Exposure Pathways

Dermal contact with groundwater by construction or utility workers is considered to be an incomplete or limited pathway. It is possible that future construction or repair of existing utilities could result in trenching operations at or below the groundwater level. Standard industrial practices would preclude most contact with groundwater. Special techniques are used for construction below the groundwater in order to keep the work area reasonably dry. A construction project in this area would likely require sheet piling or a similar cut-off technique as well as sumps and pumps in order to keep the trenches dry enough to allow work to proceed. This pathway is therefore considered an insignificant source of exposure.

A conceptual site model showing complete and incomplete exposure pathways at IR Site 31 is presented on Figure I-1. The same information is contained in Table I4-1.

I4.3 Quantification of Exposure

Exposure quantification is a two-step process that involves estimating EPCs and estimating daily intake rates. The goal of exposure quantification is to identify the combination of exposure assumptions that result in the maximum and average exposures that may be reasonably expected to occur.

I4.3.1 Exposure Point Concentrations

In accordance with EPA guidance (1989), exposure is based on the average concentration of a chemical. However, there is uncertainty that any set of samples may or may not be representative of all the concentrations found at a site. To address this uncertainty, EPA recommends using the 95 percent upper confidence limit (95 percent UCL) of the average chemical concentration (EPA 1989). The 95 percent UCL represents an upper bound limit of the average such that the true average will be lower.

In soil, an EPC was calculated for each COPC using the EPA software ProUCL, Version 3.0 (EPA 2004b), as follows:

- The distribution of the data was determined using ProUCL. Samples reported as "nondetect" were included as values with a concentration of one-half the detection limit. There were no limitations on the percentage of nondetects.
- The Student's t-test was used to calculate the EPC for normal data, the Land equation for lognormal data, and the gamma value for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data.
- The maximum concentration was used as the EPC if the appropriate 95 percent UCL was greater than the maximum concentration.

The 95 percent UCL was calculated for all COPCs, using all four methods listed above under Step 2. The results of the ProUCL modeling are presented in Attachment I2. The EPC selected for a COPC used in this HHRA is the lower value of the 95 percent UCL and the maximum detected concentration.

EPCs for each exposure medium are presented in Tables I4-2 through I4-4 for soil at 0 to 2 feet bgs, soil at 0 to 7 feet bgs, and groundwater. A depth of 7 feet means that all the historical and current soil data are included in the risk assessment and no data were excluded based on depth.

In shallow groundwater, the EPC for vapor migration modeling, is the maximum concentration found in any sample. One hypothetical sample was created that consists of the maximum concentrations for the volatile COPCs and sample that was assumed to be representative of all groundwater.

I4.3.2 Quantification of Daily Intake

Daily intake is the amount of a chemical that a person could take into his or her body averaged over the period that he or she could be exposed. Daily intake is estimated by combining variables, including contact rate, body weight, exposure duration, and averaging time with the EPC. The calculation using these variables results in an estimate of daily intake for each exposure pathway.

Daily intakes for reasonable maximum exposure (RME) are intended to represent the upper end of exposure, and for central tendency exposure (CTE) are intended to represent more average exposure. Tables I4-5 and I4-6 present the equations and exposure parameters that were used to estimate daily intake, or dose, for current and future residential, and construction scenarios for RME and CTE assumptions, respectively. Site-specific values, EPA default values, and Cal/EPA default values for exposure parameters were used in this risk assessment. Chemical-specific variables used in the exposure calculations are provided in Table I4-7 (dermal factors for contact with soil) and Table I4-8 (uptake factors for homegrown produce). The general equation for calculating intake is shown below:

$$D = (C \times CR \times EF \times ED) / (BW \times AT)$$

where:

D	=	dose (miiligram per kilogram [mg/kg] per day)
C	=	exposure point concentration (mg/kg)
CR	=	contact rate (kg per day)
EF	=	exposure frequency (days per year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)

Equations for dermal contact with soil have additional exposure parameters of adherence and absorption factors. Adherence factors indicate the amount of soil that adheres to the skin. Absorption factors (Table I4-7) reflect absorption of the chemical from soil across the skin membrane. According to DTSC (1994) and EPA Region 9 guidance (2004c), the dermal absorption factors were used in conjunction with toxicity values unadjusted for gastrointestinal absorption.

EPA, Cal/EPA, and the San Francisco Bay RWQCB default assumptions were used for current and future residential and construction scenarios.

Concentrations of volatile COPCs in indoor air for residential scenarios were estimated using shallow groundwater and all soil (0- to 7-foot depth interval) data and the Johnson and Ettinger model (EPA 2000, 2004d). Modeling input and output for the Johnson and Ettinger model are presented in Attachment I3.

Default model parameters were used except for the following site-specific input values:

Soil type	Sandy clay loam
Vadose zone soil dry bulk density	1.68 grams per cubic centimeter (site-specific data)
Vadose zone soil total porosity	0.37 (site-specific data)
Vadose zone soil water-filled porosity	0.24 cubic centimeter per cubic centimeter (site-specific data)
Average soil temperature	19.4 degrees Celsius (site-specific)
Residential air exchange rate	0.66 (EPA 1997a, using San Francisco heating degree days)

Site-specific assumptions were developed for ingestion of homegrown produce in the residential scenario. The transfer of COPCs from soil to plants is estimated with an uptake factor (Table I4-8) (DTSC 1993). Uptake factors for inorganic chemicals were developed by EPA from empirical data for plant uptake (EPA 1996). For PAHs, field data are used from studies that measured the concentrations in the soil and in produce (Samsφe-Petersen et al. 2002). For other organic chemicals, uptake factors are calculated from the chemical-specific octanol-water partition coefficient and the organic-carbon-normalized partition coefficient (DTSC 1993).

Volatile chemicals are not included in this pathway because they are not known to accumulate appreciably in plants or vegetables. Also, volatile chemicals are not likely to be persistent in shallow soils where the roots of plants would be able to absorb them.

The exposure frequency for ingestion of homegrown produce was calculated using 20 percent of the total days of exposure frequency for the residential scenario (resulting in 70 days per year for the RME scenario and 47 days per year for the CTE scenario). Ingestion rates were selected from EPA guidance (EPA 1997). U.S. EPA estimates that homegrown fruits and vegetables account for 4 percent and 6.8 percent, respectively, of receptor diets. Using the 95th percentile of fruit and vegetable intakes (12 grams per kilogram per day [g/kg-day], and 10 g/kg-day, respectively), a 70 kg adult would ingest 33.6 and 47.6 grams per day (g/day) of homegrown fruit and vegetables, respectively, and a 15-kg child would ingest 7.2 and 10.2 g/day, respectively. These values were summed to provide the total daily intake of homegrown produce. For the CTE scenario, it was assumed that intakes are 3.4 g/kg-day for fruit and 4.3 g/kg-day for vegetables. These values are for total produce intake, and represent the edible portions of the produce (EPA 1997).

I5 Toxicity Assessment

The objective of the toxicity assessment is to assess the relationship between daily intake and toxic response. The toxicity assessment identifies toxicity values for each COPC and the type of effect each COPC is capable of producing. Toxicological effects fall into two categories: those that could potentially cause cancer (carcinogens) and those that cause other types of adverse health effects (noncarcinogens). Table I5-1 tabulates the toxicity values for carcinogens and noncarcinogens, respectively. Toxicity profiles for COPCs from the Agency for Toxic Substances and Disease Registry are presented in Attachment I4.

The toxicity value for carcinogenic effects is called a cancer slope factor (CSF), and the toxicity value for noncarcinogenic effects is called a reference dose (RfD). Chemicals that show a potential for both carcinogenic and noncarcinogenic health effects are assigned both CSFs and RfDs.

Toxicity values are specific to the route of exposure (i.e., oral, inhalation, or dermal routes). Oral toxicity values were used in a route-to-route extrapolation for dermal values consistent with practices by EPA Region 9 (EPA 2004a) except that the adjustment to the oral RfD for cadmium for dermal absorption was not made. The implications of this are discussed in the Section I7, Uncertainty Analysis.

I5.1 Toxicity Values for Carcinogens

CSFs express the relationship between daily intake and the potential for an increase in cancer in people or a response associated with cancer in animals. CSFs are developed by EPA with a mathematical model that uses data from the results of human epidemiological studies or laboratory animal studies.

Most of the CSFs are developed from data on laboratory animals that are exposed to the maximum dose that they can tolerate for relatively short periods. This is intended to be protective, as human receptors are more often exposed to much lower levels over long periods of time. To account for any uncertainty in calculating CSFs using this method, EPA uses the 95 percent UCL of the average CSF to assure that any actual risk, if any exists, will be less than the estimated risk. Table I5-1 presents the CSFs for the COPCs.

I5.2 Toxicity Values for Noncarcinogenic Effects

The potential for noncarcinogenic health effects is estimated using a toxicity value known as the RfD. Each RfD is associated with a specific adverse health effect (e.g., central nervous system damage).

For noncarcinogenic effects, risk estimates assume a concentration below which there is little potential for adverse health effects over the exposure period. That concentration is referred to as the threshold concentration. RfDs are derived from either human or animal studies and are adjusted using uncertainty factors. The RfD is calculated from the highest long-term exposure level that did not cause adverse effects. An uncertainty factor is applied to the RfD to allow for any uncertainty, such as using data from animals to predict effects on humans. Uncertainty factors range from 10 to 10,000, depending on the confidence level associated with the data. The resulting RfD is used to characterize the risk. Table I5-1 presents the RfDs for the COPCs.

Also, the health effects of iron are not considered additive with other metals. The RfD for iron is provisional. Iron is a required nutrient and the required daily level is highest for pregnant women (30 mg/day or 0.44 mg/kg/day) and children (6 to 15 mg/day). The bioavailability of the iron is a key factor. Bantu men who drank iron at a rate of 50-100 mg a day in beer showed effects on the liver while people in Ethiopia with an average daily intake of 471 mg/day from food showed no adverse health effects of iron. The RfD is not based on adverse health effects but on healthy people with normal levels of iron in their blood. The RfD of 0.3 mg/kg/day (15 mg/day for 70 kg adult) is an

upper estimate of intake of iron in healthy adults and children in the United States whose iron levels are within the normal range. Based on this RfD, the hypothetical exposure to an adult who ingests 100 mg of soil a day, if all the iron in soil is in a soluble form, would double their intake of iron to 30 mg/day. However, this is the recommended daily dose for pregnant women so it is unlikely that such as increase, if it occurred at all, would have an adverse health effect. Therefore, there is evidence that the RfD overstates the possible health effects of iron.

I5.3 Toxicity Values for Lead

Exposures to lead in soil were evaluated using DTSC's Lead Risk Assessment Spreadsheet Version 7 (LeadSpread 7) (DTSC 1999). This model calculates a value that represents a safe concentration of lead in soil for children that is protective for a combined exposure to lead in the air, drinking water, food, and soil. The acceptable blood lead concentration is 10 micrograms per deciliter. Modeling output and supporting input documentation are presented in Attachment I5.

Site-specific DTSC values for lead in soil of 184 mg/kg with a scenario including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce were calculated using local concentrations for lead in outdoor air and drinking water supply (DTSC 1999). The closest monitoring stations to Alameda with ambient toxics data for lead are the San Francisco Arkansas Street station (14.7 miles west), the Richmond 13th Street station (17.5 miles northeast), and the San Pablo station (17.8 miles northeast). The maximum lead concentration reported in the last 5 years (0.055 micrograms per cubic meter reported in 2000 at the San Francisco station) was selected as representative of lead in air at Alameda Point (California Air Resources Board 2004). The East Bay Municipal Utility District's Annual Water Quality Report, Year 2003, presents chemical concentrations in the drinking water supply for the City of Alameda. The value for lead is 7 micrograms per liter (μg/L).

I5.4 Sources of Toxicity Criteria

The toxicity values used in this risk assessment were obtained from the table of PRGs published by EPA Region 9 (EPA 2004c) and confirmed by a review of the EPA Integrated Risk Information System (IRIS) database (EPA 2006). Values in IRIS are given preference by EPA Region 9. PRGs based on provisional toxicity values cannot be confirmed as these data are not available to the public.

Toxicity values developed by Cal/EPA were also used in the risk assessment. The Cal/EPA CSFs for carcinogens are listed in the Office of Environmental Health and Hazard Assessment toxicity database, accessible at http://www.oehha.ca.gov/risk/ChemicalDB/index.asp. The Navy agrees at this time to evaluate Cal/EPA toxicity values but clearly and expressly reserves the right to evaluate the legal and technical

justification for these values, and accept or reject them, before or at the time of the Navy cleanup decisions.

Total chromium samples were evaluated with a slope factor modified in accordance with the EPA Region 9 PRGs to account for the presence of hexavalent chromium.

When no toxicity value was available for a chemical, a value for another chemical of similar structure or chemical class was assigned based on chemical or structural similarity. Table I5-2 identifies chemicals without toxicity values and their chemical surrogates.

Many of the toxicity values are provisional and have not gone through the formal review process used by EPA for IRIS. The impact of provisions toxicity values is discussed in Section I7, Uncertainty Analysis.

I6 Risk Characterization

The risk characterization combines the amount of exposure with the toxicity value into a numerical risk estimate. EPA and Cal/EPA risk estimates do not predict actual health effects but are a tool for risk managers in these agencies to help them make decisions on whether action should be taken to reduce exposure. Risk assessment calculations are intentionally designed so that any actual risk, if present, will be less than the risk calculated in the risk assessment and could be zero. The calculations for each exposure pathway are presented and then summarized in Tables I6-1 through I6-37.

The risk estimate for potential carcinogenic effects is an individual excess cancer risk. This represents the probability that an individual could have an increased risk of cancer above his/her background risk. A risk of 1×10^{-6} means that each individual has a 1 in 1,000,000 probability that his/her risk of incurring cancer will increase above their baseline cancer risk.

In accordance with EPA OSWER Directive 9355.0-30, the risk management range is between 10^{-6} and 10^{-4}.

- Cancer risks below 10^{-6} are considered insignificant.
- Cancer risks within the risk management range (10^{-6} to 10^{-4}) are evaluated based on site-specific factors to determine if steps are needed to reduce exposure. The site-specific information that could be considered by risk managers is discussed in Section I7, Uncertainty Analysis.
- Cancer risks above 10^{-4} could require action to prevent unacceptable exposure from occurring now or in the future.

Noncancer adverse health effects for individual chemicals are expressed as hazard quotients (HQs) or hazard index (HI) values when HQ values are added together. (HI values are the sum of HQs for individual chemicals.) Noncancer HQs are only added together for chemicals that affect the same target organs. HQ and HI values do not represent probabilities but estimate whether the daily intake is above (HI>1) or below (HI<1) an acceptable daily amount, i.e., an amount unlikely to produce any adverse health effects over a lifetime. HI values above 1 are evaluated closely and could warrant action to reduce exposure.

The following sections present the cancer risk characterization results for current and future residential and construction scenarios. The cancer risks calculated using EPA and Cal/EPA toxicity factors are presented for all exposure pathways except the residential use of groundwater. For residential use of groundwater, the values taken from the groundwater RI/FS were calculated using Cal/EPA toxicity factors available at that time (ERRG 2004).

Risk drivers are chemicals with a cancer risk at or above 1×10^{-6} or a noncancer HI value of 1 or close to 1. The calculations and summary tables are presented in the Section I6 tables as follows:

- Current Residential Cancer and Noncancer Risk Tables – I6-1 through I6-12;
- Future Residential Cancer and Noncancer Risk Tables – I6-13 through I6-24; and
- Construction Worker Cancer and Noncancer Risk Tables – I6-25 through I6-36.

I6.1 Cancer Risks – Current Residential Scenario

The total RME cancer risks (including background) for EPA and Cal/EPA are 6×10^{-5} and 4×10^{-4}, respectively. The total RME cancer risks rank-ordered by exposure pathway for EPA and Cal/EPA, respectively, are as follows:

- Ingestion of soil (3×10^{-5} and 2×10^{-4});
- Ingestion of homegrown produce (2×10^{-5} and 1×10^{-4});
- Dermal contact with soil (4×10^{-6} and 2×10^{-5});
- Inhalation of vapors in indoor air (8×10^{-7} and 1×10^{-5}); and
- Inhalation of particulates and vapors in outdoor air (3×10^{-7} and 5×10^{-7}).

The majority of the risk (about 90 percent) is associated with arsenic in soil. The total risk for arsenic is 5×10^{-5} for EPA and 3×10^{-4} for Cal/EPA. Benzo(a)pyrene, Aroclor 1260, and dieldrin are also risk drivers (Table I6-7). Cadmium and the PCB, Aroclor 1016, are also risk drivers for Cal/EPA (Table I6-8). Most of the risk for organic chemicals is associated with the homegrown produce.

In indoor air, the EPA risk (8×10^{-7}) is below the risk management range, and Cal/EPA risk (1×10^{-5}) is within the range. The majority (90 percent) of the Cal/EPA risk is due to naphthalene in shallow groundwater at the maximum concentration found in any sample. A discussion of the range of cancer risks across Site 31 is included in the Section I7, Uncertainty Analysis.

The total EPA and Cal/EPA CTE cancer risks (including background risks) for the current residential scenario are 1×10^{-5} and 8×10^{-5}, respectively.

I6.2 Cancer Risks – Future Residential Scenario

The total RME and CTE cancer risks (including background) for both EPA and Cal/EPA are 2×10^{-2}. The total RME cancer risks rank-ordered by exposure pathway for EPA and Cal/EPA, respectively, are as follows:

- Residential use of groundwater (2×10^{-2} [Cal/EPA only, ERRG 2004]);
- Ingestion of soil (3×10^{-5} and 2×10^{-4}) ;
- Ingestion of homegrown produce (2×10^{-5} and 1×10^{-4});
- Dermal contact with soil (5×10^{-6} and 2×10^{-5});
- Inhalation of vapors in indoor air (8×10^{-7} and 1×10^{-5}); and
- Inhalation of particulates and vapors in outdoor air (4×10^{-7} and 6×10^{-7}).

Exposure pathways with cancer risks at or above the risk management range include residential use of groundwater (ingestion and inhalation while showering), ingestion of homegrown produce (Cal/EPA only), and ingestion of soil (Cal/EPA only). Most of the total cumulative risk (99 percent) is associated with benzene in groundwater. Note that the groundwater RI/FS report for OU-5 (ERRG 2004) based the cancer risk for residential use of groundwater on the Cal/EPA toxicity values. The EPA toxicity value for benzene would result in a risk that is approximately three times lower than the Cal/EPA value but still well above the risk management range.

The remaining cancer risks are generally identical to those for the current resident, with the minor exceptions of a slight increase in EPA risks for dermal contact with soil and inhalation of outdoor air from dust for COPCs in the 0- to 7-foot depth interval.

I6.3 Cancer Risk - Construction Worker Scenario

EPA and Cal/EPA cancer risks are 2×10^{-6} and 6×10^{-6}, respectively, for both RME and CTE. For EPA, chromium has the highest individual cancer risk at 1×10^{-6}. The Cal/EPA risk drivers are arsenic and chromium.

I6.4 Cancer Risks - Without Arsenic and Cadmium

EPA and Cal/EPA make risk management decisions considering cancer risk without ambient metals, so it is appropriate to present the cancer risk without metals present at ambient concentrations. Arsenic and cadmium are cancer risk drivers and ambient metals as defined by DTSC policy (Appendix H2).

The risk estimates without arsenic and cadmium are as follows (Table I6-37).

- The current residential site-specific cancer risk, without arsenic and cadmium in soil, is within the risk management range with an EPA cancer risk of 7×10^{-6} and a Cal/EPA cancer risk of 3×10^{-5} (Table 6-2 in main RI report).
- The future residential site-specific cancer risk, without residential use of groundwater and without arsenic and cadmium in soil, is within the risk management range with an EPA cancer risk of 1×10^{-5} and a Cal/EPA cancer risk of 4×10^{-5} (Table 6-2 in main RI report).

The Navy agrees at this time to evaluate Cal/EPA toxicity values but reserves the right to evaluate the legal and technical justification for these values and accept or reject them before or at the time of the Navy cleanup decisions.

I6.5 Noncancer and Lead Results

This section presents the noncancer hazard and lead results for current and future residential and construction scenarios at IR Site 31.

I6.5.1 Noncancer Results

The RME HI values for current future and residential scenarios are 5 and 149, respectively. The noncancer hazard values are based on the most sensitive receptor, a child from 0 to 6 years of age. Noncancer hazard values are the same for EPA and Cal/EPA. The RME HI values for the current and future residential scenario are as follows:

- Residential use of groundwater (145 for future residents only);
- Ingestion of soil (4);
- Inhalation of vapors indoor air (0.4);
- Homegrown produce (0.3);
- Dermal contact with soil (0.1); and
- Inhalation of particulates and vapors in outdoor air (0.02).

Iron in soil accounts for the majority of the HI value (38 percent) for soil pathways. Iron is the only metals with an HQ above 1. The health effects of iron are not considered additive with other COPCs . Iron has a provisional toxicity value that has not been accepted by EPA or Cal/EPA. There is evidence that there are not any adverse health effects from increased exposure to iron in soil or food. Also, there is evidence that the metals other than iron are present at concentrations above Alameda Point background but not site-specific background, as discussed in Section 4.1.3.3. Without iron and the ambient metals (arsenic, cadmium, chromium and vanadium), the HI is below 1.

For future residents, the elevated HI is associated with ingestion of benzene and naphthalene in groundwater. The remainder of the HI value is due to adding the HI values of the remaining chemicals together.

The RME and CTE HI values for construction scenarios are 0.2 and well below the risk management level of 1.

I6.5.2 Lead Results

The EPCs of 61.5 and 40.6 mg/kg for the 0- to 2-foot and 0- to 7-foot depth intervals, respectively, are well below the site-specific DTSC residential values for lead in soil for children (184 mg/kg for a scenario, including ingestion of homegrown produce and 322 mg/kg for a scenario without ingestion of homegrown produce). The maximum concentration in any sample of 168 mg/kg is also below the DTSC value.

I7 Uncertainty Analysis

Varying degrees of uncertainty exist in each step of the risk assessment process. To compensate for these uncertainties, EPA has developed toxicity values and exposure parameters that will not underestimate the risk, if in fact, any risk exists. The following subsections present the uncertainties specific to the HHRA conducted for IR Site 31 and evaluate the potential impact of the uncertainties on the calculated risk estimates.

I7.1 Data Evaluation

The data are considered adequate to support the risk assessment. For this 24.9-acre site, there are 646 soil samples for PAHs from over 160 locations. There are 120 samples for metals and 123 samples for VOCs, SVOCs, metals, PCBs, and pesticides from 50 locations (see Section 3 of the RI report for sample analyses summaries). There are 16 shallow groundwater samples from 16 locations with analyses for VOCs although some analytes have fewer samples.

All validated and verified data from the RI and previous investigations were used except for the PAH data from the environmental baseline survey (EBS) and the field screening data from EBS, which were not used.

Six soil samples were not included in the EPC calculations because the data were not received from the laboratory until after this step had been completed. However, it is possible to compare these data to the data that were included and draw conclusions on the potential that these data would not change the findings of the HHRA with a high level of confidence. Thirteen metals and one VOC, dichloromethane, were identified (detected) in the six samples. The maximum concentrations of the metals in these six samples were well below the maximum concentration in either the 0- to 2-foot or 0- to 7-foot depth intervals for the other 120 samples analyzed. The maximum concentration of dichloromethane of 0.0058 mg/kg is slightly higher in the six samples than the maximum of 0.002 mg/kg in either depth interval. Dichloromethane has a noncancer HI value of 0.000006 for all exposure pathways combined. Increasing the HI three fold would not impact the finding that the HI value is well below 1.

Manganese was not included in the work plan but was extrapolated by CDM from the raw data packages. The results are unverified by the laboratory and are estimated. The health risks associated with manganese are presented in Section 6.1.6.5. The EPC of 1,246 mg/kg for manganese in the upper two feet corresponds with an HI of 0.2 for current residents and the EPC of 953 mg/kg in the upper 7 feet corresponds to an HI of 0.1 for future residents.

There are four chemicals in the six samples that had reporting (or sample quantitation) limits below risk-based screening levels that were not identified in any of the 120 samples. These four chemicals are hexachlorobenzene, n-nitrosodiproplyamine, n-nitrosodimethylamine, and bis(2-chloroethyl)ether. It is unlikely that these chemicals would be present at IR Site 31. There is no evidence of past releases of hazardous organic chemicals due to industrial uses or other sources of these chemicals. Organic chemicals, other than PAHs, were rarely reported.

I7.2 Exposure Assessment

Uncertainties are also associated with the parameters presented as exposure and in the quantification of exposure. In risk assessment, the actual exposure concentration is the average concentration that an individual could be exposed to over his or her lifetime. In soil, the 95 percent UCL is used as the EPC. However, for migration of vapors from groundwater to indoor air, the maximum concentration of each chemical found in any sample from any location was used.

Each exposure assumption is designed to estimate the potential risk protectively. In this risk assessment, for example, it was assumed that residents would engage regularly in activities that would result in exposure for 30 years. It was also assumed that the individual would be exposed for 24 hours per day for the entire 30-year duration. Although this scenario is highly unlikely, due to frequency of relocation and time spent

indoors, it provides a protective estimate of exposure that would overestimate any actual risk.

Current residential exposure by Coast Guard personnel is likely to be substantially less than 30 years. The reduction in risk due to shorter residency periods is roughly proportional. For example, if a more typical exposure period for Coast Guard personnel is 6 years, then the total EPA and Cal/EPA cancer risks will be 1/5th that estimated using the standard assumption of 30 years of exposure. In this case, all cancer risks would be well within the risk management range.

For ingestion of locally grown produce, the uptake of organic chemicals (except PAHs) was estimated from theoretical equations rather than from field studies; therefore, uptake may be overestimated.

The potential for a construction worker to be exposed to groundwater was considered negligible because of standard practices when constructing below the water table. However, it is possible, given that groundwater occurs as shallow as 7 feet depth, that construction workers could occasionally come into contact with groundwater. Shallow groundwater has lower concentrations of chemicals than deeper groundwater but this potential contact does add uncertainty to the calculations for construction workers.

In comments in the Draft RI - Revision 1, DTSC requested that the exposure assumptions presented in a recent DTSC note for military sites be used for IR Site 31 (Cal/EPA 2005). The residential exposure assumptions were reviewed because residential risk is typically used to make the risk management decisions. The DTSC note recommends a surface area for children which is 10 percent greater than that used in the HHRA. The greatest change would be a 10 percent increase in the noncancer risk which would not change the risk assessment results or recommendations. Also, the DTSC note states that these assumptions do not necessarily apply to non-military facilities which is the case for IR Site 31.

I7.3 Toxicity Assessment

Provisional toxicity values were used for many chemicals for which EPA has not yet completed the scientific review process. The HI value of 4 for residential direct contact with soil is due to several COPCS, mainly iron with an HI of 2. The RfD for iron is provisional and not a peer-reviewed value. Also, HI values are only additive for chemicals that impact the same target organ. Iron is mainly a concern for overload in the blood, and no other chemicals have this same health concern.

Toxicity values have been developed to be protective of the most sensitive potential receptors. However, for some COPCs, CSFs and RfDs are not available. Toxicity information for surrogate compounds (based on chemical or structural similarity) was substituted. This may result in an underestimation or overestimation of risk.

I7.4 Indoor Air Risk Characterization

This subsection discusses the indoor air models and the likelihood that any risk could be over- or underestimated. The Johnson and Ettinger model for vapor migration into indoor air is controversial, and scientists are not in agreement that the model has been adequately validated by field studies.

Exposure via vapor migration from VOCs in groundwater may also be overestimated because the risk is based on a hypothetical sample that includes the maximum concentration of each chemical found in any samples. The EPA cancer risk is below the risk management level of 1×10^{-6}. The Cal/EPA cancer risk is 1×10^{-5} because California considers naphthalene to be a potential carcinogen. High concentrations of naphthalene (2,030 and 1,700 µg/L) were found at two locations in the area-wide OU-5/Annex IR-02 groundwater plume. These concentrations are not representative of shallow groundwater everywhere on IR Site 31. The other nine samples of shallow groundwater had much lower concentrations. The next highest concentration of 370 µg/L is associated with a cancer risk close to 1×10^{-6}. All other concentrations would result in even lower risks.

A study conducted by the U.S. Coast Guard on housing immediately to the north of IR Site 31 at Parcel 181 concluded that there was no evidence of vapor migration into indoor air above ambient air concentrations (TtEMI 2002b). Indoor and outdoor air samples were collected in 2002 from the Coast Guard housing area, including North Housing located in Parcel 181 of OU-5 (TtEMI 2002b). Outdoor air samples were collected from five locations in Parcel 181. Indoor air samples, including samples collected from crawl spaces, were collected from both occupied and unoccupied residences located in Parcel 181. Indoor air was sampled at 17 locations, and crawl-space air was sampled at 12 locations.

Statistical analyses of the indoor and outdoor air data were performed to compare indoor air with outdoor air and crawl-space air with indoor air. Conclusions of this study are as follows.

- The benzene concentrations in the crawl-space air were lower than in indoor air. If groundwater is a source of benzene, it would be expected that concentrations of VOCs in the crawl spaces would exceed the concentrations in the indoor air.
- VOC concentrations in indoor air were consistent with both outdoor air concentrations and ambient air measurements for benzene in the San Francisco Bay Area issued by the California Air Resources Board.

These conclusions suggest that although portions of the housing area in Parcel 181 are located over groundwater plumes containing benzene and naphthalene, the concentrations of these chemicals in indoor air are not above ambient conditions for the

San Francisco Bay Area. Risks to human health at OU-5 and adjacent areas are thus not likely to differ from risks to human health in other areas of the San Francisco Bay Area.

I7.5 Arsenic Risk Characterization

Arsenic at IR Site 31 is ambient in accordance with DTSC policy and separate risks were calculated without arsenic and other ambient metals (Appendix H2). Similar concentrations of arsenic are also found in other areas of Alameda Point. The exposure point concentration for arsenic at IR Site 31 of 11.7 mg/kg (0-8 feet) is similar to the Alameda Point yellow background data set (which is remote from IR Site 31) at 11.9 mg/kg and lower than that for the adjacent East Housing Area of 16.3 mg/kg. This section presents other information on the toxicity of arsenic that is relevant to the risk management decisions.

I7.5.1 Studies on Arsenic Exposure

Studies of children exposed to arsenic in soil indicate that the assumptions used in this HHRA likely overestimate exposure. This HHRA assumed that children (0 to 6 years of age) ingest 200 milligrams of soil daily and that 100 percent of the arsenic in the soil is biologically available. However, more than 24 studies on arsenic in soil show that only 10 to 50 percent (with an average of 30 percent) of the arsenic is actually transferred into the body (EPA 1996, Ruby et al. 1999, Rodriguez and Basts 1999, Roberts et al. 2002).

The standard approach to exposure via dermal contact assumes that 3 percent of the arsenic on soil on the skin passes through the skin into the body based on a study with monkeys (Wester et al. 1993). However, there are studies that indicate that measurable quantities of arsenic do not pass through the skin, even from water. Arsenic dissolved in water is more biologically available than arsenic in soil. Studies on people have shown that arsenic in water used for bathing and showering does not result in an increase in arsenic in their urine (Knobeloch 2002). In addition, studies of children exposed to arsenic in soil in Anaconda, Montana, showed that the arsenic in their urine could be predicted from ingestion of soil alone, indicating that dermal exposure is not an important route (EPA 1996, Walker and Griffin 1998). Another study of children in Bingham Creek, Utah, showed that there was no correlation between arsenic in soil on children's hands and the concentration of arsenic in their urine, indicating that the dermal route of exposure is not important (University of Cincinnati 1997).

I7.5.2 Arsenic Toxicology

The slope factor for arsenic is based on a study of skin cancer in 40,000 people in Taiwan who drank well water containing greatly elevated levels of arsenic. Recent epidemiological studies, however, indicate that using data from exposure at high doses of arsenic for people with a different nutritional background likely overestimates risks

at low doses, particularly for United States populations (Lewis et al. 1999; Steinmaus et al. 2003; Lamm et al. 2003, 2004).

EPA cancer risk assessment methodologies assume that any exposure to a potential carcinogen, no matter how small, results in an increased risk of cancer. This protective assumption is made for all carcinogens because there is insufficient information to support the use of a threshold. A threshold is a lower limit of exposure below which there will not be an increased incidence of cancer. The World Health Organization concluded that there is some evidence of a threshold for arsenic (EHGN 2002).

As a result of this approach to arsenic toxicity, the cancer risks associated with arsenic in soil are almost always below the risk associated with natural background arsenic levels in the United States. However, there is no evidence that exposure to arsenic in soil increases the incidence of cancer.

I7.6 Final Groundwater RI/FS for Site 25/IR-02 Risk Assessment Results

This section discusses the level of confidence that can be placed on the cumulative cancer risks and noncancer hazard values when the risks for residential use of groundwater at IR Site 31 are based on the calculations presented by ERRG in the final groundwater RI/FS for Site 25/IR-02 (ERRG 2004).

The RME cancer risk for ingestion of groundwater and inhalation while showering from the groundwater RI/FS is 2×10^{-2}, and the HI value is 145. Both these estimates are well above the risk management range. There is uncertainty in using these estimates as representative of residential use of groundwater at IR Site 31, but none of the aspects of this uncertainty would likely result in lower risks. The ERRG cancer risk is based on benzene and did not consider naphthalene a carcinogen. Also, ERRG did not include dermal exposure to groundwater while showering. However, these omissions would only increase the cumulative risk.

The concentration of benzene in the groundwater used in the ERRG risk assessment of 494 µg/L is similar to the maximum concentration of benzene in all groundwater samples, shallow and deep, at IR Site 31 of 480 µg/L. The concentration of naphthalene used in the Site 25/IR-02 RI risk assessment (4,171 µg/L) is similar to the maximum concentration of naphthalene in all groundwater samples, shallow and deep, at IR Site 31 (4,910 µg/L). This suggests that cancer risk estimates based on data from groundwater at IR Site 31 health effects using a 95 percent UCL for residential use of groundwater could be lower than those estimated in the ERRG risk assessment.

The migration of vapors from groundwater to indoor air was included twice in the total cumulative soil and groundwater risk estimates. However, in the calculations from the groundwater RI/FS, the risks are several orders of magnitude below those for ingestion and inhalation inside a residence, so that subtracting the risk would not change the total

cumulative risk. This is also true of the risk from the groundwater-to-indoor-air pathway for this risk assessment.

I8 Conclusion

The EPA and Cal/EPA cancer risks and noncancer hazards are above the risk management range when residential use of groundwater is considered. However, it is unlikely that groundwater will be used as a source of drinking water because the groundwater is too shallow to meet the sanitary requirements for a drinking water well, total dissolved solids are high, and the residents are supplied with drinking water from an off site source. In addition, remediation of the Site 31 groundwater is being conducted as part of the OU5/IR-02 plume, and the final remedy for OU-5 groundwater prohibits the domestic use of groundwater until remedial goals are met.

Without residential use of groundwater, the cancer risks and noncancer hazards for current and reasonable future use are associated with exposure to chemicals in soil and indoor and outdoor air. The cancer risk and noncancer hazards without residential use of groundwater are discussed below.

EPA and Cal/EPA do not require remediation of metals at concentrations below background so it is also appropriate to present the cancer risk without metals below background. The arsenic and cadmium, identified as ambient populations per DTSC policy, are removed from cancer risk estimates (Appendix H2). The cancer risks without these metals are below 10^{-4} and range from 7×10^{-6} for current residential users for EPA to 4×10^{-5} for reasonable future residential users for Cal/EPA.

The remaining risk is associated with benzo(a)pyrene, PCBs and dieldrin in soil and VOCs in groundwater. The cancer risk is at or below 10^{-6} without these chemicals. The factors allowed by EPA guidance which reduce or eliminate concerns for these chemicals are as follows:

- Benzo(a)pyrene – cancer risks are within the risk management range
- Three other chemicals with risks above 10^{-6} were rarely identified -- PCBs, (Aroclor 1016 in one of 123 samples; Aroclor 1260 in nine of 123 samples) and dieldrin in one of 123 samples—and do not represent a widespread concern (EPA/1989).
- Benzene, naphthalene and other VOCs in groundwater that contribute to vapors in indoor air will be remediated as part of the OU-5/IR-02 groundwater plume.

Without iron and the ambient metals (arsenic, cadmium, chromium, and vanadium), the HI is below 1. The health effects of iron are not considered additive with effects of other metals. There is evidence that there are not any adverse health effects from increased exposure to iron in soil and food.

Current residential exposure by Coast Guard personnel is likely to be substantially less than 30 years used to estimate the cancer risk. If a more typical exposure period for Coast Guard personnel is 6 years, then the total EPA and Cal/EPA cancer risks will be one-fifth of that estimated using the standard assumption of 30 years of exposure. In the case of a typical 6-year exposure, all cancer risks would be well within the risk management range

Based on the above factors, the EPA and Cal/EPA cancer risks are below the 10^{-6} point of departure for current residential and reasonable future exposure pathways.

For construction exposure scenarios at IR Site 31, the cancer risks and noncancer hazard values are within the risk management range and are below 1×10^{-6} without ambient metals.

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Table I3-1
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Surface Soil (0–2 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0–2 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
Acenaphthene	83-32-9	2.30E-04	J	6.70E-02		mg/kg	C3S031B081	229/326	0.00021 - 0.1325	6.70E-02	NA	Y	FD
Acenaphthylene	208-96-8	1.80E-04	J	6.40E-02	D	mg/kg	C3S031B028	256/326	0.00016 - 0.1435	6.40E-02	NA	Y	FD
Anthracene	120-12-7	2.60E-04	J	1.70E-01		mg/kg	C3S031B007	264/326	0.00019 - 0.1214	1.70E-01	NA	Y	FD
Benzo(g,h,i)Perylene	191-24-2	9.70E-04	J	1.60E+00	D	mg/kg	C3S031B028	296/326	0.0001 - 0.1656	1.60E+00	NA	Y	FD
Dichloromethane	75-09-2	8.00E-04	J	2.00E-03	J	mg/kg	3134	4/49	0.005-0.0055	2.00E-03	NA	Y	FD
Fluorene	86-73-7	1.70E-04	J	5.80E-02		mg/kg	32EDC-21-5	251/326	0.00017 - 0.11	5.80E-02	NA	Y	FD
2-Methylnaphthalene	91-57-6	3.30E-04	J	1.70E-01		mg/kg	C3S031B104	261/326	0.00021 - 0.0883	1.70E-01	NA	Y	FD
Naphthalene	91-20-3	5.10E-04	J	1.00E-01	D	mg/kg	C3S031B028	262/326	0.00021 - 0.11	1.00E-01	NA	Y	FD
Phenanthrene	85-01-8	8.20E-04	J	5.80E-01		mg/kg	C3S031B170	277/326	0.00015 - 0.1876	5.80E-01	NA	Y	FD
Pyrene	129-00-0	7.70E-04	J	2.10E+00	D	mg/kg	C3S031B028	307/326	0.00011 - 0.1766	2.10E+00	NA	Y	FD
Xylenes (total)	1330-20-7	5.00E-04	J	3.00E-03	J	mg/kg	3137	3/49	0.0085-0.013	3.00E-03	NA	Y	FD
Semivolatile Organic Compounds													
Benzo(a)Anthracene	56-55-3	3.10E-04	J	7.10E-01	D	mg/kg	C3S031B028	280/326	0.00013 - 0.1987	7.10E-01	NA	Y	FD
Benzo(a)Pyrene	50-32-8	3.50E-04	J	1.20E+00	D	mg/kg	C3S031B028	302/326	0.00014 - 0.1545	1.20E+00	NA	Y	FD
Benzo(b)Fluoranthene	205-99-2	6.40E-04	J	1.00E+00	D	mg/kg	C3S031B028	311/326	0.00014 - 0.1435	1.00E+00	NA	Y	FD
Benzo(k)Fluoranthene	207-08-9	3.80E-04	J	9.70E-01	D	mg/kg	C3S031B028	270/326	0.00015 - 0.1987	9.70E-01	NA	Y	FD
1,2-Benzphenanthracene	218-01-9	6.70E-04	J	1.10E+00	D	mg/kg	C3S031B028	297/326	0.00015 - 0.1876	1.10E+00	NA	Y	FD
Dibenz(A,H)Anthracene	53-70-3	3.20E-04	J	2.10E-01	D	mg/kg	C3S031B028	264/326	0.00018 - 0.1545	2.10E-01	NA	Y	FD
Fluoranthene	206-44-0	7.70E-04	J	1.40E+00	D	mg/kg	C3S031B028	294/326	0.00017 - 0.2097	1.40E+00	NA	Y	FD
Indeno(1,2,3-C,D)Pyrene	193-39-5	5.50E-04	J	1.50E+00	D	mg/kg	C3S031B028	274/326	0.00015 - 0.2208	1.50E+00	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
Aroclor 1016	12674-11-2	4.70E-02		4.70E-02		mg/kg	3138	1/52	0.035-0.035	4.70E-02	NA	Y	FD
Aroclor 1260	11096-82-5	5.00E-03	J	2.00E-02	J	mg/kg	3105	8/52	0.034-0.037	2.00E-02	NA	Y	FD
4,4-DDD	72-54-8	7.00E-04	J	7.00E-04	J	mg/kg	3114	1/52	0.0035-0.0035	7.00E-04	NA	Y	FD
4,4-DDE	72-55-9	5.00E-04	J	6.00E-03	J	mg/kg	3115	3/52	0.0035-0.033	6.00E-03	NA	Y	FD
4,4-DDT	50-29-3	2.00E-03	J	2.60E-03	J	mg/kg	3114	2/52	0.0035-0.0035	2.60E-03	NA	Y	FD
Dieldrin	60-57-1	5.00E-04	J	5.00E-04	J	mg/kg	3114	1/52	0.0035-0.0035	5.00E-04	NA	Y	FD
Endosulfan Sulfate	1031-07-8	4.00E-03		4.00E-03		mg/kg	178-Z16-001	1/52	0.004 - 0.084	4.00E-03	NA	Y	FD
Metals													
Antimony	7440-36-0	3.00E-01	J	3.20E+00	J	mg/kg	3101	6/49	5.3-5.7	3.20E+00		Y	
Arsenic	7440-38-2	3.70E+00		3.26E+01		mg/kg	3144	49/49	0.31-0.38	3.26E+01		Y	
Barium	7440-39-3	4.69E+01		4.76E+02		mg/kg	3125	49/49	1-1.3	4.76E+02		Y	
Beryllium	7440-41-7	6.50E-03	J	4.60E-01		mg/kg	3123	36/49	0.21-0.25	4.60E-01		Y	
Cadmium	7440-43-9	3.00E-02	J	8.80E-01		mg/kg	3147	46/49	0.21-0.25	8.80E-01		Y	
Chromium	7440-47-3	9.80E+00	J	1.76E+02	J	mg/kg	3133	49/49	0.51-0.63	1.76E+02		Y	
Cobalt	7440-48-4	8.50E+00		2.82E+01		mg/kg	3125	49/49	0.51-0.63	2.82E+01		Y	

Table I3-1
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Surface Soil (0–2 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0–2 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Copper	7440-50-8	1.05E+01		1.18E+02	J	mg/kg	3131	49/49	0.51-0.63	1.18E+02		Y	
Iron	7439-89-6	1.53E+04		6.70E+04		mg/kg	3140	49/49	3.2-35	6.70E+04		Y	
Lead	7439-92-1	6.90E+00		1.68E+02		mg/kg	3115	49/49	0.31-0.38	1.68E+02		Y	
Mercury	7439-97-6	1.30E-01	J	2.00E+00		mg/kg	3133	38/49	0.21-0.46	2.00E+00		Y	
Molybdenum	7439-98-7	1.90E+00		1.90E+00		mg/kg	3124	1/49	0.22-0.22	1.90E+00		Y	
Nickel	7440-02-0	1.19E+01	J	3.89E+02	J	mg/kg	3133	49/49	0.31-0.38	3.89E+02		Y	
Selenium	7782-49-2	1.90E+00	J	3.00E+00	J	mg/kg	3101	5/49	0.51-0.56	3.00E+00		Y	
Thallium	7440-28-0	4.80E-01	J	3.30E+00		mg/kg	3131	23/49	0.51-0.58	3.30E+00		Y	
Vanadium	7440-62-2	2.19E+01		1.04E+02		mg/kg	3140	49/49	0.51-0.63	1.04E+02		Y	
Zinc	7440-66-6	3.91E+01		2.28E+02		mg/kg	3147	49/49	0.51-0.63	2.28E+02		Y	

Notes:
[a] minimum and maximum detected concentrations
[b] refer to Appendix H for a discussion on background
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)
[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:
D – indicates the sample was diluted by the laboratory
J – indicates a value estimated by the laboratory

Table I3-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–7 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–7 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
Acenaphthene	83-32-9	2.30E-04	J	2.90E+00	D	mg/kg	C3S031B008	454/646	0.00019 - 0.1325	2.90E+00	NA	Y	FD
Acenaphthylene	208-96-8	1.60E-04	J	1.20E+00	D	mg/kg	C3S031B032	515/646	0.00015 - 0.1435	1.20E+00	NA	Y	FD
Anthracene	120-12-7	2.30E-04	J	5.00E+00	D	mg/kg	C3S031B008	529/646	0.00017 - 0.1214	5.00E+00	NA	Y	FD
Benzene	71-43-2	1.00E-03	J	3.00E-03	J	mg/kg	3145	2/120	0.0065-0.0071	3.00E-03	NA	Y	FD
Benzo(g,h,i)Perylene	191-24-2	3.40E-04	J	1.30E+01	D	mg/kg	C3S031B032	596/646	0.000089 - 0.1656	1.30E+01	NA	Y	FD
Dichloromethane	75-09-2	8.00E-04	J	2.00E-03	J	mg/kg	3134	5/120	0.005-0.0055	2.00E-03	NA	Y	FD
Fluorene	86-73-7	1.70E-04	J	1.80E-01	JD	mg/kg	C3S031B032	496/646	0.00016 - 0.11	1.80E-01	NA	Y	FD
2-Methylnaphthalene	91-57-6	2.40E-04	J	2.60E-01	JD	mg/kg	C3S031B032	520/646	0.00019 - 0.0883	2.60E-01	NA	Y	FD
Naphthalene	91-20-3	2.40E-04	J	1.60E+00	D	mg/kg	C3S031B032	538/646	0.00019 - 0.11	1.60E+00	NA	Y	FD
Phenanthrene	85-01-8	3.10E-04	J	2.40E+01	D	mg/kg	C3S031B008	569/646	0.00014 - 0.1876	2.40E+01	NA	Y	FD
Pyrene	129-00-0	2.90E-04	J	4.70E+01	D	mg/kg	C3S031B032	613/646	0.000098 - 0.1766	4.70E+01	NA	Y	FD
Xylenes (total)	1330-20-7	5.00E-04	J	3.00E-03	J	mg/kg	3137	3/120	0.0085-0.013	3.00E-03	NA	Y	FD
Semivolatile Organic Compounds													
Benzo(a)Anthracene	56-55-3	2.30E-04	J	1.50E+01	D	mg/kg	C3S031B032	574/646	0.00012 - 0.1987	1.50E+01	NA	Y	FD
Benzo(a)Pyrene	50-32-8	1.70E-04	J	2.10E+01	D	mg/kg	C3S031B032	600/646	0.00013 - 0.1545	2.10E+01	NA	Y	FD
Benzo(b)Fluoranthene	205-99-2	2.30E-04	J	1.20E+01	D	mg/kg	C3S031B032	614/646	0.00013 - 0.1435	1.20E+01	NA	Y	FD
Benzo(k)Fluoranthene	207-08-9	2.40E-04	J	1.30E+01	D	mg/kg	C3S031B032	560/646	0.00014 - 0.1987	1.30E+01	NA	Y	FD
1,2-Benzphenanthracene	218-01-9	1.90E-04	J	1.80E+01	D	mg/kg	C3S031B032	599/646	0.00014 - 0.1876	1.80E+01	NA	Y	FD
Dibenz(A,H)Anthracene	53-70-3	2.30E-04	J	1.70E+00	D	mg/kg	C3S031B032	539/646	0.00016 - 0.1545	1.70E+00	NA	Y	FD
Fluoranthene	206-44-0	3.80E-04	J	3.50E+01	D	mg/kg	C3S031B032	592/646	0.00016 - 0.2097	3.50E+01	NA	Y	FD
Indeno(1,2,3-C,D)Pyrene	193-39-5	2.70E-04	J	1.40E+01	D	mg/kg	C3S031B032	566/646	0.00014 - 0.2208	1.40E+01	NA	Y	FD
Phenol	108-95-2	2.00E-01	J	3.00E-01	J	mg/kg	3134	2/120	0.54-0.56	3.00E-01	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
Aroclor 1016	12674-11-2	4.70E-02		4.70E-02		mg/kg	3138	1/123	0.035-0.035	4.70E-02	NA	Y	FD
Aroclor 1260	11096-82-5	5.00E-03	J	2.00E-02	J	mg/kg	3105	9/123	0.034-0.037	2.00E-02	NA	Y	FD
4,4-DDD	72-54-8	4.00E-04	J	5.00E-03	J	mg/kg	3117	3/123	0.0034-0.035	5.00E-03	NA	Y	FD
4,4-DDE	72-55-9	1.00E-04	J	3.00E-02	J	mg/kg	3117	8/123	0.0032-0.035	3.00E-02	NA	Y	FD
4,4-DDT	50-29-3	2.00E-04	J	2.60E-03	J	mg/kg	3110	5/123	0.0033-0.0035	2.60E-03	NA	Y	FD
Dieldrin	60-57-1	5.00E-04	J	5.00E-04	J	mg/kg	3114	1/123	0.0035-0.0035	5.00E-04	NA	Y	FD
Endosulfan Sulfate	1031-07-8	4.00E-03		4.00E-03		mg/kg	178-Z16-001	1/123	0.004-0.084	4.00E-03	NA	Y	FD
Heptachlor	76-44-8	5.00E-04	J	5.00E-04	J	mg/kg	3114	1/123	0.0019-0.0019	5.00E-04	NA	Y	FD
Metals													
Antimony	7440-36-0	1.40E-01	J	3.20E+00	J	mg/kg	3101	17/120	5.3-7.6	3.20E+00		Y	
Arsenic	7440-38-2	2.30E+00		4.24E+01		mg/kg	3106	120/120	0.31-0.51	4.24E+01		Y	
Barium	7440-39-3	3.09E+01		4.76E+02		mg/kg	3125	120/120	1-1.7	4.76E+02		Y	
Beryllium	7440-41-7	6.50E-03	J	6.60E-01		mg/kg	3125	75/120	0.21-0.26	6.60E-01		Y	

Table I3-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–7 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–7 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Cadmium	7440-43-9	1.70E-02	J	1.50E+00		mg/kg	3125	98/120	0.21-0.34	1.50E+00		Y	
Chromium	7440-47-3	3.00E+00		1.97E+02	J	mg/kg	3134	120/120	0.51-0.85	1.97E+02		Y	
Cobalt	7440-48-4	5.50E+00		2.86E+01		mg/kg	3131	120/120	0.51-0.85	2.86E+01		Y	
Copper	7440-50-8	3.60E+00		1.18E+02	J	mg/kg	3131	120/120	0.51-0.85	1.18E+02		Y	
Iron	7439-89-6	1.05E+04	J	6.70E+04		mg/kg	3140	120/120	3.1-5.1	6.70E+04		Y	
Lead	7439-92-1	6.10E+00		1.68E+02		mg/kg	3115	120/120	0.31-0.51	1.68E+02		Y	
Mercury	7439-97-6	1.30E-01	J	2.40E+00		mg/kg	3146	97/120	0.21-0.67	2.40E+00		Y	
Molybdenum	7439-98-7	4.70E-01	J	2.50E+00		mg/kg	3101	4/120	0.22-0.3	2.50E+00		Y	
Nickel	7440-02-0	2.40E+00		4.74E+02	J	mg/kg	3134	120/120	0.31-0.51	4.74E+02		Y	
Selenium	7782-49-2	8.80E-01	J	3.10E+00	J	mg/kg	3101	13/120	0.51-0.65	3.10E+00		Y	
Thallium	7440-28-0	4.80E-01	J	3.70E+00		mg/kg	3103	44/120	0.51-0.85	3.70E+00		Y	
Vanadium	7440-62-2	2.09E+01		1.04E+02		mg/kg	3140	120/120	0.51-0.85	1.04E+02		Y	
Zinc	7440-66-6	2.75E+01		9.01E+02		mg/kg	3125	120/120	0.51-0.85	9.01E+02		Y	

Notes:
[a] minimum and maximum detected concentrations
[b] refer to Appendix H for a discussion on background
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)
[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:
D – indicates the sample was diluted by the laboratory
J – indicates a value estimated by the laboratory

Table I3-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
Acenaphthene	83-32-9	3.00E+00	J	1.00E+02	J	µg/L	3146	6/11	10-500	1.00E+02	NA	Y	FD
Acenaphthylene	208-96-8	1.50E+00	J	1.30E+02	J	µg/L	OS-HP-03	6/11	10-10	1.30E+02	NA	Y	FD
Acetone	67-64-1	3.00E+00	J	3.00E+00	J	µg/L	3150	2/11	50-50	3.00E+00	NA	Y	FD
Anthracene	120-12-7	3.00E-01		5.90E+01		µg/L	OS-HP-21	9/11	10-10	5.90E+01	NA	Y	FD
Benzene	71-43-2	6.00E-01	J	1.37E+02	J	µg/L	3146	14/16	0.5-5	1.37E+02	NA	Y	FD
Benzo(g,h,i)perylene	191-24-2	1.00E+00	J	3.70E+01	J	µg/L	OS-HP-03	7/11	10-10	3.70E+01	NA	Y	FD
Carbon disulfide	75-15-0	2.70E-01	J	9.60E-01	J	µg/L	OS-HP-05	2/4	2-2	9.60E-01	NA	Y	FD
Dibenzofuran	132-64-9	6.00E+00	J	6.00E+00	J	µg/L	3146	1/6	10-10	6.00E+00	NA	Y	FD
1,2-Dichloroethane	107-06-2	2.20E-01	J	3.00E+00	J	µg/L	3142	2/16	5-5	3.00E+00	NA	Y	FD
Dichloromethane	75-09-2	2.20E-01	J	3.10E-01	J	µg/L	OS-HP-22	2/5	1-2	3.10E-01	NA	Y	FD
Ethylbenzene	100-41-4	4.00E-01	J	5.20E+01		µg/L	3146	12/16	0.5-5	5.20E+01	NA	Y	FD
Fluorene	86-73-7	2.00E+00	J	4.50E+01		µg/L	OS-HP-20	6/11	10-10	4.50E+01	NA	Y	FD
4-Isopropyltoluene	99-87-6	1.30E-01	J	1.50E-01	J	µg/L	OS-HP-22	2/5	1-2	1.50E-01	NA	Y	FD
Methane	74-82-8	3.00E+03		3.00E+03		µg/L	OS-HP-20	1/1	—	3.00E+03	NA	Y	FD
Methylnaphthalene	1321-94-4	3.00E+00	J	1.80E+02		µg/L	3146	6/6	10-500	1.80E+02	NA	Y	FD
MTBE	1634-04-4	3.00E-01	J	1.00E+00	J	µg/L	OS-HP-21	2/5	5-5	1.00E+00	NA	Y	FD
Naphthalene	91-20-3	3.00E-01	J	2.03E+03		µg/L	3146	11/11	10-500	2.03E+03	NA	Y	FD
Phenanthrene	85-01-8	3.00E-01	J	2.50E+02		µg/L	OS-HP-22	11/11	10-500	2.50E+02	NA	Y	FD
Pyrene	129-00-0	2.10E+00	J	2.00E+02	J	µg/L	OS-HP-21	10/11	10-10	2.00E+02	NA	Y	FD
Styrene	100-42-5	4.00E-01	J	5.00E+00	J	µg/L	3146	3/16	5-5	5.00E+00	NA	Y	FD
Toluene	108-88-3	3.00E-01	J	4.00E+01	J	µg/L	3146	8/16	0.5-5	4.00E+01	NA	Y	FD
1,2,4-Trimethylbenzene	95-63-6	3.40E-01	J	9.00E+00		µg/L	3142	6/16	0.5-5	9.00E+00	NA	Y	FD
1,3,5-Trimethylbenzene	108-67-8	3.70E-01	J	4.00E+00	J	µg/L	3146	4/16	5-5	4.00E+00	NA	Y	FD
Xylenes (total)	1330-20-7	2.00E-01	J	7.00E+01		µg/L	3142	9/16	0.5-5	7.00E+01	NA	Y	FD

Table I3-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Notes:
[a] minimum and maximum detected concentrations
[b] refer to Appendix J for a discussion on background
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)
[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
FD – frequency of detection
LFD – low frequency of detection
MTBE – methyl tert-butyl ether
µg/L – micrograms per liter
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table I4-1
Selection of Exposure Pathways

Scenario Time Frame	Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Vadose zone soil (0–2 feet bgs)	Outdoor/Indoor	Residential	Child/Adult	Ingestion of soil	Quantitative	Potentially complete
					Dermal contact with soil	Quantitative	Potentially complete
					Inhalation of volatiles in indoor air	Quantitative	Potentially complete
					Inhalation of volatiles in outdoor air	Quantitative	Potentially complete
					Inhalation of particulates in outdoor air	Quantitative	Potentially complete
					Ingestion of homegrown produce	Quantitative	Potentially complete
Future	Vadose zone soil (0–7 feet bgs)	Outdoor/Indoor	Residential	Child/Adult	Ingestion of soil	Quantitative	Potentially complete
					Dermal contact with soil	Quantitative	Potentially complete
					Inhalation of volatiles in indoor air	Quantitative	Potentially complete
					Inhalation of volatiles in outdoor air	Quantitative	Potentially complete
					Inhalation of particulates in outdoor air	Quantitative	Potentially complete
					Ingestion of homegrown produce	Quantitative	Potentially complete
		Outdoor	Construction	Adult	Ingestion of soil	Quantitative	Potentially complete
					Dermal contact with soil	Quantitative	Potentially complete
					Inhalation of volatiles in outdoor air	Quantitative	Potentially complete
					Inhalation of particulates in outdoor air	Quantitative	Potentially complete
Current	Groundwater	Outdoor/Indoor	Residential	Child/Adult	Inhalation of volatiles in indoor air	Quantitative	Potentially complete
Future	Groundwater	Outdoor/Indoor	Residential	Child/Adult	Ingestion of groundwater	ERRG 2004	Regulatory requirement
					Inhalation of vapors while showering	ERRG 2004	Regulatory requirement
					Inhalation of volatiles in indoor air	Quantitative	Potentially complete
		Outdoor	Construction	Adult	Dermal contact with groundwater	None	Exposure is transient and minimal

Acronym/Abbreviation:
bgs – below ground surface
ERRG – Engineering/Remediation Resources Group, Inc.

Reference:
ERRG 2004. Groundwater Remedial Investigation/Feasibility Study. Alameda Point Site 25/Annex IR-02. Final. October.

Table I4-2
Exposure Point Concentration Summary
Surface Soil (0–2 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0–2 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Method	Rationale*
Volatile Organic Compounds							
Acenaphthene	mg/kg	1.85E-02	2.94E-02	6.70E-02	2.94E-02	Statistics	U.S. EPA guidance
Acenaphthylene	mg/kg	1.93E-02	3.01E-02	6.40E-02	3.01E-02	Statistics	U.S. EPA guidance
Anthracene	mg/kg	2.45E-02	3.58E-02	1.70E-01	3.58E-02	Statistics	U.S. EPA guidance
Benzo(g,h,i)Perylene	mg/kg	7.83E-02	9.49E-02	1.60E+00	9.49E-02	Statistics	U.S. EPA guidance
Dichloromethane	mg/kg	2.46E-03	2.77E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
Fluorene	mg/kg	1.91E-02	3.00E-02	5.80E-02	3.00E-02	Statistics	U.S. EPA guidance
2-Methylnaphthalene	mg/kg	2.20E-02	3.31E-02	1.70E-01	3.31E-02	Statistics	U.S. EPA guidance
Naphthalene	mg/kg	2.16E-02	3.24E-02	1.00E-01	3.24E-02	Statistics	U.S. EPA guidance
Phenanthrene	mg/kg	5.62E-02	6.94E-02	5.80E-01	6.94E-02	Statistics	U.S. EPA guidance
Pyrene	mg/kg	1.11E-01	1.38E-01	2.10E+00	1.38E-01	Statistics	U.S. EPA guidance
Xylenes (total)	mg/kg	4.91E-03	5.59E-03	3.00E-03	3.00E-03	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
Benzo(a)Anthracene	mg/kg	5.27E-02	7.10E-02	7.10E-01	7.10E-02	Statistics	U.S. EPA guidance
Benzo(a)Pyrene	mg/kg	6.96E-02	9.53E-02	1.20E+00	9.53E-02	Statistics	U.S. EPA guidance
Benzo(b)Fluoranthene	mg/kg	7.25E-02	9.06E-02	1.00E+00	9.06E-02	Statistics	U.S. EPA guidance
Benzo(k)Fluoranthene	mg/kg	5.13E-02	7.12E-02	9.70E-01	7.12E-02	Statistics	U.S. EPA guidance
1,2-Benzphenanthracene	mg/kg	8.79E-02	1.11E-01	1.10E+00	1.11E-01	Statistics	U.S. EPA guidance
Dibenz(A,H)Anthracene	mg/kg	2.88E-02	4.02E-02	2.10E-01	4.02E-02	Statistics	U.S. EPA guidance
Fluoranthene	mg/kg	9.86E-02	1.37E-01	1.40E+00	1.37E-01	Statistics	U.S. EPA guidance
Indeno(1,2,3-C,D)Pyrene	mg/kg	6.91E-02	9.72E-02	1.50E+00	9.72E-02	Statistics	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
Aroclor 1016	mg/kg	1.87E-02	2.12E-02	4.70E-02	2.12E-02	Statistics	U.S. EPA guidance
Aroclor 1260	mg/kg	1.69E-02	1.92E-02	2.00E-02	1.92E-02	Statistics	U.S. EPA guidance
4,4-DDD	mg/kg	1.23E-02	1.65E-02	7.00E-04	7.00E-04	Maximum	U.S. EPA guidance
4,4-DDE	mg/kg	1.19E-02	1.62E-02	6.00E-03	6.00E-03	Maximum	U.S. EPA guidance
4,4-DDT	mg/kg	1.23E-02	1.65E-02	2.60E-03	2.60E-03	Maximum	U.S. EPA guidance
Dieldrin	mg/kg	1.23E-02	1.65E-02	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance
Endosulfan Sulfate	mg/kg	2.05E-02	2.76E-02	4.00E-03	4.00E-03	Maximum	U.S. EPA guidance
Metals							
Antimony	mg/kg	1.47E+00	2.21E+00	3.20E+00	2.21E+00	Statistics	U.S. EPA guidance
Arsenic	mg/kg	1.12E+01	1.25E+01	3.26E+01	1.25E+01	Statistics	U.S. EPA guidance
Barium	mg/kg	2.18E+02	2.44E+02	4.76E+02	2.44E+02	Statistics	U.S. EPA guidance
Beryllium	mg/kg	1.79E-01	2.45E-01	4.60E-01	2.45E-01	Statistics	U.S. EPA guidance
Cadmium	mg/kg	3.45E-01	3.90E-01	8.80E-01	3.90E-01	Statistics	U.S. EPA guidance

Table I4-2
Exposure Point Concentration Summary
Surface Soil (0–2 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0–2 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Method	Rationale*
Chromium	mg/kg	4.65E+01	5.39E+01	1.76E+02	5.39E+01	Statistics	U.S. EPA guidance
Cobalt	mg/kg	1.50E+01	1.61E+01	2.82E+01	1.61E+01	Statistics	U.S. EPA guidance
Copper	mg/kg	4.42E+01	5.00E+01	1.18E+02	5.00E+01	Statistics	U.S. EPA guidance
Iron	mg/kg	3.84E+04	4.13E+04	6.70E+04	4.13E+04	Statistics	U.S. EPA guidance
Lead	mg/kg	3.64E+01	6.15E+01	1.68E+02	6.15E+01	Statistics	U.S. EPA guidance
Mercury	mg/kg	4.24E-01	5.09E-01	2.00E+00	5.09E-01	Statistics	U.S. EPA guidance
Molybdenum	mg/kg	1.55E-01	3.16E-01	1.90E+00	3.16E-01	Statistics	U.S. EPA guidance
Nickel	mg/kg	6.19E+01	1.07E+02	3.89E+02	1.07E+02	Statistics	U.S. EPA guidance
Selenium	mg/kg	5.31E-01	9.37E-01	3.00E+00	9.37E-01	Statistics	U.S. EPA guidance
Thallium	mg/kg	1.09E+00	1.69E+00	3.30E+00	1.69E+00	Statistics	U.S. EPA guidance
Vanadium	mg/kg	5.34E+01	5.79E+01	1.04E+02	5.79E+01	Statistics	U.S. EPA guidance
Zinc	mg/kg	1.12E+02	1.32E+02	2.28E+02	1.32E+02	Statistics	U.S. EPA guidance

Note:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table I4-3
Exposure Point Concentration Summary
Vadose Zone Soil (0–7 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–7 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Method	Rationale*
Volatile Organic Compounds							
Acenaphthene	mg/kg	1.87E-02	3.92E-02	2.90E+00	3.92E-02	Statistics	U.S. EPA guidance
Acenaphthylene	mg/kg	1.86E-02	2.98E-02	1.20E+00	2.98E-02	Statistics	U.S. EPA guidance
Anthracene	mg/kg	3.15E-02	6.81E-02	5.00E+00	6.81E-02	Statistics	U.S. EPA guidance
Benzene	mg/kg	2.59E-03	2.73E-03	3.00E-03	2.73E-03	Statistics	U.S. EPA guidance
Benzo(g,h,i)Perylene	mg/kg	1.62E-01	2.96E-01	1.30E+01	2.96E-01	Statistics	U.S. EPA guidance
Dichloromethane	mg/kg	2.55E-03	2.74E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
Fluorene	mg/kg	1.46E-02	2.07E-02	1.80E-01	2.07E-02	Statistics	U.S. EPA guidance
2-Methylnaphthalene	mg/kg	1.60E-02	2.23E-02	2.60E-01	2.23E-02	Statistics	U.S. EPA guidance
Naphthalene	mg/kg	2.33E-02	3.77E-02	1.60E+00	3.77E-02	Statistics	U.S. EPA guidance
Phenanthrene	mg/kg	1.01E-01	2.65E-01	2.40E+01	2.65E-01	Statistics	U.S. EPA guidance
Pyrene	mg/kg	3.30E-01	7.82E-01	4.70E+01	7.82E-01	Statistics	U.S. EPA guidance
Xylenes (total)	mg/kg	5.14E-03	5.50E-03	3.00E-03	3.00E-03	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
Benzo(a)Anthracene	mg/kg	1.03E-01	2.24E-01	1.50E+01	2.24E-01	Statistics	U.S. EPA guidance
Benzo(a)Pyrene	mg/kg	1.62E-01	3.41E-01	2.10E+01	3.41E-01	Statistics	U.S. EPA guidance
Benzo(b)Fluoranthene	mg/kg	1.33E-01	2.41E-01	1.20E+01	2.41E-01	Statistics	U.S. EPA guidance
Benzo(k)Fluoranthene	mg/kg	1.05E-01	2.15E-01	1.30E+01	2.15E-01	Statistics	U.S. EPA guidance
1,2-Benzphenanthracene	mg/kg	1.49E-01	2.98E-01	1.80E+01	2.98E-01	Statistics	U.S. EPA guidance
Dibenz(A,H)Anthracene	mg/kg	2.91E-02	4.45E-02	1.70E+00	4.45E-02	Statistics	U.S. EPA guidance
Fluoranthene	mg/kg	2.57E-01	5.88E-01	3.50E+01	5.88E-01	Statistics	U.S. EPA guidance
Indeno(1,2,3-C,D)Pyrene	mg/kg	1.52E-01	2.86E-01	1.40E+01	2.86E-01	Statistics	U.S. EPA guidance
Phenol	mg/kg	1.33E+01	2.70E+01	3.00E-01	3.00E-01	Maximum	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
Aroclor 1016	mg/kg	1.88E-02	1.99E-02	4.70E-02	1.99E-02	Statistics	U.S. EPA guidance
Aroclor 1260	mg/kg	1.79E-02	1.91E-02	2.00E-02	1.91E-02	Statistics	U.S. EPA guidance
4,4-DDD	mg/kg	8.85E-03	1.19E-02	5.00E-03	5.00E-03	Maximum	U.S. EPA guidance
4,4-DDE	mg/kg	8.84E-03	1.19E-02	3.00E-02	1.19E-02	Statistics	U.S. EPA guidance
4,4-DDT	mg/kg	8.96E-03	1.20E-02	2.60E-03	2.60E-03	Maximum	U.S. EPA guidance
Dieldrin	mg/kg	8.96E-03	1.20E-02	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance
Endosulfan Sulfate	mg/kg	1.49E-02	2.00E-02	4.00E-03	4.00E-03	Maximum	U.S. EPA guidance
Heptachlor	mg/kg	5.07E-03	6.78E-03	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance

Table I4-3
Exposure Point Concentration Summary
Vadose Zone Soil (0–7 feet bgs)

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–7 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Method	Rationale*
Metals							
Antimony	mg/kg	1.62E+00	2.10E+00	3.20E+00	2.10E+00	Statistics	U.S. EPA guidance
Arsenic	mg/kg	1.06E+01	1.17E+01	4.24E+01	1.17E+01	Statistics	U.S. EPA guidance
Barium	mg/kg	1.67E+02	1.84E+02	4.76E+02	1.84E+02	Statistics	U.S. EPA guidance
Beryllium	mg/kg	1.98E-01	2.53E-01	6.60E-01	2.53E-01	Statistics	U.S. EPA guidance
Cadmium	mg/kg	2.75E-01	3.08E-01	1.50E+00	3.08E-01	Statistics	U.S. EPA guidance
Chromium	mg/kg	5.77E+01	6.38E+01	1.97E+02	6.38E+01	Statistics	U.S. EPA guidance
Cobalt	mg/kg	1.49E+01	1.57E+01	2.86E+01	1.57E+01	Statistics	U.S. EPA guidance
Copper	mg/kg	3.54E+01	3.88E+01	1.18E+02	3.88E+01	Statistics	U.S. EPA guidance
Iron	mg/kg	3.39E+04	3.86E+04	6.70E+04	3.86E+04	Statistics	U.S. EPA guidance
Lead	mg/kg	2.84E+01	4.06E+01	1.68E+02	4.06E+01	Statistics	U.S. EPA guidance
Mercury	mg/kg	6.24E-01	7.06E-01	2.40E+00	7.06E-01	Statistics	U.S. EPA guidance
Molybdenum	mg/kg	1.58E-01	2.68E-01	2.50E+00	2.68E-01	Statistics	U.S. EPA guidance
Nickel	mg/kg	9.47E+01	1.35E+02	4.74E+02	1.35E+02	Statistics	U.S. EPA guidance
Selenium	mg/kg	5.19E-01	7.53E-01	3.10E+00	7.53E-01	Statistics	U.S. EPA guidance
Thallium	mg/kg	8.73E-01	1.23E+00	3.70E+00	1.23E+00	Statistics	U.S. EPA guidance
Vanadium	mg/kg	4.85E+01	5.12E+01	1.04E+02	5.12E+01	Statistics	U.S. EPA guidance
Zinc	mg/kg	1.03E+02	1.37E+02	9.01E+02	1.37E+02	Statistics	U.S. EPA guidance

Note:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table I4-4
Exposure Point Concentration Summary
Groundwater

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Method	Rationale*
Volatile Organic Compounds							
Acenaphthene	µg/L	NA	NA	1.00E+02	1.00E+02	Maximum	U.S. EPA guidance
Acenaphthylene	µg/L	NA	NA	1.30E+02	1.30E+02	Maximum	U.S. EPA guidance
Acetone	µg/L	NA	NA	3.00E+00	3.00E+00	Maximum	U.S. EPA guidance
Anthracene	µg/L	NA	NA	5.90E+01	5.90E+01	Maximum	U.S. EPA guidance
Benzene	µg/L	NA	NA	1.37E+02	1.37E+02	Maximum	U.S. EPA guidance
Benzo(g,h,i)perylene	µg/L	NA	NA	3.70E+01	3.70E+01	Maximum	U.S. EPA guidance
Carbon disulfide	µg/L	NA	NA	9.60E-01	9.60E-01	Maximum	U.S. EPA guidance
Dibenzofuran	µg/L	NA	NA	6.00E+00	6.00E+00	Maximum	U.S. EPA guidance
1,2-Dichloroethane	µg/L	NA	NA	3.00E+00	3.00E+00	Maximum	U.S. EPA guidance
Dichloromethane	µg/L	NA	NA	3.10E-01	3.10E-01	Maximum	U.S. EPA guidance
Ethylbenzene	µg/L	NA	NA	5.20E+01	5.20E+01	Maximum	U.S. EPA guidance
Fluorene	µg/L	NA	NA	4.50E+01	4.50E+01	Maximum	U.S. EPA guidance
4-Isopropyltoluene	µg/L	NA	NA	1.50E-01	1.50E-01	Maximum	U.S. EPA guidance
Methane	µg/L	NA	NA	3.00E+03	3.00E+03	Maximum	U.S. EPA guidance
Methylnaphthalene	µg/L	NA	NA	1.00E+00	1.00E+00	Maximum	U.S. EPA guidance
MTBE	µg/L	NA	NA	1.00E+00	1.00E+00	Maximum	U.S. EPA guidance
Naphthalene	µg/L	NA	NA	2.03E+03	2.03E+03	Maximum	U.S. EPA guidance
Phenanthrene	µg/L	NA	NA	2.50E+02	2.50E+02	Maximum	U.S. EPA guidance
Pyrene	µg/L	NA	NA	2.00E+02	2.00E+02	Maximum	U.S. EPA guidance
Styrene	µg/L	NA	NA	5.00E+00	5.00E+00	Maximum	U.S. EPA guidance
Toluene	µg/L	NA	NA	4.00E+01	4.00E+01	Maximum	U.S. EPA guidance
1,2,4-Trimethylbenzene	µg/L	NA	NA	9.00E+00	9.00E+00	Maximum	U.S. EPA guidance
1,3,5-Trimethylbenzene	µg/L	NA	NA	4.00E+00	4.00E+00	Maximum	U.S. EPA guidance
Xylenes (total)	µg/L	NA	NA	7.00E+01	7.00E+01	Maximum	U.S. EPA guidance

Note:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
MTBE – methyl tert-butyl ether
µg/L – micrograms per liter
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table I4-5
Reasonable Maximum Exposure Values Used for Daily Intake

Equation Parameter		Units	Resident Child (a)		Resident Adult (b)		Construction Worker		Intake Equation mg/kg-day
Ingestion of Soil									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S \times CF \times IRS \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Intake rate	IRS	mg/day	200	U.S. EPA 2004a	100	U.S. EPA 2004a	330	RWQCB 2005	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	2555	U.S. EPA 2004a	
Dermal Contact with Soil									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S \times CF \times AF \times SA \times DAF \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Adherence factor	AF	mg/cm²	0.2	U.S. EPA 2004a U.S. EPA 2004c	0.07	U.S. EPA 2004a U.S. EPA 2004c	0.51	RWQCB 2005	
Exposed skin area	SA	cm²/day	2,800	U.S. EPA 2004a U.S. EPA 2004c	5,700	U.S. EPA 2004a U.S. EPA 2004c	5,800	RWQCB 2005	
Dermal absorption factor	DAF	unitless	Chemical specific	DTSC 1994 U.S. EPA 2004a	Chemical specific	DTSC 1994 U.S. EPA 2004a	Chemical specific	DTSC 1994 U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	2555	U.S. EPA 2004a	
Inhalation of Vapors in Indoor Air Originating from Groundwater and Soil									
Concentration in indoor air based on concentration in groundwater or soil	C_A	mg/m³	Chemical specific	U.S. EPA 2004b	Chemical specific	U.S. EPA 2004b	NA	—	$(C_A \times IRA \times ET \times EF \times ED) / (BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	NA	—	
Exposure time	ET	hours/day	24		24		NA	—	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	NA	—	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	NA	—	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	NA	—	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	NA	—	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	NA	—	
Inhalation of Vapors in Outdoor Air Originating from Soil									
Concentration in outdoor air based on concentration in soil	C_A	mg/m³	Chemical specific	U.S. EPA 2004a	Chemical specific	U.S. EPA 2004a	Chemical specific	U.S. EPA 2004a	$(C_A \times IRA \times ET \times EF \times ED) / (BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	0.83	RWQCB 2005	
Exposure time	ET	hours/day	24		24		8		
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	2555	U.S. EPA 2004a	

Table I4-5
Reasonable Maximum Exposure Values Used for Daily Intake

Equation Parameter		Units	Resident Child (a)		Resident Adult (b)		Construction Worker		Intake Equation mg/kg-day
Inhalation of Soil Particulates									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S$ x PM10 x IRA x ET x EF x ED) / (BW x AT)
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	0.83	RWQCB 2005	
Particulate emission factor	PEF	m³/kg	1.316E+09	U.S. EPA 2004a	1.316E+09	U.S. EPA 2004a	1.440E+06	RWQCB 2005	
Exposure time	ET	hours/day	24		24		8		
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	2555	U.S. EPA 2004a	
Ingestion of Homegrown Produce									
Concentration in soil	CS	mg/kg	Chemical specific		Chemical specific		NA	—	(CS x UF x IRS x EF x ED) / (BW x AT)
Uptake factor	UF	—	Chemical specific	See Table I4-8	Chemical specific	See Table I4-8	NA	—	
Intake rate	IRS	kg/day	0.0174	U.S. EPA 1997	0.0812	U.S. EPA 1997	NA	—	
Exposure frequency	EF	days/year	70	See Appendix I	70	See Appendix I	NA	—	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	NA	—	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	NA	—	
Averaging time (cancer)	ATC	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	NA	—	
Averaging time (noncancer)	ATNC	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	NA	—	

Notes:
[a] residential child age is 0 to 6 years
[b] residental carcinogenic exposure was assumed for a total of 30 years; 6 years as a child and 24 years as an adult; residential noncarcinogenic exposure was assumed for a total of 6 years as a child

Acronyms/Abbreviations:
cm²/day – square centimeters per day
days/year – days per year
DTSC – Department of Toxic Substances Control
hours/day – hours per day
kg – kilograms
kg/day – kilograms per day
kg/mg – kilograms per milligram
m³/hour – cubic meters per hour
m³/kg – cubic meters per kilogram
mg/cm² – milligrams per square centimeter
mg/day – milligrams per day
mg/kg – milligrams per kilogram
mg/m³ – milligrams per cubic meter
NA – not applicable
RWQCB – Regional Water Quality Control Board
U.S. EPA – United States Environmental Protection Agency

References:

DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January.
RWQCB 2005. Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater. February.
U.S. EPA 1997. Exposure Factors Handbook. August.
U.S. EPA 2004a. Region 9 Preliminary Remediation Goals. October.
U.S. EPA 2004b. Software Implementation of Johnson and Ettinger Model. Version 3.0. February.
U.S. EPA 2004c. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005. July.

Table I4-6
Central Tendency Exposure Values Used for Daily Intake

Equation Parameter		Units	Residential		Residential		Construction		Intake Equation
Ingestion of Soil									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S \times CF \times IRS \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Intake rate	IRS	mg/day	100	U.S. EPA 1997	50	U.S. EPA 1997	330	RWQCB 2005	
Exposure frequency	EF	days/year	234	U.S. EPA 1993	234	U.S. EPA 1993	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	2,555	U.S. EPA 2004a	
Dermal Contact with Soil									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S \times CF \times AF \times SA \times DAF \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Adherence factor	AF	mg/cm²	0.04	U.S. EPA 2004c	0.01	U.S. EPA 2004c	0.51	RWQCB 2005	
Exposed skin area	SA	cm²/day	2,800	U.S. EPA 2004a U.S. EPA 2004c	5,700	U.S. EPA 2004a U.S. EPA 2004c	5,800	RWQCB 2005	
Dermal absorption factor	DAF	unitless	Chemical specific	DTSC 1994 U.S. EPA 2004a	Chemical specific	DTSC 1994 U.S. EPA 2004a	Chemical specific	DTSC 1994 U.S. EPA 2004a	
Exposure frequency	EF	days/year	234	U.S. EPA 1993	234	U.S. EPA 1993	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	2,555	U.S. EPA 2004a	
Inhalation of Vapors in Indoor Air Originating									
Concentration in indoor air based on concentration in soil and groundwater	C_A	mg/m³	Chemical specific	U.S. EPA 2004b	Chemical specific	U.S. EPA 2004b	NA	—	$(C_A \times IRA \times ET \times EF \times ED) / (BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	NA	—	
Exposure time	ET	hours/day	24		24		NA	—	
Exposure frequency	EF	days/year	234	U.S. EPA 1993	234	U.S. EPA 1993	NA	—	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	NA	—	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	NA	—	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	NA	—	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	NA	—	
Inhalation of Vapors in Outdoor Air Originating									
Concentration in outdoor air based on concentration in soil	C_A	mg/m³	Chemical specific	U.S. EPA 2004a	Chemical specific	U.S. EPA 2004a	Chemical specific	U.S. EPA 2004a	$(C_A \times IRA \times ET \times EF \times ED) / (BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	0.83	RWQCB 2005	
Exposure time	ET	hours/day	24		24		8		
Exposure frequency	EF	days/year	234	U.S. EPA 1993	234	U.S. EPA 1993	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	2,555	U.S. EPA 2004a	

Table I4-6
Central Tendency Exposure Values Used for Daily Intake

Equation Parameter		Units	Resident		Resident		Construction		Intake Equation
Inhalation of Soil Particulates in Outdoor Air									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		Chemical specific		$(C_S \times IRA \times ET \times EF \times ED) / (PEF \times BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	0.83	RWQCB 2005	
Particulate emission factor	PEF	m³/kg	1.316E+09	U.S. EPA 2004a	1.316E+09	U.S. EPA 2004a	1.44E+06	RWQCB 2005	
Exposure time	ET	hours/day	24		24		8		
Exposure frequency	EF	days/year	234	U.S. EPA 1993	234	U.S. EPA 1993	20	RWQCB 2005	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	7	RWQCB 2005	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	2,555	U.S. EPA 2004a	
Ingestion of Homegrown Produce									
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		NA	—	$(C_S \times UF \times IRS \times EF \times ED) / (BW \times AT)$
Uptake factor	UF	—	Chemical specific	See Table I4-8	Chemical specific	See Table I4-8	NA	—	
Intake rate	IRS	kg/day	0.0064	U.S. EPA 1997	0.03	U.S. EPA 1997	NA	—	
Exposure frequency	EF	days/year	47	See Appendix I	47	See Appendix I	NA	—	
Exposure duration	ED	years	6	U.S. EPA 2004a	9	U.S. EPA 1989	NA	—	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	NA	—	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	NA	—	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	3,285	U.S. EPA 2004a	NA	—	

Notes:
[a] residential child age is 0 to 6 years
[b] residental carcinogenic exposure was assumed for a total of 30 years; 6 years as a child and 24 years as an adult; residential noncarcinogenic exposure was assumed for a total of 6 years as a child

Acronyms/Abbreviations:
cm²/day – square centimeters per day
days/year – days per year
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
hours/day – hours per day
kg – kilograms
kg/day – kilograms per day
kg/mg – kilograms per milligram
m³/hour – cubic meters per hour
m³/kg – cubic meters per kilogram
mg/cm² – milligrams per square centimeter
mg/day – milligrams per day
mg/kg – milligrams per kilogram
mg/m³ – milligrams per cubic meter
NA – not applicable
RWQCB – Regional Water Quality Control Board
U.S. EPA – United States Environmental Protection Agency

References:

DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January.
RWQCB 2005. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, San Francisco Bay Region, July.
U.S. EPA 1989. Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002.
U.S. EPA 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. November.
U.S. EPA 1997. Exposure Factors Handbook. August.
U.S. EPA 2004a. Region 9 Preliminary Remediation Goals. October.
U.S. EPA 2004b. Software Implementation of Johnson and Ettinger Model. Version 3.0. February.
U.S. EPA 2004c. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005. September.

Table I4-7
Dermal Absorption Values for the Dermal Contact with Soil Exposure Pathway

CAS Number	Chemical of Potential Concern	ABSORPTION FACTORS FOR SOIL DTSC	U.S. EPA	Most Conservative
Volatile Organic Compounds				
83-32-9	Acenaphthene	0.15	—	0.15
208-96-8	Acenaphthylene	0.15	—	0.15
120-12-7	Anthracene	0.15	—	0.15
71-43-2	Benzene	0.1	—	0.1
191-24-2	Benzo(g,h,i)perylene	0.15	—	0.15
75-09-2	Dichloromethane	0.1	—	0.1
86-73-7	Fluorene	0.15	—	0.15
91-57-6	2-Methylnaphthalene	0.15	—	0.15
91-20-3	Naphthalene	0.15	—	0.15
85-01-8	Phenanthrene	0.15	—	0.15
129-00-0	Pyrene	0.15	—	0.15
1330-20-7	Xylenes (total)	0.1	0.1	0.1
Semivolatile Organic Compounds				
56-55-3	Benz(a)anthracene	0.15	0.13	0.15
205-99-2	Benzo(a)pyrene	0.15	0.13	0.15
207-08-9	Benzo(b)fluoranthene	0.15	0.13	0.15
50-32-8	Benzo(k)fluoranthene	0.15	0.13	0.15
218-01-9	1,2-Benzphenanthracene	0.15	0.13	0.15
53-70-3	Dibenz(a,h)anthracene	0.15	0.13	0.15
206-44-0	Fluoranthene	0.15	0.13	0.15
193-39-5	Indeno(1,2,3-cd)pyrene	0.15	0.13	0.15
108-95-2	Phenol	0.1	0.1	0.1
Pesticides/Polychlorinated Biphenyls				
12674-11-2	Aroclor 1016	0.15	0.14	0.15
11096-82-5	Aroclor 1260	0.15	0.14	0.15
72-54-8	4,4'-DDD	0.05	0.03	0.05
72-55-9	4,4'-DDE	0.05	0.03	0.05
50-29-3	4,4'-DDT	0.05	0.03	0.05
60-57-1	Dieldrin	0.05	0.1	0.1
1031-07-8	Endosulfan sulfate	0.05	0.1	0.1
76-44-8	Heptachlor	0.05	0.1	0.1
Metals				
7440-36-0	Antimony	0.01	—	0.01
7440-38-2	Arsenic	0.03	0.03	0.03
7440-39-3	Barium	0.01	—	0.01
7440-41-7	Beryllium	0.01	—	0.01
7440-43-9	Cadmium	0.001	0.001	0.001
7440-47-3	Chromium	0.01	—	0.01
7440-48-4	Cobalt	0.01	—	0.01
7440-50-8	Copper	0.01	—	0.01
7439-89-6	Iron	0.01	—	0.01
7439-92-1	Lead	0.01	—	0.01
7439-97-6	Mercury	0.01	—	0.01
7439-98-7	Molybdenum	0.01	—	0.01
7440-02-0	Nickel	0.01	—	0.01
7782-49-2	Selenium	0.01	—	0.01

Table I4-7
Dermal Absorption Values for the Dermal Contact with Soil Exposure Pathway

CAS Number	Chemical of Potential Concern	ABSORPTION FACTORS FOR SOIL		
		DTSC	U.S. EPA	Most Conservative
7440-28-0	Thallium	0.01	—	0.01
7440-62-2	Vanadium	0.01	—	0.01
7440-66-6	Zinc	0.01	—	0.01

Acronyms/Abbreviations:

CAS – Chemical Abstract Service
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
DTSC – Department of Toxic Substances Control
U.S. EPA – United States Environmental Protection Agency

Sources:

DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January.
U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.

Table I4-8
Uptake Factors Used to Evaluate the Ingestion of Homegrown Produce Exposure Pathway

$$\text{Uptake Factor (DTSC 1993, unitless)} = \frac{0.03 \times Kow^{0.77} + 0.82}{Koc \times foc}$$

where:

Kow = octonal/water partition coefficient (chemical-specific)
Koc = organic carbon partition coefficient (chemical-specific)
foc = fraction of organic carbon in upper two feet of soil (0.0018, site specific)

CAS Number	Chemical	Volatility[a]	Log Kow[b]	Kow	Koc[c]	Uptake Factor	Source
Volatile Organic Compounds							
83-32-9	Acenaphthene	1	—[d]	—	—	—	Not applicable for volatile compounds
208-96-8	Acenaphthylene	1	—	—	—	—	Not applicable for volatile compounds
120-12-7	Anthracene	1	—	—	—	—	Not applicable for volatile compounds
71-43-2	Benzene	1	—	—	—	—	Not applicable for volatile compounds
191-24-2	Benzo(g,h,i)perylene	1	—	—	—	—	Not applicable for volatile compounds
75-09-2	Dichloromethane	1	—	—	—	—	Not applicable for volatile compounds
86-73-7	Fluorene	1	—	—	—	—	Not applicable for volatile compounds
91-57-6	2-Methylnaphthalene	1	—	—	—	—	Not applicable for volatile compounds
91-20-3	Naphthalene	1	—	—	—	—	Not applicable for volatile compounds
85-01-8	Phenanthrene	1	—	—	—	—	Not applicable for volatile compounds
129-00-0	Pyrene	1	—	—	—	—	Not applicable for volatile compounds
1330-20-7	Xylenes (total)	1	—	—	—	—	Not applicable for volatile compounds
Semivolatile Organic Compounds							
56-55-3	Benz(a)anthracene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002 (B[a]P as a surrogate)
50-32-8	Benzo(a)pyrene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002
205-99-2	Benzo(b)fluoranthene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002 (B[a]P as a surrogate)
207-08-9	Benzo(k)fluoranthene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002 (B[a]P as a surrogate)
218-01-9	1,2-Benzphenanthracene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002 (B[a]P as a surrogate)
53-70-3	Dibenz(a,h)anthracene	0	—	—	—	2.06E-03	Samsøe-Petersen et al. 2002 (B[a]P as a surrogate)
206-44-0	Fluoranthene	0	—	—	—	4.79E-03	Samsøe-Petersen et al. 2002
193-39-5	Indeno(1,2,3-cd)pyrene	0	—	—	—	2.94E-03	Samsøe-Petersen et al. 2002
108-95-2	Phenol	0	—	—	—	—	Ionizing chemicals not available
Pesticides/Polychlorinated Biphenyls							
12674-11-2	Aroclor 1016	0	5.62	4.17E+05	3.35E+05	1.06E+00	DTSC 1993
11096-82-5	Aroclor 1260	0	8.27	1.86E+08	1.35E+08	2.88E-01	DTSC 1993
72-54-8	4,4'-DDD	0	6.02	1.05E+06	8.28E+05	8.70E-01	DTSC 1993
72-55-9	4,4'-DDE	0	6.51	3.24E+06	2.51E+06	6.84E-01	DTSC 1993
50-29-3	4,4'-DDT	0	6.91	8.13E+06	6.21E+06	5.62E-01	DTSC 1993
60-57-1	Dieldrin	0	5.20	1.58E+05	1.29E+05	1.30E+00	DTSC 1993
1031-07-8	Endosulfan sulfate	0	3.66	4.57E+03	3.96E+03	2.88E+00	DTSC 1993
76-44-8	Heptachlor	0	6.10	1.26E+06	9.92E+05	8.37E-01	DTSC 1993

Table I4-8
Uptake Factors Used to Evaluate the Ingestion of Homegrown Produce Exposure Pathway

CAS Number	Chemical	Volatility[a]	Log Kow[b]	Kow	Koc[c]	Uptake Factor	Source
Metals							
7440-36-0	Antimony	0	—	—	—	—	U.S. EPA 1996
7440-38-2	Arsenic	0	—	—	—	1.14E-02	U.S. EPA 1996
7440-39-3	Barium	0	—	—	—	—	U.S. EPA 1996
7440-41-7	Beryllium	0	—	—	—	—	U.S. EPA 1996
7440-43-9	Cadmium	0	—	—	—	1.44E-01	U.S. EPA 1996
7440-47-3	Chromium	0	—	—	—	—	U.S. EPA 1996
7440-48-4	Cobalt	0	—	—	—	—	U.S. EPA 1996
7440-50-8	Copper	0	—	—	—	—	U.S. EPA 1996
7439-89-6	Iron	0	—	—	—	—	U.S. EPA 1996
7439-92-1	Lead	0	—	—	—	—	U.S. EPA 1996
7439-97-6	Mercury	0	—	—	—	1.76E-02	U.S. EPA 1996
7439-98-7	Molybdenum	0	—	—	—	—	U.S. EPA 1996
7440-02-0	Nickel	0	—	—	—	1.86E-02	U.S. EPA 1996
7782-49-2	Selenium	0	—	—	—	1.83E-02	U.S. EPA 1996
7440-28-0	Thallium	0	—	—	—	—	U.S. EPA 1996
7440-62-2	Vanadium	0	—	—	—	—	U.S. EPA 1996
7440-66-6	Zinc	0	—	—	—	7.43E-02	U.S. EPA 1996

Notes:
[a] 1=volatile, 0=nonvolatile
[b] Log Kow from U.S. EPA EPI SUITE V3.1, Demwin Program V1.42, 2000 http://www.epa.gov/oppt/exposure/docs/episuitedl.htm
[c] Koc from the U.S.EPA 1996 formula: LogKoc = 0.00028 + (0.983 x logKow)
[d] not applicable

Acronyms/Abbreviations:
CAS – Chemical Abstract Services
B[a]P – benzo(a)pyrene
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
DTSC – Department of Toxic Substances Control
U.S. EPA – United States Environmental Protection Agency

References:
DTSC 1993. Parameter Values and Ranges for CalTOX, California Department of Toxic Substances Control. July.
Samsøe-Petersen, L., E.K. Larsen, P.B. Larsen, and P. Bruun. 2002. Uptake of trace elements and PAHs by fruit and vegetables from contaminated soils.
U.S. EPA 1996. Soil Screening Guidance: Technical Background Document. May.

Table I5-1
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA CSFo (mg/kg-day)$^{-1}$		U.S. EPA CSFi (mg/kg-day)$^{-1}$		Cal/EPA CSFo (mg/kg-day)$^{-1}$		Cal/EPA CSFi (mg/kg-day)$^{-1}$		U.S. EPA RfDo (mg/kg-day)		U.S. EPA RfDi (mg/kg-day)	
Volatile Organic Compounds														
83-32-9	Acenaphthene	NA	—		—		—		—		6.00E-02	I	6.00E-02	R
208-96-8	Acenaphthylene	D	—		—		—		—		6.00E-02	S	6.00E-02	S
67-64-1	Acetone	NP	—		—		—		—		9.00E-01	I	9.00E-01	R
120-12-7	Anthracene	D	—		—		—		—		3.00E-01	I	3.00E-01	R
71-43-2	Benzene	A	5.50E-02	I	2.73E-02	I	1.00E-01	C	1.00E-01	C	4.00E-03	I	8.57E-03	I
191-24-2	Benzo(ghi)perylene	D	—		—		—		—		3.00E-02	S	3.00E-02	S
75-15-0	Carbon disulfide	NA	—		—		—		—		1.00E-01	I	2.00E-01	I
132-64-9	Dibenzofuran	D	—		—		—		—		2.00E-03	N	2.00E-03	R
75-71-8	Dichlorodifluoromethane	NA	—		—		—		—		2.00E-01	I	5.70E-02	H
107-06-2	1,2-Dichloroethane	B2	9.10E-02	I	9.10E-02	I	4.70E-02	C	7.20E-02	C	2.00E-02	N	1.40E-03	N
75-09-2	Dichloromethane	B2	7.50E-03	I	1.65E-03	I	1.40E-02	C	3.50E-03	C	6.00E-02	I	8.60E-01	H
100-41-4	Ethylbenzene	D	—		—		—		—		1.00E-01	I	2.86E-01	I
86-73-7	Fluorene	D	—		—		—		—		4.00E-02	I	4.00E-02	R
99-87-6	4-Isopropyltoluene	Not in IRIS	—		—		—		—		1.00E-01	S	1.10E-01	S
74-82-8	methane	Not in IRIS	—		—		—		—		5.00E-01	S	5.00E-01	S
1321-94-4	Methylnaphthalene	Not in IRIS	—		—		—		—		2.00E-02	S	8.57E-04	S
91-57-6	2-Methylnaphthalene	Not in IRIS	—		—		—		—		2.00E-02	S	8.57E-04	S
1634-04-4	Methyl tert butyl ether	NA	1.80E-03	C	9.10E-04	C	1.80E-03	C	9.10E-04	C	8.57E-01	R	8.57E-01	I
91-20-3	Naphthalene	C	—		—		1.20E-01	C	1.20E-01	C	2.00E-02	I	8.57E-04	I
85-01-8	Phenanthrene	D	—		—		—		—		3.00E-01	S	3.00E-01	S
129-00-0	Pyrene	D	—		—		—		—		3.00E-02	I	3.00E-02	R
100-42-5	Styrene	NA	—		—		—		—		2.00E-01	I	2.86E-01	I
108-88-3	Toluene	NP	—		—		—		—		8.00E-02	I	1.43E+00	I
95-63-6	1,2,4-trimethylbenzene	Not in IRIS	—		—		—		—		5.00E-02	P	1.70E-03	P
108-67-8	1,3,5-trimethylbenzene	Not in IRIS	—		—		—		—		5.00E-02	P	1.70E-03	P
1330-20-7	Xylenes (total)	NP	—		—		—		—		2.00E-01	I	2.86E-02	I
Semivolatile Organic Compounds														
56-55-3	Benz(a)anthracene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	3.00E-01	S	3.00E-01	S
205-99-2	Benzo(b)fluoranthene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
207-08-9	Benzo(k)fluoranthene	B2	7.30E-02	N	7.30E-02	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
50-32-8	Benzo(a)pyrene	B2	7.30E+00	I	7.30E+00	R	1.20E+01	C	3.90E+00	C	3.00E-02	S	3.00E-02	S
218-01-9	1,2-Benzphenanthracene	B2	7.30E-03	N	7.30E-03	R	1.20E-01	C	3.90E-02	C	3.00E-01	S	3.00E-01	S
53-70-3	Dibenz(ah)anthracene	B2	7.30E+00	N	7.30E+00	R	4.10E+00	C	4.10E+00	C	3.00E-01	S	3.00E-01	S

Table I5-1
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA CSFo (mg/kg-day)$^{-1}$		U.S. EPA CSFi (mg/kg-day)$^{-1}$		Cal/EPA CSFo (mg/kg-day)$^{-1}$		Cal/EPA CSFi (mg/kg-day)$^{-1}$		U.S. EPA RfDo (mg/kg-day)		U.S. EPA RfDi (mg/kg-day)	
206-44-0	Fluoranthene	D	—		—		—		—		4.00E-02	I	4.00E-02	R
193-39-5	Indeno(123-cd)pyrene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
108-95-2	Phenol	D	—		—		—		—		3.00E-01	I	3.00E-01	R
Pesticides/Polychlorinated Biphenyls														
12674-11-2	Aroclor 1016	NA	7.00E-02	I	7.00E-02	I	5.00E+00	C	2.00E+00	C	7.00E-05	I	7.00E-05	R
11096-82-5	Aroclor 1260	B2	2.00E+00	I	2.00E+00	I	5.00E+00	C	2.00E+00	C	2.00E-05	S	2.00E-05	S
72-54-8	4,4'-DDD	B2	2.40E-01	I	2.40E-01	R	2.40E-01	C	2.40E-01	C	5.00E-04	S	5.00E-04	S
72-55-9	4,4'-DDE	B2	3.40E-01	I	3.40E-01	R	3.40E-01	C	3.40E-01	C	5.00E-04	S	5.00E-04	S
50-29-3	4,4'-DDT	B2	3.40E-01	I	3.40E-01	I	3.40E-01	C	3.40E-01	C	5.00E-04	I	5.00E-04	R
60-57-1	Dieldrin	B2	1.60E+01	I	1.60E+01	I	1.60E+01	C	1.60E+01	C	5.00E-05	I	5.00E-05	R
1031-07-8	Endosulfan sulfate	Not in IRIS	—		—		—		—		6.00E-03	S	6.00E-03	S
76-44-8	Heptachlor	B2	4.50E+00	I	4.60E+00	I	4.10E+00	C	4.10E+00	C	5.00E-04	I	5.00E-04	R
Metals														
7440-36-0	Antimony	NA	—		—		—		—		4.00E-04	I	—	
7440-38-2	Arsenic	A	1.50E+00	I	1.51E+01	I	9.45E+00	C	1.20E+01	C	3.00E-04	I	—	
7440-39-3	Barium	D	—		—		—		—		2.00E-01	I	1.40E-04	H
7440-41-7	Beryllium	B1	—		8.40E+00	I	—	C	8.40E+00	C	2.00E-03	I	5.71E-06	I
7440-43-9	Cadmium	B1	—		6.30E+00	I	3.80E-01	C	1.50E+01	C	5.00E-04	I	—	
7440-47-3	Chromium[b]	A (inhalation)	—		4.20E+01	I	—		7.40E+01	C	3.00E-03	S	2.29E-06	S
7440-48-4	Cobalt	Not in IRIS	—		9.80E+00	P	—		—		2.00E-02	P	5.70E-06	P
7440-50-8	Copper	D	—		—		—		—		4.00E-02	H	—	
7439-89-6	Iron	Not in IRIS	—		—		—		—		3.00E-01	N	—	
7439-92-1	Lead	B2	—		—		—		—		—		—	
7439-97-6	Mercury	C	—		—		—		—		3.00E-04	I	—	
7439-98-7	Molybdenum	NA	—		—		—		—		5.00E-03	I	—	
7440-02-0	Nickel	A	—		8.40E-01	I	—	C	9.10E-01	C	2.00E-02	I	—	
7782-49-2	Selenium	D	—		—		—		—		5.00E-03	I	—	
7440-28-0	Thallium[c]	Not in IRIS	—		—		—		—		6.60E-05	S	—	
7440-62-2	Vanadium	Not in IRIS	—		—		—		—		1.00E-03	N	—	
7440-66-6	Zinc	D	—		—		—		—		3.00E-01	I	—	

Table I5-1
Toxicity Values[a]

Notes:

[a] a dash indicates that a toxicity value is not available

[b] the Cal/EPA inhalation slope factor was calculated per U.S. EPA guidance

[c] the IRIS reference dose for thallium sulfate was modified per U.S. EPA guidance

Acronyms/Abbreviations:

Cal/EPA – California Environmental Protection Agency
CAS – Chemical Abstract Service
CSFi – inhalation cancer slope factor
CSFo – oral cancer slope factor
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
HEAST – Health Effects Assessment Summary Table
IRIS – Integrated Risk Information System
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligrams
mg/kg-day – milligrams per kilogram-day
NCEA – National Center for Environmental Assessment
PPRTV – Provisional Peer Reviewed Toxicity Values
RfDi – inhalation reference dose
RfDo – oral reference dose
U.S. EPA – United States Environmental Protection Agency

References:

C – California website source, http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H – HEAST as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
I – IRIS, http://www.epa.gov/iris/subst/index.html
N – NCEA as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
P – PPRTV as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
R – route-to-route extrapolation as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
S – values based on a surrogate chemical (see Table L2-6)

Cancer class:

A – human carcinogen
B1 – probable human carcinogen with limited human data
B2 – probable human carcinogen with sufficient evidence in animals and inadequate or no evidence in humans
C – possible human carcinogen
D – not classifiable as to human carcinogenicity
NA – not assessed
NP – not applicable (not assessed using the 1986 U.S. EPA cancer guidelines)

Table I5-2
Chemicals Without Toxicity Values And Their Chemical Surrogates

Chemical	CSF Surrogate	CSF Surrogate Basis	RfD Surrogate	RfD Surrogate Basis
Volatile Organic Compounds				
Acenaphthylene	NA	NA	Acenaphthene	Chemical similarity
Benzo(ghi)perylene	NA	NA	Pyrene	Chemical similarity
4-Isopropyltoluene	NA	NA	Cumene	Chemical similarity
Methane	NA	NA	Methanol	Chemical similarity
2-Methylnaphthalene	NA	NA	Naphthalene	Chemical similarity
Phenanthrene	NA	NA	Anthracene	Chemical similarity
Semivolatile Organic Compounds				
Benz(a)anthracene	NA	NA	Anthracene	Chemical similarity
Benzo(b)fluoranthene	NA	NA	Fluoranthene	Chemical similarity
Benzo(k)fluoranthene	NA	NA	Fluoranthene	Chemical similarity
Benzo(a)pyrene	NA	NA	Pyrene	Chemical similarity
Chrysene	NA	NA	Anthracene	Chemical similarity
Dibenz(ah)anthracene	NA	NA	Anthracene	Chemical similarity
Indeno(123-cd)pyrene	NA	NA	Fluoranthene	Chemical similarity
Pesticides/Polychlorinated Biphenyls				
Aroclor 1260	NA	NA	Aroclor 1254	Chemical similarity
4,4'-DDD	NA	NA	4,4'-DDT	Chemical similarity
4,4'-DDE	NA	NA	4,4'-DDT	Chemical similarity
Endosulfan sulfate	NA	NA	Endosulfan	Chemical similarity
Metals				
Chromium	NA	NA	Hexavalent chromium	Chemical similarity
Thallium	NA	NA	Thallium sulfate	Chemical similarity

Acronyms/Abbreviations:
- CSF – cancer slope factor
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- NA – not applicable
- RfD – reference dose

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	3.13E-09	7.50E-03	2E-11
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.11E-07	7.30E-01	8E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.49E-07	7.30E+00	1E-06
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.42E-07	7.30E-01	1E-07
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.11E-07	7.30E-02	8E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	1.74E-07	7.30E-03	1E-09
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	6.30E-08	7.30E+00	5E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	1.52E-07	7.30E-01	1E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	3.32E-08	7.00E-02	2E-09
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	3.00E-08	2.00E+00	6E-08
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.10E-09	2.40E-01	3E-10
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	9.39E-09	3.40E-01	3E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.07E-09	3.40E-01	1E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	1.60E+01	1E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.96E-05	1.50E+00	3E-05
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**3E-05**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.88E-10	7.50E-03	7E-12
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	5.26E-08	7.30E-01	4E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	7.06E-08	7.30E+00	5E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	6.72E-08	7.30E-01	5E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	5.28E-08	7.30E-02	4E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	8.25E-08	7.30E-03	6E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.98E-08	7.30E+00	2E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	7.21E-08	7.30E-01	5E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.57E-08	7.00E-02	1E-09
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.42E-08	2.00E+00	3E-08
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.73E-10	2.40E-01	4E-11
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.48E-09	3.40E-01	5E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.43E-10	3.40E-01	2E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	1.60E+01	4E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.85E-06	1.50E+00	3E-06
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**4E-06**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	7.50E-03	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.39E-08	7.30E-01	1E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.87E-08	7.30E+00	1E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.78E-08	7.30E-01	1E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.40E-08	7.30E-02	1E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	2.19E-08	7.30E-03	2E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	7.90E-09	7.30E+00	6E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	2.72E-08	7.30E-01	2E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	2.14E-06	7.00E-02	2E-07
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	5.27E-07	2.00E+00	1E-06
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	5.81E-08	2.40E-01	1E-08
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	3.91E-07	3.40E-01	1E-07
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.39E-07	3.40E-01	5E-08
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.21E-08	1.60E+01	1E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.36E-05	1.50E+00	2E-05
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**2E-05**

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	8.03E-12	7.30E-01	6E-12
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	1.08E-11	7.30E+00	8E-11
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	1.02E-11	7.30E-01	8E-12
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	8.05E-12	7.30E-02	6E-13
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	1.26E-11	7.30E-03	9E-14
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	4.55E-12	7.30E+00	3E-11
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	1.10E-11	7.30E-01	8E-12
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	2.40E-12	7.00E-02	2E-13
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	2.17E-12	2.00E+00	4E-12
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	7.91E-14	2.40E-01	2E-14
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	6.78E-13	3.40E-01	2E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	2.94E-13	3.40E-01	1E-13
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	1.60E+01	9E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	1.41E-09	1.51E+01	2E-08
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	—	—	—
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	2.77E-11	8.40E+00	2E-10
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	4.41E-11	6.30E+00	3E-10
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	6.10E-09	4.20E+01	3E-07
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	1.83E-09	9.80E+00	2E-08
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	1.21E-08	8.40E-01	1E-08
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**3E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	1.49E-07	2.73E-02	4E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	1.19E-07	1.65E-03	2E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**4E-09**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	1.60E-06	2.73E-02	4E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	1.17E-06	1.65E-03	2E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	5E-08
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	2.74E-05	2.73E-02	8E-07
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	2.73E-07	9.10E-02	3E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	4.54E-08	1.65E-03	8E-11
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	7.63E-08	9.10E-04	7E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	—	—	—
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—

Table I6-1
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m^3	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m^3	9.57E-05	—	—	—
								TOTAL	8E-07
								Total Risk Across All Exposure Routes/Pathways	6E-05

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m^3 – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	3.13E-09	1.40E-02	4E-11
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	5.07E-08	1.20E-01	6E-09
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.11E-07	1.20E+00	1E-07
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.49E-07	1.20E+01	2E-06
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.42E-07	1.20E+00	2E-07
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.11E-07	1.20E+00	1E-07
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	1.74E-07	1.20E-01	2E-08
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	6.30E-08	4.10E+00	3E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	1.52E-07	1.20E+00	2E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	3.32E-08	5.00E+00	2E-07
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	3.00E-08	5.00E+00	1E-07
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.10E-09	2.40E-01	3E-10
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	9.39E-09	3.40E-01	3E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.07E-09	3.40E-01	1E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	1.60E+01	1E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.96E-05	9.45E+00	2E-04
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	6.11E-07	3.80E-01	2E-07
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**2E-04**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.88E-10	1.40E-02	1E-11
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	2.40E-08	1.20E-01	3E-09
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	5.26E-08	1.20E+00	6E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	7.06E-08	1.20E+01	9E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	6.72E-08	1.20E+00	8E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	5.28E-08	1.20E+00	6E-08
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	8.25E-08	1.20E-01	1E-08
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.98E-08	4.10E+00	1E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	7.21E-08	1.20E+00	9E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.57E-08	5.00E+00	8E-08
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.42E-08	5.00E+00	7E-08
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.73E-10	2.40E-01	4E-11
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.48E-09	3.40E-01	5E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.43E-10	3.40E-01	2E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	1.60E+01	4E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.85E-06	9.45E+00	2E-05
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.93E-09	3.80E-01	7E-10
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**2E-05**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	1.40E-02	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	1.20E-01	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.39E-08	1.20E+00	2E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.87E-08	1.20E+01	2E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.78E-08	1.20E+00	2E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.40E-08	1.20E+00	2E-08
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	2.19E-08	1.20E-01	3E-09
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	7.90E-09	4.10E+00	3E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	2.72E-08	1.20E+00	3E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	2.14E-06	5.00E+00	1E-05
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	5.27E-07	5.00E+00	3E-06
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	5.81E-08	2.40E-01	1E-08
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	3.91E-07	3.40E-01	1E-07
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.39E-07	3.40E-01	5E-08
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.21E-08	1.60E+01	1E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.36E-05	9.45E+00	1E-04
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	5.36E-06	3.80E-01	2E-06
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**1E-04**

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	8.03E-12	3.90E-01	3E-12
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	1.08E-11	3.90E+00	4E-11
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	1.02E-11	3.90E-01	4E-12
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	8.05E-12	3.90E-01	3E-12
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	1.26E-11	3.90E-02	5E-13
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	4.55E-12	4.10E+00	2E-11
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	1.10E-11	3.90E-01	4E-12
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	2.40E-12	2.00E+00	5E-12
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	2.17E-12	2.00E+00	4E-12
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	7.91E-14	2.40E-01	2E-14
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	6.78E-13	3.40E-01	2E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	2.94E-13	3.40E-01	1E-13
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	1.60E+01	9E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	1.41E-09	1.20E+01	2E-08
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	—	—	—
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	2.77E-11	8.40E+00	2E-10
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	4.41E-11	1.50E+01	7E-10
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	6.10E-09	7.40E+01	5E-07
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	—	—	—
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	1.21E-08	9.10E-01	1E-08
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**5E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	1.49E-07	1.00E-01	1E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	1.19E-07	3.50E-03	4E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	1.30E-07	1.20E-01	2E-08
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**3E-08**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	1.60E-06	1.00E-01	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	1.17E-06	3.50E-03	4E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	2.72E-06	1.20E-01	3E-07
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	5E-07
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	2.74E-05	1.00E-01	3E-06
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	2.73E-07	7.20E-02	2E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	4.54E-08	3.50E-03	2E-10
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	7.63E-08	9.10E-04	7E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	7.82E-05	1.20E-01	9E-06
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—

Table I6-2
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m^3	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m^3	9.57E-05	—	—	—
								TOTAL	1E-05
								Total Risk Across All Exposure Routes/Pathways	4E-04

Acronyms/Abbreviations:
- bgs – below ground surface
- Cal/EPA – California Environmental Protection Agency
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- EPC – exposure point concentration
- IRP – Installation Restoration Program
- $(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
- mg/kg – milligrams per kilogram
- mg/kg-day – milligrams per kilogram-day
- mg/L – milligrams per liter
- mg/m^3 – milligrams per cubic meter
- MTBE – methyl tert-butyl ether

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	3.76E-07	6.00E-02	6E-06
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	3.85E-07	6.00E-02	6E-06
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	4.57E-07	3.00E-01	2E-06
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	1.21E-06	3.00E-02	4E-05
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	2.56E-08	6.00E-02	4E-07
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	3.83E-07	4.00E-02	1E-05
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	4.23E-07	2.00E-02	2E-05
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	4.14E-07	2.00E-02	2E-05
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	8.87E-07	3.00E-01	3E-06
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	1.76E-06	3.00E-02	6E-05
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	3.84E-08	2.00E-01	2E-07
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	9.08E-07	3.00E-01	3E-06
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.22E-06	3.00E-02	4E-05
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.16E-06	4.00E-02	3E-05
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	9.10E-07	4.00E-02	2E-05
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	1.42E-06	3.00E-01	5E-06
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	5.14E-07	3.00E-01	2E-06
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	1.75E-06	4.00E-02	4E-05
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	1.24E-06	4.00E-02	3E-05
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	2.71E-07	7.00E-05	4E-03
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	2.45E-07	2.00E-05	1E-02
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	8.95E-09	5.00E-04	2E-05
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	7.67E-08	5.00E-04	2E-04
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.32E-08	5.00E-04	7E-05
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.39E-09	5.00E-05	1E-04
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	5.11E-08	6.00E-03	9E-06

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	2.82E-05	4.00E-04	7E-02
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.60E-04	3.00E-04	5E-01
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	3.12E-03	2.00E-01	2E-02
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	3.13E-06	2.00E-03	2E-03
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	4.99E-06	5.00E-04	1E-02
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	6.90E-04	3.00E-03	2E-01
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	2.06E-04	2.00E-02	1E-02
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	6.40E-04	4.00E-02	2E-02
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	5.27E-01	3.00E-01	2E+00
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	6.51E-06	3.00E-04	2E-02
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	4.03E-06	5.00E-03	8E-04
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	1.37E-03	2.00E-02	7E-02
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	1.20E-05	5.00E-03	2E-03
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	2.16E-05	6.60E-05	3E-01
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	7.40E-04	1.00E-03	7E-01
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	1.69E-03	3.00E-01	6E-03
								TOTAL	**4E+00**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	1.58E-07	6.00E-02	3E-06
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	1.61E-07	6.00E-02	3E-06
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	1.92E-07	3.00E-01	6E-07
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	5.10E-07	3.00E-02	2E-05
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	7.16E-09	6.00E-02	1E-07
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	1.61E-07	4.00E-02	4E-06
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	1.78E-07	2.00E-02	9E-06
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	1.74E-07	2.00E-02	9E-06
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	3.73E-07	3.00E-01	1E-06

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	7.38E-07	3.00E-02	3E-05
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.07E-08	2.00E-01	5E-08
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	3.81E-07	3.00E-01	1E-06
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	5.12E-07	3.00E-02	2E-05
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	4.86E-07	4.00E-02	1E-05
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	3.82E-07	4.00E-02	1E-05
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	5.98E-07	3.00E-01	2E-06
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.16E-07	3.00E-01	7E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	7.34E-07	4.00E-02	2E-05
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	5.22E-07	4.00E-02	1E-05
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.14E-07	7.00E-05	2E-03
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.03E-07	2.00E-05	5E-03
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.25E-09	5.00E-04	3E-06
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.07E-08	5.00E-04	2E-05
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.65E-09	5.00E-04	9E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.79E-09	5.00E-05	4E-05
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.43E-08	6.00E-03	2E-06
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	7.90E-07	4.00E-04	2E-03
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.34E-05	3.00E-04	5E-02
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	8.73E-05	2.00E-01	4E-04
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	8.76E-08	2.00E-03	4E-05
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.40E-08	5.00E-04	3E-05
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	1.93E-05	3.00E-03	6E-03
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	5.78E-06	2.00E-02	3E-04
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	1.79E-05	4.00E-02	5E-04
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	1.48E-02	3.00E-01	5E-02

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	1.82E-07	3.00E-04	6E-04
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	1.13E-07	5.00E-03	2E-05
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	3.83E-05	2.00E-02	2E-03
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	3.35E-07	5.00E-03	7E-05
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	6.06E-07	6.60E-05	9E-03
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	2.07E-05	1.00E-03	2E-02
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	4.74E-05	3.00E-01	2E-04
								TOTAL	**1E-01**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	6.00E-02	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	6.00E-02	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	3.00E-01	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	3.00E-02	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	6.00E-02	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	4.00E-02	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	2.00E-02	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	2.00E-02	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	3.00E-01	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	3.00E-02	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	2.00E-01	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	3.25E-08	3.00E-01	1E-07
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	4.37E-08	3.00E-02	2E-06
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	4.15E-08	4.00E-02	1E-06
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	3.26E-08	4.00E-02	8E-07
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	5.10E-08	3.00E-01	2E-07
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	1.84E-08	3.00E-01	6E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	1.46E-07	4.00E-02	4E-06

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	6.36E-08	4.00E-02	2E-06
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	5.00E-06	7.00E-05	7E-02
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.23E-06	2.00E-05	6E-02
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.36E-07	5.00E-04	3E-04
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	9.13E-07	5.00E-04	2E-03
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.25E-07	5.00E-04	7E-04
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.45E-07	5.00E-05	3E-03
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	2.56E-06	6.00E-03	4E-04
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	4.00E-04	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	3.17E-05	3.00E-04	1E-01
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	2.00E-01	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	2.00E-03	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.25E-05	5.00E-04	3E-02
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	3.00E-03	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	2.00E-02	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	4.00E-02	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	3.00E-01	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	1.99E-06	3.00E-04	7E-03
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	5.00E-03	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	4.42E-04	2.00E-02	2E-02
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	3.81E-06	5.00E-03	8E-04
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	6.60E-05	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	1.00E-03	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	2.19E-03	3.00E-01	7E-03
								TOTAL	**3E-01**

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	3.48E-11	3.00E-01	1E-10
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	4.67E-11	3.00E-02	2E-09
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	4.44E-11	4.00E-02	1E-09
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	3.49E-11	4.00E-02	9E-10
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	5.45E-11	3.00E-01	2E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	1.97E-11	3.00E-01	7E-11
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	6.69E-11	4.00E-02	2E-09
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	4.76E-11	4.00E-02	1E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	1.04E-11	7.00E-05	2E-07
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	9.38E-12	2.00E-05	5E-07
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	3.43E-13	5.00E-04	7E-10
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	2.94E-12	5.00E-04	6E-09
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	1.27E-12	5.00E-04	3E-09
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.45E-13	5.00E-05	5E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	1.96E-12	6.00E-03	3E-10
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	—	—	—
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	1.19E-07	1.40E-04	9E-04
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	1.20E-10	5.71E-06	2E-05
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	—	—	—
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	2.64E-08	2.29E-06	1E-02
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	7.90E-09	5.70E-06	1E-03
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	—	—	—
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**1E-02**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	1.39E-07	6.00E-02	2E-06
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	1.06E-07	6.00E-02	2E-06
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	6.28E-08	3.00E-01	2E-07
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.45E-07	8.57E-03	8E-05
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	5.02E-08	3.00E-02	2E-06
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	5.17E-07	8.60E-01	6E-07
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	3.70E-08	4.00E-02	9E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	3.33E-07	8.57E-04	4E-04
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	5.61E-07	8.57E-04	7E-04
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	2.44E-07	3.00E-01	8E-07
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	1.33E-07	3.00E-02	4E-06
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	3.17E-07	2.86E-02	1E-05
								TOTAL	**1E-03**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	2.06E-06	6.00E-02	3E-05
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	1.57E-06	6.00E-02	3E-05
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	4.42E-07	3.00E-01	2E-06
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.94E-06	8.57E-03	8E-04
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	9.56E-08	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	5.07E-06	8.60E-01	6E-06
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	2.91E-07	4.00E-02	7E-06

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	5.30E-06	8.57E-04	6E-03
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	1.18E-05	8.57E-04	1E-02
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	1.72E-06	3.00E-01	6E-06
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	2.53E-07	3.00E-02	8E-06
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	7.61E-06	2.86E-02	3E-04
								TOTAL	**2E-02**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	6.20E-06	6.00E-02	1E-04
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	8.06E-06	6.00E-02	1E-04
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	2.01E-07	9.00E-01	2E-07
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	1.42E-06	3.00E-01	5E-06
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.19E-04	8.57E-03	1E-02
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	6.52E-07	3.00E-02	2E-05
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	3.52E-06	2.00E-01	2E-05
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	5.07E-08	2.00E-03	3E-05
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.18E-06	1.40E-03	9E-04
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.97E-07	8.60E-01	2E-07
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	4.47E-05	2.86E-01	2E-04
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	1.59E-06	4.00E-02	4E-05
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	1.66E-07	1.10E-01	2E-06
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	9.30E-05	5.00E-01	2E-04
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	1.54E-07	8.57E-04	2E-04
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.31E-07	8.57E-01	4E-07
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	3.39E-04	8.57E-04	4E-01
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	1.42E-06	3.00E-01	5E-06
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	3.52E-06	3.00E-02	1E-04
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	2.33E-06	2.86E-01	8E-06
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	3.58E-05	1.43E+00	3E-05
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	5.73E-06	1.70E-03	3E-03

Table I6-3
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	2.58E-06	1.70E-03	2E-03
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	6.17E-05	2.86E-02	2E-03
								TOTAL	**4E-01**
						Total Risk Across All Exposure Routes/Pathways			**5E+00**

Acronyms/Abbreviations:

bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – *methyl tert-butyl ether*
U.S. EPA – United States Environmental Protection Agency

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.50E-10	7.50E-03	6E-12
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	3.02E-08	7.30E-01	2E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	4.05E-08	7.30E+00	3E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	3.85E-08	7.30E-01	3E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	3.03E-08	7.30E-02	2E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	4.73E-08	7.30E-03	3E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	1.71E-08	7.30E+00	1E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	4.13E-08	7.30E-01	3E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	9.01E-09	7.00E-02	6E-10
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	8.14E-09	2.00E+00	2E-08
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	2.98E-10	2.40E-01	7E-11
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	2.55E-09	3.40E-01	9E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-09	3.40E-01	4E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	1.60E+01	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	5.32E-06	1.50E+00	8E-06
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**9E-06**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.55E-11	7.50E-03	7E-13
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	5.09E-09	7.30E-01	4E-09
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	6.82E-09	7.30E+00	5E-08
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	6.49E-09	7.30E-01	5E-09
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	5.10E-09	7.30E-02	4E-10
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	7.97E-09	7.30E-03	6E-11
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.88E-09	7.30E+00	2E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	6.96E-09	7.30E-01	5E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.52E-09	7.00E-02	1E-10
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.37E-09	2.00E+00	3E-09
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.67E-11	2.40E-01	4E-12
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.43E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.21E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	1.60E+01	4E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.79E-07	1.50E+00	3E-07
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**4E-07**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	7.50E-03	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	—	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.73E-09	7.30E-01	1E-09
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	2.32E-09	7.30E+00	2E-08
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	2.20E-09	7.30E-01	2E-09
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.73E-09	7.30E-02	1E-10
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	2.71E-09	7.30E-03	2E-11
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	9.78E-10	7.30E+00	7E-09
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	3.37E-09	7.30E-01	2E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	2.65E-07	7.00E-02	2E-08
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	6.52E-08	2.00E+00	1E-07
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	7.19E-09	2.40E-01	2E-09
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	4.84E-08	3.40E-01	2E-08
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.73E-08	3.40E-01	6E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.69E-09	1.60E+01	1E-07
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.68E-06	1.50E+00	3E-06
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	—	—	—
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**3E-06**

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	3.26E-12	7.30E-01	2E-12
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	4.37E-12	7.30E+00	3E-11
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	4.16E-12	7.30E-01	3E-12
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	3.27E-12	7.30E-02	2E-13
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	5.11E-12	7.30E-03	4E-14
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	1.85E-12	7.30E+00	1E-11
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	4.46E-12	7.30E-01	3E-12
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	9.73E-13	7.00E-02	7E-14
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	8.79E-13	2.00E+00	2E-12
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	3.21E-14	2.40E-01	8E-15
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	2.75E-13	3.40E-01	9E-14
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	1.19E-13	3.40E-01	4E-14
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.29E-14	1.60E+01	4E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	5.74E-10	1.51E+01	9E-09
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	—	—	—
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	1.12E-11	8.40E+00	1E-10
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	1.79E-11	6.30E+00	1E-10
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	2.47E-09	4.20E+01	1E-07
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	7.41E-10	9.80E+00	7E-09
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	4.90E-09	8.40E-01	4E-09
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**1E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.04E-08	2.73E-02	2E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.84E-08	1.65E-03	8E-11
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**2E-09**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.50E-07	2.73E-02	2E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	4.75E-07	1.65E-03	8E-10
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	**2E-08**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.11E-05	2.73E-02	3E-07
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.11E-07	9.10E-02	1E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.84E-08	1.65E-03	3E-11
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.10E-08	9.10E-04	3E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	—	—	—
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—

Table I6-4
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	—	—	—
								TOTAL	3E-07
								Total Risk Across All Exposure Routes/Pathways	1E-05

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.50E-10	1.40E-02	1E-11
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	1.38E-08	1.20E-01	2E-09
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	3.02E-08	1.20E+00	4E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	4.05E-08	1.20E+01	5E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	3.85E-08	1.20E+00	5E-08
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	3.03E-08	1.20E+00	4E-08
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	4.73E-08	1.20E-01	6E-09
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	1.71E-08	4.10E+00	7E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	4.13E-08	1.20E+00	5E-08
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	9.01E-09	5.00E+00	5E-08
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	8.14E-09	5.00E+00	4E-08
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	2.98E-10	2.40E-01	7E-11
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	2.55E-09	3.40E-01	9E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-09	3.40E-01	4E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	1.60E+01	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	5.32E-06	9.45E+00	5E-05
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.66E-07	3.80E-01	6E-08
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**5E-05**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.55E-11	1.40E-02	1E-12
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	2.32E-09	1.20E-01	3E-10
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	5.09E-09	1.20E+00	6E-09
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	6.82E-09	1.20E+01	8E-08
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	6.49E-09	1.20E+00	8E-09
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	5.10E-09	1.20E+00	6E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	7.97E-09	1.20E-01	1E-09
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.88E-09	4.10E+00	1E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	6.96E-09	1.20E+00	8E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.52E-09	5.00E+00	8E-09
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.37E-09	5.00E+00	7E-09
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.67E-11	2.40E-01	4E-12
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.43E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.21E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	1.60E+01	4E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.79E-07	9.45E+00	2E-06
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.86E-10	3.80E-01	7E-11
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**2E-06**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	—	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	—	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	—	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	1.40E-02	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	—	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	—	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	1.20E-01	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	—	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	1.73E-09	1.20E+00	2E-09
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	2.32E-09	1.20E+01	3E-08
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	2.20E-09	1.20E+00	3E-09
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	1.73E-09	1.20E+00	2E-09
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	2.71E-09	1.20E-01	3E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	9.78E-10	4.10E+00	4E-09
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	3.37E-09	1.20E+00	4E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	2.65E-07	5.00E+00	1E-06
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	6.52E-08	5.00E+00	3E-07
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	7.19E-09	2.40E-01	2E-09
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	4.84E-08	3.40E-01	2E-08
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.73E-08	3.40E-01	6E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.69E-09	1.60E+01	1E-07
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	—	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.68E-06	9.45E+00	2E-05
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	—	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	—	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	6.64E-07	3.80E-01	3E-07
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	—	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	—	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	—	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	—	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	—	—	—
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	—	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	—	—	—
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	—	—	—
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	—	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	—	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	—	—	—
								TOTAL	**2E-05**

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	3.26E-12	3.90E-01	1E-12
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	4.37E-12	3.90E+00	2E-11
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	4.16E-12	3.90E-01	2E-12
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	3.27E-12	3.90E-01	1E-12
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	5.11E-12	3.90E-02	2E-13
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	1.85E-12	4.10E+00	8E-12
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	4.46E-12	3.90E-01	2E-12
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	9.73E-13	2.00E+00	2E-12
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	8.79E-13	2.00E+00	2E-12
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	3.21E-14	2.40E-01	8E-15
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	2.75E-13	3.40E-01	9E-14
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	1.19E-13	3.40E-01	4E-14
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.29E-14	1.60E+01	4E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	5.74E-10	1.20E+01	7E-09
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	—	—	—
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	1.12E-11	8.40E+00	1E-10
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	1.79E-11	1.50E+01	3E-10
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	2.47E-09	7.40E+01	2E-07
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	—	—	—
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	4.90E-09	9.10E-01	4E-09
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**2E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.04E-08	1.00E-01	6E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.84E-08	3.50E-03	2E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	5.26E-08	1.20E-01	6E-09
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**1E-08**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.50E-07	1.00E-01	7E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	4.75E-07	3.50E-03	2E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	1.10E-06	1.20E-01	1E-07
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	**2E-07**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.11E-05	1.00E-01	1E-06
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.11E-07	7.20E-02	8E-09
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.84E-08	3.50E-03	6E-11
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.10E-08	9.10E-04	3E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	3.18E-05	1.20E-01	4E-06
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—

Table I6-5
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	—	—	—
								TOTAL	5E-06
								Total Risk Across All Exposure Routes/Pathways	8E-05

Acronyms/Abbreviations:

bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	1.26E-07	6.00E-02	2E-06
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	1.29E-07	6.00E-02	2E-06
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	1.53E-07	3.00E-01	5E-07
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	4.06E-07	3.00E-02	1E-05
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.55E-09	6.00E-02	1E-07
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	1.28E-07	4.00E-02	3E-06
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	1.41E-07	2.00E-02	7E-06
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	1.38E-07	2.00E-02	7E-06
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	2.96E-07	3.00E-01	1E-06
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	5.88E-07	3.00E-02	2E-05
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.28E-08	2.00E-01	6E-08
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	3.04E-07	3.00E-01	1E-06
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	4.07E-07	3.00E-02	1E-05
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	3.87E-07	4.00E-02	1E-05
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	3.04E-07	4.00E-02	8E-06
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	4.76E-07	3.00E-01	2E-06
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	1.72E-07	3.00E-01	6E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	5.84E-07	4.00E-02	2E-05
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	4.15E-07	4.00E-02	1E-05
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	9.06E-08	7.00E-05	1E-03
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	8.19E-08	2.00E-05	4E-03
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	2.99E-09	5.00E-04	6E-06
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	2.56E-08	5.00E-04	5E-05
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-08	5.00E-04	2E-05
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.14E-09	5.00E-05	4E-05
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.71E-08	6.00E-03	3E-06

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	9.43E-06	4.00E-04	2E-02
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	5.34E-05	3.00E-04	2E-01
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	1.04E-03	2.00E-01	5E-03
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	1.05E-06	2.00E-03	5E-04
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.67E-06	5.00E-04	3E-03
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	2.31E-04	3.00E-03	8E-02
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	6.90E-05	2.00E-02	3E-03
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	2.14E-04	4.00E-02	5E-03
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	1.76E-01	3.00E-01	6E-01
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	2.18E-06	3.00E-04	7E-03
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	1.35E-06	5.00E-03	3E-04
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	4.57E-04	2.00E-02	2E-02
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	4.00E-06	5.00E-03	8E-04
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	7.23E-06	6.60E-05	1E-01
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	2.47E-04	1.00E-03	3E-01
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	5.66E-04	3.00E-01	2E-03
								TOTAL	**1E+00**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	2.11E-08	6.00E-02	4E-07
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	2.16E-08	6.00E-02	4E-07
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	2.57E-08	3.00E-01	9E-08
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	6.81E-08	3.00E-02	2E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.57E-10	6.00E-02	2E-08
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	2.15E-08	4.00E-02	5E-07
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	2.37E-08	2.00E-02	1E-06
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	2.32E-08	2.00E-02	1E-06
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	4.98E-08	3.00E-01	2E-07

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	9.87E-08	3.00E-02	3E-06
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.44E-09	2.00E-01	7E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	5.10E-08	3.00E-01	2E-07
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	6.84E-08	3.00E-02	2E-06
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	6.50E-08	4.00E-02	2E-06
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	5.11E-08	4.00E-02	1E-06
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	7.99E-08	3.00E-01	3E-07
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	2.89E-08	3.00E-01	1E-07
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	9.81E-08	4.00E-02	3E-06
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	6.98E-08	4.00E-02	2E-06
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.52E-08	7.00E-05	2E-04
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	1.38E-08	2.00E-05	7E-04
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	1.68E-10	5.00E-04	3E-07
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	1.44E-09	5.00E-04	3E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.22E-10	5.00E-04	1E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-10	5.00E-05	5E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.91E-09	6.00E-03	3E-07
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	1.06E-07	4.00E-04	3E-04
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	1.80E-06	3.00E-04	6E-03
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	1.17E-05	2.00E-01	6E-05
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	1.17E-08	2.00E-03	6E-06
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	1.87E-09	5.00E-04	4E-06
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	2.58E-06	3.00E-03	9E-04
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	7.73E-07	2.00E-02	4E-05
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	2.39E-06	4.00E-02	6E-05
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	1.97E-03	3.00E-01	7E-03

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	2.44E-08	3.00E-04	8E-05
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	1.51E-08	5.00E-03	3E-06
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	5.12E-06	2.00E-02	3E-04
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	4.48E-08	5.00E-03	9E-06
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	8.10E-08	6.60E-05	1E-03
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	2.77E-06	1.00E-03	3E-03
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	6.34E-06	3.00E-01	2E-05
								TOTAL	**2E-02**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	2.94E-02	mg/kg	2.94E-02	mg/kg	2.94E-02	—	6.00E-02	—
	Acenaphthylene	3.01E-02	mg/kg	3.01E-02	mg/kg	3.01E-02	—	6.00E-02	—
	Anthracene	3.58E-02	mg/kg	3.58E-02	mg/kg	3.58E-02	—	3.00E-01	—
	Benzo(g,h,i)Perylene	9.49E-02	mg/kg	9.49E-02	mg/kg	9.49E-02	—	3.00E-02	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	6.00E-02	—
	Fluorene	3.00E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	—	4.00E-02	—
	2-Methylnaphthalene	3.31E-02	mg/kg	3.31E-02	mg/kg	3.31E-02	—	2.00E-02	—
	Naphthalene	3.24E-02	mg/kg	3.24E-02	mg/kg	3.24E-02	—	2.00E-02	—
	Phenanthrene	6.94E-02	mg/kg	6.94E-02	mg/kg	6.94E-02	—	3.00E-01	—
	Pyrene	1.38E-01	mg/kg	1.38E-01	mg/kg	1.38E-01	—	3.00E-02	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	2.00E-01	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	7.10E-02	mg/kg	7.10E-02	mg/kg	7.10E-02	8.04E-09	3.00E-01	3E-08
	Benzo(a)Pyrene	9.53E-02	mg/kg	9.53E-02	mg/kg	9.53E-02	1.08E-08	3.00E-02	4E-07
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	9.06E-02	mg/kg	9.06E-02	1.03E-08	4.00E-02	3E-07
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	7.12E-02	mg/kg	7.12E-02	8.06E-09	4.00E-02	2E-07
	1,2-Benzphenanthracene	1.11E-01	mg/kg	1.11E-01	mg/kg	1.11E-01	1.26E-08	3.00E-01	4E-08
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	4.02E-02	mg/kg	4.02E-02	4.55E-09	3.00E-01	2E-08
	Fluoranthene	1.37E-01	mg/kg	1.37E-01	mg/kg	1.37E-01	3.60E-08	4.00E-02	9E-07

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	9.72E-02	mg/kg	9.72E-02	1.57E-08	4.00E-02	4E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	2.12E-02	mg/kg	2.12E-02	1.23E-06	7.00E-05	2E-02
	Aroclor 1260	1.92E-02	mg/kg	1.92E-02	mg/kg	1.92E-02	3.04E-07	2.00E-05	2E-02
	4,4-DDD	7.00E-04	mg/kg	7.00E-04	mg/kg	7.00E-04	3.35E-08	5.00E-04	7E-05
	4,4-DDE	6.00E-03	mg/kg	6.00E-03	mg/kg	6.00E-03	2.25E-07	5.00E-04	5E-04
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	8.03E-08	5.00E-04	2E-04
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	3.58E-08	5.00E-05	7E-04
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	6.33E-07	6.00E-03	1E-04
	Metals								
	Antimony	2.21E+00	mg/kg	2.21E+00	mg/kg	2.21E+00	—	4.00E-04	—
	Arsenic	1.25E+01	mg/kg	1.25E+01	mg/kg	1.25E+01	7.83E-06	3.00E-04	3E-02
	Barium	2.44E+02	mg/kg	2.44E+02	mg/kg	2.44E+02	—	2.00E-01	—
	Beryllium	2.45E-01	mg/kg	2.45E-01	mg/kg	2.45E-01	—	2.00E-03	—
	Cadmium	3.90E-01	mg/kg	3.90E-01	mg/kg	3.90E-01	3.09E-06	5.00E-04	6E-03
	Chromium	5.39E+01	mg/kg	5.39E+01	mg/kg	5.39E+01	—	3.00E-03	—
	Cobalt	1.61E+01	mg/kg	1.61E+01	mg/kg	1.61E+01	—	2.00E-02	—
	Copper	5.00E+01	mg/kg	5.00E+01	mg/kg	5.00E+01	—	4.00E-02	—
	Iron	4.13E+04	mg/kg	4.13E+04	mg/kg	4.13E+04	—	3.00E-01	—
	Lead	6.15E+01	mg/kg	6.15E+01	mg/kg	6.15E+01	—	—	—
	Mercury	5.09E-01	mg/kg	5.09E-01	mg/kg	5.09E-01	4.92E-07	3.00E-04	2E-03
	Molybdenum	3.16E-01	mg/kg	3.16E-01	mg/kg	3.16E-01	—	5.00E-03	—
	Nickel	1.07E+02	mg/kg	1.07E+02	mg/kg	1.07E+02	1.09E-04	2.00E-02	6E-03
	Selenium	9.37E-01	mg/kg	9.37E-01	mg/kg	9.37E-01	9.42E-07	5.00E-03	2E-04
	Thallium	1.69E+00	mg/kg	1.69E+00	mg/kg	1.69E+00	—	6.60E-05	—
	Vanadium	5.79E+01	mg/kg	5.79E+01	mg/kg	5.79E+01	—	1.00E-03	—
	Zinc	1.32E+02	mg/kg	1.32E+02	mg/kg	1.32E+02	5.41E-04	3.00E-01	2E-03
								TOTAL	**8E-02**

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	7.10E-02	mg/kg	5.40E-11	mg/m³	5.40E-11	2.32E-11	3.00E-01	8E-11
	Benzo(a)Pyrene	9.53E-02	mg/kg	7.24E-11	mg/m³	7.24E-11	3.12E-11	3.00E-02	1E-09
	Benzo(b)Fluoranthene	9.06E-02	mg/kg	6.88E-11	mg/m³	6.88E-11	2.97E-11	4.00E-02	7E-10
	Benzo(k)Fluoranthene	7.12E-02	mg/kg	5.41E-11	mg/m³	5.41E-11	2.33E-11	4.00E-02	6E-10
	1,2-Benzphenanthracene	1.11E-01	mg/kg	8.46E-11	mg/m³	8.46E-11	3.64E-11	3.00E-01	1E-10
	Dibenz(A,H)Anthracene	4.02E-02	mg/kg	3.06E-11	mg/m³	3.06E-11	1.32E-11	3.00E-01	4E-11
	Fluoranthene	1.37E-01	mg/kg	1.04E-10	mg/m³	1.04E-10	4.47E-11	4.00E-02	1E-09
	Indeno(1,2,3-C,D)Pyrene	9.72E-02	mg/kg	7.39E-11	mg/m³	7.39E-11	3.18E-11	4.00E-02	8E-10
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	2.12E-02	mg/kg	1.61E-11	mg/m³	1.61E-11	6.94E-12	7.00E-05	1E-07
	Aroclor 1260	1.92E-02	mg/kg	1.46E-11	mg/m³	1.46E-11	6.27E-12	2.00E-05	3E-07
	4,4-DDD	7.00E-04	mg/kg	5.32E-13	mg/m³	5.32E-13	2.29E-13	5.00E-04	5E-10
	4,4-DDE	6.00E-03	mg/kg	4.56E-12	mg/m³	4.56E-12	1.96E-12	5.00E-04	4E-09
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	8.51E-13	5.00E-04	2E-09
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	1.64E-13	5.00E-05	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	1.31E-12	6.00E-03	2E-10
	Metals								
	Antimony	2.21E+00	mg/kg	1.68E-09	mg/m³	1.68E-09	—	—	—
	Arsenic	1.25E+01	mg/kg	9.50E-09	mg/m³	9.50E-09	—	—	—
	Barium	2.44E+02	mg/kg	1.85E-07	mg/m³	1.85E-07	7.98E-08	1.40E-04	6E-04
	Beryllium	2.45E-01	mg/kg	1.86E-10	mg/m³	1.86E-10	8.01E-11	5.71E-06	1E-05
	Cadmium	3.90E-01	mg/kg	2.97E-10	mg/m³	2.97E-10	—	—	—
	Chromium	5.39E+01	mg/kg	4.10E-08	mg/m³	4.10E-08	1.77E-08	2.29E-06	8E-03
	Cobalt	1.61E+01	mg/kg	1.23E-08	mg/m³	1.23E-08	5.28E-09	5.70E-06	9E-04
	Copper	5.00E+01	mg/kg	3.80E-08	mg/m³	3.80E-08	—	—	—
	Iron	4.13E+04	mg/kg	3.13E-05	mg/m³	3.13E-05	—	—	—
	Lead	6.15E+01	mg/kg	4.67E-08	mg/m³	4.67E-08	—	—	—
	Mercury	5.09E-01	mg/kg	3.87E-10	mg/m³	3.87E-10	—	—	—

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Molybdenum	3.16E-01	mg/kg	2.40E-10	mg/m³	2.40E-10	—	—	—
	Nickel	1.07E+02	mg/kg	8.12E-08	mg/m³	8.12E-08	—	—	—
	Selenium	9.37E-01	mg/kg	7.12E-10	mg/m³	7.12E-10	—	—	—
	Thallium	1.69E+00	mg/kg	1.29E-09	mg/m³	1.29E-09	—	—	—
	Vanadium	5.79E+01	mg/kg	4.40E-08	mg/m³	4.40E-08	—	—	—
	Zinc	1.32E+02	mg/kg	1.01E-07	mg/m³	1.01E-07	—	—	—
								TOTAL	**9E-03**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	9.26E-08	6.00E-02	2E-06
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	7.06E-08	6.00E-02	1E-06
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	4.20E-08	3.00E-01	1E-07
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	4.31E-07	8.57E-03	5E-05
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	3.35E-08	3.00E-02	1E-06
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	3.45E-07	8.60E-01	4E-07
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	2.47E-08	4.00E-02	6E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	2.22E-07	8.57E-04	3E-04
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	3.75E-07	8.57E-04	4E-04
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	1.63E-07	3.00E-01	5E-07
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	8.87E-08	3.00E-02	3E-06
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	2.12E-07	2.86E-02	7E-06
								TOTAL	**8E-04**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	1.38E-06	6.00E-02	2E-05
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	1.05E-06	6.00E-02	2E-05
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	2.96E-07	3.00E-01	1E-06
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	4.64E-06	8.57E-03	5E-04
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	6.39E-08	3.00E-02	2E-06
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	3.39E-06	8.60E-01	4E-06
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	1.94E-07	4.00E-02	5E-06

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	3.54E-06	8.57E-04	4E-03
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	7.88E-06	8.57E-04	9E-03
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	1.15E-06	3.00E-01	4E-06
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	1.69E-07	3.00E-02	6E-06
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	5.09E-06	2.86E-02	2E-04
								TOTAL	1E-02
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	4.15E-06	6.00E-02	7E-05
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	5.39E-06	6.00E-02	9E-05
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	1.34E-07	9.00E-01	2E-07
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	9.49E-07	3.00E-01	3E-06
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	7.94E-05	8.57E-03	9E-03
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	4.36E-07	3.00E-02	2E-05
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	2.35E-06	2.00E-01	1E-05
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	3.39E-08	2.00E-03	2E-05
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	7.92E-07	1.40E-03	6E-04
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.31E-07	8.60E-01	2E-07
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	2.99E-05	2.86E-01	1E-04
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	1.06E-06	4.00E-02	3E-05
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	1.11E-07	1.10E-01	1E-06
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	6.22E-05	5.00E-01	1E-04
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	1.03E-07	8.57E-04	1E-04
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	2.21E-07	8.57E-01	3E-07
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	2.27E-04	8.57E-04	3E-01
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	9.49E-07	3.00E-01	3E-06
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	2.35E-06	3.00E-02	8E-05
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	1.56E-06	2.86E-01	6E-06
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	2.39E-05	1.43E+00	2E-05
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	3.83E-06	1.70E-03	2E-03

Table I6-6
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Medium: Vadose Zone Soil (0–2 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	1.72E-06	1.70E-03	1E-03
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	4.12E-05	2.86E-02	1E-03
								TOTAL	**3E-01**
						Total Risk Across All Exposure Routes/Pathways			**2E+00**

Acronyms/Abbreviations:

bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-7
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	2.94E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	3.01E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	3.58E-02	6.86E-07	—	—		—	—	—	—
	Benzene		1.08E-05					4E-08	4E-09	5E-08
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	2E-11	7E-12		—	2E-09	2E-10	2E-09
	Fluorene	3.00E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	3.31E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.24E-02	1.83E-05	—	—		—	—	—	—
	Phenanthrene	6.94E-02	2.67E-06	—	—		—	—	—	—
	Pyrene	1.38E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		8E-08	4E-08	6E-12	1E-08			1E-07
	Benzo(a)Pyrene	9.53E-02		1E-06	5E-07	8E-11	1E-07			2E-06
	Benzo(b)Fluoranthene	9.06E-02		1E-07	5E-08	8E-12	1E-08			2E-07
	Benzo(k)Fluoranthene	7.12E-02		8E-09	4E-09	6E-13	1E-09			1E-08
	1,2-Benzphenanthracene	1.11E-01		1E-09	6E-10	9E-14	2E-10			2E-09
	Dibenz(A,H)Anthracene	4.02E-02		5E-07	2E-07	3E-11	6E-08			7E-07
	Fluoranthene	1.37E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		1E-07	5E-08	8E-12	2E-08			2E-07
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		2E-09	1E-09	2E-13	2E-07			2E-07
	Aroclor 1260	1.92E-02		6E-08	3E-08	4E-12	1E-06			1E-06

Table I6-7
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		3E-10	4E-11	2E-14	1E-08			1E-08
	4,4-DDE	6.00E-03		3E-09	5E-10	2E-13	1E-07			1E-07
	4,4-DDT	2.60E-03		1E-09	2E-10	1E-13	5E-08			5E-08
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Metals									
	Antimony	2.21E+00		—	—	—	—			—
	Arsenic	1.25E+01		3E-05	3E-06	2E-08	2E-05			5E-05
	Barium	2.44E+02		—	—	—	—			—
	Beryllium	2.45E-01		—	—	2E-10	—			2E-10
	Cadmium	3.90E-01		—	—	3E-10	—			3E-10
	Chromium	5.39E+01		—	—	3E-07	—			3E-07
	Cobalt	1.61E+01		—	—	2E-08	—			2E-08
	Copper	5.00E+01		—	—	—	—			—
	Iron	4.13E+04		—	—	—	—			—
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		—	—	—	—			—
	Molybdenum	3.16E-01		—	—	—	—			—
	Nickel	1.07E+02		—	—	1E-08	—			1E-08
	Selenium	9.37E-01		—	—	—	—			—
	Thallium	1.69E+00		—	—	—	—			—
	Vanadium	5.79E+01		—	—	—	—			—
	Zinc	1.32E+02		—	—	—	—			—
	Total Risk Across Soil			**3E-05**	**4E-06**	**3E-07**	**2E-05**	**5E-08**	**4E-09**	**6E-05**

Table I6-7
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					8E-07		8E-07
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					3E-08		3E-08
	Dichloromethane	3.10E-04	3.05E-07					8E-11		8E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					7E-11		7E-11
	Naphthalene	2.03E+00	5.26E-04					—		—
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—

Table I6-7
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Total Risk Across Groundwater				0E+00	0E+00	0E+00	0E+00	8E-07	0E+00	8E-07
Total Risk Across All Media and All Exposure Routes				3E-05	4E-06	3E-07	2E-05	8E-07	4E-09	6E-05

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-8
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	2.94E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	3.01E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	3.58E-02	6.86E-07	—	—		—	—	—	—
	Benzene		1.08E-05					2E-07	1E-08	2E-07
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	4E-11	1E-11		—	4E-09	4E-10	5E-09
	Fluorene	3.00E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	3.31E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.24E-02	1.83E-05	6E-09	3E-09		—	3E-07	2E-08	4E-07
	Phenanthrene	6.94E-02	2.67E-06	—	—		—	—	—	—
	Pyrene	1.38E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		1E-07	6E-08	3E-12	2E-08			2E-07
	Benzo(a)Pyrene	9.53E-02		2E-06	9E-07	4E-11	2E-07			3E-06
	Benzo(b)Fluoranthene	9.06E-02		2E-07	8E-08	4E-12	2E-08			3E-07
	Benzo(k)Fluoranthene	7.12E-02		1E-07	6E-08	3E-12	2E-08			2E-07
	1,2-Benzphenanthracene	1.11E-01		2E-08	1E-08	5E-13	3E-09			3E-08
	Dibenz(A,H)Anthracene	4.02E-02		3E-07	1E-07	2E-11	3E-08			4E-07
	Fluoranthene	1.37E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		2E-07	9E-08	4E-12	3E-08			3E-07
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		2E-07	8E-08	5E-12	1E-05			1E-05
	Aroclor 1260	1.92E-02		1E-07	7E-08	4E-12	3E-06			3E-06

Table I6-8
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		3E-10	4E-11	2E-14	1E-08			1E-08
	4,4-DDE	6.00E-03		3E-09	5E-10	2E-13	1E-07			1E-07
	4,4-DDT	2.60E-03		1E-09	2E-10	1E-13	5E-08			5E-08
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Metals									
	Antimony	2.21E+00		—	—	—	—			—
	Arsenic	1.25E+01		2E-04	2E-05	2E-08	1E-04			3E-04
	Barium	2.44E+02		—	—	—	—			—
	Beryllium	2.45E-01		—	—	2E-10	—			2E-10
	Cadmium	3.90E-01		2E-07	7E-10	7E-10	2E-06			2E-06
	Chromium	5.39E+01		—	—	5E-07	—			5E-07
	Cobalt	1.61E+01		—	—	—	—			—
	Copper	5.00E+01		—	—	—	—			—
	Iron	4.13E+04		—	—	—	—			—
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		—	—	—	—			—
	Molybdenum	3.16E-01		—	—	—	—			—
	Nickel	1.07E+02		—	—	1E-08	—			1E-08
	Selenium	9.37E-01		—	—	—	—			—
	Thallium	1.69E+00		—	—	—	—			—
	Vanadium	5.79E+01		—	—	—	—			—
	Zinc	1.32E+02		—	—	—	—			—
	Total Risk Across Soil			**2E-04**	**2E-05**	**5E-07**	**1E-04**	**5E-07**	**3E-08**	**4E-04**

Table I6-8
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	Volatile Organic Compounds									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					3E-06		3E-06
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					2E-08		2E-08
	Dichloromethane	3.10E-04	3.05E-07					2E-10		2E-10
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					7E-11		7E-11
	Naphthalene	2.03E+00	5.26E-04					9E-06		9E-06
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—

Table I6-8
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Total Risk Across Groundwater				0E+00	0E+00	0E+00	0E+00	1E-05	0E+00	1E-05
Total Risk Across All Media and All Exposure Routes				2E-04	2E-05	5E-07	1E-04	1E-05	3E-08	4E-04

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether

Table I6-9
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	2.94E-02	3.19E-06	6E-06	3E-06		—	3E-05	2E-06	5E-05
	Acenaphthylene	3.01E-02	2.43E-06	6E-06	3E-06		—	3E-05	2E-06	4E-05
	Anthracene	3.58E-02	6.86E-07	2E-06	6E-07		—	2E-06	2E-07	4E-06
	Benzene		1.08E-05					8E-04	8E-05	9E-04
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	4E-05	2E-05		—	3E-06	2E-06	6E-05
	Dichloromethane	2.00E-03	7.87E-06	4E-07	1E-07		—	6E-06	6E-07	7E-06
	Fluorene	3.00E-02	4.51E-07	1E-05	4E-06		—	7E-06	9E-07	2E-05
	2-Methylnaphthalene	3.31E-02	8.22E-06	2E-05	9E-06		—	6E-03	4E-04	7E-03
	Naphthalene	3.24E-02	1.83E-05	2E-05	9E-06		—	1E-02	7E-04	1E-02
	Phenanthrene	6.94E-02	2.67E-06	3E-06	1E-06		—	6E-06	8E-07	1E-05
	Pyrene	1.38E-01	3.92E-07	6E-05	3E-05		—	8E-06	4E-06	1E-04
	Xylenes (total)	3.00E-03	1.18E-05	2E-07	5E-08		—	3E-04	1E-05	3E-04
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		3E-06	1E-06	1E-10	1E-07			4E-06
	Benzo(a)Pyrene	9.53E-02		4E-05	2E-05	2E-09	2E-06			6E-05
	Benzo(b)Fluoranthene	9.06E-02		3E-05	1E-05	1E-09	1E-06			4E-05
	Benzo(k)Fluoranthene	7.12E-02		2E-05	1E-05	9E-10	8E-07			3E-05
	1,2-Benzphenanthracene	1.11E-01		5E-06	2E-06	2E-10	2E-07			7E-06
	Dibenz(A,H)Anthracene	4.02E-02		2E-06	7E-07	7E-11	6E-08			2E-06
	Fluoranthene	1.37E-01		4E-05	2E-05	2E-09	4E-06			7E-05
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		3E-05	1E-05	1E-09	2E-06			5E-05
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		4E-03	2E-03	2E-07	7E-02			8E-02
	Aroclor 1260	1.92E-02		1E-02	5E-03	5E-07	6E-02			8E-02

Table I6-9
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		2E-05	3E-06	7E-10	3E-04			3E-04
	4,4-DDE	6.00E-03		2E-04	2E-05	6E-09	2E-03			2E-03
	4,4-DDT	2.60E-03		7E-05	9E-06	3E-09	7E-04			7E-04
	Dieldrin	5.00E-04		1E-04	4E-05	5E-09	3E-03			3E-03
	Endosulfan Sulfate	4.00E-03		9E-06	2E-06	3E-10	4E-04			4E-04
	Metals									
	Antimony	2.21E+00		7E-02	2E-03	—	—			7E-02
	Arsenic	1.25E+01		5E-01	5E-02	—	1E-01			7E-01
	Barium	2.44E+02		2E-02	4E-04	9E-04	—			2E-02
	Beryllium	2.45E-01		2E-03	4E-05	2E-05	—			2E-03
	Cadmium	3.90E-01		1E-02	3E-05	—	3E-02			4E-02
	Chromium	5.39E+01		2E-01	6E-03	1E-02	—			2E-01
	Cobalt	1.61E+01		1E-02	3E-04	1E-03	—			1E-02
	Copper	5.00E+01		2E-02	5E-04	—	—			2E-02
	Iron	4.13E+04		2E+00	5E-02	—	—			2E+00
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		2E-02	6E-04	—	7E-03			3E-02
	Molybdenum	3.16E-01		8E-04	2E-05	—	—			8E-04
	Nickel	1.07E+02		7E-02	2E-03	—	2E-02			9E-02
	Selenium	9.37E-01		2E-03	7E-05	—	8E-04			3E-03
	Thallium	1.69E+00		3E-01	9E-03	—	—			3E-01
	Vanadium	5.79E+01		7E-01	2E-02	—	—			8E-01
	Zinc	1.32E+02		6E-03	2E-04	—	7E-03			1E-02
	Hazard Index Across Soil			**4E+00**	**1E-01**	**1E-02**	**3E-01**	**2E-02**	**1E-03**	**4E+00**

Table I6-9
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					1E-04		1E-04
	Acenaphthylene	1.30E-01	1.25E-05					1E-04		1E-04
	Acetone	3.00E-03	3.12E-07					2E-07		2E-07
	Anthracene	5.90E-02	2.20E-06					5E-06		5E-06
	Benzene	1.37E-01	1.84E-04					1E-02		1E-02
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					2E-05		2E-05
	Carbon disulfide	9.60E-04	5.46E-06					2E-05		2E-05
	Dibenzofuran	6.00E-03	7.86E-08					3E-05		3E-05
	1,2-Dichloroethane	3.00E-03	1.84E-06					9E-04		9E-04
	Dichloromethane	3.10E-04	3.05E-07					2E-07		2E-07
	Ethylbenzene	5.20E-02	6.94E-05					2E-04		2E-04
	Fluorene	4.50E-02	2.46E-06					4E-05		4E-05
	4-Isopropyltoluene	1.50E-04	2.57E-07					2E-06		2E-06
	Methane	3.00E+00	1.44E-04					2E-04		2E-04
	Methylnaphthalene	1.00E-03	2.39E-07					2E-04		2E-04
	MTBE	1.00E-03	5.13E-07					4E-07		4E-07
	Naphthalene	2.03E+00	5.26E-04					4E-01		4E-01
	Phenanthrene	2.50E-01	2.20E-06					5E-06		5E-06
	Pyrene	2.00E-01	5.47E-06					1E-04		1E-04
	Styrene	5.00E-03	3.62E-06					8E-06		8E-06
	Toluene	4.00E-02	5.56E-05					3E-05		3E-05
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					3E-03		3E-03
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					2E-03		2E-03
	Xylenes (total)	7.00E-02	9.57E-05					2E-03		2E-03

Table I6-9
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Hazard Index Across Groundwater				0E+00	0E+00	0E+00	0E+00	4E-01	0E+00	4E-01
Hazard Index Across All Media and All Exposure Routes				4E+00	1E-01	1E-02	3E-01	4E-01	1E-03	5E+00

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-10
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	2.94E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	3.01E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	3.58E-02	6.86E-07	—	—		—	—	—	—
	Benzene		1.08E-05					2E-08	2E-09	2E-08
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	6E-12	7E-13		—	8E-10	8E-11	9E-10
	Fluorene	3.00E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	3.31E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.24E-02	1.83E-05	—	—		—	—	—	—
	Phenanthrene	6.94E-02	2.67E-06	—	—		—	—	—	—
	Pyrene	1.38E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		2E-08	4E-09	2E-12	1E-09			3E-08
	Benzo(a)Pyrene	9.53E-02		3E-07	5E-08	3E-11	2E-08			4E-07
	Benzo(b)Fluoranthene	9.06E-02		3E-08	5E-09	3E-12	2E-09			3E-08
	Benzo(k)Fluoranthene	7.12E-02		2E-09	4E-10	2E-13	1E-10			3E-09
	1,2-Benzphenanthracene	1.11E-01		3E-10	6E-11	4E-14	2E-11			4E-10
	Dibenz(A,H)Anthracene	4.02E-02		1E-07	2E-08	1E-11	7E-09			2E-07
	Fluoranthene	1.37E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		3E-08	5E-09	3E-12	2E-09			4E-08
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		6E-10	1E-10	7E-14	2E-08			2E-08
	Aroclor 1260	1.92E-02		2E-08	3E-09	2E-12	1E-07			1E-07

Table I6-10
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		7E-11	4E-12	8E-15	2E-09			2E-09
	4,4-DDE	6.00E-03		9E-10	5E-11	9E-14	2E-08			2E-08
	4,4-DDT	2.60E-03		4E-10	2E-11	4E-14	6E-09			6E-09
	Dieldrin	5.00E-04		3E-09	4E-10	4E-13	1E-07			1E-07
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Metals									
	Antimony	2.21E+00		—	—	—	—			—
	Arsenic	1.25E+01		8E-06	3E-07	9E-09	3E-06			1E-05
	Barium	2.44E+02		—	—	—	—			—
	Beryllium	2.45E-01		—	—	1E-10	—			1E-10
	Cadmium	3.90E-01		—	—	1E-10	—			1E-10
	Chromium	5.39E+01		—	—	1E-07	—			1E-07
	Cobalt	1.61E+01		—	—	7E-09	—			7E-09
	Copper	5.00E+01		—	—	—	—			—
	Iron	4.13E+04		—	—	—	—			—
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		—	—	—	—			—
	Molybdenum	3.16E-01		—	—	—	—			—
	Nickel	1.07E+02		—	—	4E-09	—			4E-09
	Selenium	9.37E-01		—	—	—	—			—
	Thallium	1.69E+00		—	—	—	—			—
	Vanadium	5.79E+01		—	—	—	—			—
	Zinc	1.32E+02		—	—	—	—			—
	Total Risk Across Soil			**9E-06**	**4E-07**	**1E-07**	**3E-06**	**2E-08**	**2E-09**	**1E-05**

Table I6-10
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					3E-07		3E-07
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					1E-08		1E-08
	Dichloromethane	3.10E-04	3.05E-07					3E-11		3E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					3E-11		3E-11
	Naphthalene	2.03E+00	5.26E-04					—		—
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—

Table I6-10
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Total Risk Across Groundwater				0E+00	0E+00	0E+00	0E+00	3E-07	0E+00	3E-07
Total Risk Across All Media and All Exposure Routes				9E-06	4E-07	1E-07	3E-06	3E-07	2E-09	1E-05

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-11
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	2.94E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	3.01E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	3.58E-02	6.86E-07	—	—		—	—	—	—
	Benzene		1.08E-05					7E-08	6E-09	7E-08
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	1E-11	1E-12		—	2E-09	2E-10	2E-09
	Fluorene	3.00E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	3.31E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.24E-02	1.83E-05	2E-09	3E-10		—	1E-07	6E-09	1E-07
	Phenanthrene	6.94E-02	2.67E-06	—	—		—	—	—	—
	Pyrene	1.38E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		4E-08	6E-09	1E-12	2E-09			4E-08
	Benzo(a)Pyrene	9.53E-02		5E-07	8E-08	2E-11	3E-08			6E-07
	Benzo(b)Fluoranthene	9.06E-02		5E-08	8E-09	2E-12	3E-09			6E-08
	Benzo(k)Fluoranthene	7.12E-02		4E-08	6E-09	1E-12	2E-09			4E-08
	1,2-Benzphenanthracene	1.11E-01		6E-09	1E-09	2E-13	3E-10			7E-09
	Dibenz(A,H)Anthracene	4.02E-02		7E-08	1E-08	8E-12	4E-09			9E-08
	Fluoranthene	1.37E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		5E-08	8E-09	2E-12	4E-09			6E-08
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		5E-08	8E-09	2E-12	1E-06			1E-06
	Aroclor 1260	1.92E-02		4E-08	7E-09	2E-12	3E-07			4E-07

Table I6-11
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		7E-11	4E-12	8E-15	2E-09			2E-09
	4,4-DDE	6.00E-03		9E-10	5E-11	9E-14	2E-08			2E-08
	4,4-DDT	2.60E-03		4E-10	2E-11	4E-14	6E-09			6E-09
	Dieldrin	5.00E-04		3E-09	4E-10	4E-13	1E-07			1E-07
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Metals									
	Antimony	2.21E+00		—	—	—	—			—
	Arsenic	1.25E+01		5E-05	2E-06	7E-09	2E-05			7E-05
	Barium	2.44E+02		—	—	—	—			—
	Beryllium	2.45E-01		—	—	1E-10	—			1E-10
	Cadmium	3.90E-01		6E-08	7E-11	3E-10	3E-07			3E-07
	Chromium	5.39E+01		—	—	2E-07	—			2E-07
	Cobalt	1.61E+01		—	—	—	—			—
	Copper	5.00E+01		—	—	—	—			—
	Iron	4.13E+04		—	—	—	—			—
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		—	—	—	—			—
	Molybdenum	3.16E-01		—	—	—	—			—
	Nickel	1.07E+02		—	—	4E-09	—			4E-09
	Selenium	9.37E-01		—	—	—	—			—
	Thallium	1.69E+00		—	—	—	—			—
	Vanadium	5.79E+01		—	—	—	—			—
	Zinc	1.32E+02		—	—	—	—			—
	Total Risk Across Soil			**5E-05**	**2E-06**	**2E-07**	**2E-05**	**2E-07**	**1E-08**	**7E-05**

Table I6-11
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					1E-06		1E-06
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					8E-09		8E-09
	Dichloromethane	3.10E-04	3.05E-07					6E-11		6E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					3E-11		3E-11
	Naphthalene	2.03E+00	5.26E-04					4E-06		4E-06
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—

Table I6-11
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Total Risk Across Groundwater				0E+00	0E+00	0E+00	0E+00	5E-06	0E+00	5E-06
Total Risk Across All Media and All Exposure Routes				5E-05	2E-06	2E-07	2E-05	5E-06	1E-08	8E-05

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether

Table I6-12
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–2 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	2.94E-02	3.19E-06	2E-06	4E-07		—	2E-05	2E-06	3E-05
	Acenaphthylene	3.01E-02	2.43E-06	2E-06	4E-07		—	2E-05	1E-06	2E-05
	Anthracene	3.58E-02	6.86E-07	5E-07	9E-08		—	1E-06	1E-07	2E-06
	Benzene		1.08E-05					5E-04	5E-05	6E-04
	Benzo(g,h,i)Perylene	9.49E-02	1.48E-07	1E-05	2E-06		—	2E-06	1E-06	2E-05
	Dichloromethane	2.00E-03	7.87E-06	1E-07	2E-08		—	4E-06	4E-07	4E-06
	Fluorene	3.00E-02	4.51E-07	3E-06	5E-07		—	5E-06	6E-07	9E-06
	2-Methylnaphthalene	3.31E-02	8.22E-06	7E-06	1E-06		—	4E-03	3E-04	4E-03
	Naphthalene	3.24E-02	1.83E-05	7E-06	1E-06		—	9E-03	4E-04	1E-02
	Phenanthrene	6.94E-02	2.67E-06	1E-06	2E-07		—	4E-06	5E-07	6E-06
	Pyrene	1.38E-01	3.92E-07	2E-05	3E-06		—	6E-06	3E-06	3E-05
	Xylenes (total)	3.00E-03	1.18E-05	6E-08	7E-09		—	2E-04	7E-06	2E-04
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	7.10E-02		1E-06	2E-07	8E-11	3E-08			1E-06
	Benzo(a)Pyrene	9.53E-02		1E-05	2E-06	1E-09	4E-07			2E-05
	Benzo(b)Fluoranthene	9.06E-02		1E-05	2E-06	7E-10	3E-07			1E-05
	Benzo(k)Fluoranthene	7.12E-02		8E-06	1E-06	6E-10	2E-07			9E-06
	1,2-Benzphenanthracene	1.11E-01		2E-06	3E-07	1E-10	4E-08			2E-06
	Dibenz(A,H)Anthracene	4.02E-02		6E-07	1E-07	4E-11	2E-08			7E-07
	Fluoranthene	1.37E-01		2E-05	3E-06	1E-09	9E-07			2E-05
	Indeno(1,2,3-C,D)Pyrene	9.72E-02		1E-05	2E-06	8E-10	4E-07			1E-05
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	2.12E-02		1E-03	2E-04	1E-07	2E-02			2E-02
	Aroclor 1260	1.92E-02		4E-03	7E-04	3E-07	2E-02			2E-02

Table I6-12
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	4,4-DDD	7.00E-04		6E-06	3E-07	5E-10	7E-05			7E-05
	4,4-DDE	6.00E-03		5E-05	3E-06	4E-09	5E-04			5E-04
	4,4-DDT	2.60E-03		2E-05	1E-06	2E-09	2E-04			2E-04
	Dieldrin	5.00E-04		4E-05	5E-06	3E-09	7E-04			8E-04
	Endosulfan Sulfate	4.00E-03		3E-06	3E-07	2E-10	1E-04			1E-04
	Metals									
	Antimony	2.21E+00		2E-02	3E-04	—	—			2E-02
	Arsenic	1.25E+01		2E-01	6E-03	—	3E-02			2E-01
	Barium	2.44E+02		5E-03	6E-05	6E-04	—			6E-03
	Beryllium	2.45E-01		5E-04	6E-06	1E-05	—			5E-04
	Cadmium	3.90E-01		3E-03	4E-06	—	6E-03			1E-02
	Chromium	5.39E+01		8E-02	9E-04	8E-03	—			9E-02
	Cobalt	1.61E+01		3E-03	4E-05	9E-04	—			4E-03
	Copper	5.00E+01		5E-03	6E-05	—	—			5E-03
	Iron	4.13E+04		6E-01	7E-03	—	—			6E-01
	Lead	6.15E+01		—	—	—	—			—
	Mercury	5.09E-01		7E-03	8E-05	—	2E-03			9E-03
	Molybdenum	3.16E-01		3E-04	3E-06	—	—			3E-04
	Nickel	1.07E+02		2E-02	3E-04	—	6E-03			3E-02
	Selenium	9.37E-01		8E-04	9E-06	—	2E-04			1E-03
	Thallium	1.69E+00		1E-01	1E-03	—	—			1E-01
	Vanadium	5.79E+01		3E-01	3E-03	—	—			3E-01
	Zinc	1.32E+02		2E-03	2E-05	—	2E-03			4E-03
	Hazard Index Across Soil			**1E+00**	**2E-02**	**9E-03**	**8E-02**	**1E-02**	**8E-04**	**1E+00**

Table I6-12
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Groundwater	Volatile Organic Compounds									
	Acenaphthene	1.00E-01	9.62E-06					7E-05		7E-05
	Acenaphthylene	1.30E-01	1.25E-05					9E-05		9E-05
	Acetone	3.00E-03	3.12E-07					2E-07		2E-07
	Anthracene	5.90E-02	2.20E-06					3E-06		3E-06
	Benzene	1.37E-01	1.84E-04					9E-03		9E-03
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					2E-05		2E-05
	Carbon disulfide	9.60E-04	5.46E-06					1E-05		1E-05
	Dibenzofuran	6.00E-03	7.86E-08					2E-05		2E-05
	1,2-Dichloroethane	3.00E-03	1.84E-06					6E-04		6E-04
	Dichloromethane	3.10E-04	3.05E-07					2E-07		2E-07
	Ethylbenzene	5.20E-02	6.94E-05					1E-04		1E-04
	Fluorene	4.50E-02	2.46E-06					3E-05		3E-05
	4-Isopropyltoluene	1.50E-04	2.57E-07					1E-06		1E-06
	Methane	3.00E+00	1.44E-04					1E-04		1E-04
	Methylnaphthalene	1.00E-03	2.39E-07					1E-04		1E-04
	MTBE	1.00E-03	5.13E-07					3E-07		3E-07
	Naphthalene	2.03E+00	5.26E-04					3E-01		3E-01
	Phenanthrene	2.50E-01	2.20E-06					3E-06		3E-06
	Pyrene	2.00E-01	5.47E-06					8E-05		8E-05
	Styrene	5.00E-03	3.62E-06					6E-06		6E-06
	Toluene	4.00E-02	5.56E-05					2E-05		2E-05
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					2E-03		2E-03
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					1E-03		1E-03
	Xylenes (total)	7.00E-02	9.57E-05					1E-03		1E-03

Table I6-12
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Current Residential)

Scenario Time Frame: Current
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
Hazard Index Across Groundwater				0E+00	0E+00	0E+00	0E+00	3E-01	0E+00	3E-01
Hazard Index Across All Media and All Exposure Routes				1E+00	2E-02	9E-03	8E-02	3E-01	8E-04	2E+00

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	4.28E-09	5.50E-02	2E-10
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	3.13E-09	7.50E-03	2E-11
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	3.50E-07	7.30E-01	3E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	5.34E-07	7.30E+00	4E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	3.77E-07	7.30E-01	3E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	3.36E-07	7.30E-02	2E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	4.67E-07	7.30E-03	3E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	6.96E-08	7.30E+00	5E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	4.47E-07	7.30E-01	3E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	3.12E-08	7.00E-02	2E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	2.99E-08	2.00E+00	6E-08
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	7.83E-09	2.40E-01	2E-09
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.87E-08	3.40E-01	6E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.07E-09	3.40E-01	1E-09

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	1.60E+01	1E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	4.50E+00	4E-09
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.83E-05	1.50E+00	3E-05
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**3E-05**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.35E-09	5.50E-02	7E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.88E-10	7.50E-03	7E-12

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.66E-07	7.30E-01	1E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	2.53E-07	7.30E+00	2E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.78E-07	7.30E-01	1E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.59E-07	7.30E-02	1E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	2.21E-07	7.30E-03	2E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	3.30E-08	7.30E+00	2E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	2.12E-07	7.30E-01	2E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.48E-08	7.00E-02	1E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.42E-08	2.00E+00	3E-08
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.24E-09	2.40E-01	3E-10
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.95E-09	3.40E-01	1E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.43E-10	3.40E-01	2E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	1.60E+01	4E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	4.50E+00	1E-09
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.73E-06	1.50E+00	3E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	5E-06
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	5.50E-02	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	7.50E-03	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	4.39E-08	7.30E-01	3E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	6.70E-08	7.30E+00	5E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	4.73E-08	7.30E-01	3E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	4.22E-08	7.30E-02	3E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	5.86E-08	7.30E-03	4E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	8.74E-09	7.30E+00	6E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	8.01E-08	7.30E-01	6E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	2.01E-06	7.00E-02	1E-07
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	5.25E-07	2.00E+00	1E-06
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	4.15E-07	2.40E-01	1E-07
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	7.78E-07	3.40E-01	3E-07
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.39E-07	3.40E-01	5E-08
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.21E-08	1.60E+01	1E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	3.99E-08	4.50E+00	2E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.27E-05	1.50E+00	2E-05
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-05**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m³	1.70E-10	2.53E-11	7.30E-01	2E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m³	2.59E-10	3.85E-11	7.30E+00	3E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m³	1.83E-10	2.72E-11	7.30E-01	2E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m³	1.63E-10	2.43E-11	7.30E-02	2E-12
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m³	2.27E-10	3.37E-11	7.30E-03	2E-13
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m³	3.38E-11	5.03E-12	7.30E+00	4E-11
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m³	4.47E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m³	2.17E-10	3.23E-11	7.30E-01	2E-11
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m³	2.28E-10	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m³	1.51E-11	2.25E-12	7.00E-02	2E-13
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m³	1.45E-11	2.16E-12	2.00E+00	4E-12
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m³	3.80E-12	5.65E-13	2.40E-01	1E-13
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m³	9.07E-12	1.35E-12	3.40E-01	5E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	2.94E-13	3.40E-01	1E-13
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	1.60E+01	9E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	4.60E+00	3E-13

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	1.32E-09	1.51E+01	2E-08
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	—	—	—
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	2.87E-11	8.40E+00	2E-10
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	3.49E-11	6.30E+00	2E-10
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	7.22E-09	4.20E+01	3E-07
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	1.78E-09	9.80E+00	2E-08
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	1.53E-08	8.40E-01	1E-08
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**4E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	1.49E-07	2.73E-02	4E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	1.19E-07	1.65E-03	2E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**4E-09**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	1.60E-06	2.73E-02	4E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	1.17E-06	1.65E-03	2E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	**5E-08**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	2.74E-05	2.73E-02	8E-07
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	2.73E-07	9.10E-02	3E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	4.54E-08	1.65E-03	8E-11

Table I6-13
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	7.63E-08	9.10E-04	7E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	—	—	—
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	—	—	—
								TOTAL	**8E-07**
								Total Risk Across All Exposure Routes/Pathways	**6E-05**

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	4.28E-09	1.00E-01	4E-10
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	3.13E-09	1.40E-02	4E-11
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	5.90E-08	1.20E-01	7E-09
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	3.50E-07	1.20E+00	4E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	5.34E-07	1.20E+01	6E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	3.77E-07	1.20E+00	5E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	3.36E-07	1.20E+00	4E-07
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	4.67E-07	1.20E-01	6E-08
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	6.96E-08	4.10E+00	3E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	4.47E-07	1.20E+00	5E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	3.12E-08	5.00E+00	2E-07
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	2.99E-08	5.00E+00	1E-07
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	7.83E-09	2.40E-01	2E-09
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.87E-08	3.40E-01	6E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.07E-09	3.40E-01	1E-09

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	1.60E+01	1E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.83E-10	4.10E+00	3E-09
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.83E-05	9.45E+00	2E-04
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	4.83E-07	3.80E-01	2E-07
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-04**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.35E-09	1.00E-01	1E-10
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.88E-10	1.40E-02	1E-11

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	2.79E-08	1.20E-01	3E-09
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.66E-07	1.20E+00	2E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	2.53E-07	1.20E+01	3E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.78E-07	1.20E+00	2E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.59E-07	1.20E+00	2E-07
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	2.21E-07	1.20E-01	3E-08
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	3.30E-08	4.10E+00	1E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	2.12E-07	1.20E+00	3E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.48E-08	5.00E+00	7E-08
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.42E-08	5.00E+00	7E-08
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.24E-09	2.40E-01	3E-10
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.95E-09	3.40E-01	1E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.43E-10	3.40E-01	2E-10
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	1.60E+01	4E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.47E-10	4.10E+00	1E-09
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.73E-06	9.45E+00	2E-05
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.52E-09	3.80E-01	6E-10
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-05**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	1.00E-01	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	1.40E-02	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	1.20E-01	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	4.39E-08	1.20E+00	5E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	6.70E-08	1.20E+01	8E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	4.73E-08	1.20E+00	6E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	4.22E-08	1.20E+00	5E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	5.86E-08	1.20E-01	7E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	8.74E-09	4.10E+00	4E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	8.01E-08	1.20E+00	1E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	2.01E-06	5.00E+00	1E-05
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	5.25E-07	5.00E+00	3E-06
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	4.15E-07	2.40E-01	1E-07
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	7.78E-07	3.40E-01	3E-07
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.39E-07	3.40E-01	5E-08
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.21E-08	1.60E+01	1E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	3.99E-08	4.10E+00	2E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.27E-05	9.45E+00	1E-04
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	4.23E-06	3.80E-01	2E-06
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**1E-04**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m³	1.70E-10	2.53E-11	3.90E-01	1E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m³	2.59E-10	3.85E-11	3.90E+00	2E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m³	1.83E-10	2.72E-11	3.90E-01	1E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m³	1.63E-10	2.43E-11	3.90E-01	1E-11
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m³	2.27E-10	3.37E-11	3.90E-02	1E-12
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m³	3.38E-11	5.03E-12	4.10E+00	2E-11
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m³	4.47E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m³	2.17E-10	3.23E-11	3.90E-01	1E-11
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m³	2.28E-10	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m³	1.51E-11	2.25E-12	2.00E+00	5E-12
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m³	1.45E-11	2.16E-12	2.00E+00	4E-12
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m³	3.80E-12	5.65E-13	2.40E-01	1E-13
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m³	9.07E-12	1.35E-12	3.40E-01	5E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	2.94E-13	3.40E-01	1E-13
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	1.60E+01	9E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	5.65E-14	4.10E+00	2E-13

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	1.32E-09	1.20E+01	2E-08
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	—	—	—
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	2.87E-11	8.40E+00	2E-10
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	3.49E-11	1.50E+01	5E-10
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	7.22E-09	7.40E+01	5E-07
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	—	—	—
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	1.53E-08	9.10E-01	1E-08
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**6E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	1.49E-07	1.00E-01	1E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	1.19E-07	3.50E-03	4E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	1.30E-07	1.20E-01	2E-08

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	3E-08
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	1.60E-06	1.00E-01	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	1.17E-06	3.50E-03	4E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	2.72E-06	1.20E-01	3E-07
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	5E-07
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	2.74E-05	1.00E-01	3E-06
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	2.73E-07	7.20E-02	2E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	4.54E-08	3.50E-03	2E-10

Table I6-14
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m^3	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m^3	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m^3	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m^3	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m^3	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m^3	5.13E-07	7.63E-08	9.10E-04	7E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m^3	5.26E-04	7.82E-05	1.20E-01	9E-06
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m^3	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m^3	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m^3	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m^3	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m^3	8.89E-06	—	—	—
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m^3	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m^3	9.57E-05	—	—	—
								TOTAL	**1E-05**
								Total Risk Across All Exposure Routes/Pathways	**4E-04**

Acronyms/Abbreviations:

bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m^3 – milligrams per cubic meter
MTBE – methyl tert-butyl ether

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	5.01E-07	6.00E-02	8E-06
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	3.81E-07	6.00E-02	6E-06
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	8.71E-07	3.00E-01	3E-06
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	3.50E-08	4.00E-03	9E-06
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	3.78E-06	3.00E-02	1E-04
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	2.56E-08	6.00E-02	4E-07
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	2.64E-07	4.00E-02	7E-06
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	2.85E-07	2.00E-02	1E-05
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	4.82E-07	2.00E-02	2E-05
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	3.39E-06	3.00E-01	1E-05
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	1.00E-05	3.00E-02	3E-04
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	3.84E-08	2.00E-01	2E-07
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	2.86E-06	3.00E-01	1E-05
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	4.36E-06	3.00E-02	2E-04
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	3.08E-06	4.00E-02	8E-05
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	2.75E-06	4.00E-02	7E-05
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	3.82E-06	3.00E-01	1E-05
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	5.69E-07	3.00E-01	2E-06
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	7.52E-06	4.00E-02	2E-04
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	3.65E-06	4.00E-02	9E-05
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	3.84E-06	3.00E-01	1E-05
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	2.55E-07	7.00E-05	4E-03
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	2.44E-07	2.00E-05	1E-02
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	6.39E-08	5.00E-04	1E-04
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.53E-07	5.00E-04	3E-04
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.32E-08	5.00E-04	7E-05

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.39E-09	5.00E-05	1E-04
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	5.11E-08	6.00E-03	9E-06
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	6.39E-09	5.00E-04	1E-05
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	2.68E-05	4.00E-04	7E-02
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.49E-04	3.00E-04	5E-01
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	2.35E-03	2.00E-01	1E-02
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	3.24E-06	2.00E-03	2E-03
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	3.94E-06	5.00E-04	8E-03
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	8.16E-04	3.00E-03	3E-01
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	2.01E-04	2.00E-02	1E-02
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	4.96E-04	4.00E-02	1E-02
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	4.94E-01	3.00E-01	2E+00
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	9.03E-06	3.00E-04	3E-02
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	3.42E-06	5.00E-03	7E-04
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	1.73E-03	2.00E-02	9E-02
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	9.63E-06	5.00E-03	2E-03
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	1.58E-05	6.60E-05	2E-01
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	6.55E-04	1.00E-03	7E-01
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	1.75E-03	3.00E-01	6E-03
								TOTAL	**4E+00**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	2.10E-07	6.00E-02	4E-06
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	1.60E-07	6.00E-02	3E-06
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	3.66E-07	3.00E-01	1E-06
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	9.79E-09	4.00E-03	2E-06
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	1.59E-06	3.00E-02	5E-05
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	7.16E-09	6.00E-02	1E-07

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	1.11E-07	4.00E-02	3E-06
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	1.20E-07	2.00E-02	6E-06
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	2.02E-07	2.00E-02	1E-05
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	1.42E-06	3.00E-01	5E-06
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	4.20E-06	3.00E-02	1E-04
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.07E-08	2.00E-01	5E-08
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.20E-06	3.00E-01	4E-06
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.83E-06	3.00E-02	6E-05
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.29E-06	4.00E-02	3E-05
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.15E-06	4.00E-02	3E-05
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.60E-06	3.00E-01	5E-06
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	2.39E-07	3.00E-01	8E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	3.16E-06	4.00E-02	8E-05
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	1.53E-06	4.00E-02	4E-05
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	1.07E-06	3.00E-01	4E-06
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.07E-07	7.00E-05	2E-03
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.03E-07	2.00E-05	5E-03
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	8.95E-09	5.00E-04	2E-05
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.14E-08	5.00E-04	4E-05
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	4.65E-09	5.00E-04	9E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.79E-09	5.00E-05	4E-05
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.43E-08	6.00E-03	2E-06
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.79E-09	5.00E-04	4E-06
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	7.51E-07	4.00E-04	2E-03
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.25E-05	3.00E-04	4E-02
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	6.57E-05	2.00E-01	3E-04

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	9.07E-08	2.00E-03	5E-05
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.10E-08	5.00E-04	2E-05
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	2.28E-05	3.00E-03	8E-03
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	5.62E-06	2.00E-02	3E-04
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	1.39E-05	4.00E-02	4E-04
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	1.38E-02	3.00E-01	5E-02
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	2.53E-07	3.00E-04	8E-04
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	9.59E-08	5.00E-03	2E-05
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	4.84E-05	2.00E-02	2E-03
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	2.70E-07	5.00E-03	5E-05
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	4.42E-07	6.60E-05	7E-03
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	1.83E-05	1.00E-03	2E-02
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	4.89E-05	3.00E-01	2E-04
								TOTAL	**1E-01**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	6.00E-02	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	6.00E-02	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	3.00E-01	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	4.00E-03	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	3.00E-02	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	6.00E-02	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	4.00E-02	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	2.00E-02	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	2.00E-02	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	3.00E-01	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	3.00E-02	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	2.00E-01	—

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.02E-07	3.00E-01	3E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.56E-07	3.00E-02	5E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.10E-07	4.00E-02	3E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	9.84E-08	4.00E-02	3E-06
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.37E-07	3.00E-01	5E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	2.04E-08	3.00E-01	7E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	6.27E-07	4.00E-02	2E-05
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	1.87E-07	4.00E-02	5E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	3.00E-01	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	4.69E-06	7.00E-05	7E-02
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.23E-06	2.00E-05	6E-02
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	9.68E-07	5.00E-04	2E-03
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.82E-06	5.00E-04	4E-03
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.25E-07	5.00E-04	7E-04
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.45E-07	5.00E-05	3E-03
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	2.56E-06	6.00E-03	4E-04
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	9.31E-08	5.00E-04	2E-04
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	4.00E-04	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	2.96E-05	3.00E-04	1E-01
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	2.00E-01	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	2.00E-03	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	9.88E-06	5.00E-04	2E-02
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	3.00E-03	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	2.00E-02	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	4.00E-02	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	3.00E-01	—

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	2.76E-06	3.00E-04	9E-03
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	5.00E-03	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	5.59E-04	2.00E-02	3E-02
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	3.07E-06	5.00E-03	6E-04
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	6.60E-05	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	1.00E-03	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	2.26E-03	3.00E-01	8E-03
								TOTAL	**3E-01**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m³	1.70E-10	1.09E-10	3.00E-01	4E-10
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m³	2.59E-10	1.67E-10	3.00E-02	6E-09
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m³	1.83E-10	1.18E-10	4.00E-02	3E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m³	1.63E-10	1.05E-10	4.00E-02	3E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m³	2.27E-10	1.46E-10	3.00E-01	5E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m³	3.38E-11	2.18E-11	3.00E-01	7E-11
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m³	4.47E-10	2.88E-10	4.00E-02	7E-09
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m³	2.17E-10	1.40E-10	4.00E-02	4E-09
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m³	2.28E-10	1.47E-10	3.00E-01	5E-10
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m³	1.51E-11	9.75E-12	7.00E-05	1E-07
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m³	1.45E-11	9.35E-12	2.00E-05	5E-07
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m³	3.80E-12	2.45E-12	5.00E-04	5E-09
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m³	9.07E-12	5.84E-12	5.00E-04	1E-08
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	1.27E-12	5.00E-04	3E-09
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.45E-13	5.00E-05	5E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	1.96E-12	6.00E-03	3E-10
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.45E-13	5.00E-04	5E-10

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	—	—	—
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	8.99E-08	1.40E-04	6E-04
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	1.24E-10	5.71E-06	2E-05
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	—	—	—
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	3.13E-08	2.29E-06	1E-02
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	7.69E-09	5.70E-06	1E-03
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	—	—	—
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**2E-02**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	1.39E-07	6.00E-02	2E-06
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	1.06E-07	6.00E-02	2E-06
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	6.28E-08	3.00E-01	2E-07
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.45E-07	8.57E-03	8E-05
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	5.02E-08	3.00E-02	2E-06
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	5.17E-07	8.60E-01	6E-07
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	3.70E-08	4.00E-02	9E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	3.33E-07	8.57E-04	4E-04
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	5.61E-07	8.57E-04	7E-04

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	2.44E-07	3.00E-01	8E-07
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	1.33E-07	3.00E-02	4E-06
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	3.17E-07	2.86E-02	1E-05
								TOTAL	**1E-03**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	2.06E-06	6.00E-02	3E-05
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	1.57E-06	6.00E-02	3E-05
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	4.42E-07	3.00E-01	2E-06
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.94E-06	8.57E-03	8E-04
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	9.56E-08	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	5.07E-06	8.60E-01	6E-06
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	2.91E-07	4.00E-02	7E-06
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	5.30E-06	8.57E-04	6E-03
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	1.18E-05	8.57E-04	1E-02
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	1.72E-06	3.00E-01	6E-06
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	2.53E-07	3.00E-02	8E-06
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	7.61E-06	2.86E-02	3E-04
								TOTAL	**2E-02**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	6.20E-06	6.00E-02	1E-04
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	8.06E-06	6.00E-02	1E-04
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	2.01E-07	9.00E-01	2E-07
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	1.42E-06	3.00E-01	5E-06
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.19E-04	8.57E-03	1E-02
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	6.52E-07	3.00E-02	2E-05
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	3.52E-06	2.00E-01	2E-05
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	5.07E-08	2.00E-03	3E-05
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.18E-06	1.40E-03	9E-04
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.97E-07	8.60E-01	2E-07

Table I6-15
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	4.47E-05	2.86E-01	2E-04
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	1.59E-06	4.00E-02	4E-05
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	1.66E-07	1.10E-01	2E-06
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	9.30E-05	5.00E-01	2E-04
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	1.54E-07	8.57E-04	2E-04
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.31E-07	8.57E-01	4E-07
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	3.39E-04	8.57E-04	4E-01
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	1.42E-06	3.00E-01	5E-06
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	3.52E-06	3.00E-02	1E-04
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	2.33E-06	2.86E-01	8E-06
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	3.58E-05	1.43E+00	3E-05
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	5.73E-06	1.70E-03	3E-03
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	2.58E-06	1.70E-03	2E-03
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	6.17E-05	2.86E-02	2E-03
								TOTAL	**4E-01**
								Total Risk Across All Exposure Routes/Pathways	**4E+00**

Acronyms/Abbreviations:

bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.16E-09	5.50E-02	6E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.50E-10	7.50E-03	6E-12
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	9.50E-08	7.30E-01	7E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.45E-07	7.30E+00	1E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.02E-07	7.30E-01	7E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	9.13E-08	7.30E-02	7E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.27E-07	7.30E-03	9E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.89E-08	7.30E+00	1E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	1.21E-07	7.30E-01	9E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	8.46E-09	7.00E-02	6E-10
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	8.12E-09	2.00E+00	2E-08
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	2.13E-09	2.40E-01	5E-10
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	5.07E-09	3.40E-01	2E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-09	3.40E-01	4E-10

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	1.60E+01	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	4.50E+00	1E-09
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	4.96E-06	1.50E+00	7E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**9E-06**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.31E-10	5.50E-02	7E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.55E-11	7.50E-03	7E-13

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.60E-08	7.30E-01	1E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	2.44E-08	7.30E+00	2E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.72E-08	7.30E-01	1E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.54E-08	7.30E-02	1E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	2.14E-08	7.30E-03	2E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	3.19E-09	7.30E+00	2E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	2.05E-08	7.30E-01	2E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.43E-09	7.00E-02	1E-10
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.37E-09	2.00E+00	3E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.19E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.85E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.21E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	1.60E+01	4E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	4.50E+00	1E-10
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.67E-07	1.50E+00	3E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**5E-07**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	5.50E-02	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	7.50E-03	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.43E-09	7.30E-01	4E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.29E-09	7.30E+00	6E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	5.85E-09	7.30E-01	4E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.22E-09	7.30E-02	4E-10
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.26E-09	7.30E-03	5E-11
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.08E-09	7.30E+00	8E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.91E-09	7.30E-01	7E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	2.49E-07	7.00E-02	2E-08
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.50E-08	2.00E+00	1E-07
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.14E-08	2.40E-01	1E-08
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	9.64E-08	3.40E-01	3E-08
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.73E-08	3.40E-01	6E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.69E-09	1.60E+01	1E-07
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	4.94E-09	4.50E+00	2E-08
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.57E-06	1.50E+00	2E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**3E-06**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m³	1.70E-10	1.03E-11	7.30E-01	8E-12
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m³	2.59E-10	1.56E-11	7.30E+00	1E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m³	1.83E-10	1.10E-11	7.30E-01	8E-12
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m³	1.63E-10	9.85E-12	7.30E-02	7E-13
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m³	2.27E-10	1.37E-11	7.30E-03	1E-13
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m³	3.38E-11	2.04E-12	7.30E+00	1E-11
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m³	4.47E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m³	2.17E-10	1.31E-11	7.30E-01	1E-11
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m³	2.28E-10	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m³	1.51E-11	9.13E-13	7.00E-02	6E-14
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m³	1.45E-11	8.76E-13	2.00E+00	2E-12
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m³	3.80E-12	2.29E-13	2.40E-01	6E-14
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m³	9.07E-12	5.48E-13	3.40E-01	2E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	1.19E-13	3.40E-01	4E-14
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.29E-14	1.60E+01	4E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	2.29E-14	4.60E+00	1E-13

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	5.36E-10	1.51E+01	8E-09
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	—	—	—
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	1.16E-11	8.40E+00	1E-10
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	1.41E-11	6.30E+00	9E-11
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	2.93E-09	4.20E+01	1E-07
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	7.21E-10	9.80E+00	7E-09
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	6.20E-09	8.40E-01	5E-09
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**1E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.04E-08	2.73E-02	2E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.84E-08	1.65E-03	8E-11
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—

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Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	2E-09
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.50E-07	2.73E-02	2E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	4.75E-07	1.65E-03	8E-10
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	2E-08
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.11E-05	2.73E-02	3E-07
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.11E-07	9.10E-02	1E-08
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.84E-08	1.65E-03	3E-11

Table I6-16
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.10E-08	9.10E-04	3E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	—	—	—
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	—	—	—
								TOTAL	**3E-07**
								Total Risk Across All Exposure Routes/Pathways	**1E-05**

Acronyms/Abbreviations:
- bgs – below ground surface
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- EPC – exposure point concentration
- IRP – Installation Restoration Program
- $(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
- mg/kg – milligrams per kilogram
- mg/kg-day – milligrams per kilogram-day
- mg/L – milligrams per liter
- mg/m³ – milligrams per cubic meter
- MTBE – methyl tert-butyl ether
- U.S. EPA – United States Environmental Protection Agency

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.16E-09	1.00E-01	1E-10
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.50E-10	1.40E-02	1E-11
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.60E-08	1.20E-01	2E-09
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	9.50E-08	1.20E+00	1E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.45E-07	1.20E+01	2E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.02E-07	1.20E+00	1E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	9.13E-08	1.20E+00	1E-07
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.27E-07	1.20E-01	2E-08
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.89E-08	4.10E+00	8E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	1.21E-07	1.20E+00	2E-07
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	8.46E-09	5.00E+00	4E-08
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	8.12E-09	5.00E+00	4E-08
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	2.13E-09	2.40E-01	5E-10
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	5.07E-09	3.40E-01	2E-09
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-09	3.40E-01	4E-10

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	1.60E+01	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.13E-10	4.10E+00	9E-10
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	4.96E-06	9.45E+00	5E-05
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.31E-07	3.80E-01	5E-08
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**5E-05**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.31E-10	1.00E-01	1E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.55E-11	1.40E-02	1E-12

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	2.70E-09	1.20E-01	3E-10
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.60E-08	1.20E+00	2E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	2.44E-08	1.20E+01	3E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.72E-08	1.20E+00	2E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.54E-08	1.20E+00	2E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	2.14E-08	1.20E-01	3E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	3.19E-09	4.10E+00	1E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	2.05E-08	1.20E+00	2E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.43E-09	5.00E+00	7E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.37E-09	5.00E+00	7E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.19E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.85E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.21E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	1.60E+01	4E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-11	4.10E+00	1E-10
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.67E-07	9.45E+00	2E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.47E-10	3.80E-01	6E-11
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-06**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	1.00E-01	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	1.40E-02	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	1.20E-01	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.43E-09	1.20E+00	7E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.29E-09	1.20E+01	1E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	5.85E-09	1.20E+00	7E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.22E-09	1.20E+00	6E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.26E-09	1.20E-01	9E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.08E-09	4.10E+00	5E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.91E-09	1.20E+00	1E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	2.49E-07	5.00E+00	1E-06
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.50E-08	5.00E+00	3E-07
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.14E-08	2.40E-01	1E-08
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	9.64E-08	3.40E-01	3E-08
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.73E-08	3.40E-01	6E-09
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	7.69E-09	1.60E+01	1E-07
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	4.94E-09	4.10E+00	2E-08
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.57E-06	9.45E+00	1E-05
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	5.24E-07	3.80E-01	2E-07
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-05**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m^3	1.70E-10	1.03E-11	3.90E-01	4E-12
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m^3	2.59E-10	1.56E-11	3.90E+00	6E-11
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m^3	1.83E-10	1.10E-11	3.90E-01	4E-12
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m^3	1.63E-10	9.85E-12	3.90E-01	4E-12
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m^3	2.27E-10	1.37E-11	3.90E-02	5E-13
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m^3	3.38E-11	2.04E-12	4.10E+00	8E-12
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m^3	4.47E-10	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m^3	2.17E-10	1.31E-11	3.90E-01	5E-12
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m^3	2.28E-10	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m^3	1.51E-11	9.13E-13	2.00E+00	2E-12
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m^3	1.45E-11	8.76E-13	2.00E+00	2E-12
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m^3	3.80E-12	2.29E-13	2.40E-01	6E-14
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m^3	9.07E-12	5.48E-13	3.40E-01	2E-13
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m^3	1.98E-12	1.19E-13	3.40E-01	4E-14
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m^3	3.80E-13	2.29E-14	1.60E+01	4E-13
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m^3	3.04E-12	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m^3	3.80E-13	2.29E-14	4.10E+00	1E-13

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	5.36E-10	1.20E+01	6E-09
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	—	—	—
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	1.16E-11	8.40E+00	1E-10
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	1.41E-11	1.50E+01	2E-10
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	2.93E-09	7.40E+01	2E-07
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	—	—	—
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	6.20E-09	9.10E-01	6E-09
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**2E-07**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	6.04E-08	1.00E-01	6E-09
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.84E-08	3.50E-03	2E-10
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	5.26E-08	1.20E-01	6E-09

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	**1E-08**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	—	—	—
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	—	—	—
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	6.50E-07	1.00E-01	7E-08
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	—	—	—
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	4.75E-07	3.50E-03	2E-09
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	—	—	—
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	1.10E-06	1.20E-01	1E-07
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	—	—	—
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	—	—	—
								TOTAL	**2E-07**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	—	—	—
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	—	—	—
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	—	—	—
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	1.11E-05	1.00E-01	1E-06
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	—	—	—
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	—	—	—
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	—	—	—
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	1.11E-07	7.20E-02	8E-09
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.84E-08	3.50E-03	6E-11

Table I6-17
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	—	—	—
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	—	—	—
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	—	—	—
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	—	—	—
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	—	—	—
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	3.10E-08	9.10E-04	3E-11
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	3.18E-05	1.20E-01	4E-06
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	—	—	—
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	—	—	—
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	—	—	—
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	—	—	—
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	—	—	—
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	—	—	—
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	—	—	—
								TOTAL	**5E-06**
								Total Risk Across All Exposure Routes/Pathways	**7E-05**

Acronyms/Abbreviations:
- bgs – below ground surface
- Cal/EPA – California Environmental Protection Agency
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- EPC – exposure point concentration
- IRP – Installation Restoration Program
- $(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
- mg/kg – milligrams per kilogram
- mg/kg-day – milligrams per kilogram-day
- mg/L – milligrams per liter
- mg/m³ – milligrams per cubic meter
- MTBE – methyl tert-butyl ether

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	1.67E-07	6.00E-02	3E-06
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	1.27E-07	6.00E-02	2E-06
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	2.91E-07	3.00E-01	1E-06
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.17E-08	4.00E-03	3E-06
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	1.26E-06	3.00E-02	4E-05
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	8.55E-09	6.00E-02	1E-07
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	8.83E-08	4.00E-02	2E-06
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	9.54E-08	2.00E-02	5E-06
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.61E-07	2.00E-02	8E-06
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	1.13E-06	3.00E-01	4E-06
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	3.34E-06	3.00E-02	1E-04
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.28E-08	2.00E-01	6E-08
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	9.55E-07	3.00E-01	3E-06
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.46E-06	3.00E-02	5E-05
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.03E-06	4.00E-02	3E-05
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	9.18E-07	4.00E-02	2E-05
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.28E-06	3.00E-01	4E-06
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.90E-07	3.00E-01	6E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	2.51E-06	4.00E-02	6E-05
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	1.22E-06	4.00E-02	3E-05
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	1.28E-06	3.00E-01	4E-06
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	8.51E-08	7.00E-05	1E-03
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	8.16E-08	2.00E-05	4E-03
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	2.14E-08	5.00E-04	4E-05
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	5.10E-08	5.00E-04	1E-04
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	1.11E-08	5.00E-04	2E-05

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.14E-09	5.00E-05	4E-05
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.71E-08	6.00E-03	3E-06
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.14E-09	5.00E-04	4E-06
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	8.97E-06	4.00E-04	2E-02
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	4.99E-05	3.00E-04	2E-01
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	7.85E-04	2.00E-01	4E-03
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	1.08E-06	2.00E-03	5E-04
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.32E-06	5.00E-04	3E-03
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	2.73E-04	3.00E-03	9E-02
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	6.71E-05	2.00E-02	3E-03
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	1.66E-04	4.00E-02	4E-03
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	1.65E-01	3.00E-01	6E-01
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	3.02E-06	3.00E-04	1E-02
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	1.14E-06	5.00E-03	2E-04
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	5.78E-04	2.00E-02	3E-02
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	3.22E-06	5.00E-03	6E-04
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	5.28E-06	6.60E-05	8E-02
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	2.19E-04	1.00E-03	2E-01
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	5.84E-04	3.00E-01	2E-03
								TOTAL	**1E+00**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	2.81E-08	6.00E-02	5E-07
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	2.14E-08	6.00E-02	4E-07
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	4.89E-08	3.00E-01	2E-07
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	1.31E-09	4.00E-03	3E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	2.12E-07	3.00E-02	7E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	9.57E-10	6.00E-02	2E-08

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	1.48E-08	4.00E-02	4E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	1.60E-08	2.00E-02	8E-07
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	2.70E-08	2.00E-02	1E-06
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	1.90E-07	3.00E-01	6E-07
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	5.62E-07	3.00E-02	2E-05
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	1.44E-09	2.00E-01	7E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	1.60E-07	3.00E-01	5E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	2.45E-07	3.00E-02	8E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	1.73E-07	4.00E-02	4E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	1.54E-07	4.00E-02	4E-06
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	2.14E-07	3.00E-01	7E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	3.19E-08	3.00E-01	1E-07
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	4.22E-07	4.00E-02	1E-05
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	2.05E-07	4.00E-02	5E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	1.44E-07	3.00E-01	5E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.43E-08	7.00E-05	2E-04
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	1.37E-08	2.00E-05	7E-04
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.20E-09	5.00E-04	2E-06
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	2.86E-09	5.00E-04	6E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.22E-10	5.00E-04	1E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-10	5.00E-05	5E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.91E-09	6.00E-03	3E-07
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.39E-10	5.00E-04	5E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	1.00E-07	4.00E-04	3E-04
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	1.68E-06	3.00E-04	6E-03
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	8.79E-06	2.00E-01	4E-05

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	1.21E-08	2.00E-03	6E-06
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	1.48E-09	5.00E-04	3E-06
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	3.06E-06	3.00E-03	1E-03
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	7.52E-07	2.00E-02	4E-05
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	1.86E-06	4.00E-02	5E-05
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	1.85E-03	3.00E-01	6E-03
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	3.38E-08	3.00E-04	1E-04
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	1.28E-08	5.00E-03	3E-06
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	6.47E-06	2.00E-02	3E-04
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	3.60E-08	5.00E-03	7E-06
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	5.91E-08	6.60E-05	9E-04
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	2.45E-06	1.00E-03	3E-03
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	6.54E-06	3.00E-01	2E-05
								TOTAL	**2E-02**
Ingestion of Homegrown Produce	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	6.00E-02	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	6.00E-02	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	3.00E-01	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	—	4.00E-03	—
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	3.00E-02	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	—	6.00E-02	—
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	4.00E-02	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	2.00E-02	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	2.00E-02	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	3.00E-01	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	3.00E-02	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	2.00E-01	—

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	2.53E-08	3.00E-01	8E-08
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	3.86E-08	3.00E-02	1E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	2.72E-08	4.00E-02	7E-07
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	2.43E-08	4.00E-02	6E-07
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	3.38E-08	3.00E-01	1E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	5.03E-09	3.00E-01	2E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	1.55E-07	4.00E-02	4E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	4.61E-08	4.00E-02	1E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	3.00E-01	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	1.16E-06	7.00E-05	2E-02
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	3.03E-07	2.00E-05	2E-02
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	2.39E-07	5.00E-04	5E-04
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	4.48E-07	5.00E-04	9E-04
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	8.03E-08	5.00E-04	2E-04
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	3.58E-08	5.00E-05	7E-04
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	6.33E-07	6.00E-03	1E-04
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	2.30E-08	5.00E-04	5E-05
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	4.00E-04	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	7.31E-06	3.00E-04	2E-02
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	2.00E-01	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	2.00E-03	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	2.44E-06	5.00E-04	5E-03
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	3.00E-03	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	2.00E-02	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	4.00E-02	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	3.00E-01	—

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	6.83E-07	3.00E-04	2E-03
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	5.00E-03	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	1.38E-04	2.00E-02	7E-03
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	7.57E-07	5.00E-03	2E-04
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	6.60E-05	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	1.00E-03	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	5.58E-04	3.00E-01	2E-03
								TOTAL	**8E-02**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.70E-10	mg/m³	1.70E-10	7.32E-11	3.00E-01	2E-10
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.59E-10	mg/m³	2.59E-10	1.12E-10	3.00E-02	4E-09
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.83E-10	mg/m³	1.83E-10	7.88E-11	4.00E-02	2E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.63E-10	mg/m³	1.63E-10	7.03E-11	4.00E-02	2E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.27E-10	mg/m³	2.27E-10	9.77E-11	3.00E-01	3E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.38E-11	mg/m³	3.38E-11	1.46E-11	3.00E-01	5E-11
	Fluoranthene	5.88E-01	mg/kg	4.47E-10	mg/m³	4.47E-10	1.93E-10	4.00E-02	5E-09
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.17E-10	mg/m³	2.17E-10	9.35E-11	4.00E-02	2E-09
	Phenol	3.00E-01	mg/kg	2.28E-10	mg/m³	2.28E-10	9.82E-11	3.00E-01	3E-10
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.51E-11	mg/m³	1.51E-11	6.52E-12	7.00E-05	9E-08
	Aroclor 1260	1.91E-02	mg/kg	1.45E-11	mg/m³	1.45E-11	6.25E-12	2.00E-05	3E-07
	4,4-DDD	5.00E-03	mg/kg	3.80E-12	mg/m³	3.80E-12	1.64E-12	5.00E-04	3E-09
	4,4-DDE	1.19E-02	mg/kg	9.07E-12	mg/m³	9.07E-12	3.91E-12	5.00E-04	8E-09
	4,4-DDT	2.60E-03	mg/kg	1.98E-12	mg/m³	1.98E-12	8.51E-13	5.00E-04	2E-09
	Dieldrin	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	1.64E-13	5.00E-05	3E-09
	Endosulfan Sulfate	4.00E-03	mg/kg	3.04E-12	mg/m³	3.04E-12	1.31E-12	6.00E-03	2E-10
	Heptachlor	5.00E-04	mg/kg	3.80E-13	mg/m³	3.80E-13	1.64E-13	5.00E-04	3E-10

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Metals								
	Antimony	2.10E+00	mg/kg	1.59E-09	mg/m³	1.59E-09	—	—	—
	Arsenic	1.17E+01	mg/kg	8.87E-09	mg/m³	8.87E-09	—	—	—
	Barium	1.84E+02	mg/kg	1.40E-07	mg/m³	1.40E-07	6.01E-08	1.40E-04	4E-04
	Beryllium	2.53E-01	mg/kg	1.93E-10	mg/m³	1.93E-10	8.30E-11	5.71E-06	2E-05
	Cadmium	3.08E-01	mg/kg	2.34E-10	mg/m³	2.34E-10	—	—	—
	Chromium	6.38E+01	mg/kg	4.85E-08	mg/m³	4.85E-08	2.09E-08	2.29E-06	9E-03
	Cobalt	1.57E+01	mg/kg	1.19E-08	mg/m³	1.19E-08	5.14E-09	5.70E-06	9E-04
	Copper	3.88E+01	mg/kg	2.95E-08	mg/m³	2.95E-08	—	—	—
	Iron	3.86E+04	mg/kg	2.94E-05	mg/m³	2.94E-05	—	—	—
	Lead	4.06E+01	mg/kg	3.09E-08	mg/m³	3.09E-08	—	—	—
	Mercury	7.06E-01	mg/kg	5.37E-10	mg/m³	5.37E-10	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.04E-10	mg/m³	2.04E-10	—	—	—
	Nickel	1.35E+02	mg/kg	1.03E-07	mg/m³	1.03E-07	—	—	—
	Selenium	7.53E-01	mg/kg	5.72E-10	mg/m³	5.72E-10	—	—	—
	Thallium	1.23E+00	mg/kg	9.38E-10	mg/m³	9.38E-10	—	—	—
	Vanadium	5.12E+01	mg/kg	3.89E-08	mg/m³	3.89E-08	—	—	—
	Zinc	1.37E+02	mg/kg	1.04E-07	mg/m³	1.04E-07	—	—	—
								TOTAL	**1E-02**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	9.26E-08	6.00E-02	2E-06
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	7.06E-08	6.00E-02	1E-06
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	4.20E-08	3.00E-01	1E-07
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	4.31E-07	8.57E-03	5E-05
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	3.35E-08	3.00E-02	1E-06
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	3.45E-07	8.60E-01	4E-07
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	2.47E-08	4.00E-02	6E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	2.22E-07	8.57E-04	3E-04
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	3.75E-07	8.57E-04	4E-04

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	1.63E-07	3.00E-01	5E-07
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	8.87E-08	3.00E-02	3E-06
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	2.12E-07	2.86E-02	7E-06
								TOTAL	**8E-04**
Inhalation of Indoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.19E-06	mg/m³	3.19E-06	1.38E-06	6.00E-02	2E-05
	Acenaphthylene	2.98E-02	mg/kg	2.43E-06	mg/m³	2.43E-06	1.05E-06	6.00E-02	2E-05
	Anthracene	6.81E-02	mg/kg	6.86E-07	mg/m³	6.86E-07	2.96E-07	3.00E-01	1E-06
	Benzene	2.73E-03	mg/kg	1.08E-05	mg/m³	1.08E-05	4.64E-06	8.57E-03	5E-04
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	1.48E-07	mg/m³	1.48E-07	6.39E-08	3.00E-02	2E-06
	Dichloromethane	2.00E-03	mg/kg	7.87E-06	mg/m³	7.87E-06	3.39E-06	8.60E-01	4E-06
	Fluorene	2.07E-02	mg/kg	4.51E-07	mg/m³	4.51E-07	1.94E-07	4.00E-02	5E-06
	2-Methylnaphthalene	2.23E-02	mg/kg	8.22E-06	mg/m³	8.22E-06	3.54E-06	8.57E-04	4E-03
	Naphthalene	3.77E-02	mg/kg	1.83E-05	mg/m³	1.83E-05	7.88E-06	8.57E-04	9E-03
	Phenanthrene	2.65E-01	mg/kg	2.67E-06	mg/m³	2.67E-06	1.15E-06	3.00E-01	4E-06
	Pyrene	7.82E-01	mg/kg	3.92E-07	mg/m³	3.92E-07	1.69E-07	3.00E-02	6E-06
	Xylenes (total)	3.00E-03	mg/kg	1.18E-05	mg/m³	1.18E-05	5.09E-06	2.86E-02	2E-04
								TOTAL	**1E-02**
Inhalation of Indoor Air from Groundwater	**Volatile Organic Compounds**								
	Acenaphthene	1.00E-01	mg/L	9.62E-06	mg/m³	9.62E-06	4.15E-06	6.00E-02	7E-05
	Acenaphthylene	1.30E-01	mg/L	1.25E-05	mg/m³	1.25E-05	5.39E-06	6.00E-02	9E-05
	Acetone	3.00E-03	mg/L	3.12E-07	mg/m³	3.12E-07	1.34E-07	9.00E-01	2E-07
	Anthracene	5.90E-02	mg/L	2.20E-06	mg/m³	2.20E-06	9.49E-07	3.00E-01	3E-06
	Benzene	1.37E-01	mg/L	1.84E-04	mg/m³	1.84E-04	7.94E-05	8.57E-03	9E-03
	Benzo(g,h,i)perylene	3.70E-02	mg/L	1.01E-06	mg/m³	1.01E-06	4.36E-07	3.00E-02	2E-05
	Carbon disulfide	9.60E-04	mg/L	5.46E-06	mg/m³	5.46E-06	2.35E-06	2.00E-01	1E-05
	Dibenzofuran	6.00E-03	mg/L	7.86E-08	mg/m³	7.86E-08	3.39E-08	2.00E-03	2E-05
	1,2-Dichloroethane	3.00E-03	mg/L	1.84E-06	mg/m³	1.84E-06	7.92E-07	1.40E-03	6E-04
	Dichloromethane	3.10E-04	mg/L	3.05E-07	mg/m³	3.05E-07	1.31E-07	8.60E-01	2E-07

Table I6-18
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Ethylbenzene	5.20E-02	mg/L	6.94E-05	mg/m³	6.94E-05	2.99E-05	2.86E-01	1E-04
	Fluorene	4.50E-02	mg/L	2.46E-06	mg/m³	2.46E-06	1.06E-06	4.00E-02	3E-05
	4-Isopropyltoluene	1.50E-04	mg/L	2.57E-07	mg/m³	2.57E-07	1.11E-07	1.10E-01	1E-06
	Methane	3.00E+00	mg/L	1.44E-04	mg/m³	1.44E-04	6.22E-05	5.00E-01	1E-04
	Methylnaphthalene	1.00E-03	mg/L	2.39E-07	mg/m³	2.39E-07	1.03E-07	8.57E-04	1E-04
	MTBE	1.00E-03	mg/L	5.13E-07	mg/m³	5.13E-07	2.21E-07	8.57E-01	3E-07
	Naphthalene	2.03E+00	mg/L	5.26E-04	mg/m³	5.26E-04	2.27E-04	8.57E-04	3E-01
	Phenanthrene	2.50E-01	mg/L	2.20E-06	mg/m³	2.20E-06	9.49E-07	3.00E-01	3E-06
	Pyrene	2.00E-01	mg/L	5.47E-06	mg/m³	5.47E-06	2.35E-06	3.00E-02	8E-05
	Styrene	5.00E-03	mg/L	3.62E-06	mg/m³	3.62E-06	1.56E-06	2.86E-01	6E-06
	Toluene	4.00E-02	mg/L	5.56E-05	mg/m³	5.56E-05	2.39E-05	1.43E+00	2E-05
	1,2,4-Trimethylbenzene	9.00E-03	mg/L	8.89E-06	mg/m³	8.89E-06	3.83E-06	1.70E-03	2E-03
	1,3,5-Trimethylbenzene	4.00E-03	mg/L	4.00E-06	mg/m³	4.00E-06	1.72E-06	1.70E-03	1E-03
	Xylenes (total)	7.00E-02	mg/L	9.57E-05	mg/m³	9.57E-05	4.12E-05	2.86E-02	1E-03
								TOTAL	**3E-01**
								Total Risk Across All Exposure Routes/Pathways	**2E+00**

Acronyms/Abbreviations:

bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/L – milligrams per liter
mg/m³ – milligrams per cubic meter
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-19
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	3.92E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	2.98E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	6.81E-02	6.86E-07	—	—		—	—	—	—
	Benzene	2.73E-03	1.08E-05	2E-10	7E-11		—	4E-08	4E-09	5E-08
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	2E-11	7E-12		—	2E-09	2E-10	2E-09
	Fluorene	2.07E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	2.23E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.77E-02	1.83E-05	—	—		—	—	—	—
	Phenanthrene	2.65E-01	2.67E-06	—	—		—	—	—	—
	Pyrene	7.82E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		3E-07	1E-07	2E-11	3E-08			4E-07
	Benzo(a)Pyrene	3.41E-01		4E-06	2E-06	3E-10	5E-07			6E-06
	Benzo(b)Fluoranthene	2.41E-01		3E-07	1E-07	2E-11	3E-08			4E-07
	Benzo(k)Fluoranthene	2.15E-01		2E-08	1E-08	2E-12	3E-09			4E-08
	1,2-Benzphenanthracene	2.98E-01		3E-09	2E-09	2E-13	4E-10			5E-09
	Dibenz(A,H)Anthracene	4.45E-02		5E-07	2E-07	4E-11	6E-08			8E-07
	Fluoranthene	5.88E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		3E-07	2E-07	2E-11	6E-08			5E-07
	Phenol	3.00E-01		—	—	—	—			—

Table I6-19
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		2E-09	1E-09	2E-13	1E-07			1E-07
	Aroclor 1260	1.91E-02		6E-08	3E-08	4E-12	1E-06			1E-06
	4,4-DDD	5.00E-03		2E-09	3E-10	1E-13	1E-07			1E-07
	4,4-DDE	1.19E-02		6E-09	1E-09	5E-13	3E-07			3E-07
	4,4-DDT	2.60E-03		1E-09	2E-10	1E-13	5E-08			5E-08
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Heptachlor	5.00E-04		4E-09	1E-09	3E-13	2E-07			2E-07
	Metals									
	Antimony	2.10E+00		—	—	—	—			—
	Arsenic	1.17E+01		3E-05	3E-06	2E-08	2E-05			5E-05
	Barium	1.84E+02		—	—	—	—			—
	Beryllium	2.53E-01		—	—	2E-10	—			2E-10
	Cadmium	3.08E-01		—	—	2E-10	—			2E-10
	Chromium	6.38E+01		—	—	3E-07	—			3E-07
	Cobalt	1.57E+01		—	—	2E-08	—			2E-08
	Copper	3.88E+01		—	—	—	—			—
	Iron	3.86E+04		—	—	—	—			—
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		—	—	—	—			—
	Molybdenum	2.68E-01		—	—	—	—			—
	Nickel	1.35E+02		—	—	1E-08	—			1E-08
	Selenium	7.53E-01		—	—	—	—			—
	Thallium	1.23E+00		—	—	—	—			—

Table I6-19
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—	—			—
	Zinc	1.37E+02		—	—	—	—			—
	Total Risk Across Soil			**3E-05**	**5E-06**	**4E-07**	**2E-05**	**5E-08**	**4E-09**	**6E-05**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					8E-07		8E-07
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					3E-08		3E-08
	Dichloromethane	3.10E-04	3.05E-07					8E-11		8E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					7E-11		7E-11
	Naphthalene	2.03E+00	5.26E-04					—		—
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—

Table I6-19
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—
Total Risk Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**8E-07**	**0E+00**	**8E-07**
Total Risk Across All Media and All Exposure Routes				**3E-05**	**5E-06**	**4E-07**	**2E-05**	**8E-07**	**4E-09**	**6E-05**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-20
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	3.92E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	2.98E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	6.81E-02	6.86E-07	—	—		—	—	—	—
	Benzene	2.73E-03	1.08E-05	4E-10	1E-10		—	2E-07	1E-08	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	4E-11	1E-11		—	4E-09	4E-10	5E-09
	Fluorene	2.07E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	2.23E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.77E-02	1.83E-05	7E-09	3E-09		—	3E-07	2E-08	4E-07
	Phenanthrene	2.65E-01	2.67E-06	—	—		—	—	—	—
	Pyrene	7.82E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		4E-07	2E-07	1E-11	5E-08			7E-07
	Benzo(a)Pyrene	3.41E-01		6E-06	3E-06	2E-10	8E-07			1E-05
	Benzo(b)Fluoranthene	2.41E-01		5E-07	2E-07	1E-11	6E-08			7E-07
	Benzo(k)Fluoranthene	2.15E-01		4E-07	2E-07	1E-11	5E-08			6E-07
	1,2-Benzphenanthracene	2.98E-01		6E-08	3E-08	1E-12	7E-09			9E-08
	Dibenz(A,H)Anthracene	4.45E-02		3E-07	1E-07	2E-11	4E-08			5E-07
	Fluoranthene	5.88E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		5E-07	3E-07	1E-11	1E-07			9E-07
	Phenol	3.00E-01		—	—	—	—			—

Table I6-20
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		2E-07	7E-08	5E-12	1E-05			1E-05
	Aroclor 1260	1.91E-02		1E-07	7E-08	4E-12	3E-06			3E-06
	4,4-DDD	5.00E-03		2E-09	3E-10	1E-13	1E-07			1E-07
	4,4-DDE	1.19E-02		6E-09	1E-09	5E-13	3E-07			3E-07
	4,4-DDT	2.60E-03		1E-09	2E-10	1E-13	5E-08			5E-08
	Dieldrin	5.00E-04		1E-08	4E-09	9E-13	1E-06			1E-06
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Heptachlor	5.00E-04		3E-09	1E-09	2E-13	2E-07			2E-07
	Metals									
	Antimony	2.10E+00		—	—	—	—			—
	Arsenic	1.17E+01		2E-04	2E-05	2E-08	1E-04			3E-04
	Barium	1.84E+02		—	—	—	—			—
	Beryllium	2.53E-01		—	—	2E-10	—			2E-10
	Cadmium	3.08E-01		2E-07	6E-10	5E-10	2E-06			2E-06
	Chromium	6.38E+01		—	—	5E-07	—			5E-07
	Cobalt	1.57E+01		—	—	—	—			—
	Copper	3.88E+01		—	—	—	—			—
	Iron	3.86E+04		—	—	—	—			—
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		—	—	—	—			—
	Molybdenum	2.68E-01		—	—	—	—			—
	Nickel	1.35E+02		—	—	1E-08	—			1E-08
	Selenium	7.53E-01		—	—	—	—			—
	Thallium	1.23E+00		—	—	—	—			—

Table I6-20
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—	—			—
	Zinc	1.37E+02		—	—	—	—			—
	Total Risk Across Soil			**2E-04**	**2E-05**	**6E-07**	**1E-04**	**5E-07**	**3E-08**	**3E-04**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					3E-06		3E-06
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					2E-08		2E-08
	Dichloromethane	3.10E-04	3.05E-07					2E-10		2E-10
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					7E-11		7E-11
	Naphthalene	2.03E+00	5.26E-04					9E-06		9E-06
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—

Table I6-20
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—
Total Risk Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**1E-05**	**0E+00**	**1E-05**
Total Risk Across All Media and All Exposure Routes				**2E-04**	**2E-05**	**6E-07**	**1E-04**	**1E-05**	**3E-08**	**4E-04**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether

Table I6-21
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	3.92E-02	3.19E-06	8E-06	4E-06		—	3E-05	2E-06	5E-05
	Acenaphthylene	2.98E-02	2.43E-06	6E-06	3E-06		—	3E-05	2E-06	4E-05
	Anthracene	6.81E-02	6.86E-07	3E-06	1E-06		—	2E-06	2E-07	6E-06
	Benzene	2.73E-03	1.08E-05	9E-06	2E-06		—	8E-04	8E-05	9E-04
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	1E-04	5E-05		—	3E-06	2E-06	2E-04
	Dichloromethane	2.00E-03	7.87E-06	4E-07	1E-07		—	6E-06	6E-07	7E-06
	Fluorene	2.07E-02	4.51E-07	7E-06	3E-06		—	7E-06	9E-07	2E-05
	2-Methylnaphthalene	2.23E-02	8.22E-06	1E-05	6E-06		—	6E-03	4E-04	7E-03
	Naphthalene	3.77E-02	1.83E-05	2E-05	1E-05		—	1E-02	7E-04	1E-02
	Phenanthrene	2.65E-01	2.67E-06	1E-05	5E-06		—	6E-06	8E-07	2E-05
	Pyrene	7.82E-01	3.92E-07	3E-04	1E-04		—	8E-06	4E-06	5E-04
	Xylenes (total)	3.00E-03	1.18E-05	2E-07	5E-08		—	3E-04	1E-05	3E-04
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		1E-05	4E-06	4E-10	3E-07			1E-05
	Benzo(a)Pyrene	3.41E-01		2E-04	6E-05	6E-09	5E-06			2E-04
	Benzo(b)Fluoranthene	2.41E-01		8E-05	3E-05	3E-09	3E-06			1E-04
	Benzo(k)Fluoranthene	2.15E-01		7E-05	3E-05	3E-09	3E-06			1E-04
	1,2-Benzphenanthracene	2.98E-01		1E-05	5E-06	5E-10	5E-07			2E-05
	Dibenz(A,H)Anthracene	4.45E-02		2E-06	8E-07	7E-11	7E-08			3E-06
	Fluoranthene	5.88E-01		2E-04	8E-05	7E-09	2E-05			3E-04
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		9E-05	4E-05	4E-09	5E-06			1E-04
	Phenol	3.00E-01		1E-05	4E-06	5E-10	—			2E-05

Table I6-21
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		4E-03	2E-03	1E-07	7E-02			7E-02
	Aroclor 1260	1.91E-02		1E-02	5E-03	5E-07	6E-02			8E-02
	4,4-DDD	5.00E-03		1E-04	2E-05	5E-09	2E-03			2E-03
	4,4-DDE	1.19E-02		3E-04	4E-05	1E-08	4E-03			4E-03
	4,4-DDT	2.60E-03		7E-05	9E-06	3E-09	7E-04			7E-04
	Dieldrin	5.00E-04		1E-04	4E-05	5E-09	3E-03			3E-03
	Endosulfan Sulfate	4.00E-03		9E-06	2E-06	3E-10	4E-04			4E-04
	Heptachlor	5.00E-04		1E-05	4E-06	5E-10	2E-04			2E-04
	Metals									
	Antimony	2.10E+00		7E-02	2E-03	—	—			7E-02
	Arsenic	1.17E+01		5E-01	4E-02	—	1E-01			6E-01
	Barium	1.84E+02		1E-02	3E-04	6E-04	—			1E-02
	Beryllium	2.53E-01		2E-03	5E-05	2E-05	—			2E-03
	Cadmium	3.08E-01		8E-03	2E-05	—	2E-02			3E-02
	Chromium	6.38E+01		3E-01	8E-03	1E-02	—			3E-01
	Cobalt	1.57E+01		1E-02	3E-04	1E-03	—			1E-02
	Copper	3.88E+01		1E-02	4E-04	—	—			1E-02
	Iron	3.86E+04		2E+00	5E-02	—	—			2E+00
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		3E-02	8E-04	—	9E-03			4E-02
	Molybdenum	2.68E-01		7E-04	2E-05	—	—			7E-04
	Nickel	1.35E+02		9E-02	2E-03	—	3E-02			1E-01
	Selenium	7.53E-01		2E-03	5E-05	—	6E-04			3E-03
	Thallium	1.23E+00		2E-01	7E-03	—	—			2E-01

Table I6-21
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		7E-01	2E-02	—	—			7E-01
	Zinc	1.37E+02		6E-03	2E-04	—	8E-03			1E-02
	Hazard Index Across Soil			**4E+00**	**1E-01**	**2E-02**	**3E-01**	**2E-02**	**1E-03**	**4E+00**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					1E-04		1E-04
	Acenaphthylene	1.30E-01	1.25E-05					1E-04		1E-04
	Acetone	3.00E-03	3.12E-07					2E-07		2E-07
	Anthracene	5.90E-02	2.20E-06					5E-06		5E-06
	Benzene	1.37E-01	1.84E-04					1E-02		1E-02
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					2E-05		2E-05
	Carbon disulfide	9.60E-04	5.46E-06					2E-05		2E-05
	Dibenzofuran	6.00E-03	7.86E-08					3E-05		3E-05
	1,2-Dichloroethane	3.00E-03	1.84E-06					9E-04		9E-04
	Dichloromethane	3.10E-04	3.05E-07					2E-07		2E-07
	Ethylbenzene	5.20E-02	6.94E-05					2E-04		2E-04
	Fluorene	4.50E-02	2.46E-06					4E-05		4E-05
	4-Isopropyltoluene	1.50E-04	2.57E-07					2E-06		2E-06
	Methane	3.00E+00	1.44E-04					2E-04		2E-04
	Methylnaphthalene	1.00E-03	2.39E-07					2E-04		2E-04
	MTBE	1.00E-03	5.13E-07					4E-07		4E-07
	Naphthalene	2.03E+00	5.26E-04					4E-01		4E-01
	Phenanthrene	2.50E-01	2.20E-06					5E-06		5E-06
	Pyrene	2.00E-01	5.47E-06					1E-04		1E-04
	Styrene	5.00E-03	3.62E-06					8E-06		8E-06
	Toluene	4.00E-02	5.56E-05					3E-05		3E-05

Table I6-21
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					3E-03		3E-03
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					2E-03		2E-03
	Xylenes (total)	7.00E-02	9.57E-05					2E-03		2E-03
Hazard Index Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**4E-01**	**0E+00**	**4E-01**
Hazard Index Across All Media and All Exposure Routes				**4E+00**	**1E-01**	**2E-02**	**3E-01**	**4E-01**	**1E-03**	**4E+00**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-22
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	3.92E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	2.98E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	6.81E-02	6.86E-07	—	—		—	—	—	—
	Benzene	2.73E-03	1.08E-05	6E-11	7E-12		—	2E-08	2E-09	2E-08
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	6E-12	7E-13		—	8E-10	8E-11	9E-10
	Fluorene	2.07E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	2.23E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.77E-02	1.83E-05	—	—		—	—	—	—
	Phenanthrene	2.65E-01	2.67E-06	—	—		—	—	—	—
	Pyrene	7.82E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		7E-08	1E-08	8E-12	4E-09			9E-08
	Benzo(a)Pyrene	3.41E-01		1E-06	2E-07	1E-10	6E-08			1E-06
	Benzo(b)Fluoranthene	2.41E-01		7E-08	1E-08	8E-12	4E-09			9E-08
	Benzo(k)Fluoranthene	2.15E-01		7E-09	1E-09	7E-13	4E-10			8E-09
	1,2-Benzphenanthracene	2.98E-01		9E-10	2E-10	1E-13	5E-11			1E-09
	Dibenz(A,H)Anthracene	4.45E-02		1E-07	2E-08	1E-11	8E-09			2E-07
	Fluoranthene	5.88E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		9E-08	2E-08	1E-11	7E-09			1E-07
	Phenol	3.00E-01		—	—	—	—			—

Table I6-22
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		6E-10	1E-10	6E-14	2E-08			2E-08
	Aroclor 1260	1.91E-02		2E-08	3E-09	2E-12	1E-07			1E-07
	4,4-DDD	5.00E-03		5E-10	3E-11	6E-14	1E-08			1E-08
	4,4-DDE	1.19E-02		2E-09	1E-10	2E-13	3E-08			3E-08
	4,4-DDT	2.60E-03		4E-10	2E-11	4E-14	6E-09			6E-09
	Dieldrin	5.00E-04		3E-09	4E-10	4E-13	1E-07			1E-07
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Heptachlor	5.00E-04		1E-09	1E-10	1E-13	2E-08			2E-08
	Metals									
	Antimony	2.10E+00		—	—	—	—			—
	Arsenic	1.17E+01		7E-06	3E-07	8E-09	2E-06			1E-05
	Barium	1.84E+02		—	—	—	—			—
	Beryllium	2.53E-01		—	—	1E-10	—			1E-10
	Cadmium	3.08E-01		—	—	9E-11	—			9E-11
	Chromium	6.38E+01		—	—	1E-07	—			1E-07
	Cobalt	1.57E+01		—	—	7E-09	—			7E-09
	Copper	3.88E+01		—	—	—	—			—
	Iron	3.86E+04		—	—	—	—			—
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		—	—	—	—			—
	Molybdenum	2.68E-01		—	—	—	—			—
	Nickel	1.35E+02		—	—	5E-09	—			5E-09
	Selenium	7.53E-01		—	—	—	—			—
	Thallium	1.23E+00		—	—	—	—			—

Table I6-22
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—	—			—
	Zinc	1.37E+02		—	—	—	—			—
	Total Risk Across Soil			**9E-06**	**5E-07**	**1E-07**	**3E-06**	**2E-08**	**2E-09**	**1E-05**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					3E-07		3E-07
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					1E-08		1E-08
	Dichloromethane	3.10E-04	3.05E-07					3E-11		3E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					3E-11		3E-11
	Naphthalene	2.03E+00	5.26E-04					—		—
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—

Table I6-22
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—
Total Risk Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**3E-07**	**0E+00**	**3E-07**
Total Risk Across All Media and All Exposure Routes				**9E-06**	**5E-07**	**1E-07**	**3E-06**	**3E-07**	**2E-09**	**1E-05**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-23
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs Soil	**Volatile Organic Compounds**									
	Acenaphthene	3.92E-02	3.19E-06	—	—		—	—	—	—
	Acenaphthylene	2.98E-02	2.43E-06	—	—		—	—	—	—
	Anthracene	6.81E-02	6.86E-07	—	—		—	—	—	—
	Benzene	2.73E-03	1.08E-05	1E-10	1E-11		—	7E-08	6E-09	7E-08
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	—	—		—	—	—	—
	Dichloromethane	2.00E-03	7.87E-06	1E-11	1E-12		—	2E-09	2E-10	2E-09
	Fluorene	2.07E-02	4.51E-07	—	—		—	—	—	—
	2-Methylnaphthalene	2.23E-02	8.22E-06	—	—		—	—	—	—
	Naphthalene	3.77E-02	1.83E-05	2E-09	3E-10		—	1E-07	6E-09	1E-07
	Phenanthrene	2.65E-01	2.67E-06	—	—		—	—	—	—
	Pyrene	7.82E-01	3.92E-07	—	—		—	—	—	—
	Xylenes (total)	3.00E-03	1.18E-05	—	—		—	—	—	—
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		1E-07	2E-08	4E-12	7E-09			1E-07
	Benzo(a)Pyrene	3.41E-01		2E-06	3E-07	6E-11	1E-07			2E-06
	Benzo(b)Fluoranthene	2.41E-01		1E-07	2E-08	4E-12	7E-09			2E-07
	Benzo(k)Fluoranthene	2.15E-01		1E-07	2E-08	4E-12	6E-09			1E-07
	1,2-Benzphenanthracene	2.98E-01		2E-08	3E-09	5E-13	9E-10			2E-08
	Dibenz(A,H)Anthracene	4.45E-02		8E-08	1E-08	8E-12	5E-09			1E-07
	Fluoranthene	5.88E-01		—	—	—	—			—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		2E-07	2E-08	5E-12	1E-08			2E-07
	Phenol	3.00E-01		—	—	—	—			—

Table I6-23
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		4E-08	7E-09	2E-12	1E-06			1E-06
	Aroclor 1260	1.91E-02		4E-08	7E-09	2E-12	3E-07			4E-07
	4,4-DDD	5.00E-03		5E-10	3E-11	6E-14	1E-08			1E-08
	4,4-DDE	1.19E-02		2E-09	1E-10	2E-13	3E-08			3E-08
	4,4-DDT	2.60E-03		4E-10	2E-11	4E-14	6E-09			6E-09
	Dieldrin	5.00E-04		3E-09	4E-10	4E-13	1E-07			1E-07
	Endosulfan Sulfate	4.00E-03		—	—	—	—			—
	Heptachlor	5.00E-04		9E-10	1E-10	1E-13	2E-08			2E-08
	Metals									
	Antimony	2.10E+00		—	—	—	—			—
	Arsenic	1.17E+01		5E-05	2E-06	6E-09	1E-05			6E-05
	Barium	1.84E+02		—	—	—	—			—
	Beryllium	2.53E-01		—	—	1E-10	—			1E-10
	Cadmium	3.08E-01		5E-08	6E-11	2E-10	2E-07			2E-07
	Chromium	6.38E+01		—	—	2E-07	—			2E-07
	Cobalt	1.57E+01		—	—	—	—			—
	Copper	3.88E+01		—	—	—	—			—
	Iron	3.86E+04		—	—	—	—			—
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		—	—	—	—			—
	Molybdenum	2.68E-01		—	—	—	—			—
	Nickel	1.35E+02		—	—	6E-09	—			6E-09
	Selenium	7.53E-01		—	—	—	—			—
	Thallium	1.23E+00		—	—	—	—			—

Table I6-23
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—	—			—
	Zinc	1.37E+02		—	—	—	—			—
	Total Risk Across Soil			**5E-05**	**2E-06**	**2E-07**	**2E-05**	**2E-07**	**1E-08**	**7E-05**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					—		—
	Acenaphthylene	1.30E-01	1.25E-05					—		—
	Acetone	3.00E-03	3.12E-07					—		—
	Anthracene	5.90E-02	2.20E-06					—		—
	Benzene	1.37E-01	1.84E-04					1E-06		1E-06
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					—		—
	Carbon disulfide	9.60E-04	5.46E-06					—		—
	Dibenzofuran	6.00E-03	7.86E-08					—		—
	1,2-Dichloroethane	3.00E-03	1.84E-06					8E-09		8E-09
	Dichloromethane	3.10E-04	3.05E-07					6E-11		6E-11
	Ethylbenzene	5.20E-02	6.94E-05					—		—
	Fluorene	4.50E-02	2.46E-06					—		—
	4-Isopropyltoluene	1.50E-04	2.57E-07					—		—
	Methane	3.00E+00	1.44E-04					—		—
	Methylnaphthalene	1.00E-03	2.39E-07					—		—
	MTBE	1.00E-03	5.13E-07					3E-11		3E-11
	Naphthalene	2.03E+00	5.26E-04					4E-06		4E-06
	Phenanthrene	2.50E-01	2.20E-06					—		—
	Pyrene	2.00E-01	5.47E-06					—		—
	Styrene	5.00E-03	3.62E-06					—		—
	Toluene	4.00E-02	5.56E-05					—		—

Table I6-23
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					—		—
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					—		—
	Xylenes (total)	7.00E-02	9.57E-05					—		—
Total Risk Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**5E-06**	**0E+00**	**5E-06**
Total Risk Across All Media and All Exposure Routes				**5E-05**	**2E-06**	**2E-07**	**2E-05**	**5E-06**	**1E-08**	**7E-05**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether

Table I6-24
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**									
Soil	Acenaphthene	3.92E-02	3.19E-06	3E-06	5E-07		—	2E-05	2E-06	3E-05
	Acenaphthylene	2.98E-02	2.43E-06	2E-06	4E-07		—	2E-05	1E-06	2E-05
	Anthracene	6.81E-02	6.86E-07	1E-06	2E-07		—	1E-06	1E-07	2E-06
	Benzene	2.73E-03	1.08E-05	3E-06	3E-07		—	5E-04	5E-05	6E-04
	Benzo(g,h,i)Perylene	2.96E-01	1.48E-07	4E-05	7E-06		—	2E-06	1E-06	5E-05
	Dichloromethane	2.00E-03	7.87E-06	1E-07	2E-08		—	4E-06	4E-07	4E-06
	Fluorene	2.07E-02	4.51E-07	2E-06	4E-07		—	5E-06	6E-07	8E-06
	2-Methylnaphthalene	2.23E-02	8.22E-06	5E-06	8E-07		—	4E-03	3E-04	4E-03
	Naphthalene	3.77E-02	1.83E-05	8E-06	1E-06		—	9E-03	4E-04	1E-02
	Phenanthrene	2.65E-01	2.67E-06	4E-06	6E-07		—	4E-06	5E-07	9E-06
	Pyrene	7.82E-01	3.92E-07	1E-04	2E-05		—	6E-06	3E-06	1E-04
	Xylenes (total)	3.00E-03	1.18E-05	6E-08	7E-09		—	2E-04	7E-06	2E-04
	Semivolatile Organic Compounds									
	Benzo(a)Anthracene	2.24E-01		3E-06	5E-07	2E-10	8E-08			4E-06
	Benzo(a)Pyrene	3.41E-01		5E-05	8E-06	4E-09	1E-06			6E-05
	Benzo(b)Fluoranthene	2.41E-01		3E-05	4E-06	2E-09	7E-07			3E-05
	Benzo(k)Fluoranthene	2.15E-01		2E-05	4E-06	2E-09	6E-07			3E-05
	1,2-Benzphenanthracene	2.98E-01		4E-06	7E-07	3E-10	1E-07			5E-06
	Dibenz(A,H)Anthracene	4.45E-02		6E-07	1E-07	5E-11	2E-08			8E-07
	Fluoranthene	5.88E-01		6E-05	1E-05	5E-09	4E-06			8E-05
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		3E-05	5E-06	2E-09	1E-06			4E-05
	Phenol	3.00E-01		4E-06	5E-07	3E-10	—			5E-06

Table I6-24
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls									
	Aroclor 1016	1.99E-02		1E-03	2E-04	9E-08	2E-02			2E-02
	Aroclor 1260	1.91E-02		4E-03	7E-04	3E-07	2E-02			2E-02
	4,4-DDD	5.00E-03		4E-05	2E-06	3E-09	5E-04			5E-04
	4,4-DDE	1.19E-02		1E-04	6E-06	8E-09	9E-04			1E-03
	4,4-DDT	2.60E-03		2E-05	1E-06	2E-09	2E-04			2E-04
	Dieldrin	5.00E-04		4E-05	5E-06	3E-09	7E-04			8E-04
	Endosulfan Sulfate	4.00E-03		3E-06	3E-07	2E-10	1E-04			1E-04
	Heptachlor	5.00E-04		4E-06	5E-07	3E-10	5E-05			5E-05
	Metals									
	Antimony	2.10E+00		2E-02	3E-04	—	—			2E-02
	Arsenic	1.17E+01		2E-01	6E-03	—	2E-02			2E-01
	Barium	1.84E+02		4E-03	4E-05	4E-04	—			4E-03
	Beryllium	2.53E-01		5E-04	6E-06	2E-05	—			6E-04
	Cadmium	3.08E-01		3E-03	3E-06	—	5E-03			8E-03
	Chromium	6.38E+01		9E-02	1E-03	9E-03	—			1E-01
	Cobalt	1.57E+01		3E-03	4E-05	9E-04	—			4E-03
	Copper	3.88E+01		4E-03	5E-05	—	—			4E-03
	Iron	3.86E+04		6E-01	6E-03	—	—			6E-01
	Lead	4.06E+01		—	—	—	—			—
	Mercury	7.06E-01		1E-02	1E-04	—	2E-03			1E-02
	Molybdenum	2.68E-01		2E-04	3E-06	—	—			2E-04
	Nickel	1.35E+02		3E-02	3E-04	—	7E-03			4E-02
	Selenium	7.53E-01		6E-04	7E-06	—	2E-04			8E-04
	Thallium	1.23E+00		8E-02	9E-04	—	—			8E-02

Table I6-24
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		2E-01	3E-03	—	—			2E-01
	Zinc	1.37E+02		2E-03	2E-05	—	2E-03			4E-03
	Hazard Index Across Soil			**1E+00**	**2E-02**	**1E-02**	**8E-02**	**1E-02**	**8E-04**	**1E+00**
Groundwater	**Volatile Organic Compounds**									
	Acenaphthene	1.00E-01	9.62E-06					7E-05		7E-05
	Acenaphthylene	1.30E-01	1.25E-05					9E-05		9E-05
	Acetone	3.00E-03	3.12E-07					2E-07		2E-07
	Anthracene	5.90E-02	2.20E-06					3E-06		3E-06
	Benzene	1.37E-01	1.84E-04					9E-03		9E-03
	Benzo(g,h,i)perylene	3.70E-02	1.01E-06					2E-05		2E-05
	Carbon disulfide	9.60E-04	5.46E-06					1E-05		1E-05
	Dibenzofuran	6.00E-03	7.86E-08					2E-05		2E-05
	1,2-Dichloroethane	3.00E-03	1.84E-06					6E-04		6E-04
	Dichloromethane	3.10E-04	3.05E-07					2E-07		2E-07
	Ethylbenzene	5.20E-02	6.94E-05					1E-04		1E-04
	Fluorene	4.50E-02	2.46E-06					3E-05		3E-05
	4-Isopropyltoluene	1.50E-04	2.57E-07					1E-06		1E-06
	Methane	3.00E+00	1.44E-04					1E-04		1E-04
	Methylnaphthalene	1.00E-03	2.39E-07					1E-04		1E-04
	MTBE	1.00E-03	5.13E-07					3E-07		3E-07
	Naphthalene	2.03E+00	5.26E-04					3E-01		3E-01
	Phenanthrene	2.50E-01	2.20E-06					3E-06		3E-06
	Pyrene	2.00E-01	5.47E-06					8E-05		8E-05
	Styrene	5.00E-03	3.62E-06					6E-06		6E-06
	Toluene	4.00E-02	5.56E-05					2E-05		2E-05

Table I6-24
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Future Residential)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX						
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Ingestion of Homegrown Produce	Inhalation of Indoor Air	Inhalation of Outdoor Air	Exposure Route Total
	1,2,4-Trimethylbenzene	9.00E-03	8.89E-06					2E-03		2E-03
	1,3,5-Trimethylbenzene	4.00E-03	4.00E-06					1E-03		1E-03
	Xylenes (total)	7.00E-02	9.57E-05					1E-03		1E-03
Hazard Index Across Groundwater				**0E+00**	**0E+00**	**0E+00**	**0E+00**	**3E-01**	**0E+00**	**3E-01**
Hazard Index Across All Media and All Exposure Routes				**1E+00**	**2E-02**	**1E-02**	**8E-02**	**3E-01**	**8E-04**	**2E+00**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg); units for groundwater concentrations are milligrams per liter (mg/L)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-11	5.50E-02	4E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-11	7.50E-03	4E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-09	7.30E-01	4E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-09	7.30E+00	6E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-09	7.30E-01	5E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-09	7.30E-02	4E-10
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-09	7.30E-03	6E-11
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-09	7.30E+00	8E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-09	7.30E-01	5E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-10	7.00E-02	4E-11
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-10	2.00E+00	1E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	4.50E+00	6E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-07	1.50E+00	5E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	6E-07
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-11	5.50E-02	4E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-11	7.50E-03	4E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-09	7.30E-01	6E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-08	7.30E+00	9E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-09	7.30E-01	6E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-09	7.30E-02	5E-10

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-08	7.30E-03	8E-11
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-09	7.30E+00	1E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-09	7.30E-01	7E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-10	7.00E-02	5E-11
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-10	2.00E+00	1E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-11	2.40E-01	1E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-11	3.40E-01	1E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	4.50E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-08	1.50E+00	1E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-07**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m^3	1.55E-07	8.07E-11	7.30E-01	6E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m^3	2.37E-07	1.23E-10	7.30E+00	9E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m^3	1.67E-07	8.69E-11	7.30E-01	6E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m^3	1.49E-07	7.75E-11	7.30E-02	6E-12
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m^3	2.07E-07	1.08E-10	7.30E-03	8E-13
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m^3	3.09E-08	1.61E-11	7.30E+00	1E-10
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m^3	4.08E-07	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m^3	1.98E-07	1.03E-10	7.30E-01	8E-11
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m^3	2.08E-07	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m^3	1.38E-08	7.18E-12	7.00E-02	5E-13
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m^3	1.33E-08	6.89E-12	2.00E+00	1E-11

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-12	2.40E-01	4E-13
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-12	3.40E-01	2E-12
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-13	3.40E-01	3E-13
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	1.60E+01	3E-12
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	4.60E+00	8E-13
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	4.21E-09	1.51E+01	6E-08
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	—	—	—
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-11	8.40E+00	8E-10
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	1.11E-10	6.30E+00	7E-10
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-08	4.20E+01	1E-06
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	5.67E-09	9.80E+00	6E-08
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	4.88E-08	8.40E-01	4E-08
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-25
Calculation of Cancer Risks, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	1E-06
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-10	2.73E-02	1E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-10	1.65E-03	7E-13
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	2E-11
								Total Risk Across All Exposure Routes/Pathways	**2E-06**

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/m³ – milligrams per cubic meter
U.S. EPA – United States Environmental Protection Agency

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-11	1.00E-01	7E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-11	1.40E-02	7E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	9.73E-10	1.20E-01	1E-10
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-09	1.20E+00	7E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-09	1.20E+01	1E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-09	1.20E+00	7E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-09	1.20E+00	7E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-09	1.20E-01	9E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-09	4.10E+00	5E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-09	1.20E+00	9E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-10	5.00E+00	3E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-10	5.00E+00	2E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	4.10E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-07	9.45E+00	3E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.97E-09	3.80E-01	3E-09
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**3E-06**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-11	1.00E-01	6E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-11	1.40E-02	7E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.31E-09	1.20E-01	2E-10
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-09	1.20E+00	9E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-08	1.20E+01	1E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-09	1.20E+00	1E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-09	1.20E+00	9E-09

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-08	1.20E-01	1E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-09	4.10E+00	6E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-09	1.20E+00	1E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-10	5.00E+00	4E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-10	5.00E+00	3E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-11	2.40E-01	1E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-11	3.40E-01	1E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	4.10E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-08	9.45E+00	8E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.14E-11	3.80E-01	3E-11
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor (mg/kg-day)$^{-1}$	Cancer Risk
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	1E-06
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m³	1.55E-07	8.07E-11	3.90E-01	3E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m³	2.37E-07	1.23E-10	3.90E+00	5E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m³	1.67E-07	8.69E-11	3.90E-01	3E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m³	1.49E-07	7.75E-11	3.90E-01	3E-11
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m³	2.07E-07	1.08E-10	3.90E-02	4E-12
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m³	3.09E-08	1.61E-11	4.10E+00	7E-11
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m³	4.08E-07	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m³	1.98E-07	1.03E-10	3.90E-01	4E-11
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m³	2.08E-07	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m³	1.38E-08	7.18E-12	2.00E+00	1E-11
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m³	1.33E-08	6.89E-12	2.00E+00	1E-11

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-12	2.40E-01	4E-13
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-12	3.40E-01	2E-12
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-13	3.40E-01	3E-13
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	1.60E+01	3E-12
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	4.10E+00	7E-13
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	4.21E-09	1.20E+01	5E-08
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	—	—	—
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-11	8.40E+00	8E-10
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	1.11E-10	1.50E+01	2E-09
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-08	7.40E+01	2E-06
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	—	—	—
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	4.88E-08	9.10E-01	4E-08
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-26
Calculation of Cancer Risks, Reasonable Maximum Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	2E-06
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-10	1.00E-01	5E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-10	3.50E-03	2E-12
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	4.53E-10	1.20E-01	5E-11
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	1E-10
								Total Risk Across All Exposure Routes/Pathways	**6E-06**

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/m³ – milligrams per cubic meter

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	1.01E-08	6.00E-02	2E-07
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	7.70E-09	6.00E-02	1E-07
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	1.76E-08	3.00E-01	6E-08
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-10	4.00E-03	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	7.64E-08	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-10	6.00E-02	9E-09
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	5.34E-09	4.00E-02	1E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	5.77E-09	2.00E-02	3E-07
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	9.73E-09	2.00E-02	5E-07
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	6.84E-08	3.00E-01	2E-07
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	2.02E-07	3.00E-02	7E-06
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	7.75E-10	2.00E-01	4E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-08	3.00E-01	2E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-08	3.00E-02	3E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-08	4.00E-02	2E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-08	4.00E-02	1E-06
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-08	3.00E-01	3E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-08	3.00E-01	4E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	1.52E-07	4.00E-02	4E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-08	4.00E-02	2E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	7.75E-08	3.00E-01	3E-07

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-09	7.00E-05	7E-05
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-09	2.00E-05	2E-04
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-09	5.00E-04	3E-06
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-09	5.00E-04	6E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-10	5.00E-04	1E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-10	5.00E-05	3E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.03E-09	6.00E-03	2E-07
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-10	5.00E-04	3E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	5.42E-07	4.00E-04	1E-03
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-06	3.00E-04	1E-02
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	4.74E-05	2.00E-01	2E-04
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	6.55E-08	2.00E-03	3E-05
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.97E-08	5.00E-04	2E-04
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	1.65E-05	3.00E-03	5E-03
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	4.06E-06	2.00E-02	2E-04
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	1.00E-05	4.00E-02	3E-04
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	9.98E-03	3.00E-01	3E-02
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	1.82E-07	3.00E-04	6E-04
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	6.92E-08	5.00E-03	1E-05
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	3.49E-05	2.00E-02	2E-03

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	1.95E-07	5.00E-03	4E-05
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	3.19E-07	6.60E-05	5E-03
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	1.32E-05	1.00E-03	1E-02
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	3.53E-05	3.00E-01	1E-04
								TOTAL	**7E-02**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	1.36E-08	6.00E-02	2E-07
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	1.04E-08	6.00E-02	2E-07
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	2.36E-08	3.00E-01	8E-08
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-10	4.00E-03	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	1.03E-07	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-10	6.00E-02	8E-09
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	7.18E-09	4.00E-02	2E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	7.75E-09	2.00E-02	4E-07
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.31E-08	2.00E-02	7E-07
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	9.20E-08	3.00E-01	3E-07
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	2.72E-07	3.00E-02	9E-06
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	6.95E-10	2.00E-01	4E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-08	3.00E-01	3E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-07	3.00E-02	4E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-08	4.00E-02	2E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-08	4.00E-02	2E-06

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-07	3.00E-01	4E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-08	3.00E-01	5E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	2.04E-07	4.00E-02	5E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-08	4.00E-02	3E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	6.95E-08	3.00E-01	2E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-09	7.00E-05	1E-04
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-09	2.00E-05	3E-04
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-10	5.00E-04	1E-06
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-09	5.00E-04	3E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-10	5.00E-04	6E-07
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-10	5.00E-05	2E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	9.26E-10	6.00E-03	2E-07
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-10	5.00E-04	2E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	4.86E-08	4.00E-04	1E-04
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-07	3.00E-04	3E-03
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	4.25E-06	2.00E-01	2E-05
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	5.87E-09	2.00E-03	3E-06
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.14E-10	5.00E-04	1E-06
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	1.48E-06	3.00E-03	5E-04
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	3.64E-07	2.00E-02	2E-05
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	8.98E-07	4.00E-02	2E-05

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	8.94E-04	3.00E-01	3E-03
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	1.63E-08	3.00E-04	5E-05
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	6.20E-09	5.00E-03	1E-06
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	3.13E-06	2.00E-02	2E-04
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	1.74E-08	5.00E-03	4E-06
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	2.86E-08	6.60E-05	4E-04
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	1.19E-06	1.00E-03	1E-03
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	3.16E-06	3.00E-01	1E-05
								TOTAL	**9E-03**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m³	1.55E-07	8.07E-10	3.00E-01	3E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m³	2.37E-07	1.23E-09	3.00E-02	4E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m³	1.67E-07	8.69E-10	4.00E-02	2E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m³	1.49E-07	7.75E-10	4.00E-02	2E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m³	2.07E-07	1.08E-09	3.00E-01	4E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m³	3.09E-08	1.61E-10	3.00E-01	5E-10
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m³	4.08E-07	2.12E-09	4.00E-02	5E-08
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m³	1.98E-07	1.03E-09	4.00E-02	3E-08
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m³	2.08E-07	1.08E-09	3.00E-01	4E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m³	1.38E-08	7.18E-11	7.00E-05	1E-06
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m³	1.33E-08	6.89E-11	2.00E-05	3E-06

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-11	5.00E-04	4E-08
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-11	5.00E-04	9E-08
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-12	5.00E-04	2E-08
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-12	5.00E-05	4E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	1.44E-11	6.00E-03	2E-09
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-12	5.00E-04	4E-09
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	—	—	—
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	6.63E-07	1.40E-04	5E-03
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-10	5.71E-06	2E-04
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	—	—	—
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-07	2.29E-06	1E-01
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	5.67E-08	5.70E-06	1E-02
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	—	—	—
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-27
Calculation of Hazard Index, Reasonable Maximum Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	1E-01
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	1.12E-09	6.00E-02	2E-08
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	8.51E-10	6.00E-02	1E-08
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	5.07E-10	3.00E-01	2E-09
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-09	8.57E-03	6E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	4.05E-10	3.00E-02	1E-08
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-09	8.60E-01	5E-09
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	2.98E-10	4.00E-02	8E-09
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	2.68E-09	8.57E-04	3E-06
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	4.53E-09	8.57E-04	5E-06
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	1.97E-09	3.00E-01	7E-09
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	1.07E-09	3.00E-02	4E-08
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	2.56E-09	2.86E-02	9E-08
								TOTAL	9E-06
								Total Risk Across All Exposure Routes/Pathways	**2E-01**

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/m³ – milligrams per cubic meter
U.S. EPA – United States Environmental Protection Agency

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-11	5.50E-02	4E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-11	7.50E-03	4E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-09	7.30E-01	4E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-09	7.30E+00	6E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-09	7.30E-01	5E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-09	7.30E-02	4E-10
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-09	7.30E-03	6E-11
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-09	7.30E+00	8E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-09	7.30E-01	5E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-10	7.00E-02	4E-11
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-10	2.00E+00	1E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	4.50E+00	6E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-07	1.50E+00	5E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**6E-07**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-11	5.50E-02	4E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-11	7.50E-03	4E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	—	—	—
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-09	7.30E-01	6E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-08	7.30E+00	9E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-09	7.30E-01	6E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-09	7.30E-02	5E-10

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-08	7.30E-03	8E-11
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-09	7.30E+00	1E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-09	7.30E-01	7E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-10	7.00E-02	5E-11
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-10	2.00E+00	1E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-11	2.40E-01	1E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-11	3.40E-01	1E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	4.50E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-08	1.50E+00	1E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	—	—	—
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**2E-07**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m^3	1.55E-07	8.07E-11	7.30E-01	6E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m^3	2.37E-07	1.23E-10	7.30E+00	9E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m^3	1.67E-07	8.69E-11	7.30E-01	6E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m^3	1.49E-07	7.75E-11	7.30E-02	6E-12
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m^3	2.07E-07	1.08E-10	7.30E-03	8E-13
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m^3	3.09E-08	1.61E-11	7.30E+00	1E-10
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m^3	4.08E-07	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m^3	1.98E-07	1.03E-10	7.30E-01	8E-11
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m^3	2.08E-07	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m^3	1.38E-08	7.18E-12	7.00E-02	5E-13
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m^3	1.33E-08	6.89E-12	2.00E+00	1E-11

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-12	2.40E-01	4E-13
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-12	3.40E-01	2E-12
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-13	3.40E-01	3E-13
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	1.60E+01	3E-12
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	4.60E+00	8E-13
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	4.21E-09	1.51E+01	6E-08
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	—	—	—
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-11	8.40E+00	8E-10
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	1.11E-10	6.30E+00	7E-10
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-08	4.20E+01	1E-06
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	5.67E-09	9.80E+00	6E-08
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	4.88E-08	8.40E-01	4E-08
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-28
Calculation of Cancer Risks, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	1E-06
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-10	2.73E-02	1E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-10	1.65E-03	7E-13
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	—	—	—
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	2E-11
								Total Risk Across All Exposure Routes/Pathways	**2E-06**

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/m³ – milligrams per cubic meter
U.S. EPA – United States Environmental Protection Agency

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-11	1.00E-01	7E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-11	1.40E-02	7E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	9.73E-10	1.20E-01	1E-10
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-09	1.20E+00	7E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-09	1.20E+01	1E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-09	1.20E+00	7E-09
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-09	1.20E+00	7E-09
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-09	1.20E-01	9E-10
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-09	4.10E+00	5E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-09	1.20E+00	9E-09
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-10	5.00E+00	3E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-10	5.00E+00	2E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-10	2.40E-01	3E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-10	3.40E-01	1E-10
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-11	3.40E-01	2E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-11	4.10E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-07	9.45E+00	3E-06
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.97E-09	3.80E-01	3E-09
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	3E-06
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	—	—	—
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	—	—	—
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-11	1.00E-01	6E-12
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	—	—	—
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-11	1.40E-02	7E-13
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	—	—	—
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.31E-09	1.20E-01	2E-10
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	—	—	—
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	—	—	—
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-09	1.20E+00	9E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-08	1.20E+01	1E-07
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-09	1.20E+00	1E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-09	1.20E+00	9E-09

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-08	1.20E-01	1E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-09	4.10E+00	6E-09
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-09	1.20E+00	1E-08
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-10	5.00E+00	4E-09
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-10	5.00E+00	3E-09
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-11	2.40E-01	1E-11
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-10	3.40E-01	5E-11
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-11	3.40E-01	1E-11
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	1.60E+01	2E-10
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	—	—	—
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-11	4.10E+00	5E-11
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	—	—	—
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-08	9.45E+00	8E-07
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	—	—	—
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	—	—	—
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.14E-11	3.80E-01	3E-11
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	—	—	—
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	—	—	—
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	—	—	—

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	—	—	—
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	—	—	—
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	—	—	—
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	—	—	—
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	—	—	—
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	—	—	—
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	—	—	—
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	—	—	—
								TOTAL	**1E-06**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m^3	1.55E-07	8.07E-11	3.90E-01	3E-11
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m^3	2.37E-07	1.23E-10	3.90E+00	5E-10
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m^3	1.67E-07	8.69E-11	3.90E-01	3E-11
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m^3	1.49E-07	7.75E-11	3.90E-01	3E-11
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m^3	2.07E-07	1.08E-10	3.90E-02	4E-12
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m^3	3.09E-08	1.61E-11	4.10E+00	7E-11
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m^3	4.08E-07	—	—	—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m^3	1.98E-07	1.03E-10	3.90E-01	4E-11
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m^3	2.08E-07	—	—	—
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m^3	1.38E-08	7.18E-12	2.00E+00	1E-11
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m^3	1.33E-08	6.89E-12	2.00E+00	1E-11

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-12	2.40E-01	4E-13
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-12	3.40E-01	2E-12
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-13	3.40E-01	3E-13
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	1.60E+01	3E-12
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	—	—	—
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-13	4.10E+00	7E-13
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	4.21E-09	1.20E+01	5E-08
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	—	—	—
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-11	8.40E+00	8E-10
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	1.11E-10	1.50E+01	2E-09
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-08	7.40E+01	2E-06
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	—	—	—
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	4.88E-08	9.10E-01	4E-08
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-29
Calculation of Cancer Risks, Central Tendency Exposure
Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Cancer Risk
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	2E-06
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	—	—	—
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	—	—	—
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	—	—	—
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-10	1.00E-01	5E-11
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	—	—	—
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-10	3.50E-03	2E-12
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	—	—	—
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	—	—	—
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	4.53E-10	1.20E-01	5E-11
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	—	—	—
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	—	—	—
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	—	—	—
								TOTAL	1E-10
								Total Risk Across All Exposure Routes/Pathways	**6E-06**

Acronyms/Abbreviations:
- bgs – below ground surface
- Cal/EPA – California Environmental Protection Agency
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- EPC – exposure point concentration
- IRP – Installation Restoration Program
- $(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligram
- mg/kg – milligrams per kilogram
- mg/kg-day – milligrams per kilogram-day
- mg/m³ – milligrams per cubic meter

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
Ingestion of Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	1.01E-08	6.00E-02	2E-07
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	7.70E-09	6.00E-02	1E-07
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	1.76E-08	3.00E-01	6E-08
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	7.06E-10	4.00E-03	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	7.64E-08	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	5.17E-10	6.00E-02	9E-09
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	5.34E-09	4.00E-02	1E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	5.77E-09	2.00E-02	3E-07
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	9.73E-09	2.00E-02	5E-07
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	6.84E-08	3.00E-01	2E-07
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	2.02E-07	3.00E-02	7E-06
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	7.75E-10	2.00E-01	4E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	5.77E-08	3.00E-01	2E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	8.81E-08	3.00E-02	3E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	6.22E-08	4.00E-02	2E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	5.55E-08	4.00E-02	1E-06
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	7.71E-08	3.00E-01	3E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.15E-08	3.00E-01	4E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	1.52E-07	4.00E-02	4E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	7.38E-08	4.00E-02	2E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	7.75E-08	3.00E-01	3E-07

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	5.14E-09	7.00E-05	7E-05
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	4.93E-09	2.00E-05	2E-04
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	1.29E-09	5.00E-04	3E-06
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	3.08E-09	5.00E-04	6E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	6.72E-10	5.00E-04	1E-06
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-10	5.00E-05	3E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	1.03E-09	6.00E-03	2E-07
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.29E-10	5.00E-04	3E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	5.42E-07	4.00E-04	1E-03
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	3.02E-06	3.00E-04	1E-02
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	4.74E-05	2.00E-01	2E-04
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	6.55E-08	2.00E-03	3E-05
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.97E-08	5.00E-04	2E-04
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	1.65E-05	3.00E-03	5E-03
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	4.06E-06	2.00E-02	2E-04
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	1.00E-05	4.00E-02	3E-04
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	9.98E-03	3.00E-01	3E-02
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	1.82E-07	3.00E-04	6E-04
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	6.92E-08	5.00E-03	1E-05
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	3.49E-05	2.00E-02	2E-03

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	1.95E-07	5.00E-03	4E-05
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	3.19E-07	6.60E-05	5E-03
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	1.32E-05	1.00E-03	1E-02
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	3.53E-05	3.00E-01	1E-04
								TOTAL	**7E-02**
Dermal Contact with Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	3.92E-02	mg/kg	3.92E-02	1.36E-08	6.00E-02	2E-07
	Acenaphthylene	2.98E-02	mg/kg	2.98E-02	mg/kg	2.98E-02	1.04E-08	6.00E-02	2E-07
	Anthracene	6.81E-02	mg/kg	6.81E-02	mg/kg	6.81E-02	2.36E-08	3.00E-01	8E-08
	Benzene	2.73E-03	mg/kg	2.73E-03	mg/kg	2.73E-03	6.33E-10	4.00E-03	2E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	2.96E-01	mg/kg	2.96E-01	1.03E-07	3.00E-02	3E-06
	Dichloromethane	2.00E-03	mg/kg	2.00E-03	mg/kg	2.00E-03	4.63E-10	6.00E-02	8E-09
	Fluorene	2.07E-02	mg/kg	2.07E-02	mg/kg	2.07E-02	7.18E-09	4.00E-02	2E-07
	2-Methylnaphthalene	2.23E-02	mg/kg	2.23E-02	mg/kg	2.23E-02	7.75E-09	2.00E-02	4E-07
	Naphthalene	3.77E-02	mg/kg	3.77E-02	mg/kg	3.77E-02	1.31E-08	2.00E-02	7E-07
	Phenanthrene	2.65E-01	mg/kg	2.65E-01	mg/kg	2.65E-01	9.20E-08	3.00E-01	3E-07
	Pyrene	7.82E-01	mg/kg	7.82E-01	mg/kg	7.82E-01	2.72E-07	3.00E-02	9E-06
	Xylenes (total)	3.00E-03	mg/kg	3.00E-03	mg/kg	3.00E-03	6.95E-10	2.00E-01	4E-09
	Semivolatile Organic Compounds								
	Benzo(a)Anthracene	2.24E-01	mg/kg	2.24E-01	mg/kg	2.24E-01	7.76E-08	3.00E-01	3E-07
	Benzo(a)Pyrene	3.41E-01	mg/kg	3.41E-01	mg/kg	3.41E-01	1.18E-07	3.00E-02	4E-06
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	2.41E-01	mg/kg	2.41E-01	8.36E-08	4.00E-02	2E-06
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	2.15E-01	mg/kg	2.15E-01	7.46E-08	4.00E-02	2E-06

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.98E-01	mg/kg	2.98E-01	1.04E-07	3.00E-01	4E-07
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	4.45E-02	mg/kg	4.45E-02	1.55E-08	3.00E-01	5E-08
	Fluoranthene	5.88E-01	mg/kg	5.88E-01	mg/kg	5.88E-01	2.04E-07	4.00E-02	5E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	2.86E-01	mg/kg	2.86E-01	9.92E-08	4.00E-02	3E-06
	Phenol	3.00E-01	mg/kg	3.00E-01	mg/kg	3.00E-01	6.95E-08	3.00E-01	2E-07
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.99E-02	mg/kg	1.99E-02	6.91E-09	7.00E-05	1E-04
	Aroclor 1260	1.91E-02	mg/kg	1.91E-02	mg/kg	1.91E-02	6.63E-09	2.00E-05	3E-04
	4,4-DDD	5.00E-03	mg/kg	5.00E-03	mg/kg	5.00E-03	5.79E-10	5.00E-04	1E-06
	4,4-DDE	1.19E-02	mg/kg	1.19E-02	mg/kg	1.19E-02	1.38E-09	5.00E-04	3E-06
	4,4-DDT	2.60E-03	mg/kg	2.60E-03	mg/kg	2.60E-03	3.01E-10	5.00E-04	6E-07
	Dieldrin	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-10	5.00E-05	2E-06
	Endosulfan Sulfate	4.00E-03	mg/kg	4.00E-03	mg/kg	4.00E-03	9.26E-10	6.00E-03	2E-07
	Heptachlor	5.00E-04	mg/kg	5.00E-04	mg/kg	5.00E-04	1.16E-10	5.00E-04	2E-07
	Metals								
	Antimony	2.10E+00	mg/kg	2.10E+00	mg/kg	2.10E+00	4.86E-08	4.00E-04	1E-04
	Arsenic	1.17E+01	mg/kg	1.17E+01	mg/kg	1.17E+01	8.11E-07	3.00E-04	3E-03
	Barium	1.84E+02	mg/kg	1.84E+02	mg/kg	1.84E+02	4.25E-06	2.00E-01	2E-05
	Beryllium	2.53E-01	mg/kg	2.53E-01	mg/kg	2.53E-01	5.87E-09	2.00E-03	3E-06
	Cadmium	3.08E-01	mg/kg	3.08E-01	mg/kg	3.08E-01	7.14E-10	5.00E-04	1E-06
	Chromium	6.38E+01	mg/kg	6.38E+01	mg/kg	6.38E+01	1.48E-06	3.00E-03	5E-04
	Cobalt	1.57E+01	mg/kg	1.57E+01	mg/kg	1.57E+01	3.64E-07	2.00E-02	2E-05
	Copper	3.88E+01	mg/kg	3.88E+01	mg/kg	3.88E+01	8.98E-07	4.00E-02	2E-05

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Iron	3.86E+04	mg/kg	3.86E+04	mg/kg	3.86E+04	8.94E-04	3.00E-01	3E-03
	Lead	4.06E+01	mg/kg	4.06E+01	mg/kg	4.06E+01	—	—	—
	Mercury	7.06E-01	mg/kg	7.06E-01	mg/kg	7.06E-01	1.63E-08	3.00E-04	5E-05
	Molybdenum	2.68E-01	mg/kg	2.68E-01	mg/kg	2.68E-01	6.20E-09	5.00E-03	1E-06
	Nickel	1.35E+02	mg/kg	1.35E+02	mg/kg	1.35E+02	3.13E-06	2.00E-02	2E-04
	Selenium	7.53E-01	mg/kg	7.53E-01	mg/kg	7.53E-01	1.74E-08	5.00E-03	4E-06
	Thallium	1.23E+00	mg/kg	1.23E+00	mg/kg	1.23E+00	2.86E-08	6.60E-05	4E-04
	Vanadium	5.12E+01	mg/kg	5.12E+01	mg/kg	5.12E+01	1.19E-06	1.00E-03	1E-03
	Zinc	1.37E+02	mg/kg	1.37E+02	mg/kg	1.37E+02	3.16E-06	3.00E-01	1E-05
								TOTAL	**9E-03**
Inhalation of Particulates	**Semivolatile Organic Compounds**								
	Benzo(a)Anthracene	2.24E-01	mg/kg	1.55E-07	mg/m³	1.55E-07	8.07E-10	3.00E-01	3E-09
	Benzo(a)Pyrene	3.41E-01	mg/kg	2.37E-07	mg/m³	2.37E-07	1.23E-09	3.00E-02	4E-08
	Benzo(b)Fluoranthene	2.41E-01	mg/kg	1.67E-07	mg/m³	1.67E-07	8.69E-10	4.00E-02	2E-08
	Benzo(k)Fluoranthene	2.15E-01	mg/kg	1.49E-07	mg/m³	1.49E-07	7.75E-10	4.00E-02	2E-08
	1,2-Benzphenanthracene	2.98E-01	mg/kg	2.07E-07	mg/m³	2.07E-07	1.08E-09	3.00E-01	4E-09
	Dibenz(A,H)Anthracene	4.45E-02	mg/kg	3.09E-08	mg/m³	3.09E-08	1.61E-10	3.00E-01	5E-10
	Fluoranthene	5.88E-01	mg/kg	4.08E-07	mg/m³	4.08E-07	2.12E-09	4.00E-02	5E-08
	Indeno(1,2,3-C,D)Pyrene	2.86E-01	mg/kg	1.98E-07	mg/m³	1.98E-07	1.03E-09	4.00E-02	3E-08
	Phenol	3.00E-01	mg/kg	2.08E-07	mg/m³	2.08E-07	1.08E-09	3.00E-01	4E-09
	Pesticides/Polychlorinated Biphenyls								
	Aroclor 1016	1.99E-02	mg/kg	1.38E-08	mg/m³	1.38E-08	7.18E-11	7.00E-05	1E-06
	Aroclor 1260	1.91E-02	mg/kg	1.33E-08	mg/m³	1.33E-08	6.89E-11	2.00E-05	3E-06

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	4,4-DDD	5.00E-03	mg/kg	3.47E-09	mg/m³	3.47E-09	1.80E-11	5.00E-04	4E-08
	4,4-DDE	1.19E-02	mg/kg	8.29E-09	mg/m³	8.29E-09	4.31E-11	5.00E-04	9E-08
	4,4-DDT	2.60E-03	mg/kg	1.81E-09	mg/m³	1.81E-09	9.38E-12	5.00E-04	2E-08
	Dieldrin	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-12	5.00E-05	4E-08
	Endosulfan Sulfate	4.00E-03	mg/kg	2.78E-09	mg/m³	2.78E-09	1.44E-11	6.00E-03	2E-09
	Heptachlor	5.00E-04	mg/kg	3.47E-10	mg/m³	3.47E-10	1.80E-12	5.00E-04	4E-09
	Metals								
	Antimony	2.10E+00	mg/kg	1.46E-06	mg/m³	1.46E-06	—	—	—
	Arsenic	1.17E+01	mg/kg	8.11E-06	mg/m³	8.11E-06	—	—	—
	Barium	1.84E+02	mg/kg	1.28E-04	mg/m³	1.28E-04	6.63E-07	1.40E-04	5E-03
	Beryllium	2.53E-01	mg/kg	1.76E-07	mg/m³	1.76E-07	9.15E-10	5.71E-06	2E-04
	Cadmium	3.08E-01	mg/kg	2.14E-07	mg/m³	2.14E-07	—	—	—
	Chromium	6.38E+01	mg/kg	4.43E-05	mg/m³	4.43E-05	2.30E-07	2.29E-06	1E-01
	Cobalt	1.57E+01	mg/kg	1.09E-05	mg/m³	1.09E-05	5.67E-08	5.70E-06	1E-02
	Copper	3.88E+01	mg/kg	2.69E-05	mg/m³	2.69E-05	—	—	—
	Iron	3.86E+04	mg/kg	2.68E-02	mg/m³	2.68E-02	—	—	—
	Lead	4.06E+01	mg/kg	2.82E-05	mg/m³	2.82E-05	—	—	—
	Mercury	7.06E-01	mg/kg	4.90E-07	mg/m³	4.90E-07	—	—	—
	Molybdenum	2.68E-01	mg/kg	1.86E-07	mg/m³	1.86E-07	—	—	—
	Nickel	1.35E+02	mg/kg	9.39E-05	mg/m³	9.39E-05	—	—	—
	Selenium	7.53E-01	mg/kg	5.23E-07	mg/m³	5.23E-07	—	—	—
	Thallium	1.23E+00	mg/kg	8.57E-07	mg/m³	8.57E-07	—	—	—
	Vanadium	5.12E+01	mg/kg	3.56E-05	mg/m³	3.56E-05	—	—	—

Table I6-30
Calculation of Hazard Index, Central Tendency Exposure
U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Medium: Vadose Zone Soil (0–7 feet bgs), and Groundwater
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation	Intake mg/kg-day	Reference Dose mg/kg-day	Hazard Quotient
	Zinc	1.37E+02	mg/kg	9.49E-05	mg/m³	9.49E-05	—	—	—
								TOTAL	**1E-01**
Inhalation of Outdoor Air from Soil	**Volatile Organic Compounds**								
	Acenaphthene	3.92E-02	mg/kg	2.15E-07	mg/m³	2.15E-07	1.12E-09	6.00E-02	2E-08
	Acenaphthylene	2.98E-02	mg/kg	1.64E-07	mg/m³	1.64E-07	8.51E-10	6.00E-02	1E-08
	Anthracene	6.81E-02	mg/kg	9.75E-08	mg/m³	9.75E-08	5.07E-10	3.00E-01	2E-09
	Benzene	2.73E-03	mg/kg	1.00E-06	mg/m³	1.00E-06	5.20E-09	8.57E-03	6E-07
	Benzo(g,h,i)Perylene	2.96E-01	mg/kg	7.78E-08	mg/m³	7.78E-08	4.05E-10	3.00E-02	1E-08
	Dichloromethane	2.00E-03	mg/kg	8.02E-07	mg/m³	8.02E-07	4.17E-09	8.60E-01	5E-09
	Fluorene	2.07E-02	mg/kg	5.74E-08	mg/m³	5.74E-08	2.98E-10	4.00E-02	8E-09
	2-Methylnaphthalene	2.23E-02	mg/kg	5.16E-07	mg/m³	5.16E-07	2.68E-09	8.57E-04	3E-06
	Naphthalene	3.77E-02	mg/kg	8.71E-07	mg/m³	8.71E-07	4.53E-09	8.57E-04	5E-06
	Phenanthrene	2.65E-01	mg/kg	3.79E-07	mg/m³	3.79E-07	1.97E-09	3.00E-01	7E-09
	Pyrene	7.82E-01	mg/kg	2.06E-07	mg/m³	2.06E-07	1.07E-09	3.00E-02	4E-08
	Xylenes (total)	3.00E-03	mg/kg	4.92E-07	mg/m³	4.92E-07	2.56E-09	2.86E-02	9E-08
								TOTAL	**9E-06**
								Total Risk Across All Exposure Routes/Pathways	**2E-01**

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
mg/kg – milligrams per kilogram
mg/kg-day – milligrams per kilogram-day
mg/m³ – milligrams per cubic meter
U.S. EPA – United States Environmental Protection Agency

Table I6-31
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**							
Soil	Acenaphthene	3.92E-02	2.15E-07	—	—		—	—
	Acenaphthylene	2.98E-02	1.64E-07	—	—		—	—
	Anthracene	6.81E-02	9.75E-08	—	—		—	—
	Benzene	2.73E-03	1.00E-06	4E-12	4E-12		1E-11	2E-11
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	—	—		—	—
	Dichloromethane	2.00E-03	8.02E-07	4E-13	4E-13		7E-13	1E-12
	Fluorene	2.07E-02	5.74E-08	—	—		—	—
	2-Methylnaphthalene	2.23E-02	5.16E-07	—	—		—	—
	Naphthalene	3.77E-02	8.71E-07	—	—		—	—
	Phenanthrene	2.65E-01	3.79E-07	—	—		—	—
	Pyrene	7.82E-01	2.06E-07	—	—		—	—
	Xylenes (total)	3.00E-03	4.92E-07	—	—		—	—
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		4E-09	6E-09	6E-11		1E-08
	Benzo(a)Pyrene	3.41E-01		6E-08	9E-08	9E-10		1E-07
	Benzo(b)Fluoranthene	2.41E-01		5E-09	6E-09	6E-11		1E-08
	Benzo(k)Fluoranthene	2.15E-01		4E-10	5E-10	6E-12		9E-10
	1,2-Benzphenanthracene	2.98E-01		6E-11	8E-11	8E-13		1E-10
	Dibenz(A,H)Anthracene	4.45E-02		8E-09	1E-08	1E-10		2E-08
	Fluoranthene	5.88E-01		—	—	—		—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		5E-09	7E-09	8E-11		1E-08
	Phenol	3.00E-01		—	—	—		—

Table I6-31
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		4E-11	5E-11	5E-13		9E-11
	Aroclor 1260	1.91E-02		1E-09	1E-09	1E-11		2E-09
	4,4-DDD	5.00E-03		3E-11	1E-11	4E-13		4E-11
	4,4-DDE	1.19E-02		1E-10	5E-11	2E-12		1E-10
	4,4-DDT	2.60E-03		2E-11	1E-11	3E-13		3E-11
	Dieldrin	5.00E-04		2E-10	2E-10	3E-12		4E-10
	Endosulfan Sulfate	4.00E-03		—	—	—		—
	Heptachlor	5.00E-04		6E-11	5E-11	8E-13		1E-10
	Metals							
	Antimony	2.10E+00		—	—	—		—
	Arsenic	1.17E+01		5E-07	1E-07	6E-08		7E-07
	Barium	1.84E+02		—	—	—		—
	Beryllium	2.53E-01		—	—	8E-10		8E-10
	Cadmium	3.08E-01		—	—	7E-10		7E-10
	Chromium	6.38E+01		—	—	1E-06		1E-06
	Cobalt	1.57E+01		—	—	6E-08		6E-08
	Copper	3.88E+01		—	—	—		—
	Iron	3.86E+04		—	—	—		—
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		—	—	—		—
	Molybdenum	2.68E-01		—	—	—		—
	Nickel	1.35E+02		—	—	4E-08		4E-08
	Selenium	7.53E-01		—	—	—		—
	Thallium	1.23E+00		—	—	—		—

Table I6-31
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—		—
	Zinc	1.37E+02		—	—	—		—
	Total Risk Across Soil			**6E-07**	**2E-07**	**1E-06**	**2E-11**	**2E-06**
	Total Risk Across All Media and All Exposure Routes			**6E-07**	**2E-07**	**1E-06**	**2E-11**	**2E-06**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
U.S. EPA – United States Environmental Protection Agency

Table I6-32
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs Soil	**Volatile Organic Compounds**							
	Acenaphthene	3.92E-02	2.15E-07	—	—		—	—
	Acenaphthylene	2.98E-02	1.64E-07	—	—		—	—
	Anthracene	6.81E-02	9.75E-08	—	—		—	—
	Benzene	2.73E-03	1.00E-06	7E-12	6E-12		5E-11	7E-11
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	—	—		—	—
	Dichloromethane	2.00E-03	8.02E-07	7E-13	7E-13		2E-12	3E-12
	Fluorene	2.07E-02	5.74E-08	—	—		—	—
	2-Methylnaphthalene	2.23E-02	5.16E-07	—	—		—	—
	Naphthalene	3.77E-02	8.71E-07	1E-10	2E-10		5E-11	3E-10
	Phenanthrene	2.65E-01	3.79E-07	—	—		—	—
	Pyrene	7.82E-01	2.06E-07	—	—		—	—
	Xylenes (total)	3.00E-03	4.92E-07	—	—		—	—
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		7E-09	9E-09	3E-11		2E-08
	Benzo(a)Pyrene	3.41E-01		1E-07	1E-07	5E-10		2E-07
	Benzo(b)Fluoranthene	2.41E-01		7E-09	1E-08	3E-11		2E-08
	Benzo(k)Fluoranthene	2.15E-01		7E-09	9E-09	3E-11		2E-08
	1,2-Benzphenanthracene	2.98E-01		9E-10	1E-09	4E-12		2E-09
	Dibenz(A,H)Anthracene	4.45E-02		5E-09	6E-09	7E-11		1E-08
	Fluoranthene	5.88E-01		—	—	—		—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		9E-09	1E-08	4E-11		2E-08
	Phenol	3.00E-01		—	—	—		—

Table I6-32
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		3E-09	4E-09	1E-11		7E-09
	Aroclor 1260	1.91E-02		2E-09	3E-09	1E-11		5E-09
	4,4-DDD	5.00E-03		3E-11	1E-11	4E-13		4E-11
	4,4-DDE	1.19E-02		1E-10	5E-11	2E-12		1E-10
	4,4-DDT	2.60E-03		2E-11	1E-11	3E-13		3E-11
	Dieldrin	5.00E-04		2E-10	2E-10	3E-12		4E-10
	Endosulfan Sulfate	4.00E-03		—	—	—		—
	Heptachlor	5.00E-04		5E-11	5E-11	7E-13		1E-10
	Metals							
	Antimony	2.10E+00		—	—	—		—
	Arsenic	1.17E+01		3E-06	8E-07	5E-08		4E-06
	Barium	1.84E+02		—	—	—		—
	Beryllium	2.53E-01		—	—	8E-10		8E-10
	Cadmium	3.08E-01		3E-09	3E-11	2E-09		5E-09
	Chromium	6.38E+01		—	—	2E-06		2E-06
	Cobalt	1.57E+01		—	—	—		—
	Copper	3.88E+01		—	—	—		—
	Iron	3.86E+04		—	—	—		—
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		—	—	—		—
	Molybdenum	2.68E-01		—	—	—		—
	Nickel	1.35E+02		—	—	4E-08		4E-08
	Selenium	7.53E-01		—	—	—		—
	Thallium	1.23E+00		—	—	—		—

Table I6-32
Summary of Cancer Risk, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—		—
	Zinc	1.37E+02		—	—	—		—
	Total Risk Across Soil			**3E-06**	**1E-06**	**2E-06**	**1E-10**	**6E-06**
	Total Risk Across All Media and All Exposure Routes			**3E-06**	**1E-06**	**2E-06**	**1E-10**	**6E-06**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program

Table I6-33
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**							
Soil	Acenaphthene	3.92E-02	2.15E-07	2E-07	2E-07		2E-08	4E-07
	Acenaphthylene	2.98E-02	1.64E-07	1E-07	2E-07		1E-08	3E-07
	Anthracene	6.81E-02	9.75E-08	6E-08	8E-08		2E-09	1E-07
	Benzene	2.73E-03	1.00E-06	2E-07	2E-07		6E-07	1E-06
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	3E-06	3E-06		1E-08	6E-06
	Dichloromethane	2.00E-03	8.02E-07	9E-09	8E-09		5E-09	2E-08
	Fluorene	2.07E-02	5.74E-08	1E-07	2E-07		8E-09	3E-07
	2-Methylnaphthalene	2.23E-02	5.16E-07	3E-07	4E-07		3E-06	4E-06
	Naphthalene	3.77E-02	8.71E-07	5E-07	7E-07		5E-06	6E-06
	Phenanthrene	2.65E-01	3.79E-07	2E-07	3E-07		7E-09	5E-07
	Pyrene	7.82E-01	2.06E-07	7E-06	9E-06		4E-08	2E-05
	Xylenes (total)	3.00E-03	4.92E-07	4E-09	4E-09		9E-08	1E-07
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		2E-07	3E-07	3E-09		5E-07
	Benzo(a)Pyrene	3.41E-01		3E-06	4E-06	4E-08		7E-06
	Benzo(b)Fluoranthene	2.41E-01		2E-06	2E-06	2E-08		4E-06
	Benzo(k)Fluoranthene	2.15E-01		1E-06	2E-06	2E-08		3E-06
	1,2-Benzphenanthracene	2.98E-01		3E-07	4E-07	4E-09		7E-07
	Dibenz(A,H)Anthracene	4.45E-02		4E-08	5E-08	5E-10		9E-08
	Fluoranthene	5.88E-01		4E-06	5E-06	5E-08		9E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		2E-06	3E-06	3E-08		5E-06
	Phenol	3.00E-01		3E-07	2E-07	4E-09		5E-07

Table I6-33
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		7E-05	1E-04	1E-06		2E-04
	Aroclor 1260	1.91E-02		2E-04	3E-04	3E-06		5E-04
	4,4-DDD	5.00E-03		3E-06	1E-06	4E-08		4E-06
	4,4-DDE	1.19E-02		6E-06	3E-06	9E-08		9E-06
	4,4-DDT	2.60E-03		1E-06	6E-07	2E-08		2E-06
	Dieldrin	5.00E-04		3E-06	2E-06	4E-08		5E-06
	Endosulfan Sulfate	4.00E-03		2E-07	2E-07	2E-09		4E-07
	Heptachlor	5.00E-04		3E-07	2E-07	4E-09		5E-07
	Metals							
	Antimony	2.10E+00		1E-03	1E-04	—		1E-03
	Arsenic	1.17E+01		1E-02	3E-03	—		1E-02
	Barium	1.84E+02		2E-04	2E-05	5E-03		5E-03
	Beryllium	2.53E-01		3E-05	3E-06	2E-04		2E-04
	Cadmium	3.08E-01		2E-04	1E-06	—		2E-04
	Chromium	6.38E+01		5E-03	5E-04	1E-01		1E-01
	Cobalt	1.57E+01		2E-04	2E-05	1E-02		1E-02
	Copper	3.88E+01		3E-04	2E-05	—		3E-04
	Iron	3.86E+04		3E-02	3E-03	—		3E-02
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		6E-04	5E-05	—		7E-04
	Molybdenum	2.68E-01		1E-05	1E-06	—		1E-05
	Nickel	1.35E+02		2E-03	2E-04	—		2E-03
	Selenium	7.53E-01		4E-05	4E-06	—		4E-05
	Thallium	1.23E+00		5E-03	4E-04	—		5E-03

Table I6-33
Summary of Hazard Index, Reasonable Maximum Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		1E-02	1E-03	—		1E-02
	Zinc	1.37E+02		1E-04	1E-05	—		1E-04
	Hazard Index Across Soil			**7E-02**	**9E-03**	**1E-01**	**9E-06**	**2E-01**
	Hazard Index Across All Media and All Exposure Routes			**7E-02**	**9E-03**	**1E-01**	**9E-06**	**2E-01**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
U.S. EPA – United States Environmental Protection Agency

Table I6-34
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**							
Soil	Acenaphthene	3.92E-02	2.15E-07	—	—		—	—
	Acenaphthylene	2.98E-02	1.64E-07	—	—		—	—
	Anthracene	6.81E-02	9.75E-08	—	—		—	—
	Benzene	2.73E-03	1.00E-06	4E-12	4E-12		1E-11	2E-11
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	—	—		—	—
	Dichloromethane	2.00E-03	8.02E-07	4E-13	4E-13		7E-13	1E-12
	Fluorene	2.07E-02	5.74E-08	—	—		—	—
	2-Methylnaphthalene	2.23E-02	5.16E-07	—	—		—	—
	Naphthalene	3.77E-02	8.71E-07	—	—		—	—
	Phenanthrene	2.65E-01	3.79E-07	—	—		—	—
	Pyrene	7.82E-01	2.06E-07	—	—		—	—
	Xylenes (total)	3.00E-03	4.92E-07	—	—		—	—
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		4E-09	6E-09	6E-11		1E-08
	Benzo(a)Pyrene	3.41E-01		6E-08	9E-08	9E-10		1E-07
	Benzo(b)Fluoranthene	2.41E-01		5E-09	6E-09	6E-11		1E-08
	Benzo(k)Fluoranthene	2.15E-01		4E-10	5E-10	6E-12		9E-10
	1,2-Benzphenanthracene	2.98E-01		6E-11	8E-11	8E-13		1E-10
	Dibenz(A,H)Anthracene	4.45E-02		8E-09	1E-08	1E-10		2E-08
	Fluoranthene	5.88E-01		—	—	—		—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		5E-09	7E-09	8E-11		1E-08
	Phenol	3.00E-01		—	—	—		—

Table I6-34
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		4E-11	5E-11	5E-13		9E-11
	Aroclor 1260	1.91E-02		1E-09	1E-09	1E-11		2E-09
	4,4-DDD	5.00E-03		3E-11	1E-11	4E-13		4E-11
	4,4-DDE	1.19E-02		1E-10	5E-11	2E-12		1E-10
	4,4-DDT	2.60E-03		2E-11	1E-11	3E-13		3E-11
	Dieldrin	5.00E-04		2E-10	2E-10	3E-12		4E-10
	Endosulfan Sulfate	4.00E-03		—	—	—		—
	Heptachlor	5.00E-04		6E-11	5E-11	8E-13		1E-10
	Metals							
	Antimony	2.10E+00		—	—	—		—
	Arsenic	1.17E+01		5E-07	1E-07	6E-08		7E-07
	Barium	1.84E+02		—	—	—		—
	Beryllium	2.53E-01		—	—	8E-10		8E-10
	Cadmium	3.08E-01		—	—	7E-10		7E-10
	Chromium	6.38E+01		—	—	1E-06		1E-06
	Cobalt	1.57E+01		—	—	6E-08		6E-08
	Copper	3.88E+01		—	—	—		—
	Iron	3.86E+04		—	—	—		—
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		—	—	—		—
	Molybdenum	2.68E-01		—	—	—		—
	Nickel	1.35E+02		—	—	4E-08		4E-08
	Selenium	7.53E-01		—	—	—		—
	Thallium	1.23E+00		—	—	—		—

Table I6-34
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—		—
	Zinc	1.37E+02		—	—	—		—
	Total Risk Across Soil			**6E-07**	**2E-07**	**1E-06**	**2E-11**	**2E-06**
	Total Risk Across All Media and All Exposure Routes			**6E-07**	**2E-07**	**1E-06**	**2E-11**	**2E-06**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
U.S. EPA – United States Environmental Protection Agency

Table I6-35
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs Soil	**Volatile Organic Compounds**							
	Acenaphthene	3.92E-02	2.15E-07	—	—		—	—
	Acenaphthylene	2.98E-02	1.64E-07	—	—		—	—
	Anthracene	6.81E-02	9.75E-08	—	—		—	—
	Benzene	2.73E-03	1.00E-06	7E-12	6E-12		5E-11	7E-11
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	—	—		—	—
	Dichloromethane	2.00E-03	8.02E-07	7E-13	7E-13		2E-12	3E-12
	Fluorene	2.07E-02	5.74E-08	—	—		—	—
	2-Methylnaphthalene	2.23E-02	5.16E-07	—	—		—	—
	Naphthalene	3.77E-02	8.71E-07	1E-10	2E-10		5E-11	3E-10
	Phenanthrene	2.65E-01	3.79E-07	—	—		—	—
	Pyrene	7.82E-01	2.06E-07	—	—		—	—
	Xylenes (total)	3.00E-03	4.92E-07	—	—		—	—
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		7E-09	9E-09	3E-11		2E-08
	Benzo(a)Pyrene	3.41E-01		1E-07	1E-07	5E-10		2E-07
	Benzo(b)Fluoranthene	2.41E-01		7E-09	1E-08	3E-11		2E-08
	Benzo(k)Fluoranthene	2.15E-01		7E-09	9E-09	3E-11		2E-08
	1,2-Benzphenanthracene	2.98E-01		9E-10	1E-09	4E-12		2E-09
	Dibenz(A,H)Anthracene	4.45E-02		5E-09	6E-09	7E-11		1E-08
	Fluoranthene	5.88E-01		—	—	—		—
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		9E-09	1E-08	4E-11		2E-08
	Phenol	3.00E-01		—	—	—		—

Table I6-35
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		3E-09	4E-09	1E-11		7E-09
	Aroclor 1260	1.91E-02		2E-09	3E-09	1E-11		5E-09
	4,4-DDD	5.00E-03		3E-11	1E-11	4E-13		4E-11
	4,4-DDE	1.19E-02		1E-10	5E-11	2E-12		1E-10
	4,4-DDT	2.60E-03		2E-11	1E-11	3E-13		3E-11
	Dieldrin	5.00E-04		2E-10	2E-10	3E-12		4E-10
	Endosulfan Sulfate	4.00E-03		—	—	—		—
	Heptachlor	5.00E-04		5E-11	5E-11	7E-13		1E-10
	Metals							
	Antimony	2.10E+00		—	—	—		—
	Arsenic	1.17E+01		3E-06	8E-07	5E-08		4E-06
	Barium	1.84E+02		—	—	—		—
	Beryllium	2.53E-01		—	—	8E-10		8E-10
	Cadmium	3.08E-01		3E-09	3E-11	2E-09		5E-09
	Chromium	6.38E+01		—	—	2E-06		2E-06
	Cobalt	1.57E+01		—	—	—		—
	Copper	3.88E+01		—	—	—		—
	Iron	3.86E+04		—	—	—		—
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		—	—	—		—
	Molybdenum	2.68E-01		—	—	—		—
	Nickel	1.35E+02		—	—	4E-08		4E-08
	Selenium	7.53E-01		—	—	—		—
	Thallium	1.23E+00		—	—	—		—

Table I6-35
Summary of Cancer Risk, Central Tendency Exposure
All Chemicals with Associated Pathways – Cal/EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		CANCER RISK				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		—	—	—		—
	Zinc	1.37E+02		—	—	—		—
	Total Risk Across Soil			**3E-06**	**1E-06**	**2E-06**	**1E-10**	**6E-06**
	Total Risk Across All Media and All Exposure Routes			**3E-06**	**1E-06**	**2E-06**	**1E-10**	**6E-06**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program

Table I6-36
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
0–7 feet bgs	**Volatile Organic Compounds**							
Soil	Acenaphthene	3.92E-02	2.15E-07	2E-07	2E-07		2E-08	4E-07
	Acenaphthylene	2.98E-02	1.64E-07	1E-07	2E-07		1E-08	3E-07
	Anthracene	6.81E-02	9.75E-08	6E-08	8E-08		2E-09	1E-07
	Benzene	2.73E-03	1.00E-06	2E-07	2E-07		6E-07	1E-06
	Benzo(g,h,i)Perylene	2.96E-01	7.78E-08	3E-06	3E-06		1E-08	6E-06
	Dichloromethane	2.00E-03	8.02E-07	9E-09	8E-09		5E-09	2E-08
	Fluorene	2.07E-02	5.74E-08	1E-07	2E-07		8E-09	3E-07
	2-Methylnaphthalene	2.23E-02	5.16E-07	3E-07	4E-07		3E-06	4E-06
	Naphthalene	3.77E-02	8.71E-07	5E-07	7E-07		5E-06	6E-06
	Phenanthrene	2.65E-01	3.79E-07	2E-07	3E-07		7E-09	5E-07
	Pyrene	7.82E-01	2.06E-07	7E-06	9E-06		4E-08	2E-05
	Xylenes (total)	3.00E-03	4.92E-07	4E-09	4E-09		9E-08	1E-07
	Semivolatile Organic Compounds							
	Benzo(a)Anthracene	2.24E-01		2E-07	3E-07	3E-09		5E-07
	Benzo(a)Pyrene	3.41E-01		3E-06	4E-06	4E-08		7E-06
	Benzo(b)Fluoranthene	2.41E-01		2E-06	2E-06	2E-08		4E-06
	Benzo(k)Fluoranthene	2.15E-01		1E-06	2E-06	2E-08		3E-06
	1,2-Benzphenanthracene	2.98E-01		3E-07	4E-07	4E-09		7E-07
	Dibenz(A,H)Anthracene	4.45E-02		4E-08	5E-08	5E-10		9E-08
	Fluoranthene	5.88E-01		4E-06	5E-06	5E-08		9E-06
	Indeno(1,2,3-C,D)Pyrene	2.86E-01		2E-06	3E-06	3E-08		5E-06
	Phenol	3.00E-01		3E-07	2E-07	4E-09		5E-07

Table I6-36
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Pesticides/Polychlorinated Biphenyls							
	Aroclor 1016	1.99E-02		7E-05	1E-04	1E-06		2E-04
	Aroclor 1260	1.91E-02		2E-04	3E-04	3E-06		5E-04
	4,4-DDD	5.00E-03		3E-06	1E-06	4E-08		4E-06
	4,4-DDE	1.19E-02		6E-06	3E-06	9E-08		9E-06
	4,4-DDT	2.60E-03		1E-06	6E-07	2E-08		2E-06
	Dieldrin	5.00E-04		3E-06	2E-06	4E-08		5E-06
	Endosulfan Sulfate	4.00E-03		2E-07	2E-07	2E-09		4E-07
	Heptachlor	5.00E-04		3E-07	2E-07	4E-09		5E-07
	Metals							
	Antimony	2.10E+00		1E-03	1E-04	—		1E-03
	Arsenic	1.17E+01		1E-02	3E-03	—		1E-02
	Barium	1.84E+02		2E-04	2E-05	5E-03		5E-03
	Beryllium	2.53E-01		3E-05	3E-06	2E-04		2E-04
	Cadmium	3.08E-01		2E-04	1E-06	—		2E-04
	Chromium	6.38E+01		5E-03	5E-04	1E-01		1E-01
	Cobalt	1.57E+01		2E-04	2E-05	1E-02		1E-02
	Copper	3.88E+01		3E-04	2E-05	—		3E-04
	Iron	3.86E+04		3E-02	3E-03	—		3E-02
	Lead	4.06E+01		—	—	—		—
	Mercury	7.06E-01		6E-04	5E-05	—		7E-04
	Molybdenum	2.68E-01		1E-05	1E-06	—		1E-05
	Nickel	1.35E+02		2E-03	2E-04	—		2E-03
	Selenium	7.53E-01		4E-05	4E-06	—		4E-05
	Thallium	1.23E+00		5E-03	4E-04	—		5E-03

Table I6-36
Summary of Hazard Index, Central Tendency Exposure
All Chemicals with Associated Pathways – U.S. EPA (Sitewide, Construction)

Scenario Time Frame: Future
Exposure Point: IRP Site 31, Sitewide
Receptor Population: Construction
Receptor Age: Adult

		EPC		HAZARD INDEX				
Exposure Medium	Chemical	Direct Contact[a]	Outdoor Vapor[b]	Ingestion	Dermal Contact	Inhalation of Dust	Inhalation of Outdoor Air	Exposure Route Total
	Vanadium	5.12E+01		1E-02	1E-03	—		1E-02
	Zinc	1.37E+02		1E-04	1E-05	—		1E-04
	Hazard Index Across Soil			**7E-02**	**9E-03**	**1E-01**	**9E-06**	**2E-01**
	Hazard Index Across All Media and All Exposure Routes			**7E-02**	**9E-03**	**1E-01**	**9E-06**	**2E-01**

Notes:
[a] Units for soil concentrations are milligrams per kilogram (mg/kg)
[b] Units for vapor phase are milligrams per cubic meter (mg/m³)

Acronyms/Abbreviations:
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EPC – exposure point concentration
IRP – Installation Restoration Program
U.S. EPA – United States Environmental Protection Agency

Table I6-37
Human Health Risk Assessment Without Ambient Metals by Pathway[1]
Reasonable Maximum Exposure

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
CURRENT RESIDENTIAL			
Ingestion of soil	2E-06	3E-06	2
Dermal contact with soil	9E-07	1E-06	0.07
Direct Contact with Soil Subtotal	**3E-06**	**5E-06**	**2**
Inhalation of vapors in indoor air from soil	5E-08	5E-07	0.02
Inhalation of vapors in indoor air from groundwater	8E-07	1E-05	0.4
Indoor Air Subtotal	**8E-07**	**1E-05**	**0.4**
Inhalation of vapors in outdoor air from soil	4E-09	3E-08	0.001
Inhalation of particulates in outdoor air from soil	3E-08	1E-08	0.002
Outdoor Air Subtotal	**3E-08**	**4E-08**	**0.003**
Ingestion of homegrown produce	3E-06	2E-05	0.2
Total without residential use of groundwater	**7E-06**	**3E-05**	**3**
Ingestion of groundwater and inhalation of vapors while showering[2]	—	—	—
Total with residential use of groundwater	**7E-06**	**3E-05**	**3**
FUTURE RESIDENTIAL			
Ingestion of soil	5E-06	9E-06	2
Dermal contact with soil	3E-06	4E-06	0.07
Direct Contact with Soil Subtotal	**8E-06**	**1E-05**	**2**
Inhalation of vapors in indoor air from soil	5E-08	5E-07	0.02
Inhalation of vapors in indoor air from groundwater	8E-07	1E-05	0.4
Indoor Air Subtotal	**8E-07**	**1E-05**	**0.4**
Inhalation of vapors in outdoor air from soil	4E-09	3E-08	0.001
Inhalation of particulates in outdoor air from soil	3E-08	1E-08	0.002
Outdoor Air Subtotal	**4E-08**	**5E-08**	**0.003**
Ingestion of homegrown produce	4E-06	2E-05	0.2
Total without residential use of groundwater	**1E-05**	**4E-05**	**3**
Ingestion of groundwater and inhalation of vapors while showering[2]	**2E-02**	**2E-02**	**145**
Total with residential use of groundwater	**2E-02**	**2E-02**	**148**
CONSTRUCTION			
Ingestion of soil	8E-08	1E-07	0.04
Dermal contact with soil	1E-07	2E-07	0.004
Direct Contact with Soil Subtotal	**2E-07**	**3E-07**	**0.04**
Inhalation of vapors in outdoor air from soil	2E-11	1E-10	0.000009
Inhalation of particulates in outdoor air from soil	1E-07	5E-08	0.02
Outdoor Air Subtotal	**1E-07**	**5E-08**	**0.02**
TOTAL	**3E-07**	**4E-07**	**0.06**

Note:

[1] Does not include ambient metals (arsenic, cadmium, chromium and vanadium) in soil, see Section 4.1.4 in the main report

[2] Cal/EPA toxicity values were used in the calculation of cancer risk for residential use of groundwater (ERRG 2004)

Acronyms/Abbreviations:

Cal/EPA – California Environmental Protection Agency
ERRG – Engineering/Remediation Resources Group, Inc.
U.S. EPA – United States Environmental Protection Agency

Reference:

ERRG 2004. Groundwater Remedial Investigation/Feasibility Study. Alameda Point Site 25/Annex IR-02. Final. October

Attachment I1
Sampling Locations

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
178-0001RE	SB	11/15/1994	0 - 0 ft	REG
C032C538	SB	5/29/2002	0 - 0.5 ft	REG
C032C542	SB	5/29/2002	0 - 0.5 ft	REG
C032C546	SB	5/29/2002	0 - 0.5 ft	REG
C032C551	SB	5/29/2002	0 - 0.5 ft	REG
C032C555	SB	5/29/2002	0 - 0.5 ft	REG
C032C560	SB	5/30/2002	0 - 0.5 ft	REG
C032C568	SB	5/30/2002	0 - 0.5 ft	REG
C032C573	SB	5/30/2002	0 - 0.5 ft	REG
C032C577	SB	5/30/2002	0 - 0.5 ft	REG
C032C582	SB	5/30/2002	0 - 0.5 ft	REG
C032C586	SB	5/30/2002	0 - 0.5 ft	REG
C0593055	SB	9/10/2003	0 - 0.5 ft	REG
C0593059	SB	9/10/2003	0 - 0.5 ft	REG
C0593063	SB	10/1/2003	0 - 0.5 ft	REG
C0593064	SB	10/1/2003	0 - 0.5 ft	REG
C0593072	SB	10/2/2003	0 - 0.5 ft	REG
C0593081	SB	10/3/2003	0 - 0.5 ft	REG
C0593086	SB	9/10/2003	0 - 0.5 ft	REG
C0593090	SB	10/1/2003	0 - 0.5 ft	REG
C0593095	SB	9/11/2003	0 - 0.5 ft	REG
C0593099	SB	10/2/2003	0 - 0.5 ft	REG
C0593108	SB	10/2/2003	0 - 0.5 ft	REG
C0593112	SB	10/8/2003	0 - 0.5 ft	REG
C0593117	SB	10/3/2003	0 - 0.5 ft	REG
C0593121	SB	10/3/2003	0 - 0.5 ft	REG
C0593126	SB	9/10/2003	0 - 0.5 ft	REG
C0593130	SB	10/1/2003	0 - 0.5 ft	REG
C0593135	SB	9/11/2003	0 - 0.5 ft	REG
C0593139	SB	10/2/2003	0 - 0.5 ft	REG
C0593143	SB	9/12/2003	0 - 0.5 ft	REG
C0593144	SB	9/12/2003	0 - 0.5 ft	REG
C0593148	SB	10/2/2003	0 - 0.5 ft	REG
C0593152	SB	10/2/2003	0 - 0.5 ft	REG
C0593157	SB	10/3/2003	0 - 0.5 ft	REG
C0593161	SB	10/3/2003	0 - 0.5 ft	REG
C0593166	SB	10/3/2003	0 - 0.5 ft	REG
C0593175	SB	9/10/2003	0 - 0.5 ft	REG
C0593179	SB	10/1/2003	0 - 0.5 ft	REG
C0593183	SB	9/11/2003	0 - 0.5 ft	REG
C0593184	SB	9/11/2003	0 - 0.5 ft	REG
C0593188	SB	9/16/2003	0 - 0.5 ft	REG
C0593192	SB	9/16/2003	0 - 0.5 ft	REG
C0593197	SB	10/2/2003	0 - 0.5 ft	REG
C0593201	SB	10/2/2003	0 - 0.5 ft	REG
C0593206	SB	10/2/2003	0 - 0.5 ft	REG
C0593215	SB	10/6/2003	0 - 0.5 ft	REG
C0593219	SB	10/6/2003	0 - 0.5 ft	REG
C0593223	SB	10/6/2003	0 - 0.5 ft	REG
C0593224	SB	10/6/2003	0 - 0.5 ft	REG

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593232	SB	10/7/2003	0 - 0.5 ft	REG
C0593241	SB	9/10/2003	0 - 0.5 ft	REG
C0593246	SB	9/15/2003	0 - 0.5 ft	REG
C0593250	SB	10/2/2003	0 - 0.5 ft	REG
C0593255	SB	10/2/2003	0 - 0.5 ft	REG
C0593264	SB	10/10/2003	0 - 0.5 ft	REG
C0593268	SB	10/6/2003	0 - 0.5 ft	REG
C0593272	SB	10/6/2003	0 - 0.5 ft	REG
C0593277	SB	10/3/2003	0 - 0.5 ft	REG
C0593281	SB	10/7/2003	0 - 0.5 ft	REG
C0593286	SB	10/7/2003	0 - 0.5 ft	REG
C0593290	SB	10/9/2003	0 - 0.5 ft	REG
C0593295	SB	10/9/2003	0 - 0.5 ft	REG
C0593299	SB	10/9/2003	0 - 0.5 ft	REG
C0593303	SB	10/10/2003	0 - 0.5 ft	REG
C0593304	SB	10/10/2003	0 - 0.5 ft	REG
C0593308	SB	10/10/2003	0 - 0.5 ft	REG
C0593312	SB	10/10/2003	0 - 0.5 ft	REG
C0593317	SB	10/1/2003	0 - 0.5 ft	REG
C0593321	SB	10/1/2003	0 - 0.5 ft	REG
C0593326	SB	9/15/2003	0 - 0.5 ft	REG
C0593330	SB	10/2/2003	0 - 0.5 ft	REG
C0593339	SB	10/2/2003	0 - 0.5 ft	REG
C0593352	SB	10/3/2003	0 - 0.5 ft	REG
C0593357	SB	10/7/2003	0 - 0.5 ft	REG
C0593366	SB	10/9/2003	0 - 0.5 ft	REG
C0593375	SB	10/9/2003	0 - 0.5 ft	REG
C0593383	SB	10/10/2003	0 - 0.5 ft	REG
C0593384	SB	10/10/2003	0 - 0.5 ft	REG
C0593388	SB	10/10/2003	0 - 0.5 ft	REG
C0593392	SB	10/10/2003	0 - 0.5 ft	REG
C0593397	SB	10/17/2003	0 - 0.5 ft	REG
C0593401	SB	10/10/2003	0 - 0.5 ft	REG
C0593406	SB	10/13/2003	0 - 0.5 ft	REG
C0593410	SB	9/15/2003	0 - 0.5 ft	REG
C0593415	SB	9/12/2003	0 - 0.5 ft	REG
C0593423	SB	9/15/2003	0 - 0.5 ft	REG
C0593424	SB	9/15/2003	0 - 0.5 ft	REG
C0593428	SB	9/16/2003	0 - 0.5 ft	REG
C0593432	SB	9/16/2003	0 - 0.5 ft	REG
C0593437	SB	10/2/2003	0 - 0.5 ft	REG
C0593441	SB	10/2/2003	0 - 0.5 ft	REG
C0593446	SB	10/2/2003	0 - 0.5 ft	REG
C0593450	SB	9/17/2003	0 - 0.5 ft	REG
C0593455	SB	10/3/2003	0 - 0.5 ft	REG
C0593459	SB	10/3/2003	0 - 0.5 ft	REG
C0593463	SB	10/3/2003	0 - 0.5 ft	REG
C0593464	SB	10/3/2003	0 - 0.5 ft	REG
C0593503	SB	10/9/2003	0 - 0.5 ft	REG
C0593508	SB	10/9/2003	0 - 0.5 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593512	SB	10/9/2003	0 - 0.5 ft	REG
C0593517	SB	10/10/2003	0 - 0.5 ft	REG
C0593521	SB	10/10/2003	0 - 0.5 ft	REG
C0593526	SB	10/10/2003	0 - 0.5 ft	REG
C0593530	SB	10/13/2003	0 - 0.5 ft	REG
C0593535	SB	10/13/2003	0 - 0.5 ft	REG
C0593539	SB	10/13/2003	0 - 0.5 ft	REG
C0593544	SB	9/12/2003	0 - 0.5 ft	REG
C0593548	SB	9/17/2003	0 - 0.5 ft	REG
C0593552	SB	9/16/2003	0 - 0.5 ft	REG
C0593557	SB	10/1/2003	0 - 0.5 ft	REG
C0593561	SB	9/17/2003	0 - 0.5 ft	REG
C0593566	SB	10/17/2003	0 - 0.5 ft	REG
C0593570	SB	9/23/2003	0 - 0.5 ft	REG
C0593575	SB	10/3/2003	0 - 0.5 ft	REG
C0593583	SB	10/7/2003	0 - 0.5 ft	REG
C0593584	SB	10/7/2003	0 - 0.5 ft	REG
C0593588	SB	10/8/2003	0 - 0.5 ft	REG
C0593597	SB	10/9/2003	0 - 0.5 ft	REG
C0593601	SB	10/17/2003	0 - 0.5 ft	REG
C0593606	SB	10/17/2003	0 - 0.5 ft	REG
C0593610	SB	10/17/2003	0 - 0.5 ft	REG
C0593615	SB	10/17/2003	0 - 0.5 ft	REG
C0593619	SB	10/13/2003	0 - 0.5 ft	REG
C0593628	SB	10/17/2003	0 - 0.5 ft	REG
C0593632	SB	9/16/2003	0 - 0.5 ft	REG
C0593637	SB	10/1/2003	0 - 0.5 ft	REG
C0593641	SB	9/24/2003	0 - 0.5 ft	REG
C0593646	SB	9/22/2003	0 - 0.5 ft	REG
C0593650	SB	10/3/2003	0 - 0.5 ft	REG
C0593659	SB	10/8/2003	0 - 0.5 ft	REG
C0593663	SB	10/7/2003	0 - 0.5 ft	REG
C0593664	SB	10/7/2003	0 - 0.5 ft	REG
C0593668	SB	10/8/2003	0 - 0.5 ft	REG
C0593677	SB	10/9/2003	0 - 0.5 ft	REG
C0593681	SB	10/9/2003	0 - 0.5 ft	REG
C0593686	SB	10/10/2003	0 - 0.5 ft	REG
C0593690	SB	10/10/2003	0 - 0.5 ft	REG
C0593695	SB	10/10/2003	0 - 0.5 ft	REG
C0593699	SB	10/13/2003	0 - 0.5 ft	REG
C0593703	SB	9/15/2003	0 - 0.5 ft	REG
C0593704	SB	9/15/2003	0 - 0.5 ft	REG
C0593708	SB	9/11/2003	0 - 0.5 ft	REG
C0593712	SB	10/1/2003	0 - 0.5 ft	REG
C0593717	SB	9/16/2003	0 - 0.5 ft	REG
C0593721	SB	10/1/2003	0 - 0.5 ft	REG
C0593726	SB	10/6/2003	0 - 0.5 ft	REG
C0593730	SB	9/23/2003	0 - 0.5 ft	REG
C0593735	SB	9/24/2003	0 - 0.5 ft	REG
C0593743	SB	10/8/2003	0 - 0.5 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593744	SB	10/8/2003	0 - 0.5 ft	REG
C0593748	SB	10/8/2003	0 - 0.5 ft	REG
C0593752	SB	10/8/2003	0 - 0.5 ft	REG
C0593757	SB	10/8/2003	0 - 0.5 ft	REG
C0593761	SB	10/8/2003	0 - 0.5 ft	REG
C0593766	SB	10/10/2003	0 - 0.5 ft	REG
C0593770	SB	10/10/2003	0 - 0.5 ft	REG
C0593775	SB	10/10/2003	0 - 0.5 ft	REG
C0593779	SB	10/9/2003	0 - 0.5 ft	REG
C0593783	SB	10/9/2003	0 - 0.5 ft	REG
C0593784	SB	10/9/2003	0 - 0.5 ft	REG
C0593788	SB	10/10/2003	0 - 0.5 ft	REG
C0593792	SB	10/10/2003	0 - 0.5 ft	REG
C0593797	SB	10/10/2003	0 - 0.5 ft	REG
C0593801	SB	10/10/2003	0 - 0.5 ft	REG
C0593806	SB	10/10/2003	0 - 0.5 ft	REG
C0593810	SB	10/1/2003	0 - 0.5 ft	REG
C0593815	SB	9/11/2003	0 - 0.5 ft	REG
31001 3101	DP	11/1/2005	0 - 2 ft	N
31004 3103	DP	11/2/2005	0 - 2 ft	N
31007 3104	DP	11/2/2005	0 - 2 ft	N
31010 3105	DP	11/2/2005	0 - 2 ft	N
31014 3106	DP	11/3/2005	0 - 2 ft	N
31017 3107	DP	11/3/2005	0 - 2 ft	N
31020 3108	DP	11/3/2005	0 - 2 ft	N
31024 3109	DP	11/3/2005	0 - 2 ft	N
31027 3110	DP	11/3/2005	0 - 2 ft	N
31030 3111	DP	11/3/2005	0 - 2 ft	N
31033 3112	DP	11/3/2005	0 - 2 ft	N
31037 3113	DP	11/3/2005	0 - 2 ft	N
31040 3114	DP	11/3/2005	0 - 2 ft	N
31043 3115	DP	11/3/2005	0 - 2 ft	N
31047 3116	DP	11/4/2005	0 - 2 ft	N
31052 3117	DP	11/4/2005	0 - 2 ft	N
31055 3118	DP	11/4/2005	0 - 2 ft	N
31058 3119	DP	11/4/2005	0 - 2 ft	N
31060 3120	DP	11/4/2005	0 - 2 ft	N
31063 3121	DP	11/4/2005	0 - 2 ft	N
31066 3122	DP	11/4/2005	0 - 2 ft	N
31069 3123	DP	11/4/2005	0 - 2 ft	N
31071 3124	DP	11/4/2005	0 - 2 ft	N
31073 3125	DP	11/5/2005	0 - 2 ft	N
31078 3126	DP	11/6/2005	0 - 2 ft	N
31081 3127	DP	11/6/2005	0 - 2 ft	N
31083 3128	DP	11/6/2005	0 - 2 ft	N
31084 3129	DP	11/6/2005	0 - 2 ft	N
31085 3130	DP	11/6/2005	0 - 2 ft	N
31087 3132	DP	11/6/2005	0 - 2 ft	N
31091 3133	DP	11/6/2005	0 - 2 ft	N
31094 3134	DP	11/6/2005	0 - 2 ft	N

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
31097 3136	DP	11/7/2005	0 - 2 ft	N
31101 3138	DP	11/7/2005	0 - 2 ft	N
31104 3139	DP	11/7/2005	0 - 2 ft	N
31106 3140	DP	11/7/2005	0 - 2 ft	N
31108 3141	DP	11/7/2005	0 - 2 ft	N
31112 3142	DP	11/7/2005	0 - 2 ft	N
31114 3143	DP	11/8/2005	0 - 2 ft	N
31116 3144	DP	11/8/2005	0 - 2 ft	N
31132 3146	DP	11/8/2005	0 - 2 ft	N
31135 3147	DP	11/9/2005	0 - 2 ft	N
31137 3148	DP	11/9/2005	0 - 2 ft	N
31139 3149	DP	11/9/2005	0 - 2 ft	N
31141 3150	DP	11/9/2005	0 - 2 ft	N
31144 3102	DP	11/9/2005	0 - 2 ft	N
31156 3131	DP	11/10/2005	0 - 2 ft	N
31158 3135	DP	11/10/2005	0 - 2 ft	N
31160 3137	DP	11/10/2005	0 - 2 ft	N
178-0002	SB	11/15/1994	0.5 - 1 ft	REG
178-0003	SB	11/15/1994	0.5 - 1 ft	REG
C032C539	SB	5/29/2002	0.5 - 2 ft	REG
C032C543	SB	5/29/2002	0.5 - 2 ft	REG
C032C547	SB	5/29/2002	0.5 - 2 ft	REG
C032C548	SB	5/29/2002	0.5 - 2 ft	REG
C032C552	SB	5/29/2002	0.5 - 2 ft	REG
C032C556	SB	5/29/2002	0.5 - 2 ft	REG
C032C561	SB	5/30/2002	0.5 - 2 ft	REG
C032C565	SB	5/29/2002	0.5 - 2 ft	REG
C032C569	SB	5/30/2002	0.5 - 2 ft	REG
C032C570	SB	5/30/2002	0.5 - 2 ft	REG
C032C574	SB	5/30/2002	0.5 - 2 ft	REG
C032C578	SB	5/30/2002	0.5 - 2 ft	REG
C032C583	SB	5/30/2002	0.5 - 2 ft	REG
C032C587	SB	5/30/2002	0.5 - 2 ft	REG
C0593056	SB	9/10/2003	0.5 - 2 ft	REG
C0593060	SB	9/10/2003	0.5 - 2 ft	REG
C0593065	SB	10/1/2003	0.5 - 2 ft	REG
C0593069	SB	9/11/2003	0.5 - 2 ft	REG
C0593073	SB	10/2/2003	0.5 - 2 ft	REG
C0593074	SB	10/2/2003	0.5 - 2 ft	REG
C0593082	SB	10/3/2003	0.5 - 2 ft	REG
C0593087	SB	9/10/2003	0.5 - 2 ft	REG
C0593091	SB	10/1/2003	0.5 - 2 ft	REG
C0593096	SB	9/11/2003	0.5 - 2 ft	REG
C0593100	SB	10/2/2003	0.5 - 2 ft	REG
C0593109	SB	10/2/2003	0.5 - 2 ft	REG
C0593113	SB	10/8/2003	0.5 - 2 ft	REG
C0593114	SB	10/8/2003	0.5 - 2 ft	REG
C0593118	SB	10/3/2003	0.5 - 2 ft	REG
C0593122	SB	10/3/2003	0.5 - 2 ft	REG
C0593131	SB	10/1/2003	0.5 - 2 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593136	SB	9/11/2003	0.5 - 2 ft	REG
C0593140	SB	10/2/2003	0.5 - 2 ft	REG
C0593145	SB	9/12/2003	0.5 - 2 ft	REG
C0593149	SB	10/2/2003	0.5 - 2 ft	REG
C0593153	SB	10/2/2003	0.5 - 2 ft	REG
C0593154	SB	10/2/2003	0.5 - 2 ft	REG
C0593158	SB	10/3/2003	0.5 - 2 ft	REG
C0593162	SB	10/3/2003	0.5 - 2 ft	REG
C0593167	SB	10/3/2003	0.5 - 2 ft	REG
C0593176	SB	9/10/2003	0.5 - 2 ft	REG
C0593180	SB	10/1/2003	0.5 - 2 ft	REG
C0593185	SB	9/11/2003	0.5 - 2 ft	REG
C0593189	SB	9/16/2003	0.5 - 2 ft	REG
C0593193	SB	9/16/2003	0.5 - 2 ft	REG
C0593194	SB	9/16/2003	0.5 - 2 ft	REG
C0593198	SB	10/2/2003	0.5 - 2 ft	REG
C0593202	SB	10/2/2003	0.5 - 2 ft	REG
C0593207	SB	10/2/2003	0.5 - 2 ft	REG
C0593211	SB	10/3/2003	0.5 - 2 ft	REG
C0593216	SB	10/6/2003	0.5 - 2 ft	REG
C0593220	SB	10/6/2003	0.5 - 2 ft	REG
C0593225	SB	10/6/2003	0.5 - 2 ft	REG
C0593229	SB	10/6/2003	0.5 - 2 ft	REG
C0593233	SB	10/7/2003	0.5 - 2 ft	REG
C0593234	SB	10/7/2003	0.5 - 2 ft	REG
C0593238	SB	10/7/2003	0.5 - 2 ft	REG
C0593242	SB	9/10/2003	0.5 - 2 ft	REG
C0593247	SB	9/15/2003	0.5 - 2 ft	REG
C0593251	SB	10/2/2003	0.5 - 2 ft	REG
C0593256	SB	10/2/2003	0.5 - 2 ft	REG
C0593265	SB	10/10/2003	0.5 - 2 ft	REG
C0593269	SB	10/6/2003	0.5 - 2 ft	REG
C0593273	SB	10/6/2003	0.5 - 2 ft	REG
C0593274	SB	10/6/2003	0.5 - 2 ft	REG
C0593278	SB	10/3/2003	0.5 - 2 ft	REG
C0593282	SB	10/7/2003	0.5 - 2 ft	REG
C0593287	SB	10/7/2003	0.5 - 2 ft	REG
C0593291	SB	10/9/2003	0.5 - 2 ft	REG
C0593296	SB	10/9/2003	0.5 - 2 ft	REG
C0593300	SB	10/9/2003	0.5 - 2 ft	REG
C0593305	SB	10/10/2003	0.5 - 2 ft	REG
C0593309	SB	10/10/2003	0.5 - 2 ft	REG
C0593313	SB	10/10/2003	0.5 - 2 ft	REG
C0593314	SB	10/10/2003	0.5 - 2 ft	REG
C0593318	SB	10/1/2003	0.5 - 2 ft	REG
C0593322	SB	10/1/2003	0.5 - 2 ft	REG
C0593327	SB	9/15/2003	0.5 - 2 ft	REG
C0593331	SB	10/2/2003	0.5 - 2 ft	REG
C0593336	SB	10/6/2003	0.5 - 2 ft	REG
C0593340	SB	10/2/2003	0.5 - 2 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593353	SB	10/3/2003	0.5 - 2 ft	REG
C0593358	SB	10/7/2003	0.5 - 2 ft	REG
C0593362	SB	10/7/2003	0.5 - 2 ft	REG
C0593367	SB	10/9/2003	0.5 - 2 ft	REG
C0593376	SB	10/9/2003	0.5 - 2 ft	REG
C0593380	SB	10/9/2003	0.5 - 2 ft	REG
C0593385	SB	10/10/2003	0.5 - 2 ft	REG
C0593393	SB	10/10/2003	0.5 - 2 ft	REG
C0593394	SB	10/10/2003	0.5 - 2 ft	REG
C0593398	SB	10/17/2003	0.5 - 2 ft	REG
C0593402	SB	10/10/2003	0.5 - 2 ft	REG
C0593407	SB	10/13/2003	0.5 - 2 ft	REG
C0593411	SB	9/15/2003	0.5 - 2 ft	REG
C0593416	SB	9/12/2003	0.5 - 2 ft	REG
C0593420	SB	9/12/2003	0.5 - 2 ft	REG
C0593425	SB	9/15/2003	0.5 - 2 ft	REG
C0593429	SB	9/16/2003	0.5 - 2 ft	REG
C0593433	SB	9/16/2003	0.5 - 2 ft	REG
C0593434	SB	9/16/2003	0.5 - 2 ft	REG
C0593438	SB	10/2/2003	0.5 - 2 ft	REG
C0593442	SB	10/2/2003	0.5 - 2 ft	REG
C0593447	SB	10/2/2003	0.5 - 2 ft	REG
C0593451	SB	9/17/2003	0.5 - 2 ft	REG
C0593456	SB	10/3/2003	0.5 - 2 ft	REG
C0593460	SB	10/3/2003	0.5 - 2 ft	REG
C0593465	SB	10/3/2003	0.5 - 2 ft	REG
C0593469	SB	10/7/2003	0.5 - 2 ft	REG
C0593478	SB	10/7/2003	0.5 - 2 ft	REG
C0593491	SB	10/9/2003	0.5 - 2 ft	REG
C0593505	SB	10/9/2003	0.5 - 2 ft	REG
C0593509	SB	10/9/2003	0.5 - 2 ft	REG
C0593513	SB	10/9/2003	0.5 - 2 ft	REG
C0593514	SB	10/9/2003	0.5 - 2 ft	REG
C0593518	SB	10/10/2003	0.5 - 2 ft	REG
C0593522	SB	10/10/2003	0.5 - 2 ft	REG
C0593527	SB	10/10/2003	0.5 - 2 ft	REG
C0593531	SB	10/13/2003	0.5 - 2 ft	REG
C0593536	SB	10/13/2003	0.5 - 2 ft	REG
C0593540	SB	10/13/2003	0.5 - 2 ft	REG
C0593545	SB	9/12/2003	0.5 - 2 ft	REG
C0593549	SB	9/17/2003	0.5 - 2 ft	REG
C0593553	SB	9/16/2003	0.5 - 2 ft	REG
C0593554	SB	9/16/2003	0.5 - 2 ft	REG
C0593558	SB	10/1/2003	0.5 - 2 ft	REG
C0593562	SB	9/17/2003	0.5 - 2 ft	REG
C0593567	SB	10/17/2003	0.5 - 2 ft	REG
C0593571	SB	9/23/2003	0.5 - 2 ft	REG
C0593576	SB	10/3/2003	0.5 - 2 ft	REG
C0593585	SB	10/7/2003	0.5 - 2 ft	REG
C0593589	SB	10/8/2003	0.5 - 2 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593594	SB	10/9/2003	0.5 - 2 ft	REG
C0593598	SB	10/9/2003	0.5 - 2 ft	REG
C0593602	SB	10/17/2003	0.5 - 2 ft	REG
C0593607	SB	10/17/2003	0.5 - 2 ft	REG
C0593611	SB	10/17/2003	0.5 - 2 ft	REG
C0593616	SB	10/17/2003	0.5 - 2 ft	REG
C0593620	SB	10/13/2003	0.5 - 2 ft	REG
C0593629	SB	10/17/2003	0.5 - 2 ft	REG
C0593633	SB	9/16/2003	0.5 - 2 ft	REG
C0593634	SB	9/16/2003	0.5 - 2 ft	REG
C0593638	SB	10/1/2003	0.5 - 2 ft	REG
C0593642	SB	9/24/2003	0.5 - 2 ft	REG
C0593647	SB	9/22/2003	0.5 - 2 ft	REG
C0593651	SB	10/3/2003	0.5 - 2 ft	REG
C0593660	SB	10/8/2003	0.5 - 2 ft	REG
C0593665	SB	10/7/2003	0.5 - 2 ft	REG
C0593669	SB	10/8/2003	0.5 - 2 ft	REG
C0593673	SB	10/8/2003	0.5 - 2 ft	REG
C0593674	SB	10/8/2003	0.5 - 2 ft	REG
C0593678	SB	10/9/2003	0.5 - 2 ft	REG
C0593682	SB	10/9/2003	0.5 - 2 ft	REG
C0593687	SB	10/10/2003	0.5 - 2 ft	REG
C0593691	SB	10/10/2003	0.5 - 2 ft	REG
C0593696	SB	10/10/2003	0.5 - 2 ft	REG
C0593700	SB	10/13/2003	0.5 - 2 ft	REG
C0593705	SB	9/15/2003	0.5 - 2 ft	REG
C0593709	SB	9/11/2003	0.5 - 2 ft	REG
C0593713	SB	10/1/2003	0.5 - 2 ft	REG
C0593714	SB	10/1/2003	0.5 - 2 ft	REG
C0593718	SB	9/16/2003	0.5 - 2 ft	REG
C0593722	SB	10/1/2003	0.5 - 2 ft	REG
C0593727	SB	10/6/2003	0.5 - 2 ft	REG
C0593731	SB	9/23/2003	0.5 - 2 ft	REG
C0593736	SB	9/24/2003	0.5 - 2 ft	REG
C0593740	SB	10/3/2003	0.5 - 2 ft	REG
C0593745	SB	10/8/2003	0.5 - 2 ft	REG
C0593749	SB	10/8/2003	0.5 - 2 ft	REG
C0593753	SB	10/8/2003	0.5 - 2 ft	REG
C0593754	SB	10/8/2003	0.5 - 2 ft	REG
C0593758	SB	10/8/2003	0.5 - 2 ft	REG
C0593762	SB	10/8/2003	0.5 - 2 ft	REG
C0593767	SB	10/10/2003	0.5 - 2 ft	REG
C0593771	SB	10/10/2003	0.5 - 2 ft	REG
C0593776	SB	10/10/2003	0.5 - 2 ft	REG
C0593780	SB	10/9/2003	0.5 - 2 ft	REG
C0593785	SB	10/9/2003	0.5 - 2 ft	REG
C0593789	SB	10/10/2003	0.5 - 2 ft	REG
C0593793	SB	10/10/2003	0.5 - 2 ft	REG
C0593794	SB	10/10/2003	0.5 - 2 ft	REG
C0593798	SB	10/10/2003	0.5 - 2 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593802	SB	10/10/2003	0.5 - 2 ft	REG
C0593807	SB	10/10/2003	0.5 - 2 ft	REG
C0593811	SB	10/1/2003	0.5 - 2 ft	REG
C032C540	SB	5/29/2002	2 - 4 ft	REG
C032C544	SB	5/29/2002	2 - 4 ft	REG
C032C549	SB	5/29/2002	2 - 4 ft	REG
C032C553	SB	5/29/2002	2 - 4 ft	REG
C032C562	SB	5/30/2002	2 - 4 ft	REG
C032C566	SB	5/29/2002	2 - 4 ft	REG
C032C571	SB	5/30/2002	2 - 4 ft	REG
C032C575	SB	5/30/2002	2 - 4 ft	REG
C032C579	SB	5/30/2002	2 - 4 ft	REG
C032C584	SB	5/30/2002	2 - 4 ft	REG
C032C588	SB	5/30/2002	2 - 4 ft	REG
C0593066	SB	10/1/2003	2 - 4 ft	REG
C0593070	SB	9/11/2003	2 - 4 ft	REG
C0593075	SB	10/2/2003	2 - 4 ft	REG
C0593083	SB	10/3/2003	2 - 4 ft	REG
C0593084	SB	10/3/2003	2 - 4 ft	REG
C0593088	SB	9/10/2003	2 - 4 ft	REG
C0593092	SB	10/1/2003	2 - 4 ft	REG
C0593097	SB	9/11/2003	2 - 4 ft	REG
C0593101	SB	10/2/2003	2 - 4 ft	REG
C0593115	SB	10/8/2003	2 - 4 ft	REG
C0593119	SB	10/3/2003	2 - 4 ft	REG
C0593123	SB	10/3/2003	2 - 4 ft	REG
C0593124	SB	10/3/2003	2 - 4 ft	REG
C0593132	SB	10/1/2003	2 - 4 ft	REG
C0593137	SB	9/11/2003	2 - 4 ft	REG
C0593141	SB	10/2/2003	2 - 4 ft	REG
C0593150	SB	10/2/2003	2 - 4 ft	REG
C0593155	SB	10/2/2003	2 - 4 ft	REG
C0593159	SB	10/3/2003	2 - 4 ft	REG
C0593163	SB	10/3/2003	2 - 4 ft	REG
C0593164	SB	10/3/2003	2 - 4 ft	REG
C0593168	SB	10/3/2003	2 - 4 ft	REG
C0593177	SB	9/10/2003	2 - 4 ft	REG
C0593181	SB	10/1/2003	2 - 4 ft	REG
C0593190	SB	9/16/2003	2 - 4 ft	REG
C0593195	SB	9/16/2003	2 - 4 ft	REG
C0593199	SB	10/2/2003	2 - 4 ft	REG
C0593203	SB	10/2/2003	2 - 4 ft	REG
C0593204	SB	10/2/2003	2 - 4 ft	REG
C0593208	SB	10/2/2003	2 - 4 ft	REG
C0593212	SB	10/3/2003	2 - 4 ft	REG
C0593217	SB	10/6/2003	2 - 4 ft	REG
C0593221	SB	10/6/2003	2 - 4 ft	REG
C0593226	SB	10/6/2003	2 - 4 ft	REG
C0593230	SB	10/6/2003	2 - 4 ft	REG
C0593235	SB	10/7/2003	2 - 4 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593239	SB	10/7/2003	2 - 4 ft	REG
C0593243	SB	9/10/2003	2 - 4 ft	REG
C0593244	SB	9/10/2003	2 - 4 ft	REG
C0593248	SB	9/15/2003	2 - 4 ft	REG
C0593252	SB	10/2/2003	2 - 4 ft	REG
C0593257	SB	10/2/2003	2 - 4 ft	REG
C0593266	SB	10/10/2003	2 - 4 ft	REG
C0593270	SB	10/6/2003	2 - 4 ft	REG
C0593275	SB	10/6/2003	2 - 4 ft	REG
C0593279	SB	10/3/2003	2 - 4 ft	REG
C0593283	SB	10/7/2003	2 - 4 ft	REG
C0593284	SB	10/7/2003	2 - 4 ft	REG
C0593292	SB	10/9/2003	2 - 4 ft	REG
C0593297	SB	10/9/2003	2 - 4 ft	REG
C0593301	SB	10/9/2003	2 - 4 ft	REG
C0593306	SB	10/10/2003	2 - 4 ft	REG
C0593310	SB	10/10/2003	2 - 4 ft	REG
C0593315	SB	10/10/2003	2 - 4 ft	REG
C0593323	SB	10/1/2003	2 - 4 ft	REG
C0593324	SB	10/1/2003	2 - 4 ft	REG
C0593328	SB	9/15/2003	2 - 4 ft	REG
C0593341	SB	10/2/2003	2 - 4 ft	REG
C0593350	SB	10/6/2003	2 - 4 ft	REG
C0593359	SB	10/7/2003	2 - 4 ft	REG
C0593363	SB	10/7/2003	2 - 4 ft	REG
C0593364	SB	10/7/2003	2 - 4 ft	REG
C0593372	SB	10/9/2003	2 - 4 ft	REG
C0593377	SB	10/9/2003	2 - 4 ft	REG
C0593381	SB	10/9/2003	2 - 4 ft	REG
C0593386	SB	10/10/2003	2 - 4 ft	REG
C0593390	SB	10/10/2003	2 - 4 ft	REG
C0593395	SB	10/10/2003	2 - 4 ft	REG
C0593399	SB	10/17/2003	2 - 4 ft	REG
C0593403	SB	10/10/2003	2 - 4 ft	REG
C0593404	SB	10/10/2003	2 - 4 ft	REG
C0593408	SB	10/13/2003	2 - 4 ft	REG
C0593412	SB	9/15/2003	2 - 4 ft	REG
C0593421	SB	9/12/2003	2 - 4 ft	REG
C0593426	SB	9/15/2003	2 - 4 ft	REG
C0593430	SB	9/16/2003	2 - 4 ft	REG
C0593435	SB	9/16/2003	2 - 4 ft	REG
C0593439	SB	10/2/2003	2 - 4 ft	REG
C0593443	SB	10/2/2003	2 - 4 ft	REG
C0593444	SB	10/2/2003	2 - 4 ft	REG
C0593448	SB	10/2/2003	2 - 4 ft	REG
C0593452	SB	9/17/2003	2 - 4 ft	REG
C0593457	SB	10/3/2003	2 - 4 ft	REG
C0593461	SB	10/3/2003	2 - 4 ft	REG
C0593466	SB	10/3/2003	2 - 4 ft	REG
C0593470	SB	10/7/2003	2 - 4 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593479	SB	10/7/2003	2 - 4 ft	REG
C0593483	SB	10/9/2003	2 - 4 ft	REG
C0593484	SB	10/9/2003	2 - 4 ft	REG
C0593492	SB	10/9/2003	2 - 4 ft	REG
C0593497	SB	10/9/2003	2 - 4 ft	REG
C0593506	SB	10/9/2003	2 - 4 ft	REG
C0593510	SB	10/9/2003	2 - 4 ft	REG
C0593515	SB	10/9/2003	2 - 4 ft	REG
C0593519	SB	10/10/2003	2 - 4 ft	REG
C0593523	SB	10/10/2003	2 - 4 ft	REG
C0593524	SB	10/10/2003	2 - 4 ft	REG
C0593528	SB	10/10/2003	2 - 4 ft	REG
C0593532	SB	10/13/2003	2 - 4 ft	REG
C0593537	SB	10/13/2003	2 - 4 ft	REG
C0593541	SB	10/13/2003	2 - 4 ft	REG
C0593546	SB	9/12/2003	2 - 4 ft	REG
C0593550	SB	9/17/2003	2 - 4 ft	REG
C0593555	SB	9/16/2003	2 - 4 ft	REG
C0593559	SB	10/1/2003	2 - 4 ft	REG
C0593563	SB	9/17/2003	2 - 4 ft	REG
C0593564	SB	9/17/2003	2 - 4 ft	REG
C0593568	SB	10/17/2003	2 - 4 ft	REG
C0593572	SB	9/23/2003	2 - 4 ft	REG
C0593577	SB	10/3/2003	2 - 4 ft	REG
C0593581	SB	10/3/2003	2 - 4 ft	REG
C0593586	SB	10/7/2003	2 - 4 ft	REG
C0593590	SB	10/8/2003	2 - 4 ft	REG
C0593595	SB	10/9/2003	2 - 4 ft	REG
C0593603	SB	10/17/2003	2 - 4 ft	REG
C0593604	SB	10/17/2003	2 - 4 ft	REG
C0593608	SB	10/17/2003	2 - 4 ft	REG
C0593612	SB	10/17/2003	2 - 4 ft	REG
C0593617	SB	10/17/2003	2 - 4 ft	REG
C0593621	SB	10/13/2003	2 - 4 ft	REG
C0593630	SB	10/17/2003	2 - 4 ft	REG
C0593635	SB	9/16/2003	2 - 4 ft	REG
C0593639	SB	10/1/2003	2 - 4 ft	REG
C0593643	SB	9/24/2003	2 - 4 ft	REG
C0593644	SB	9/24/2003	2 - 4 ft	REG
C0593648	SB	9/22/2003	2 - 4 ft	REG
C0593652	SB	10/3/2003	2 - 4 ft	REG
C0593657	SB	10/3/2003	2 - 4 ft	REG
C0593661	SB	10/8/2003	2 - 4 ft	REG
C0593666	SB	10/7/2003	2 - 4 ft	REG
C0593670	SB	10/8/2003	2 - 4 ft	REG
C0593675	SB	10/8/2003	2 - 4 ft	REG
C0593679	SB	10/9/2003	2 - 4 ft	REG
C0593683	SB	10/9/2003	2 - 4 ft	REG
C0593684	SB	10/9/2003	2 - 4 ft	REG
C0593688	SB	10/10/2003	2 - 4 ft	REG

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593692	SB	10/10/2003	2 - 4 ft	REG
C0593697	SB	10/10/2003	2 - 4 ft	REG
C0593701	SB	10/13/2003	2 - 4 ft	REG
C0593706	SB	9/15/2003	2 - 4 ft	REG
C0593710	SB	9/11/2003	2 - 4 ft	REG
C0593715	SB	10/1/2003	2 - 4 ft	REG
C0593719	SB	9/16/2003	2 - 4 ft	REG
C0593723	SB	10/1/2003	2 - 4 ft	REG
C0593724	SB	10/1/2003	2 - 4 ft	REG
C0593728	SB	10/6/2003	2 - 4 ft	REG
C0593732	SB	9/23/2003	2 - 4 ft	REG
C0593737	SB	9/24/2003	2 - 4 ft	REG
C0593741	SB	10/3/2003	2 - 4 ft	REG
C0593746	SB	10/8/2003	2 - 4 ft	REG
C0593750	SB	10/8/2003	2 - 4 ft	REG
C0593755	SB	10/8/2003	2 - 4 ft	REG
C0593759	SB	10/8/2003	2 - 4 ft	REG
C0593763	SB	10/8/2003	2 - 4 ft	REG
C0593764	SB	10/8/2003	2 - 4 ft	REG
C0593768	SB	10/10/2003	2 - 4 ft	REG
C0593772	SB	10/10/2003	2 - 4 ft	REG
C0593777	SB	10/10/2003	2 - 4 ft	REG
C0593781	SB	10/9/2003	2 - 4 ft	REG
C0593786	SB	10/9/2003	2 - 4 ft	REG
C0593790	SB	10/10/2003	2 - 4 ft	REG
C0593795	SB	10/10/2003	2 - 4 ft	REG
C0593799	SB	10/10/2003	2 - 4 ft	REG
C0593803	SB	10/10/2003	2 - 4 ft	REG
C0593804	SB	10/10/2003	2 - 4 ft	REG
C0593808	SB	10/10/2003	2 - 4 ft	REG
C0593812	SB	10/1/2003	2 - 4 ft	REG
C0593817	SB	9/11/2003	2 - 4 ft	REG
31002 3101	DP	11/1/2005	2 - 4 ft	N
31005 3103	DP	11/2/2005	2 - 4 ft	N
31008 3104	DP	11/2/2005	2 - 4 ft	N
31011 3105	DP	11/2/2005	2 - 4 ft	N
31015 3106	DP	11/3/2005	2 - 4 ft	N
31018 3107	DP	11/3/2005	2 - 4 ft	N
31022 3108	DP	11/3/2005	2 - 4 ft	N
31025 3109	DP	11/3/2005	2 - 4 ft	N
31031 3111	DP	11/3/2005	2 - 4 ft	N
31034 3112	DP	11/3/2005	2 - 4 ft	N
31038 3113	DP	11/3/2005	2 - 4 ft	N
31041 3114	DP	11/3/2005	2 - 4 ft	N
31044 3115	DP	11/3/2005	2 - 4 ft	N
31048 3116	DP	11/4/2005	2 - 4 ft	N
31053 3117	DP	11/4/2005	2 - 4 ft	N
31057 3118	DP	11/4/2005	2 - 4 ft	N
31059 3119	DP	11/4/2005	2 - 4 ft	N
31061 3120	DP	11/4/2005	2 - 4 ft	N

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
31064 3121	DP	11/4/2005	2 - 4 ft	N
31068 3122	DP	11/4/2005	2 - 4 ft	N
31070 3123	DP	11/4/2005	2 - 4 ft	N
31072 3124	DP	11/4/2005	2 - 4 ft	N
31074 3125	DP	11/5/2005	2 - 4 ft	N
31080 3126	DP	11/6/2005	2 - 4 ft	N
31086 3130	DP	11/6/2005	2 - 4 ft	N
31088 3132	DP	11/6/2005	2 - 4 ft	N
31092 3133	DP	11/6/2005	2 - 4 ft	N
31095 3134	DP	11/6/2005	2 - 4 ft	N
31098 3136	DP	11/7/2005	2 - 4 ft	N
31105 3139	DP	11/7/2005	2 - 4 ft	N
31107 3140	DP	11/7/2005	2 - 4 ft	N
31109 3141	DP	11/7/2005	2 - 4 ft	N
31113 3142	DP	11/7/2005	2 - 4 ft	N
31115 3143	DP	11/8/2005	2 - 4 ft	N
31117 3144	DP	11/8/2005	2 - 4 ft	N
31119 3145	DP	11/8/2005	2 - 4 ft	N
31133 3146	DP	11/8/2005	2 - 4 ft	N
31136 3147	DP	11/9/2005	2 - 4 ft	N
31138 3148	DP	11/9/2005	2 - 4 ft	N
31140 3149	DP	11/9/2005	2 - 4 ft	N
31142 3150	DP	11/9/2005	2 - 4 ft	N
31145 3102	DP	11/9/2005	2 - 4 ft	N
31157 3131	DP	11/10/2005	2 - 4 ft	N
31159 3135	DP	11/10/2005	2 - 4 ft	N
31161 3137	DP	11/10/2005	2 - 4 ft	N
31028 3110	DP	11/3/2005	3 - 4 ft	N
31003 3101	DP	11/1/2005	4 - 6 ft	N
31009 3104	DP	11/2/2005	4 - 6 ft	N
31012 3105	DP	11/2/2005	4 - 6 ft	N
31016 3106	DP	11/3/2005	4 - 6 ft	N
31019 3107	DP	11/3/2005	4 - 6 ft	N
31026 3109	DP	11/3/2005	4 - 6 ft	N
31032 3111	DP	11/3/2005	4 - 6 ft	N
31039 3113	DP	11/3/2005	4 - 6 ft	N
31045 3115	DP	11/3/2005	4 - 6 ft	N
31049 3116	DP	11/4/2005	4 - 6 ft	N
31054 3117	DP	11/4/2005	4 - 6 ft	N
31065 3121	DP	11/4/2005	4 - 6 ft	N
31075 3125	DP	11/5/2005	4 - 6 ft	N
31099 3136	DP	11/7/2005	4 - 6 ft	N
31103 3138	DP	11/7/2005	4 - 6 ft	N
31110 3141	DP	11/7/2005	4 - 6 ft	N
31118 3144	DP	11/8/2005	4 - 6 ft	N
31121 3145	DP	11/8/2005	4 - 6 ft	N
31134 3146	DP	11/8/2005	4 - 6 ft	N
C032C541	SB	5/29/2002	4 - 8 ft	REG
C032C545	SB	5/29/2002	4 - 8 ft	REG
C032C550	SB	5/29/2002	4 - 8 ft	REG

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Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C032C567	SB	5/29/2002	4 - 8 ft	REG
C032C572	SB	5/30/2002	4 - 8 ft	REG
C032C576	SB	5/30/2002	4 - 8 ft	REG
C032C580	SB	5/30/2002	4 - 8 ft	REG
C032C581	SB	5/30/2002	4 - 8 ft	REG
C032C589	SB	5/30/2002	4 - 8 ft	REG
C032C590	SB	5/30/2002	4 - 8 ft	REG
C0593076	SB	10/2/2003	4 - 8 ft	REG
C0593089	SB	9/10/2003	4 - 8 ft	REG
C0593093	SB	10/1/2003	4 - 8 ft	REG
C0593094	SB	10/1/2003	4 - 8 ft	REG
C0593098	SB	9/11/2003	4 - 8 ft	REG
C0593102	SB	10/2/2003	4 - 8 ft	REG
C0593120	SB	10/3/2003	4 - 8 ft	REG
C0593125	SB	10/3/2003	4 - 8 ft	REG
C0593129	SB	9/10/2003	4 - 8 ft	REG
C0593133	SB	10/1/2003	4 - 8 ft	REG
C0593134	SB	10/1/2003	4 - 8 ft	REG
C0593138	SB	9/11/2003	4 - 8 ft	REG
C0593147	SB	9/12/2003	4 - 8 ft	REG
C0593151	SB	10/2/2003	4 - 8 ft	REG
C0593156	SB	10/2/2003	4 - 8 ft	REG
C0593160	SB	10/3/2003	4 - 8 ft	REG
C0593165	SB	10/3/2003	4 - 8 ft	REG
C0593178	SB	9/10/2003	4 - 8 ft	REG
C0593182	SB	10/1/2003	4 - 8 ft	REG
C0593196	SB	9/16/2003	4 - 8 ft	REG
C0593209	SB	10/2/2003	4 - 8 ft	REG
C0593213	SB	10/3/2003	4 - 8 ft	REG
C0593214	SB	10/3/2003	4 - 8 ft	REG
C0593218	SB	10/6/2003	4 - 8 ft	REG
C0593227	SB	10/6/2003	4 - 8 ft	REG
C0593231	SB	10/6/2003	4 - 8 ft	REG
C0593236	SB	10/7/2003	4 - 8 ft	REG
C0593240	SB	10/7/2003	4 - 8 ft	REG
C0593245	SB	9/10/2003	4 - 8 ft	REG
C0593249	SB	9/15/2003	4 - 8 ft	REG
C0593267	SB	10/10/2003	4 - 8 ft	REG
C0593271	SB	10/6/2003	4 - 8 ft	REG
C0593276	SB	10/6/2003	4 - 8 ft	REG
C0593280	SB	10/3/2003	4 - 8 ft	REG
C0593285	SB	10/7/2003	4 - 8 ft	REG
C0593289	SB	10/7/2003	4 - 8 ft	REG
C0593294	SB	10/9/2003	4 - 8 ft	REG
C0593298	SB	10/9/2003	4 - 8 ft	REG
C0593302	SB	10/9/2003	4 - 8 ft	REG
C0593307	SB	10/10/2003	4 - 8 ft	REG
C0593311	SB	10/10/2003	4 - 8 ft	REG
C0593316	SB	10/10/2003	4 - 8 ft	REG
C0593325	SB	10/1/2003	4 - 8 ft	REG

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593329	SB	9/15/2003	4 - 8 ft	REG
C0593338	SB	10/6/2003	4 - 8 ft	REG
C0593342	SB	10/2/2003	4 - 8 ft	REG
C0593351	SB	10/6/2003	4 - 8 ft	REG
C0593360	SB	10/7/2003	4 - 8 ft	REG
C0593365	SB	10/7/2003	4 - 8 ft	REG
C0593369	SB	10/9/2003	4 - 8 ft	REG
C0593373	SB	10/9/2003	4 - 8 ft	REG
C0593374	SB	10/9/2003	4 - 8 ft	REG
C0593378	SB	10/9/2003	4 - 8 ft	REG
C0593382	SB	10/9/2003	4 - 8 ft	REG
C0593387	SB	10/10/2003	4 - 8 ft	REG
C0593391	SB	10/10/2003	4 - 8 ft	REG
C0593396	SB	10/10/2003	4 - 8 ft	REG
C0593400	SB	10/17/2003	4 - 8 ft	REG
C0593405	SB	10/10/2003	4 - 8 ft	REG
C0593409	SB	10/13/2003	4 - 8 ft	REG
C0593422	SB	9/12/2003	4 - 8 ft	REG
C0593427	SB	9/15/2003	4 - 8 ft	REG
C0593431	SB	9/16/2003	4 - 8 ft	REG
C0593436	SB	9/16/2003	4 - 8 ft	REG
C0593440	SB	10/2/2003	4 - 8 ft	REG
C0593445	SB	10/2/2003	4 - 8 ft	REG
C0593449	SB	10/2/2003	4 - 8 ft	REG
C0593453	SB	9/17/2003	4 - 8 ft	REG
C0593454	SB	9/17/2003	4 - 8 ft	REG
C0593458	SB	10/3/2003	4 - 8 ft	REG
C0593462	SB	10/3/2003	4 - 8 ft	REG
C0593467	SB	10/3/2003	4 - 8 ft	REG
C0593471	SB	10/7/2003	4 - 8 ft	REG
C0593480	SB	10/7/2003	4 - 8 ft	REG
C0593485	SB	10/9/2003	4 - 8 ft	REG
C0593493	SB	10/9/2003	4 - 8 ft	REG
C0593494	SB	10/9/2003	4 - 8 ft	REG
C0593498	SB	10/9/2003	4 - 8 ft	REG
C0593507	SB	10/9/2003	4 - 8 ft	REG
C0593511	SB	10/9/2003	4 - 8 ft	REG
C0593516	SB	10/9/2003	4 - 8 ft	REG
C0593520	SB	10/10/2003	4 - 8 ft	REG
C0593525	SB	10/10/2003	4 - 8 ft	REG
C0593529	SB	10/10/2003	4 - 8 ft	REG
C0593533	SB	10/13/2003	4 - 8 ft	REG
C0593534	SB	10/13/2003	4 - 8 ft	REG
C0593538	SB	10/13/2003	4 - 8 ft	REG
C0593542	SB	10/13/2003	4 - 8 ft	REG
C0593547	SB	9/12/2003	4 - 8 ft	REG
C0593551	SB	9/17/2003	4 - 8 ft	REG
C0593556	SB	9/16/2003	4 - 8 ft	REG
C0593560	SB	10/1/2003	4 - 8 ft	REG
C0593565	SB	9/17/2003	4 - 8 ft	REG

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593569	SB	10/17/2003	4 - 8 ft	REG
C0593573	SB	9/23/2003	4 - 8 ft	REG
C0593574	SB	9/23/2003	4 - 8 ft	REG
C0593578	SB	10/3/2003	4 - 8 ft	REG
C0593582	SB	10/3/2003	4 - 8 ft	REG
C0593587	SB	10/7/2003	4 - 8 ft	REG
C0593591	SB	10/8/2003	4 - 8 ft	REG
C0593596	SB	10/9/2003	4 - 8 ft	REG
C0593600	SB	10/9/2003	4 - 8 ft	REG
C0593605	SB	10/17/2003	4 - 8 ft	REG
C0593609	SB	10/17/2003	4 - 8 ft	REG
C0593613	SB	10/17/2003	4 - 8 ft	REG
C0593614	SB	10/17/2003	4 - 8 ft	REG
C0593618	SB	10/17/2003	4 - 8 ft	REG
C0593622	SB	10/13/2003	4 - 8 ft	REG
C0593631	SB	10/17/2003	4 - 8 ft	REG
C0593636	SB	9/16/2003	4 - 8 ft	REG
C0593640	SB	10/1/2003	4 - 8 ft	REG
C0593645	SB	9/24/2003	4 - 8 ft	REG
C0593649	SB	9/22/2003	4 - 8 ft	REG
C0593653	SB	10/3/2003	4 - 8 ft	REG
C0593654	SB	10/3/2003	4 - 8 ft	REG
C0593658	SB	10/3/2003	4 - 8 ft	REG
C0593662	SB	10/8/2003	4 - 8 ft	REG
C0593667	SB	10/7/2003	4 - 8 ft	REG
C0593671	SB	10/8/2003	4 - 8 ft	REG
C0593676	SB	10/8/2003	4 - 8 ft	REG
C0593680	SB	10/9/2003	4 - 8 ft	REG
C0593685	SB	10/9/2003	4 - 8 ft	REG
C0593689	SB	10/10/2003	4 - 8 ft	REG
C0593693	SB	10/10/2003	4 - 8 ft	REG
C0593694	SB	10/10/2003	4 - 8 ft	REG
C0593698	SB	10/10/2003	4 - 8 ft	REG
C0593702	SB	10/13/2003	4 - 8 ft	REG
C0593707	SB	9/15/2003	4 - 8 ft	REG
C0593711	SB	9/11/2003	4 - 8 ft	REG
C0593716	SB	10/1/2003	4 - 8 ft	REG
C0593725	SB	10/1/2003	4 - 8 ft	REG
C0593729	SB	10/6/2003	4 - 8 ft	REG
C0593733	SB	9/23/2003	4 - 8 ft	REG
C0593734	SB	9/23/2003	4 - 8 ft	REG
C0593738	SB	9/24/2003	4 - 8 ft	REG
C0593742	SB	10/3/2003	4 - 8 ft	REG
C0593747	SB	10/8/2003	4 - 8 ft	REG
C0593751	SB	10/8/2003	4 - 8 ft	REG
C0593756	SB	10/8/2003	4 - 8 ft	REG
C0593760	SB	10/8/2003	4 - 8 ft	REG
C0593765	SB	10/8/2003	4 - 8 ft	REG
C0593769	SB	10/10/2003	4 - 8 ft	REG
C0593773	SB	10/10/2003	4 - 8 ft	REG

Sampling Information for Soil

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
C0593774	SB	10/10/2003	4 - 8 ft	REG
C0593778	SB	10/10/2003	4 - 8 ft	REG
C0593787	SB	10/9/2003	4 - 8 ft	REG
C0593791	SB	10/10/2003	4 - 8 ft	REG
C0593796	SB	10/10/2003	4 - 8 ft	REG
C0593800	SB	10/10/2003	4 - 8 ft	REG
C0593805	SB	10/10/2003	4 - 8 ft	REG
C0593813	SB	10/1/2003	4 - 8 ft	REG
C0593814	SB	10/1/2003	4 - 8 ft	REG
31006 3103	DP	11/2/2005	4.5 - 6.5 ft	N
31029 3110	DP	11/3/2005	4.5 - 6.5 ft	N
31035 3112	DP	11/3/2005	4.5 - 6.5 ft	N
31096 3134	DP	11/6/2005	4.5 - 6.5 ft	N
31090 3132	DP	11/6/2005	5 - 7 ft	N
31093 3133	DP	11/6/2005	5 - 7 ft	N

Acronyms/Abbreviations

DP - direct push technology
ft - feet
N - normal sample
REG - regular sample
SB - soil boring

Sampling Information for Groundwater

Sample and Station	Station Type	Collection Date	Top and Bottom	Sample Type
3141 31123	DP	11/8/2005	15 - 20 ft	N
3142 31125	DP	11/8/2005	14 - 19 ft	N
3143 31127	DP	11/8/2005	12 - 17 ft	N
3146 31148	DP	11/9/2005	9.5 - 14.5 ft	N
3148 31162	DP	11/10/2005	6 - 11 ft	N
3147 31164	DP	11/9/2005	9 - 14 ft	N
3145 31166	DP	11/10/2005	9 - 14 ft	N
3144 31167	DP	11/9/2005	15 - 20 ft	N
3149 31170	DP	11/10/2005	5 - 10 ft	N
3119 31171	DP	11/10/2005	5 - 10 ft	N
3150 31173	DP	11/10/2005	9 - 14 ft	N
OS-HP-03 178-033	HP	6/19/2001	12 - 16 ft	N
OS-HP-05 178-031	HP	6/15/2001	12 - 16 ft	N
OS-HP-20 178- 029	HP	6/14/2001	16 - 20 ft	N
OS-HP-21 178-032	HP	6/15/2001	12 - 16 ft	N
OS-HP-22 178-030	HP	6/15/2001	16 - 20 ft	N

Acronyms/Abbreviations

DP - direct push technology
ft - feet
N - normal sample
HP - hydropunch

Attachment I2
Exposure Point Concentration Calculations

Statistical Data Summary and Selection of the 95% UCL
Surface Soil (0–2 feet bgs)

Chemical	Frequency of Detections	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Arithmetic Mean (mg/kg)	Standard Deviation (mg/kg)	Mean of Log Data (mg/kg)	Standard Deviation of Log Data (mg/kg)	Arithmetic 95% UCL (mg/kg)	Land's 95% UCL (mg/kg)	Gamma 95% UCL (mg/kg)	Approximate Chebyshev Limit on 95% UCL (mg/kg)	ProUCL Recommendation	Distribution Dependent 95% UCL (mg/kg)	Final 95% UCL (mg/kg)	Basis for Final 95% UCL
Volatile Organic Compounds															
Acenaphthene	229/326	2.30E-04	6.70E 02	1.85E-02	4.50E-02	-5.68E+00	1.74E+00	2.26E-02	2.05E-02	2.16E-02	2.94E-02	Data are Non-parametric (0.05)	2.94E-02	2.94E-02	Statistics
Acenaphthylene	256/326	1.80E-04	6.40E-02	1.93E-02	4.47E-02	-5.46E+00	1.69E+00	2.34E-02	2.28E-02	2.23E-02	3.01E-02	Data are Non-parametric (0.05)	3.01E-02	3.01E-02	Statistics
Anthracene	264/326	2.60E-04	1.70E-01	2.45E-02	4.68E-02	-4.93E+00	1.59E+00	2.87E-02	3.23E-02	2.79E-02	3.58E-02	Data are Non-parametric (0.05)	3.58E-02	3.58E-02	Statistics
Benzo(g,h,i)Perylene	296/326	9.70E-04	1.60E+00	7.83E-02	1.22E-01	-3.19E+00	1.17E+00	8.95E-02	9.49E-02	8.65E-02	1.08E-01	Data are lognormal (0.05)	9.49E-02	9.49E-02	Statistics
Dichloromethane	4/49	8.00E-04	2.00E-03	2.46E-03	4.94E-04	-6.04E+00	2.70E-01	2.58E-03	2.66E-03	2.61E-03	2.77E-03	Data are Non-parametric (0.05)	2.77E-03	2.00E-03	Maximum
Fluorene	251/326	1.70E-04	5.80E-02	1.91E-02	4.50E-02	-5.60E+00	1.74E+00	2.32E-02	2.22E-02	2.22E-02	3.00E-02	Data are Non-parametric (0.05)	3.00E-02	3.00E-02	Statistics
2-Methylnaphthalene	261/326	3.30E-04	1.70E-01	2.20E-02	4.60E-02	-5.11E+00	1.55E+00	2.62E-02	2.51E-02	2.51E-02	3.31E-02	Data are Non-parametric (0.05)	3.31E-02	3.31E-02	Statistics
Naphthalene	262/326	5.10E-04	1.00E-01	2.16E-02	4.47E-02	-4.95E+00	1.39E+00	2.57E-02	2.26E-02	2.45E-02	3.24E-02	Data are Non-parametric (0.05)	3.24E-02	3.24E-02	Statistics
Phenanthrene	277/326	8.20E-04	5.80E-01	5.62E-02	8.26E-02	-3.65E+00	1.27E+00	6.38E-02	6.94E-02	6.26E-02	7.62E-02	Data are lognormal (0.05)	6.94E-02	6.94E-02	Statistics
Pyrene	307/326	7.70E-04	2.10E+00	1.11E-01	1.88E-01	-2.97E+00	1.28E+00	1.29E-01	1.38E-01	1.24E-01	1.57E-01	Data are lognormal (0.05)	1.38E-01	1.38E-01	Statistics
Xylenes (total)	3/49	5.00E-04	3.00E-03	4.91E-03	1.08E-03	-5.37E+00	4.48E-01	5.17E-03	5.77E-03	5.35E-03	5.59E-03	Data are Non-parametric (0.05)	5.59E-03	3.00E-03	Maximum
Semivolatile Organic Compounds															
Benzo(a)Anthracene	280/326	3.10E-04	7.10E-01	5.27E-02	7.57E-02	-3.71E+00	1.31E+00	5.96E-02	6.83E-02	5.87E-02	7.10E-02	Data are Non-parametric (0.05)	7.10E-02	7.10E-02	Statistics
Benzo(a)Pyrene	302/326	3.50E-04	1.20E+00	6.96E-02	1.06E-01	-3.44E+00	1.33E+00	7.93E-02	9.36E-02	7.74E-02	9.53E-02	Data are Non-parametric (0.05)	9.53E-02	9.53E-02	Statistics
Benzo(b)Fluoranthene	311/326	6.40E-04	1.00E+00	7.25E-02	9.81E-02	-3.29E+00	1.21E+00	8.14E-02	9.06E-02	8.01E-02	9.62E-02	Data are lognormal (0.05)	9.06E-02	9.06E-02	Statistics
Benzo(k)Fluoranthene	270/326	3.80E-04	9.70E-01	5.13E-02	8.24E-02	-3.77E+00	1.32E+00	5.88E-02	6.61E-02	5.72E-02	7.12E-02	Data are Non-parametric (0.05)	7.12E-02	7.12E-02	Statistics
1,2-Benzphenanthracene	297/326	6.70E-04	1.10E+00	8.79E-02	1.13E-01	-3.08E+00	1.21E+00	9.83E-02	1.11E-01	9.71E-02	1.15E-01	Data are lognormal (0.05)	1.11E-01	1.11E-01	Statistics
Dibenz(A,H)Anthracene	264/326	3.20E-04	2.10E-01	2.88E-02	4.72E-02	-4.46E+00	1.38E+00	3.32E-02	3.58E-02	3.24E-02	4.02E-02	Data are Non-parametric (0.05)	4.02E-02	4.02E-02	Statistics
Fluoranthene	294/326	7.70E-04	1.40E+00	9.86E-02	1.58E-01	-3.10E+00	1.30E+00	1.13E-01	1.24E-01	1.10E-01	1.37E-01	Data are Non-parametric (0.05)	1.37E-01	1.37E-01	Statistics
Indeno(1,2,3-C,D)Pyrene	274/326	5.50E-04	1.50E+00	6.91E-02	1.17E-01	-3.41E+00	1.28E+00	7.97E-02	8.84E-02	7.67E-02	9.72E-02	Data are Non-parametric (0.05)	9.72E-02	9.72E-02	Statistics
Pesticides/Polychlorinated Biphenyls															
Aroclor 1016	1/52	4.70E-02	4.70E-02	1.87E-02	4.09E-03	-3.99E+00	1.39E-01	1.97E-02	1.93E-02	1.95E-02	2.12E-02	Data are Non-parametric (0.05)	2.12E-02	2.12E-02	Statistics
Aroclor 1260	8/52	5.00E-03	2.00E-02	1.69E-02	3.75E-03	-4.12E+00	3.17E-01	1.78E-02	1.85E-02	1.80E-02	1.92E-02	Data are Non-parametric (0.05)	1.92E-02	1.92E-02	Statistics
4,4-DDD	1/52	7.00E-04	7.00E-04	1.23E-02	7.00E-03	-4.77E+00	1.08E+00	1.39E-02	2.16E-02	1.51E-02	1.65E-02	Data are Non-parametric (0.05)	1.65E-02	7.00E-04	Maximum
4,4-DDE	3/52	5.00E-04	6.00E-03	1.19E-02	7.10E-03	-4.83E+00	1.09E+00	1.35E-02	2.10E-02	1.46E-02	1.62E-02	Data are Non-parametric (0.05)	1.62E-02	6.00E-03	Maximum
4,4-DDT	2/52	2.00E-03	2.60E-03	1.23E-02	6.94E-03	-4.75E+00	1.03E+00	1.40E-02	2.07E-02	1.51E-02	1.65E-02	Data are Non-parametric (0.05)	1.65E-02	2.60E-03	Maximum
Dieldrin	1/52	5.00E-04	5.00E-04	1.23E-02	7.00E-03	-4.78E+00	1.09E+00	1.39E-02	2.20E-02	1.51E-02	1.65E-02	Data are Non-parametric (0.05)	1.65E-02	5.00E-04	Maximum
Endosulfan Sulfate	1/52	4.00E-03	4.00E-03	2.05E-02	1.17E-02	-4.26E+00	1.07E+00	2.32E-02	3.57E-02	2.51E-02	2.76E-02	Data are Non-parametric (0.05)	2.76E-02	4.00E-03	Maximum
Metals															
Antimony	6/49	3.00E-01	3.20E+00	1.47E+00	1.18E+00	-9.26E-02	1.08E+00	1.75E+00	2.38E+00	1.86E+00	2.21E+00	Data are Non-parametric (0.05)	2.21E+00	2.21E+00	Statistics
Arsenic	49/49	3.70E+00	3.26E+01	1.12E+01	5.66E+00	2.31E+00	4.43E-01	1.25E+01	1.26E+01	1.25E+01	1.47E+01	Data follow gamma distribution (0.05)	1.25E+01	1.25E+01	Statistics
Barium	49/49	4.69E+01	4.76E+02	2.18E+02	9.91E+01	5.28E+00	4.78E-01	2.42E+02	2.50E+02	2.44E+02	2.80E+02	Data follow gamma distribution (0.05)	2.44E+02	2.44E+02	Statistics
Beryllium	36/49	6.50E-03	4.60E-01	1.79E-01	1.05E-01	-1.92E+00	7.29E-01	2.04E-01	2.38E-01	2.09E-01	2.45E-01	Data are Non-parametric (0.05)	2.45E-01	2.45E-01	Statistics
Cadmium	46/49	3.00E-02	8.80E-01	3.45E-01	1.68E-01	-1.19E+00	5.50E-01	3.85E-01	4.12E-01	3.90E-01	4.50E-01	Data follow gamma distribution (0.05)	3.90E-01	3.90E-01	Statistics
Chromium	49/49	9.80E+00	1.76E+02	4.65E+01	3.13E+01	3.66E+00	6.02E-01	5.40E+01	5.51E+01	5.39E+01	6.60E+01	Data follow gamma distribution (0.05)	5.39E+01	5.39E+01	Statistics
Cobalt	49/49	8.50E+00	2.82E+01	1.50E+01	4.82E+00	2.66E+00	3.07E-01	1.61E+01	1.62E+01	1.61E+01	1.80E+01	Data follow gamma distribution (0.05)	1.61E+01	1.61E+01	Statistics
Copper	49/49	1.05E+01	1.18E+02	4.42E+01	2.32E+01	3.66E+00	5.14E-01	4.98E+01	5.12E+01	5.00E+01	5.86E+01	Data follow gamma distribution (0.05)	5.00E+01	5.00E+01	Statistics
Iron	49/49	1.53E+04	6.70E+04	3.84E+04	1.17E+04	1.05E+01	3.43E-01	4.13E+04	4.22E+04	4.16E+04	4.57E+04	Data are normal (0.05)	4.13E+04	4.13E+04	Statistics
Lead	49/49	6.90E+00	1.68E+02	3.64E+01	4.03E+01	3.21E+00	7.92E-01	4.61E+01	4.34E+01	4.50E+01	6.15E+01	Data are Non-parametric (0.05)	6.15E+01	6.15E+01	Statistics
Mercury	38/49	1.30E-01	2.00E+00	4.24E-01	3.62E-01	-1.14E+00	7.57E-01	5.11E-01	5.35E-01	5.09E-01	6.49E-01	Data follow gamma distribution (0.05)	5.09E-01	5.09E-01	Statistics
Molybdenum	1/49	1.90E+00	1.90E+00	1.55E-01	2.58E-01	-2.11E+00	4.57E-01	2.17E-01	1.52E-01	1.83E-01	3.16E-01	Data are Non-parametric (0.05)	3.16E-01	3.16E-01	Statistics
Nickel	49/49	1.19E+01	3.89E+02	6.19E+01	7.23E+01	3.78E+00	7.40E-01	7.92E+01	7.19E+01	7.58E+01	1.07E+02	Data are Non-parametric (0.05)	1.07E+02	1.07E+02	Statistics
Selenium	5/49	1.90E+00	3.00E+00	5.31E-01	6.52E-01	-9.80E-01	6.86E-01	6.87E-01	5.80E-01	6.50E-01	9.37E-01	Data are Non-parametric (0.05)	9.37E-01	9.37E-01	Statistics
Thallium	23/49	4.80E-01	3.30E+00	1.09E+00	9.71E-01	-3.99E-01	1.04E+00	1.32E+00	1.64E+00	1.38E+00	1.69E+00	Data are Non-parametric (0.05)	1.69E+00	1.69E+00	Statistics
Vanadium	49/49	2.19E+01	1.04E+02	5.34E+01	1.81E+01	3.92E+00	3.33E-01	5.77E+01	5.82E+01	5.79E+01	6.47E+01	Data follow gamma distribution (0.05)	5.79E+01	5.79E+01	Statistics
Zinc	49/49	3.91E+01	2.28E+02	1.12E+02	3.26E+01	4.68E+00	3.00E-01	1.20E+02	1.21E+02	1.20E+02	1.32E+02	Data are Non-parametric (0.05)	1.32E+02	1.32E+02	Statistics

Acronyms/Abbreviations:
- bgs – below ground surface
- DDD – dichlorodiphenyldichloroethane
- DDE – dichlorodiphenyldichloroethene
- DDT – dichlorodiphenyltrichloroethane
- mg/kg – milligrams per kilogram
- UCL – upper confidence limit

Acenaphthene

Data File		Variable:	Acenaphthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.342076
Number of Unique Samples	133	Lilliefors 5% Critical Value	0.049071
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.018537	95% UCL (Assuming Normal Distribution)	
Median	0.00265	Student's-t UCL	0.022648
Standard Deviation	0.045001		
Variance	0.002025	Gamma Distribution Test	
Coefficient of Variation	2.427684	A-D Test Statistic	24.66744
Skewness	3.958066	A-D 5% Critical Value	0.848642
		K-S Test Statistic	0.235774
Gamma Statistics		K-S 5% Critical Value	0.05398
k hat	0.390948	Data do not follow gamma distribution	
k star (bias corrected)	0.389395	at 5% significance level	
Theta hat	0.047415		
Theta star	0.047604	95% UCLs (Assuming Gamma Distribution)	
nu hat	254.8979	Approximate Gamma UCL	0.02159
nu star	253.8856	Adjusted Gamma UCL	0.021604
Approx.Chi Square Value (.05)	217.9849		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	217.8387	Lilliefors Test Statisitic	0.140545
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.677411	95% H-UCL	0.020519
Standard Deviation of log data	1.743381	95% Chebyshev (MVUE) UCL	0.02556
Variance of log data	3.039376	97.5% Chebyshev (MVUE) UCL	0.029929
		99% Chebyshev (MVUE) UCL	0.038511
		95% Non-parametric UCLs	
		CLT UCL	0.022636
		Adj-CLT UCL (Adjusted for skewness)	0.02322
		Mod-t UCL (Adjusted for skewness)	0.022739
		Jackknife UCL	0.022648
		Standard Bootstrap UCL	0.022693
		Bootstrap-t UCL	0.023342
RECOMMENDATION		Hall's Bootstrap UCL	0.02327
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.02279
		BCA Bootstrap UCL	0.023377
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.029401
		97.5% Chebyshev (Mean, Sd) UCL	0.034102
		99% Chebyshev (Mean, Sd) UCL	0.043336

Acenaphthylene

Data File		Variable:	Acenaphthylene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.33478
Number of Unique Samples	131	Lilliefors 5% Critical Value	0.049071
Minimum	0.00018	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.019273	95% UCL (Assuming Normal Distribution)	
Median	0.0031	Student's-t UCL	0.023361
Standard Deviation	0.044741		
Variance	0.002002	Gamma Distribution Test	
Coefficient of Variation	2.321396	A-D Test Statistic	19.04292
Skewness	3.979051	A-D 5% Critical Value	0.839169
		K-S Test Statistic	0.211782
Gamma Statistics		K-S 5% Critical Value	0.0537
k hat	0.429775	Data do not follow gamma distribution	
k star (bias corrected)	0.427865	at 5% significance level	
Theta hat	0.044845		
Theta star	0.045045	95% UCLs (Assuming Gamma Distribution)	
nu hat	280.2131	Approximate Gamma UCL	0.022284
nu star	278.9678	Adjusted Gamma UCL	0.022298
Approx.Chi Square Value (.05)	241.2774		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	241.1234	Lilliefors Test Statisitic	0.093475
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.622554		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.462624	95% H-UCL	0.022803
Standard Deviation of log data	1.687871	95% Chebyshev (MVUE) UCL	0.028283
Variance of log data	2.848907	97.5% Chebyshev (MVUE) UCL	0.032972
		99% Chebyshev (MVUE) UCL	0.042183
		95% Non-parametric UCLs	
		CLT UCL	0.023349
		Adj-CLT UCL (Adjusted for skewness)	0.023933
		Mod-t UCL (Adjusted for skewness)	0.023452
		Jackknife UCL	0.023361
		Standard Bootstrap UCL	0.02339
		Bootstrap-t UCL	0.024774
RECOMMENDATION		Hall's Bootstrap UCL	0.024091
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.02345
		BCA Bootstrap UCL	0.023946
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.030075
		97.5% Chebyshev (Mean, Sd) UCL	0.034748
		99% Chebyshev (Mean, Sd) UCL	0.043929

Anthracene

Data File		Variable:	Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.302516
Number of Unique Samples	140	Lilliefors 5% Critical Value	0.049071
Minimum	0.00026	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.024457	95% UCL (Assuming Normal Distribution)	
Median	0.0063	Student's-t UCL	0.028732
Standard Deviation	0.046787		
Variance	0.002189	Gamma Distribution Test	
Coefficient of Variation	1.913014	A-D Test Statistic	11.64772
Skewness	3.432815	A-D 5% Critical Value	0.820393
		K-S Test Statistic	0.155244
Gamma Statistics		K-S 5% Critical Value	0.053138
k hat	0.516443	Data do not follow gamma distribution	
k star (bias corrected)	0.513735	at 5% significance level	
Theta hat	0.047357		
Theta star	0.047606	95% UCLs (Assuming Gamma Distribution)	
nu hat	336.7207	Approximate Gamma UCL	0.027908
nu star	334.9553	Adjusted Gamma UCL	0.027924
Approx.Chi Square Value (.05)	293.5407		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	293.3705	Lilliefors Test Statisitic	0.056095
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.254829		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.934617	95% H-UCL	0.032328
Standard Deviation of log data	1.592799	95% Chebyshev (MVUE) UCL	0.039766
Variance of log data	2.537009	97.5% Chebyshev (MVUE) UCL	0.046003
		99% Chebyshev (MVUE) UCL	0.058254
		95% Non-parametric UCLs	
		CLT UCL	0.028719
		Adj-CLT UCL (Adjusted for skewness)	0.029246
		Mod-t UCL (Adjusted for skewness)	0.028814
		Jackknife UCL	0.028732
		Standard Bootstrap UCL	0.028698
		Bootstrap-t UCL	0.029689
RECOMMENDATION		Hall's Bootstrap UCL	0.029525
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.028705
		BCA Bootstrap UCL	0.029323
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.035752
		97.5% Chebyshev (Mean, Sd) UCL	0.04064
		99% Chebyshev (Mean, Sd) UCL	0.05024

Benzo(g,h,i)Perylene

Data File		Variable:	Benzo(g,h,i)Perylene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.263518
Number of Unique Samples	139	Lilliefors 5% Critical Value	0.049071
Minimum	0.00097	Data not normal at 5% significance level	
Maximum	1.6		
Mean	0.078342	95% UCL (Assuming Normal Distribution)	
Median	0.0455	Student's-t UCL	0.089517
Standard Deviation	0.12232		
Variance	0.014962	Gamma Distribution Test	
Coefficient of Variation	1.561361	A-D Test Statistic	4.058659
Skewness	6.876656	A-D 5% Critical Value	0.788836
		K-S Test Statistic	0.102824
Gamma Statistics		K-S 5% Critical Value	0.052001
k hat	0.909799	Data do not follow gamma distribution	
k star (bias corrected)	0.903472	at 5% significance level	
Theta hat	0.086109		
Theta star	0.086712	95% UCLs (Assuming Gamma Distribution)	
nu hat	593.189	Approximate Gamma UCL	0.08646
nu star	589.0636	Adjusted Gamma UCL	0.086497
Approx.Chi Square Value (.05)	533.754		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	533.5233	Lilliefors Test Statisitic	0.045666
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-6.938214		
Maximum of log data	0.470004	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.188381	95% H-UCL	0.094911
Standard Deviation of log data	1.172087	95% Chebyshev (MVUE) UCL	0.111409
Variance of log data	1.373789	97.5% Chebyshev (MVUE) UCL	0.124275
		99% Chebyshev (MVUE) UCL	0.149549
		95% Non-parametric UCLs	
		CLT UCL	0.089485
		Adj-CLT UCL (Adjusted for skewness)	0.092242
		Mod-t UCL (Adjusted for skewness)	0.089947
		Jackknife UCL	0.089517
		Standard Bootstrap UCL	0.089612
		Bootstrap-t UCL	0.093588
RECOMMENDATION		Hall's Bootstrap UCL	0.10186
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.090256
		BCA Bootstrap UCL	0.091604
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.107872
		97.5% Chebyshev (Mean, Sd) UCL	0.12065
		99% Chebyshev (Mean, Sd) UCL	0.145749

Dichloromethane

Data File		Variable:	Dichloromethane
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.840048
Number of Unique Samples	24	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.0008	Data not normal at 5% significance level	
Maximum	0.0036		
Mean	0.002461	95% UCL (Assuming Normal Distribution)	
Median	0.00255	Student's-t UCL	0.00258
Standard Deviation	0.000494		
Variance	2.44E-07	Gamma Distribution Test	
Coefficient of Variation	0.200735	A-D Test Statistic	4.348899
Skewness	-1.521318	A-D 5% Critical Value	0.748473
		K-S Test Statistic	0.218037
Gamma Statistics		K-S 5% Critical Value	0.12632
k hat	17.54125	Data do not follow gamma distribution	
k star (bias corrected)	16.4809	at 5% significance level	
Theta hat	0.00014		
Theta star	0.000149	95% UCLs (Assuming Gamma Distribution)	
nu hat	1719.042	Approximate Gamma UCL	0.00261
nu star	1615.128	Adjusted Gamma UCL	0.002615
Approx.Chi Square Value (.05)	1522.773		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	1520.071	Shapiro-Wilk Test Statisitic	0.67982
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.130899		
Maximum of log data	-5.626821	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-6.035871	95% H-UCL	0.002656
Standard Deviation of log data	0.270304	95% Chebyshev (MVUE) UCL	0.002902
Variance of log data	0.073064	97.5% Chebyshev (MVUE) UCL	0.003085
		99% Chebyshev (MVUE) UCL	0.003445
		95% Non-parametric UCLs	
		CLT UCL	0.002577
		Adj-CLT UCL (Adjusted for skewness)	0.002561
		Mod-t UCL (Adjusted for skewness)	0.002577
		Jackknife UCL	0.00258
		Standard Bootstrap UCL	0.002573
		Bootstrap-t UCL	0.002563
RECOMMENDATION		Hall's Bootstrap UCL	0.002566
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.002573
		BCA Bootstrap UCL	0.002562
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.002769
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.002902
		99% Chebyshev (Mean, Sd) UCL	0.003163

Calculation of Outdoor Air Concentrations From Soil

CAS Number	Chemical	C_s (mg/kg)	VF[a] (m^3/kg)	C_{as} (mg/m^3)
83-32-9	Acenaphthene	3.9E-02	1.8E+05	2.15E-07
208-96-8	Acenaphthylene	3.0E-02	1.8E+05	1.64E-07
120-12-7	Anthracene	6.8E-02	7.0E+05	9.75E-08
71-43-2	Benzene	2.7E-03	2.7E+03	1.00E-06
191-24-2	Benzo(g,h,i)Perylene	3.0E-01	3.8E+06	7.78E-08
75-09-2	Dichloromethane	2.0E-03	2.5E+03	8.02E-07
86-73-7	Fluorene	2.1E-02	3.6E+05	5.74E-08
91-57-6	2-Methylnaphthalene	2.2E-02	4.3E+04	5.16E-07
91-20-3	Naphthalene	3.8E-02	4.3E+04	8.71E-07
85-01-8	Phenanthrene	2.6E-01	7.0E+05	3.79E-07
129-00-0	Pyrene	7.8E-01	3.8E+06	2.06E-07
1330-20-7	Xylenes (total)	3.0E-03	6.1E+03	4.92E-07

Notes:

[a] from U.S. EPA 2004 except where noted

[b] acenaphthene used as a surrogate for acenaphthylene

[c] pyrene used as a surrogate for benzo(g,h,i)perylene

[d] naphthalene used as a surrogate for 2-methylnaphthalene

[e] anthracene used as a surrogate for phenanthrene

Acronyms/Abbreviations:

C_s – chemical concentration in soil

C_{as} – chemical concentration in outdoor air

CAS – Chemical Abstract Service

m^3/kg – cubic meters per kilogram

mg/kg – milligrams per kilogram

mg/m^3 – milligrams per cubic meter

U.S. EPA – United States Environmental Protection Agency

VF – volatilization factor

References:

U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.

Fluorene

Data File		Variable:	Fluorene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.336945
Number of Unique Samples	130	Lilliefors 5% Critical Value	0.049071
Minimum	0.00017	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.019098	95% UCL (Assuming Normal Distribution)	
Median	0.002675	Student's-t UCL	0.023207
Standard Deviation	0.044979		
Variance	0.002023	Gamma Distribution Test	
Coefficient of Variation	2.355184	A-D Test Statistic	22.18416
Skewness	3.928401	A-D 5% Critical Value	0.846093
		K-S Test Statistic	0.216797
Gamma Statistics		K-S 5% Critical Value	0.053905
k hat	0.401395	Data do not follow gamma distribution	
k star (bias corrected)	0.399746	at 5% significance level	
Theta hat	0.047579		
Theta star	0.047775	95% UCLs (Assuming Gamma Distribution)	
nu hat	261.7093	Approximate Gamma UCL	0.022197
nu star	260.6343	Adjusted Gamma UCL	0.022212
Approx.Chi Square Value (.05)	224.2437		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	224.0954	Lilliefors Test Statisitic	0.11152
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.679712		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.596629	95% H-UCL	0.022203
Standard Deviation of log data	1.742419	95% Chebyshev (MVUE) UCL	0.027655
Variance of log data	3.036025	97.5% Chebyshev (MVUE) UCL	0.03238
		99% Chebyshev (MVUE) UCL	0.041661
		95% Non-parametric UCLs	
		CLT UCL	0.023196
		Adj-CLT UCL (Adjusted for skewness)	0.023775
		Mod-t UCL (Adjusted for skewness)	0.023298
		Jackknife UCL	0.023207
		Standard Bootstrap UCL	0.023274
		Bootstrap-t UCL	0.023719
RECOMMENDATION		Hall's Bootstrap UCL	0.023727
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.023385
		BCA Bootstrap UCL	0.024352
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.029957
		97.5% Chebyshev (Mean, Sd) UCL	0.034655
		99% Chebyshev (Mean, Sd) UCL	0.043885

2-Methylnaphthalene

Data File		Variable:	2-Methylnaphthalene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.318835
Number of Unique Samples	121	Lilliefors 5% Critical Value	0.049071
Minimum	0.00033	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.021972	95% UCL (Assuming Normal Distribution)	
Median	0.0044	Student's-t UCL	0.02617
Standard Deviation	0.045953		
Variance	0.002112	Gamma Distribution Test	
Coefficient of Variation	2.091434	A-D Test Statistic	17.5008
Skewness	3.679267	A-D 5% Critical Value	0.82346
		K-S Test Statistic	0.169541
Gamma Statistics		K-S 5% Critical Value	0.053237
k hat	0.494156	Data do not follow gamma distribution	
k star (bias corrected)	0.491653	at 5% significance level	
Theta hat	0.044464		
Theta star	0.04469	95% UCLs (Assuming Gamma Distribution)	
nu hat	322.1895	Approximate Gamma UCL	0.025148
nu star	320.5579	Adjusted Gamma UCL	0.025163
Approx.Chi Square Value (.05)	280.0691		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	279.903	Lilliefors Test Statisitic	0.105785
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.016418		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.105722	95% H-UCL	0.025114
Standard Deviation of log data	1.54765	95% Chebyshev (MVUE) UCL	0.030761
Variance of log data	2.395222	97.5% Chebyshev (MVUE) UCL	0.035452
		99% Chebyshev (MVUE) UCL	0.044667
		95% Non-parametric UCLs	
		CLT UCL	0.026158
		Adj-CLT UCL (Adjusted for skewness)	0.026713
		Mod-t UCL (Adjusted for skewness)	0.026257
		Jackknife UCL	0.02617
		Standard Bootstrap UCL	0.026103
		Bootstrap-t UCL	0.026923
RECOMMENDATION		Hall's Bootstrap UCL	0.026783
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.026414
		BCA Bootstrap UCL	0.026672
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.033066
		97.5% Chebyshev (Mean, Sd) UCL	0.037866
		99% Chebyshev (Mean, Sd) UCL	0.047295

Naphthalene

Data File		Variable:	Naphthalene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.318762
Number of Unique Samples	121	Lilliefors 5% Critical Value	0.049071
Minimum	0.00051	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.021579	95% UCL (Assuming Normal Distribution)	
Median	0.0054	Student's-t UCL	0.025664
Standard Deviation	0.044717		
Variance	0.002	Gamma Distribution Test	
Coefficient of Variation	2.072251	A-D Test Statistic	18.79919
Skewness	3.872246	A-D 5% Critical Value	0.815821
		K-S Test Statistic	0.183607
Gamma Statistics		K-S 5% Critical Value	0.052979
k hat	0.562283	Data do not follow gamma distribution	
k star (bias corrected)	0.559154	at 5% significance level	
Theta hat	0.038378		
Theta star	0.038592	95% UCLs (Assuming Gamma Distribution)	
nu hat	366.6085	Approximate Gamma UCL	0.024484
nu star	364.5682	Adjusted Gamma UCL	0.024498
Approx.Chi Square Value (.05)	321.3098		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	321.1316	Lilliefors Test Statisitic	0.097901
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.5811		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.945585	95% H-UCL	0.022552
Standard Deviation of log data	1.389014	95% Chebyshev (MVUE) UCL	0.027167
Variance of log data	1.929361	97.5% Chebyshev (MVUE) UCL	0.030891
		99% Chebyshev (MVUE) UCL	0.038206
		95% Non-parametric UCLs	
		CLT UCL	0.025653
		Adj-CLT UCL (Adjusted for skewness)	0.02622
		Mod-t UCL (Adjusted for skewness)	0.025753
		Jackknife UCL	0.025664
		Standard Bootstrap UCL	0.025648
		Bootstrap-t UCL	0.026304
RECOMMENDATION		Hall's Bootstrap UCL	0.026278
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.025895
		BCA Bootstrap UCL	0.026393
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.032375
		97.5% Chebyshev (Mean, Sd) UCL	0.037046
		99% Chebyshev (Mean, Sd) UCL	0.046222

Phenanthrene

Data File		Variable:	Phenanthrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.26368
Number of Unique Samples	138	Lilliefors 5% Critical Value	0.049071
Minimum	0.00082	Data not normal at 5% significance level	
Maximum	0.58		
Mean	0.056245	95% UCL (Assuming Normal Distribution)	
Median	0.025	Student's-t UCL	0.063795
Standard Deviation	0.082641		
Variance	0.00683	Gamma Distribution Test	
Coefficient of Variation	1.469295	A-D Test Statistic	6.476965
Skewness	3.138325	A-D 5% Critical Value	0.795783
		K-S Test Statistic	0.121137
Gamma Statistics		K-S 5% Critical Value	0.052276
k hat	0.775388	Data do not follow gamma distribution	
k star (bias corrected)	0.770298	at 5% significance level	
Theta hat	0.072538		
Theta star	0.073018	95% UCLs (Assuming Gamma Distribution)	
nu hat	505.5532	Approximate Gamma UCL	0.0626
nu star	502.2342	Adjusted Gamma UCL	0.062629
Approx.Chi Square Value (.05)	451.2543		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	451.0424	Lilliefors Test Statisitic	0.046519
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-7.106206		
Maximum of log data	-0.544727	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.646624	95% H-UCL	0.069371
Standard Deviation of log data	1.274659	95% Chebyshev (MVUE) UCL	0.082462
Variance of log data	1.624755	97.5% Chebyshev (MVUE) UCL	0.092831
		99% Chebyshev (MVUE) UCL	0.113198
		95% Non-parametric UCLs	
		CLT UCL	0.063774
		Adj-CLT UCL (Adjusted for skewness)	0.064624
		Mod-t UCL (Adjusted for skewness)	0.063928
		Jackknife UCL	0.063795
		Standard Bootstrap UCL	0.063683
		Bootstrap-t UCL	0.065314
RECOMMENDATION		Hall's Bootstrap UCL	0.064739
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.064272
		BCA Bootstrap UCL	0.064698
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.076196
		97.5% Chebyshev (Mean, Sd) UCL	0.084829
		99% Chebyshev (Mean, Sd) UCL	0.101787

Pyrene

Data File		Variable:	Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.277692
Number of Unique Samples	139	Lilliefors 5% Critical Value	0.049071
Minimum	0.00077	Data not normal at 5% significance level	
Maximum	2.1		
Mean	0.111425	95% UCL (Assuming Normal Distribution)	
Median	0.051	Student's-t UCL	0.128569
Standard Deviation	0.187643		
Variance	0.03521	Gamma Distribution Test	
Coefficient of Variation	1.684027	A-D Test Statistic	5.586004
Skewness	5.311292	A-D 5% Critical Value	0.796245
		K-S Test Statistic	0.10736
Gamma Statistics		K-S 5% Critical Value	0.052294
k hat	0.766458	Data do not follow gamma distribution	
k star (bias corrected)	0.76145	at 5% significance level	
Theta hat	0.145377		
Theta star	0.146333	95% UCLs (Assuming Gamma Distribution)	
nu hat	499.7307	Approximate Gamma UCL	0.124093
nu star	496.4653	Adjusted Gamma UCL	0.124151
Approx.Chi Square Value (.05)	445.7858		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	445.5753	Lilliefors Test Statisitic	0.03283
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-7.16912		
Maximum of log data	0.741937	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.973155	95% H-UCL	0.137524
Standard Deviation of log data	1.282033	95% Chebyshev (MVUE) UCL	0.163621
Variance of log data	1.64361	97.5% Chebyshev (MVUE) UCL	0.184315
		99% Chebyshev (MVUE) UCL	0.224963
		95% Non-parametric UCLs	
		CLT UCL	0.12852
		Adj-CLT UCL (Adjusted for skewness)	0.131786
		Mod-t UCL (Adjusted for skewness)	0.129078
		Jackknife UCL	0.128569
		Standard Bootstrap UCL	0.128686
		Bootstrap-t UCL	0.133768
RECOMMENDATION		Hall's Bootstrap UCL	0.133945
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.128997
		BCA Bootstrap UCL	0.132057
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.156726
		97.5% Chebyshev (Mean, Sd) UCL	0.176327
		99% Chebyshev (Mean, Sd) UCL	0.21483

Xylenes (total)

Data File		Variable:	Xylenes (total)
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.707064
Number of Unique Samples	18	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.007		
Mean	0.004914	95% UCL (Assuming Normal Distribution)	
Median	0.005	Student's-t UCL	0.005174
Standard Deviation	0.001084		
Variance	1.17E-06	Gamma Distribution Test	
Coefficient of Variation	0.220537	A-D Test Statistic	8.189345
Skewness	-2.58995	A-D 5% Critical Value	0.750431
		K-S Test Statistic	0.324152
Gamma Statistics		K-S 5% Critical Value	0.126606
k hat	8.708159	Data do not follow gamma distribution	
k star (bias corrected)	8.188612	at 5% significance level	
Theta hat	0.000564		
Theta star	0.0006	95% UCLs (Assuming Gamma Distribution)	
nu hat	853.3996	Approximate Gamma UCL	0.005346
nu star	802.4839	Adjusted Gamma UCL	0.005359
Approx.Chi Square Value (.05)	737.7307		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	735.8582	Shapiro-Wilk Test Statisitic	0.443843
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-4.961845	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.374124	95% H-UCL	0.005774
Standard Deviation of log data	0.448057	95% Chebyshev (MVUE) UCL	0.006597
Variance of log data	0.200756	97.5% Chebyshev (MVUE) UCL	0.00724
		99% Chebyshev (MVUE) UCL	0.008501
		95% Non-parametric UCLs	
		CLT UCL	0.005169
		Adj-CLT UCL (Adjusted for skewness)	0.005108
		Mod-t UCL (Adjusted for skewness)	0.005164
		Jackknife UCL	0.005174
		Standard Bootstrap UCL	0.005166
		Bootstrap-t UCL	0.00513
RECOMMENDATION		Hall's Bootstrap UCL	0.005115
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.005149
		BCA Bootstrap UCL	0.005126
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.005589
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.005881
		99% Chebyshev (Mean, Sd) UCL	0.006455

Benzo(a)Anthracene

Data File		Variable:	Benzo(a)Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.244443
Number of Unique Samples	139	Lilliefors 5% Critical Value	0.049071
Minimum	0.00031	Data not normal at 5% significance level	
Maximum	0.71		
Mean	0.052728	95% UCL (Assuming Normal Distribution)	
Median	0.025	Student's-t UCL	0.059647
Standard Deviation	0.075739		
Variance	0.005736	Gamma Distribution Test	
Coefficient of Variation	1.436421	A-D Test Statistic	5.269758
Skewness	3.503551	A-D 5% Critical Value	0.795925
		K-S Test Statistic	0.112591
Gamma Statistics		K-S 5% Critical Value	0.052282
k hat	0.772651	Data do not follow gamma distribution	
k star (bias corrected)	0.767586	at 5% significance level	
Theta hat	0.068243		
Theta star	0.068693	95% UCLs (Assuming Gamma Distribution)	
nu hat	503.7687	Approximate Gamma UCL	0.058696
nu star	500.4661	Adjusted Gamma UCL	0.058724
Approx.Chi Square Value (.05)	449.5781		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	449.3666	Lilliefors Test Statisitic	0.049699
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.078938		
Maximum of log data	-0.34249	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.714292	95% H-UCL	0.068315
Standard Deviation of log data	1.309816	95% Chebyshev (MVUE) UCL	0.081548
Variance of log data	1.715618	97.5% Chebyshev (MVUE) UCL	0.092087
		99% Chebyshev (MVUE) UCL	0.112788
		95% Non-parametric UCLs	
		CLT UCL	0.059628
		Adj-CLT UCL (Adjusted for skewness)	0.060497
		Mod-t UCL (Adjusted for skewness)	0.059783
		Jackknife UCL	0.059647
		Standard Bootstrap UCL	0.059718
		Bootstrap-t UCL	0.060839
RECOMMENDATION		Hall's Bootstrap UCL	0.061293
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.05976
		BCA Bootstrap UCL	0.060939
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.071013
		97.5% Chebyshev (Mean, Sd) UCL	0.078924
		99% Chebyshev (Mean, Sd) UCL	0.094466

Benzo(a)Pyrene

Data File		Variable:	Benzo(a)Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.257843
Number of Unique Samples	139	Lilliefors 5% Critical Value	0.049071
Minimum	0.00035	Data not normal at 5% significance level	
Maximum	1.2		
Mean	0.069566	95% UCL (Assuming Normal Distribution)	
Median	0.0345	Student's-t UCL	0.079295
Standard Deviation	0.106485		
Variance	0.011339	Gamma Distribution Test	
Coefficient of Variation	1.530697	A-D Test Statistic	3.126311
Skewness	5.013855	A-D 5% Critical Value	0.795926
		K-S Test Statistic	0.093802
Gamma Statistics		K-S 5% Critical Value	0.052282
k hat	0.772629	Data do not follow gamma distribution	
k star (bias corrected)	0.767564	at 5% significance level	
Theta hat	0.090039		
Theta star	0.090633	95% UCLs (Assuming Gamma Distribution)	
nu hat	503.7542	Approximate Gamma UCL	0.077441
nu star	500.4517	Adjusted Gamma UCL	0.077477
Approx.Chi Square Value (.05)	449.5644		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	449.3529	Lilliefors Test Statisitic	0.0507
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.957577		
Maximum of log data	0.182322	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.437178	95% H-UCL	0.093606
Standard Deviation of log data	1.334677	95% Chebyshev (MVUE) UCL	0.112063
Variance of log data	1.781364	97.5% Chebyshev (MVUE) UCL	0.126822
		99% Chebyshev (MVUE) UCL	0.155813
		95% Non-parametric UCLs	
		CLT UCL	0.079267
		Adj-CLT UCL (Adjusted for skewness)	0.081017
		Mod-t UCL (Adjusted for skewness)	0.079568
		Jackknife UCL	0.079295
		Standard Bootstrap UCL	0.079246
		Bootstrap-t UCL	0.081605
RECOMMENDATION		Hall's Bootstrap UCL	0.082988
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.079399
		BCA Bootstrap UCL	0.080996
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.095274
		97.5% Chebyshev (Mean, Sd) UCL	0.106397
		99% Chebyshev (Mean, Sd) UCL	0.128247

Benzo(b)Fluoranthene

Data File		Variable:	Benzo(b)Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.232059
Number of Unique Samples	133	Lilliefors 5% Critical Value	0.049071
Minimum	0.00064	Data not normal at 5% significance level	
Maximum	1		
Mean	0.07247	95% UCL (Assuming Normal Distribution)	
Median	0.039	Student's-t UCL	0.081434
Standard Deviation	0.098118		
Variance	0.009627	Gamma Distribution Test	
Coefficient of Variation	1.353903	A-D Test Statistic	4.034097
Skewness	3.89762	A-D 5% Critical Value	0.790456
		K-S Test Statistic	0.09436
Gamma Statistics		K-S 5% Critical Value	0.052065
k hat	0.878453	Data do not follow gamma distribution	
k star (bias corrected)	0.872414	at 5% significance level	
Theta hat	0.082498		
Theta star	0.083069	95% UCLs (Assuming Gamma Distribution)	
nu hat	572.7515	Approximate Gamma UCL	0.080123
nu star	568.8141	Adjusted Gamma UCL	0.080159
Approx.Chi Square Value (.05)	514.484		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	514.2575	Lilliefors Test Statisitic	0.035991
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-7.354042		
Maximum of log data	0	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.292096	95% H-UCL	0.090582
Standard Deviation of log data	1.213506	95% Chebyshev (MVUE) UCL	0.106878
Variance of log data	1.472597	97.5% Chebyshev (MVUE) UCL	0.119664
		99% Chebyshev (MVUE) UCL	0.14478
		95% Non-parametric UCLs	
		CLT UCL	0.081409
		Adj-CLT UCL (Adjusted for skewness)	0.082662
		Mod-t UCL (Adjusted for skewness)	0.08163
		Jackknife UCL	0.081434
		Standard Bootstrap UCL	0.081229
		Bootstrap-t UCL	0.083264
RECOMMENDATION		Hall's Bootstrap UCL	0.0834
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.081845
		BCA Bootstrap UCL	0.083475
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.096158
		97.5% Chebyshev (Mean, Sd) UCL	0.106407
		99% Chebyshev (Mean, Sd) UCL	0.12654

Benzo(k)Fluoranthene

Data File		Variable:	Benzo(k)Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.268198
Number of Unique Samples	142	Lilliefors 5% Critical Value	0.049071
Minimum	0.00038	Data not normal at 5% significance level	
Maximum	0.97		
Mean	0.051305	95% UCL (Assuming Normal Distribution)	
Median	0.025	Student's-t UCL	0.05883
Standard Deviation	0.082366		
Variance	0.006784	Gamma Distribution Test	
Coefficient of Variation	1.605433	A-D Test Statistic	4.333891
Skewness	5.4311	A-D 5% Critical Value	0.796996
		K-S Test Statistic	0.108137
Gamma Statistics		K-S 5% Critical Value	0.052324
k hat	0.751914	Data do not follow gamma distribution	
k star (bias corrected)	0.74704	at 5% significance level	
Theta hat	0.068232		
Theta star	0.068677	95% UCLs (Assuming Gamma Distribution)	
nu hat	490.248	Approximate Gamma UCL	0.057198
nu star	487.0699	Adjusted Gamma UCL	0.057226
Approx.Chi Square Value (.05)	436.8835		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	436.6751	Lilliefors Test Statisitic	0.056921
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.875339		
Maximum of log data	-0.030459	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.765846	95% H-UCL	0.06606
Standard Deviation of log data	1.321688	95% Chebyshev (MVUE) UCL	0.078966
Variance of log data	1.746859	97.5% Chebyshev (MVUE) UCL	0.089264
		99% Chebyshev (MVUE) UCL	0.109493
		95% Non-parametric UCLs	
		CLT UCL	0.058808
		Adj-CLT UCL (Adjusted for skewness)	0.060274
		Mod-t UCL (Adjusted for skewness)	0.059058
		Jackknife UCL	0.05883
		Standard Bootstrap UCL	0.058819
		Bootstrap-t UCL	0.060782
RECOMMENDATION		Hall's Bootstrap UCL	0.062035
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.059311
		BCA Bootstrap UCL	0.060014
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.071189
		97.5% Chebyshev (Mean, Sd) UCL	0.079793
		99% Chebyshev (Mean, Sd) UCL	0.096694

1,2-Benzphenanthracene

Data File		Variable:	1,2-Benzphenanthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.220816
Number of Unique Samples	139	Lilliefors 5% Critical Value	0.049071
Minimum	0.00067	Data not normal at 5% significance level	
Maximum	1.1		
Mean	0.08792	95% UCL (Assuming Normal Distribution)	
Median	0.0455	Student's-t UCL	0.09828
Standard Deviation	0.113395		
Variance	0.012858	Gamma Distribution Test	
Coefficient of Variation	1.289742	A-D Test Statistic	4.105428
Skewness	3.399259	A-D 5% Critical Value	0.789285
		K-S Test Statistic	0.098294
Gamma Statistics		K-S 5% Critical Value	0.052018
k hat	0.901105	Data do not follow gamma distribution	
k star (bias corrected)	0.894858	at 5% significance level	
Theta hat	0.09757		
Theta star	0.098251	95% UCLs (Assuming Gamma Distribution)	
nu hat	587.5205	Approximate Gamma UCL	0.097078
nu star	583.4472	Adjusted Gamma UCL	0.097121
Approx.Chi Square Value (.05)	528.4076		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	528.178	Lilliefors Test Statisitic	0.043511
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-7.308233		
Maximum of log data	0.09531	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.079994	95% H-UCL	0.111338
Standard Deviation of log data	1.209363	95% Chebyshev (MVUE) UCL	0.1313
Variance of log data	1.462559	97.5% Chebyshev (MVUE) UCL	0.146954
		99% Chebyshev (MVUE) UCL	0.177702
		95% Non-parametric UCLs	
		CLT UCL	0.098251
		Adj-CLT UCL (Adjusted for skewness)	0.099514
		Mod-t UCL (Adjusted for skewness)	0.098477
		Jackknife UCL	0.09828
		Standard Bootstrap UCL	0.09826
		Bootstrap-t UCL	0.099825
RECOMMENDATION		Hall's Bootstrap UCL	0.100057
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.098428
		BCA Bootstrap UCL	0.09887
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.115296
		97.5% Chebyshev (Mean, Sd) UCL	0.127141
		99% Chebyshev (Mean, Sd) UCL	0.150409

Dibenz(A,H)Anthracene

Data File		Variable:	Dibenz(A,H)Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.272749
Number of Unique Samples	133	Lilliefors 5% Critical Value	0.049071
Minimum	0.00032	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.028842	95% UCL (Assuming Normal Distribution)	
Median	0.0099	Student's-t UCL	0.033153
Standard Deviation	0.047181		
Variance	0.002226	Gamma Distribution Test	
Coefficient of Variation	1.635856	A-D Test Statistic	8.582246
Skewness	3.24723	A-D 5% Critical Value	0.805684
		K-S Test Statistic	0.129177
Gamma Statistics		K-S 5% Critical Value	0.052626
k hat	0.663898	Data do not follow gamma distribution	
k star (bias corrected)	0.659834	at 5% significance level	
Theta hat	0.043443		
Theta star	0.043711	95% UCLs (Assuming Gamma Distribution)	
nu hat	432.8615	Approximate Gamma UCL	0.032387
nu star	430.2115	Adjusted Gamma UCL	0.032404
Approx.Chi Square Value (.05)	383.1168		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	382.9219	Lilliefors Test Statisitic	0.063942
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.04719		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.463042	95% H-UCL	0.035845
Standard Deviation of log data	1.376961	95% Chebyshev (MVUE) UCL	0.043122
Variance of log data	1.896023	97.5% Chebyshev (MVUE) UCL	0.048981
		99% Chebyshev (MVUE) UCL	0.06049
		95% Non-parametric UCLs	
		CLT UCL	0.03314
		Adj-CLT UCL (Adjusted for skewness)	0.033642
		Mod-t UCL (Adjusted for skewness)	0.033231
		Jackknife UCL	0.033153
		Standard Bootstrap UCL	0.033316
		Bootstrap-t UCL	0.033515
RECOMMENDATION		Hall's Bootstrap UCL	0.03359
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.033266
		BCA Bootstrap UCL	0.033915
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.040232
		97.5% Chebyshev (Mean, Sd) UCL	0.045161
		99% Chebyshev (Mean, Sd) UCL	0.054842

Fluoranthene

Data File		Variable:	Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.267362
Number of Unique Samples	145	Lilliefors 5% Critical Value	0.049071
Minimum	0.00077	Data not normal at 5% significance level	
Maximum	1.4		
Mean	0.098605	95% UCL (Assuming Normal Distribution)	
Median	0.0445	Student's-t UCL	0.113003
Standard Deviation	0.157593		
Variance	0.024835	Gamma Distribution Test	
Coefficient of Variation	1.598215	A-D Test Statistic	5.887534
Skewness	4.078093	A-D 5% Critical Value	0.796585
		K-S Test Statistic	0.125724
Gamma Statistics		K-S 5% Critical Value	0.052308
k hat	0.759879	Data do not follow gamma distribution	
k star (bias corrected)	0.754931	at 5% significance level	
Theta hat	0.129765		
Theta star	0.130615	95% UCLs (Assuming Gamma Distribution)	
nu hat	495.4411	Approximate Gamma UCL	0.109868
nu star	492.2151	Adjusted Gamma UCL	0.10992
Approx.Chi Square Value (.05)	441.7581		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	441.5485	Lilliefors Test Statisitic	0.066108
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.16912		
Maximum of log data	0.336472	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.103038	95% H-UCL	0.123606
Standard Deviation of log data	1.297642	95% Chebyshev (MVUE) UCL	0.147337
Variance of log data	1.683874	97.5% Chebyshev (MVUE) UCL	0.1662
		99% Chebyshev (MVUE) UCL	0.203252
		95% Non-parametric UCLs	
		CLT UCL	0.112962
		Adj-CLT UCL (Adjusted for skewness)	0.115069
		Mod-t UCL (Adjusted for skewness)	0.113332
		Jackknife UCL	0.113003
		Standard Bootstrap UCL	0.11318
		Bootstrap-t UCL	0.116348
RECOMMENDATION		Hall's Bootstrap UCL	0.116704
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.113758
		BCA Bootstrap UCL	0.114122
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.136651
		97.5% Chebyshev (Mean, Sd) UCL	0.153113
		99% Chebyshev (Mean, Sd) UCL	0.18545

Indeno(1,2,3-C,D)Pyrene

Data File		Variable:	Indeno(1,2,3-C,D)Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	326	Lilliefors Test Statisitic	0.278419
Number of Unique Samples	136	Lilliefors 5% Critical Value	0.049071
Minimum	0.00055	Data not normal at 5% significance level	
Maximum	1.5		
Mean	0.069053	95% UCL (Assuming Normal Distribution)	
Median	0.037	Student's-t UCL	0.079705
Standard Deviation	0.116592		
Variance	0.013594	Gamma Distribution Test	
Coefficient of Variation	1.688443	A-D Test Statistic	3.517883
Skewness	6.837482	A-D 5% Critical Value	0.794445
		K-S Test Statistic	0.10328
Gamma Statistics		K-S 5% Critical Value	0.052223
k hat	0.801277	Data do not follow gamma distribution	
k star (bias corrected)	0.795948	at 5% significance level	
Theta hat	0.086179		
Theta star	0.086756	95% UCLs (Assuming Gamma Distribution)	
nu hat	522.4327	Approximate Gamma UCL	0.076717
nu star	518.9584	Adjusted Gamma UCL	0.076752
Approx.Chi Square Value (.05)	467.117		
Adjusted Level of Significance	0.049264	Lognormal Distribution Test	
Adjusted Chi Square Value	466.9014	Lilliefors Test Statisitic	0.051592
		Lilliefors 5% Critical Value	0.049071
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.505592		
Maximum of log data	0.405465	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.413407	95% H-UCL	0.08841
Standard Deviation of log data	1.280975	95% Chebyshev (MVUE) UCL	0.105174
Variance of log data	1.640897	97.5% Chebyshev (MVUE) UCL	0.118464
		99% Chebyshev (MVUE) UCL	0.14457
		95% Non-parametric UCLs	
		CLT UCL	0.079675
		Adj-CLT UCL (Adjusted for skewness)	0.082288
		Mod-t UCL (Adjusted for skewness)	0.080113
		Jackknife UCL	0.079705
		Standard Bootstrap UCL	0.079586
		Bootstrap-t UCL	0.083636
RECOMMENDATION		Hall's Bootstrap UCL	0.088407
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.08093
		BCA Bootstrap UCL	0.081692
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.0972
		97.5% Chebyshev (Mean, Sd) UCL	0.10938
		99% Chebyshev (Mean, Sd) UCL	0.133304

Aroclor 1016

Data File		Variable:	Aroclor 1016
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.358344
Number of Unique Samples	8	Lilliefors 5% Critical Value	0.122866
Minimum	0.017	Data not normal at 5% significance level	
Maximum	0.047		
Mean	0.018731	95% UCL (Assuming Normal Distribution)	
Median	0.018	Student's-t UCL	0.01968
Standard Deviation	0.004085		
Variance	1.67E-05	Gamma Distribution Test	
Coefficient of Variation	0.218114	A-D Test Statistic	10.25999
Skewness	6.746265	A-D 5% Critical Value	0.74786
		K-S Test Statistic	0.327841
Gamma Statistics		K-S 5% Critical Value	0.122774
k hat	39.24437	Data do not follow gamma distribution	
k star (bias corrected)	36.99309	at 5% significance level	
Theta hat	0.000477		
Theta star	0.000506	95% UCLs (Assuming Gamma Distribution)	
nu hat	4081.415	Approximate Gamma UCL	0.019455
nu star	3847.282	Adjusted Gamma UCL	0.019476
Approx.Chi Square Value (.05)	3704.113		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	3700.136	Lilliefors Test Statisitic	0.307675
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-4.074542		
Maximum of log data	-3.057608	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.990382	95% H-UCL	0.019302
Standard Deviation of log data	0.139464	95% Chebyshev (MVUE) UCL	0.02025
Variance of log data	0.01945	97.5% Chebyshev (MVUE) UCL	0.020934
		99% Chebyshev (MVUE) UCL	0.022277
		95% Non-parametric UCLs	
		CLT UCL	0.019663
		Adj-CLT UCL (Adjusted for skewness)	0.020229
		Mod-t UCL (Adjusted for skewness)	0.019768
		Jackknife UCL	0.01968
		Standard Bootstrap UCL	0.019664
		Bootstrap-t UCL	0.022509
RECOMMENDATION		Hall's Bootstrap UCL	0.023224
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.019817
		BCA Bootstrap UCL	0.020462
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.0212
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.022269
		99% Chebyshev (Mean, Sd) UCL	0.024368

Aroclor 1260

Data File		Variable:	Aroclor 1260
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.392047
Number of Unique Samples	13	Lilliefors 5% Critical Value	0.122866
Minimum	0.005	Data not normal at 5% significance level	
Maximum	0.0205		
Mean	0.016885	95% UCL (Assuming Normal Distribution)	
Median	0.018	Student's-t UCL	0.017756
Standard Deviation	0.003753		
Variance	1.41E-05	Gamma Distribution Test	
Coefficient of Variation	0.222269	A-D Test Statistic	9.612654
Skewness	-2.109421	A-D 5% Critical Value	0.74941
		K-S Test Statistic	0.414882
Gamma Statistics		K-S 5% Critical Value	0.123022
k hat	13.07817	Data do not follow gamma distribution	
k star (bias corrected)	12.33649	at 5% significance level	
Theta hat	0.001291		
Theta star	0.001369	95% UCLs (Assuming Gamma Distribution)	
nu hat	1360.13	Approximate Gamma UCL	0.01804
nu star	1282.994	Adjusted Gamma UCL	0.018074
Approx.Chi Square Value (.05)	1200.809		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	1198.556	Lilliefors Test Statisitic	0.422437
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-5.298317		
Maximum of log data	-3.88733	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.120071	95% H-UCL	0.018478
Standard Deviation of log data	0.317276	95% Chebyshev (MVUE) UCL	0.020406
Variance of log data	0.100664	97.5% Chebyshev (MVUE) UCL	0.021852
		99% Chebyshev (MVUE) UCL	0.024692
		95% Non-parametric UCLs	
		CLT UCL	0.017741
		Adj-CLT UCL (Adjusted for skewness)	0.017578
		Mod-t UCL (Adjusted for skewness)	0.017731
		Jackknife UCL	0.017756
		Standard Bootstrap UCL	0.017741
		Bootstrap-t UCL	0.017616
RECOMMENDATION		Hall's Bootstrap UCL	0.01759
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.017712
		BCA Bootstrap UCL	0.017577
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.019153
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.020135
		99% Chebyshev (Mean, Sd) UCL	0.022063

4,4-DDD

Data File		Variable:	4,4-DDD
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.387199
Number of Unique Samples	13	Lilliefors 5% Critical Value	0.122866
Minimum	0.0007	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.012312	95% UCL (Assuming Normal Distribution)	
Median	0.016	Student's-t UCL	0.013937
Standard Deviation	0.006998		
Variance	4.9E-05	Gamma Distribution Test	
Coefficient of Variation	0.568444	A-D Test Statistic	9.552581
Skewness	-0.788692	A-D 5% Critical Value	0.768151
		K-S Test Statistic	0.424913
Gamma Statistics		K-S 5% Critical Value	0.125423
k hat	1.475996	Data do not follow gamma distribution	
k star (bias corrected)	1.403663	at 5% significance level	
Theta hat	0.008341		
Theta star	0.008771	95% UCLs (Assuming Gamma Distribution)	
nu hat	153.5036	Approximate Gamma UCL	0.015096
nu star	145.9809	Adjusted Gamma UCL	0.015185
Approx.Chi Square Value (.05)	119.0522		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	118.3604	Lilliefors Test Statisitic	0.424685
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.26443		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.772743	95% H-UCL	0.021632
Standard Deviation of log data	1.076836	95% Chebyshev (MVUE) UCL	0.026452
Variance of log data	1.159575	97.5% Chebyshev (MVUE) UCL	0.031474
		99% Chebyshev (MVUE) UCL	0.041339
		95% Non-parametric UCLs	
		CLT UCL	0.013908
		Adj-CLT UCL (Adjusted for skewness)	0.013794
		Mod-t UCL (Adjusted for skewness)	0.01392
		Jackknife UCL	0.013937
		Standard Bootstrap UCL	0.013874
		Bootstrap-t UCL	0.013759
RECOMMENDATION		Hall's Bootstrap UCL	0.013763
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.01392
		BCA Bootstrap UCL	0.013812
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.016542
		97.5% Chebyshev (Mean, Sd) UCL	0.018372
		99% Chebyshev (Mean, Sd) UCL	0.021968

4,4-DDE

Data File		Variable:	4,4-DDE
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.368266
Number of Unique Samples	15	Lilliefors 5% Critical Value	0.122866
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.011875	95% UCL (Assuming Normal Distribution)	
Median	0.016	Student's-t UCL	0.013524
Standard Deviation	0.007099		
Variance	5.04E-05	Gamma Distribution Test	
Coefficient of Variation	0.597837	A-D Test Statistic	8.218382
Skewness	-0.622235	A-D 5% Critical Value	0.769544
		K-S Test Statistic	0.401829
Gamma Statistics		K-S 5% Critical Value	0.125581
k hat	1.419083	Data do not follow gamma distribution	
k star (bias corrected)	1.350033	at 5% significance level	
Theta hat	0.008368		
Theta star	0.008796	95% UCLs (Assuming Gamma Distribution)	
nu hat	147.5846	Approximate Gamma UCL	0.014623
nu star	140.4035	Adjusted Gamma UCL	0.01471
Approx.Chi Square Value (.05)	114.0179		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	113.3413	Lilliefors Test Statisitic	0.400143
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.825327	95% H-UCL	0.02096
Standard Deviation of log data	1.09015	95% Chebyshev (MVUE) UCL	0.025623
Variance of log data	1.188427	97.5% Chebyshev (MVUE) UCL	0.030531
		99% Chebyshev (MVUE) UCL	0.04017
		95% Non-parametric UCLs	
		CLT UCL	0.013494
		Adj-CLT UCL (Adjusted for skewness)	0.013404
		Mod-t UCL (Adjusted for skewness)	0.01351
		Jackknife UCL	0.013524
		Standard Bootstrap UCL	0.013467
		Bootstrap-t UCL	0.013372
RECOMMENDATION		Hall's Bootstrap UCL	0.01333
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.013466
		BCA Bootstrap UCL	0.013431
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.016166
		97.5% Chebyshev (Mean, Sd) UCL	0.018023
		99% Chebyshev (Mean, Sd) UCL	0.021671

4,4-DDT

Data File		Variable:	4,4-DDT
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.386653
Number of Unique Samples	13	Lilliefors 5% Critical Value	0.122866
Minimum	0.00155	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.012348	95% UCL (Assuming Normal Distribution)	
Median	0.016	Student's-t UCL	0.013961
Standard Deviation	0.006941		
Variance	4.82E-05	Gamma Distribution Test	
Coefficient of Variation	0.562139	A-D Test Statistic	9.631808
Skewness	-0.785125	A-D 5% Critical Value	0.766993
		K-S Test Statistic	0.423788
Gamma Statistics		K-S 5% Critical Value	0.12528
k hat	1.561208	Data do not follow gamma distribution	
k star (bias corrected)	1.483959	at 5% significance level	
Theta hat	0.007909		
Theta star	0.008321	95% UCLs (Assuming Gamma Distribution)	
nu hat	162.3656	Approximate Gamma UCL	0.015052
nu star	154.3317	Adjusted Gamma UCL	0.015137
Approx.Chi Square Value (.05)	126.6089		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	125.8946	Lilliefors Test Statisitic	0.424731
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-6.4695		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.747508	95% H-UCL	0.020696
Standard Deviation of log data	1.031731	95% Chebyshev (MVUE) UCL	0.025316
Variance of log data	1.06447	97.5% Chebyshev (MVUE) UCL	0.029976
		99% Chebyshev (MVUE) UCL	0.039131
		95% Non-parametric UCLs	
		CLT UCL	0.013931
		Adj-CLT UCL (Adjusted for skewness)	0.013819
		Mod-t UCL (Adjusted for skewness)	0.013943
		Jackknife UCL	0.013961
		Standard Bootstrap UCL	0.013906
		Bootstrap-t UCL	0.013892
RECOMMENDATION		Hall's Bootstrap UCL	0.013795
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.013838
		BCA Bootstrap UCL	0.013722
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.016544
		97.5% Chebyshev (Mean, Sd) UCL	0.018359
		99% Chebyshev (Mean, Sd) UCL	0.021926

Dieldrin

Data File		Variable:	Dieldrin
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.387243
Number of Unique Samples	13	Lilliefors 5% Critical Value	0.122866
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.012308	95% UCL (Assuming Normal Distribution)	
Median	0.016	Student's-t UCL	0.013935
Standard Deviation	0.007005		
Variance	4.91E-05	Gamma Distribution Test	
Coefficient of Variation	0.569154	A-D Test Statistic	9.475938
Skewness	-0.789648	A-D 5% Critical Value	0.768685
		K-S Test Statistic	0.425018
Gamma Statistics		K-S 5% Critical Value	0.125483
k hat	1.454165	Data do not follow gamma distribution	
k star (bias corrected)	1.383092	at 5% significance level	
Theta hat	0.008464		
Theta star	0.008899	95% UCLs (Assuming Gamma Distribution)	
nu hat	151.2332	Approximate Gamma UCL	0.015116
nu star	143.8415	Adjusted Gamma UCL	0.015205
Approx.Chi Square Value (.05)	117.1199		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	116.4339	Lilliefors Test Statisitic	0.423868
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.779213	95% H-UCL	0.022049
Standard Deviation of log data	1.092991	95% Chebyshev (MVUE) UCL	0.026952
Variance of log data	1.19463	97.5% Chebyshev (MVUE) UCL	0.032124
		99% Chebyshev (MVUE) UCL	0.042282
		95% Non-parametric UCLs	
		CLT UCL	0.013906
		Adj-CLT UCL (Adjusted for skewness)	0.013792
		Mod-t UCL (Adjusted for skewness)	0.013917
		Jackknife UCL	0.013935
		Standard Bootstrap UCL	0.013895
		Bootstrap-t UCL	0.013891
RECOMMENDATION		Hall's Bootstrap UCL	0.013844
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.013782
		BCA Bootstrap UCL	0.013802
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.016542
		97.5% Chebyshev (Mean, Sd) UCL	0.018374
		99% Chebyshev (Mean, Sd) UCL	0.021973

Endosulfan Sulfate

Data File		Variable:	Endosulfan Sulfate
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	52	Lilliefors Test Statisitic	0.376974
Number of Unique Samples	19	Lilliefors 5% Critical Value	0.122866
Minimum	0.002	Data not normal at 5% significance level	
Maximum	0.042		
Mean	0.020517	95% UCL (Assuming Normal Distribution)	
Median	0.0265	Student's-t UCL	0.023226
Standard Deviation	0.01166		
Variance	0.000136	Gamma Distribution Test	
Coefficient of Variation	0.568285	A-D Test Statistic	9.616644
Skewness	-0.800168	A-D 5% Critical Value	0.767999
		K-S Test Statistic	0.419232
Gamma Statistics		K-S 5% Critical Value	0.125405
k hat	1.482224	Data do not follow gamma distribution	
k star (bias corrected)	1.409531	at 5% significance level	
Theta hat	0.013842		
Theta star	0.014556	95% UCLs (Assuming Gamma Distribution)	
nu hat	154.1513	Approximate Gamma UCL	0.025147
nu star	146.5913	Adjusted Gamma UCL	0.025294
Approx.Chi Square Value (.05)	119.6038		
Adjusted Level of Significance	0.045385	Lognormal Distribution Test	
Adjusted Chi Square Value	118.9102	Lilliefors Test Statisitic	0.421216
		Lilliefors 5% Critical Value	0.122866
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-6.214608		
Maximum of log data	-3.170086	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.26029	95% H-UCL	0.035737
Standard Deviation of log data	1.070181	95% Chebyshev (MVUE) UCL	0.043705
Variance of log data	1.145287	97.5% Chebyshev (MVUE) UCL	0.051966
		99% Chebyshev (MVUE) UCL	0.068193
		95% Non-parametric UCLs	
		CLT UCL	0.023177
		Adj-CLT UCL (Adjusted for skewness)	0.022985
		Mod-t UCL (Adjusted for skewness)	0.023196
		Jackknife UCL	0.023226
		Standard Bootstrap UCL	0.023169
		Bootstrap-t UCL	0.023112
RECOMMENDATION		Hall's Bootstrap UCL	0.022986
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.023171
		BCA Bootstrap UCL	0.0229
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.027565
		97.5% Chebyshev (Mean, Sd) UCL	0.030615
		99% Chebyshev (Mean, Sd) UCL	0.036605

Antimony

Data File		Variable:	Antimony
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.752682
Number of Unique Samples	35	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.09	Data not normal at 5% significance level	
Maximum	3.2		
Mean	1.468878	95% UCL (Assuming Normal Distribution)	
Median	0.6	Student's-t UCL	1.752297
Standard Deviation	1.182869		
Variance	1.399179	Gamma Distribution Test	
Coefficient of Variation	0.805288	A-D Test Statistic	4.218635
Skewness	0.168147	A-D 5% Critical Value	0.774862
		K-S Test Statistic	0.259343
Gamma Statistics		K-S 5% Critical Value	0.12973
k hat	1.18689	Data do not follow gamma distribution	
k star (bias corrected)	1.127829	at 5% significance level	
Theta hat	1.237585		
Theta star	1.302394	95% UCLs (Assuming Gamma Distribution)	
nu hat	116.3152	Approximate Gamma UCL	1.860632
nu star	110.5272	Adjusted Gamma UCL	1.874083
Approx.Chi Square Value (.05)	87.25578		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	86.62953	Shapiro-Wilk Test Statisitic	0.825058
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.407946		
Maximum of log data	1.163151	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.092621	95% H-UCL	2.382685
Standard Deviation of log data	1.081933	95% Chebyshev (MVUE) UCL	2.905595
Variance of log data	1.170579	97.5% Chebyshev (MVUE) UCL	3.467522
		99% Chebyshev (MVUE) UCL	4.571319
		95% Non-parametric UCLs	
		CLT UCL	1.746827
		Adj-CLT UCL (Adjusted for skewness)	1.751164
		Mod-t UCL (Adjusted for skewness)	1.752974
		Jackknife UCL	1.752297
		Standard Bootstrap UCL	1.746929
		Bootstrap-t UCL	1.76204
RECOMMENDATION		Hall's Bootstrap UCL	1.715073
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.733469
		BCA Bootstrap UCL	1.742245
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	2.20545
		97.5% Chebyshev (Mean, Sd) UCL	2.524165
		99% Chebyshev (Mean, Sd) UCL	3.15022

Arsenic

Data File		Variable:	Arsenic
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.823871
Number of Unique Samples	42	Shapiro-Wilk 5% Critical Value	0.947
Minimum	3.7	Data not normal at 5% significance level	
Maximum	32.6		
Mean	11.19388	95% UCL (Assuming Normal Distribution)	
Median	10.3	Student's-t UCL	12.54961
Standard Deviation	5.658232		
Variance	32.01559	Gamma Distribution Test	
Coefficient of Variation	0.505476	A-D Test Statistic	0.751476
Skewness	1.964769	A-D 5% Critical Value	0.753485
		K-S Test Statistic	0.093981
Gamma Statistics		K-S 5% Critical Value	0.126884
k hat	5.110075	Data follow gamma distribution	
k star (bias corrected)	4.810819	at 5% significance level	
Theta hat	2.19055		
Theta star	2.326813	95% UCLs (Assuming Gamma Distribution)	
nu hat	500.7874	Approximate Gamma UCL	12.50277
nu star	471.4602	Adjusted Gamma UCL	12.54467
Approx.Chi Square Value (.05)	422.1038		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	420.6942	Shapiro-Wilk Test Statisitic	0.972202
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	1.308333		
Maximum of log data	3.484312	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.314342	95% H-UCL	12.56195
Standard Deviation of log data	0.443444	95% Chebyshev (MVUE) UCL	14.33763
Variance of log data	0.196643	97.5% Chebyshev (MVUE) UCL	15.72158
		99% Chebyshev (MVUE) UCL	18.4401
		95% Non-parametric UCLs	
		CLT UCL	12.52344
		Adj-CLT UCL (Adjusted for skewness)	12.76587
		Mod-t UCL (Adjusted for skewness)	12.58742
		Jackknife UCL	12.54961
		Standard Bootstrap UCL	12.51526
		Bootstrap-t UCL	13.02749
RECOMMENDATION		Hall's Bootstrap UCL	13.23007
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	12.6551
		BCA Bootstrap UCL	12.8102
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	14.71726
		97.5% Chebyshev (Mean, Sd) UCL	16.24183
		99% Chebyshev (Mean, Sd) UCL	19.23655

Barium

Data File		Variable:	Barium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.943507
Number of Unique Samples	47	Shapiro-Wilk 5% Critical Value	0.947
Minimum	46.9	Data not normal at 5% significance level	
Maximum	476		
Mean	217.8612	95% UCL (Assuming Normal Distribution)	
Median	187	Student's-t UCL	241.6082
Standard Deviation	99.10957		
Variance	9822.707	Gamma Distribution Test	
Coefficient of Variation	0.454921	A-D Test Statistic	0.277548
Skewness	0.725656	A-D 5% Critical Value	0.753561
		K-S Test Statistic	0.108203
Gamma Statistics		K-S 5% Critical Value	0.126905
k hat	4.912367	Data follow gamma distribution	
k star (bias corrected)	4.625215	at 5% significance level	
Theta hat	44.34955		
Theta star	47.10294	95% UCLs (Assuming Gamma Distribution)	
nu hat	481.4119	Approximate Gamma UCL	243.8883
nu star	453.2711	Adjusted Gamma UCL	244.7224
Approx.Chi Square Value (.05)	404.8993		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	403.5192	Shapiro-Wilk Test Statisitic	0.978211
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	3.848018		
Maximum of log data	6.165418	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	5.278635	95% H-UCL	250.0321
Standard Deviation of log data	0.477944	95% Chebyshev (MVUE) UCL	287.5195
Variance of log data	0.228431	97.5% Chebyshev (MVUE) UCL	317.0542
		99% Chebyshev (MVUE) UCL	375.0696
		95% Non-parametric UCLs	
		CLT UCL	241.1499
		Adj-CLT UCL (Adjusted for skewness)	242.7182
		Mod-t UCL (Adjusted for skewness)	241.8528
		Jackknife UCL	241.6082
		Standard Bootstrap UCL	241.0857
		Bootstrap-t UCL	243.247
RECOMMENDATION		Hall's Bootstrap UCL	242.9139
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	242.2041
		BCA Bootstrap UCL	241.5898
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	279.5767
		97.5% Chebyshev (Mean, Sd) UCL	306.2811
		99% Chebyshev (Mean, Sd) UCL	358.7366

Beryllium

Data File		Variable:	Beryllium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.889231
Number of Unique Samples	30	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.0065	Data not normal at 5% significance level	
Maximum	0.46		
Mean	0.17899	95% UCL (Assuming Normal Distribution)	
Median	0.14	Student's-t UCL	0.204262
Standard Deviation	0.105474		
Variance	0.011125	Gamma Distribution Test	
Coefficient of Variation	0.589276	A-D Test Statistic	1.04052
Skewness	0.970493	A-D 5% Critical Value	0.758543
		K-S Test Statistic	0.135476
Gamma Statistics		K-S 5% Critical Value	0.127725
k hat	2.672524	Data do not follow gamma distribution	
k star (bias corrected)	2.522505	at 5% significance level	
Theta hat	0.066974		
Theta star	0.070957	95% UCLs (Assuming Gamma Distribution)	
nu hat	261.9073	Approximate Gamma UCL	0.208914
nu star	247.2055	Adjusted Gamma UCL	0.209896
Approx.Chi Square Value (.05)	211.7962		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	210.8057	Shapiro-Wilk Test Statisitic	0.858414
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-5.035953		
Maximum of log data	-0.776529	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.919029	95% H-UCL	0.237809
Standard Deviation of log data	0.729472	95% Chebyshev (MVUE) UCL	0.285325
Variance of log data	0.532129	97.5% Chebyshev (MVUE) UCL	0.326491
		99% Chebyshev (MVUE) UCL	0.407353
		95% Non-parametric UCLs	
		CLT UCL	0.203774
		Adj-CLT UCL (Adjusted for skewness)	0.206006
		Mod-t UCL (Adjusted for skewness)	0.20461
		Jackknife UCL	0.204262
		Standard Bootstrap UCL	0.203159
		Bootstrap-t UCL	0.208587
RECOMMENDATION		Hall's Bootstrap UCL	0.206614
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.204388
		BCA Bootstrap UCL	0.205224
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.244669
		97.5% Chebyshev (Mean, Sd) UCL	0.273088
		99% Chebyshev (Mean, Sd) UCL	0.328912

Cadmium

Data File		Variable:	Cadmium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.931629
Number of Unique Samples	32	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.03	Data not normal at 5% significance level	
Maximum	0.88		
Mean	0.345204	95% UCL (Assuming Normal Distribution)	
Median	0.31	Student's-t UCL	0.385466
Standard Deviation	0.168034		
Variance	0.028235	Gamma Distribution Test	
Coefficient of Variation	0.486767	A-D Test Statistic	0.382017
Skewness	1.052129	A-D 5% Critical Value	0.753415
		K-S Test Statistic	0.08663
Gamma Statistics		K-S 5% Critical Value	0.127019
k hat	4.152596	Data follow gamma distribution	
k star (bias corrected)	3.911961	at 5% significance level	
Theta hat	0.08313		
Theta star	0.088243	95% UCLs (Assuming Gamma Distribution)	
nu hat	406.9544	Approximate Gamma UCL	0.390409
nu star	383.3721	Adjusted Gamma UCL	0.391866
Approx.Chi Square Value (.05)	338.9818		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	337.7214	Shapiro-Wilk Test Statisitic	0.920358
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.506558		
Maximum of log data	-0.127833	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.188831	95% H-UCL	0.412349
Standard Deviation of log data	0.549551	95% Chebyshev (MVUE) UCL	0.481012
Variance of log data	0.302006	97.5% Chebyshev (MVUE) UCL	0.536412
		99% Chebyshev (MVUE) UCL	0.645234
		95% Non-parametric UCLs	
		CLT UCL	0.384689
		Adj-CLT UCL (Adjusted for skewness)	0.388544
		Mod-t UCL (Adjusted for skewness)	0.386067
		Jackknife UCL	0.385466
		Standard Bootstrap UCL	0.384263
		Bootstrap-t UCL	0.388953
RECOMMENDATION		Hall's Bootstrap UCL	0.388059
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	0.382857
		BCA Bootstrap UCL	0.389388
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.449839
		97.5% Chebyshev (Mean, Sd) UCL	0.495114
		99% Chebyshev (Mean, Sd) UCL	0.584049

Chromium

Data File		Variable:	Chromium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.82627
Number of Unique Samples	48	Shapiro-Wilk 5% Critical Value	0.947
Minimum	9.8	Data not normal at 5% significance level	
Maximum	176		
Mean	46.52857	95% UCL (Assuming Normal Distribution)	
Median	35.9	Student's-t UCL	54.03752
Standard Deviation	31.33908		
Variance	982.1379	Gamma Distribution Test	
Coefficient of Variation	0.673545	A-D Test Statistic	0.546533
Skewness	2.020887	A-D 5% Critical Value	0.757136
		K-S Test Statistic	0.110353
Gamma Statistics		K-S 5% Critical Value	0.127553
k hat	2.916198	Data follow gamma distribution	
k star (bias corrected)	2.751261	at 5% significance level	
Theta hat	15.95522		
Theta star	16.91173	95% UCLs (Assuming Gamma Distribution)	
nu hat	285.7874	Approximate Gamma UCL	53.93694
nu star	269.6236	Adjusted Gamma UCL	54.17905
Approx.Chi Square Value (.05)	232.5901		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	231.5508	Shapiro-Wilk Test Statisitic	0.988534
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	2.282382		
Maximum of log data	5.170484	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.658921	95% H-UCL	55.13944
Standard Deviation of log data	0.601962	95% Chebyshev (MVUE) UCL	64.93066
Variance of log data	0.362359	97.5% Chebyshev (MVUE) UCL	72.97941
		99% Chebyshev (MVUE) UCL	88.78962
		95% Non-parametric UCLs	
		CLT UCL	53.8926
		Adj-CLT UCL (Adjusted for skewness)	55.27366
		Mod-t UCL (Adjusted for skewness)	54.25294
		Jackknife UCL	54.03752
		Standard Bootstrap UCL	53.80272
		Bootstrap-t UCL	56.44434
RECOMMENDATION		Hall's Bootstrap UCL	57.11263
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	54.31837
		BCA Bootstrap UCL	55.36531
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	66.04341
		97.5% Chebyshev (Mean, Sd) UCL	74.4875
		99% Chebyshev (Mean, Sd) UCL	91.07427

Cobalt

Data File		Variable:	Cobalt
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.918351
Number of Unique Samples	44	Shapiro-Wilk 5% Critical Value	0.947
Minimum	8.5	Data not normal at 5% significance level	
Maximum	28.2		
Mean	14.96735	95% UCL (Assuming Normal Distribution)	
Median	14.2	Student's-t UCL	16.12143
Standard Deviation	4.816655		
Variance	23.20016	Gamma Distribution Test	
Coefficient of Variation	0.321811	A-D Test Statistic	0.519831
Skewness	0.922453	A-D 5% Critical Value	0.749248
		K-S Test Statistic	0.097931
Gamma Statistics		K-S 5% Critical Value	0.126488
k hat	10.75023	Data follow gamma distribution	
k star (bias corrected)	10.10566	at 5% significance level	
Theta hat	1.392282		
Theta star	1.481086	95% UCLs (Assuming Gamma Distribution)	
nu hat	1053.522	Approximate Gamma UCL	16.14195
nu star	990.3544	Adjusted Gamma UCL	16.17881
Approx.Chi Square Value (.05)	918.2893		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	916.197	Shapiro-Wilk Test Statisitic	0.963804
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	2.140066		
Maximum of log data	3.339322	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.65864	95% H-UCL	16.18456
Standard Deviation of log data	0.306945	95% Chebyshev (MVUE) UCL	17.86367
Variance of log data	0.094215	97.5% Chebyshev (MVUE) UCL	19.12421
		99% Chebyshev (MVUE) UCL	21.6003
		95% Non-parametric UCLs	
		CLT UCL	16.09916
		Adj-CLT UCL (Adjusted for skewness)	16.19605
		Mod-t UCL (Adjusted for skewness)	16.13655
		Jackknife UCL	16.12143
		Standard Bootstrap UCL	16.11801
		Bootstrap-t UCL	16.2706
RECOMMENDATION		Hall's Bootstrap UCL	16.24075
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	16.11224
		BCA Bootstrap UCL	16.11633
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	17.96668
		97.5% Chebyshev (Mean, Sd) UCL	19.26449
		99% Chebyshev (Mean, Sd) UCL	21.81379

Copper

Data File		Variable:	Copper
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.895533
Number of Unique Samples	49	Shapiro-Wilk 5% Critical Value	0.947
Minimum	10.5	Data not normal at 5% significance level	
Maximum	118		
Mean	44.20816	95% UCL (Assuming Normal Distribution)	
Median	38.1	Student's-t UCL	49.76198
Standard Deviation	23.17922		
Variance	537.2762	Gamma Distribution Test	
Coefficient of Variation	0.52432	A-D Test Statistic	0.322107
Skewness	1.314249	A-D 5% Critical Value	0.753409
		K-S Test Statistic	0.073651
Gamma Statistics		K-S 5% Critical Value	0.127024
k hat	4.1201	Data follow gamma distribution	
k star (bias corrected)	3.881454	at 5% significance level	
Theta hat	10.72988		
Theta star	11.38959	95% UCLs (Assuming Gamma Distribution)	
nu hat	403.7698	Approximate Gamma UCL	50.02231
nu star	380.3825	Adjusted Gamma UCL	50.20975
Approx.Chi Square Value (.05)	336.1703		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	334.9153	Shapiro-Wilk Test Statisitic	0.980959
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	2.351375		
Maximum of log data	4.770685	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.662672	95% H-UCL	51.18449
Standard Deviation of log data	0.51447	95% Chebyshev (MVUE) UCL	59.30174
Variance of log data	0.26468	97.5% Chebyshev (MVUE) UCL	65.77396
		99% Chebyshev (MVUE) UCL	78.4874
		95% Non-parametric UCLs	
		CLT UCL	49.65479
		Adj-CLT UCL (Adjusted for skewness)	50.31909
		Mod-t UCL (Adjusted for skewness)	49.8656
		Jackknife UCL	49.76198
		Standard Bootstrap UCL	49.63197
		Bootstrap-t UCL	50.62682
RECOMMENDATION		Hall's Bootstrap UCL	50.66356
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	49.54694
		BCA Bootstrap UCL	49.99388
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	58.64186
		97.5% Chebyshev (Mean, Sd) UCL	64.88733
		99% Chebyshev (Mean, Sd) UCL	77.15535

Iron

Data File		Variable:	Iron
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.958372
Number of Unique Samples	47	Shapiro-Wilk 5% Critical Value	0.947
Minimum	15300	Data are normal at 5% significance level	
Maximum	67000		
Mean	38442.86	95% UCL (Assuming Normal Distribution)	
Median	41000	Student's-t UCL	41250.85
Standard Deviation	11719.32		
Variance	1.37E+08	Gamma Distribution Test	
Coefficient of Variation	0.30485	A-D Test Statistic	1.306912
Skewness	-0.12424	A-D 5% Critical Value	0.749629
		K-S Test Statistic	0.188361
Gamma Statistics		K-S 5% Critical Value	0.126533
k hat	9.652227	Data do not follow gamma distribution	
k star (bias corrected)	9.07488	at 5% significance level	
Theta hat	3982.796		
Theta star	4236.183	95% UCLs (Assuming Gamma Distribution)	
nu hat	945.9183	Approximate Gamma UCL	41637.24
nu star	889.3383	Adjusted Gamma UCL	41737.73
Approx.Chi Square Value (.05)	821.1088		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	819.1318	Shapiro-Wilk Test Statisitic	0.919768
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	9.635608		
Maximum of log data	11.11245	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	10.50423	95% H-UCL	42244.49
Standard Deviation of log data	0.34261	95% Chebyshev (MVUE) UCL	47064.62
Variance of log data	0.117382	97.5% Chebyshev (MVUE) UCL	50716.36
		99% Chebyshev (MVUE) UCL	57889.5
		95% Non-parametric UCLs	
		CLT UCL	41196.65
		Adj-CLT UCL (Adjusted for skewness)	41164.9
		Mod-t UCL (Adjusted for skewness)	41245.89
		Jackknife UCL	41250.85
		Standard Bootstrap UCL	41132.49
		Bootstrap-t UCL	41260.86
RECOMMENDATION		Hall's Bootstrap UCL	41109.41
Data are normal (0.05)		Percentile Bootstrap UCL	41118.37
		BCA Bootstrap UCL	41242.86
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	45740.48
		97.5% Chebyshev (Mean, Sd) UCL	48898.16
		99% Chebyshev (Mean, Sd) UCL	55100.83

Lead

Data File		Variable:	Lead
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.635783
Number of Unique Samples	47	Shapiro-Wilk 5% Critical Value	0.947
Minimum	6.9	Data not normal at 5% significance level	
Maximum	168		
Mean	36.39592	95% UCL (Assuming Normal Distribution)	
Median	19.9	Student's-t UCL	46.05892
Standard Deviation	40.32914		
Variance	1626.44	Gamma Distribution Test	
Coefficient of Variation	1.108068	A-D Test Statistic	4.307243
Skewness	2.154259	A-D 5% Critical Value	0.768325
		K-S Test Statistic	0.282476
Gamma Statistics		K-S 5% Critical Value	0.128941
k hat	1.459586	Data do not follow gamma distribution	
k star (bias corrected)	1.383829	at 5% significance level	
Theta hat	24.93579		
Theta star	26.30088	95% UCLs (Assuming Gamma Distribution)	
nu hat	143.0394	Approximate Gamma UCL	44.99209
nu star	135.6152	Adjusted Gamma UCL	45.28326
Approx.Chi Square Value (.05)	109.7046		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	108.9992	Shapiro-Wilk Test Statisitic	0.868713
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.931521		
Maximum of log data	5.123964	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.214322	95% H-UCL	43.36309
Standard Deviation of log data	0.792027	95% Chebyshev (MVUE) UCL	52.3863
Variance of log data	0.627307	97.5% Chebyshev (MVUE) UCL	60.4395
		99% Chebyshev (MVUE) UCL	76.25845
		95% Non-parametric UCLs	
		CLT UCL	45.87242
		Adj-CLT UCL (Adjusted for skewness)	47.76695
		Mod-t UCL (Adjusted for skewness)	46.35443
		Jackknife UCL	46.05892
		Standard Bootstrap UCL	45.6826
		Bootstrap-t UCL	48.71
RECOMMENDATION		Hall's Bootstrap UCL	47.30415
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	46.31429
		BCA Bootstrap UCL	47.49796
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	61.50887
		97.5% Chebyshev (Mean, Sd) UCL	72.37526
		99% Chebyshev (Mean, Sd) UCL	93.72019

Mercury

Data File		Variable:	Mercury
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.783952
Number of Unique Samples	41	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.055	Data not normal at 5% significance level	
Maximum	2		
Mean	0.42398	95% UCL (Assuming Normal Distribution)	
Median	0.29	Student's-t UCL	0.51071
Standard Deviation	0.361975		
Variance	0.131026	Gamma Distribution Test	
Coefficient of Variation	0.853756	A-D Test Statistic	0.560067
Skewness	2.307682	A-D 5% Critical Value	0.763163
		K-S Test Statistic	0.111978
Gamma Statistics		K-S 5% Critical Value	0.128293
k hat	1.925269	Data follow gamma distribution	
k star (bias corrected)	1.821001	at 5% significance level	
Theta hat	0.220218		
Theta star	0.232828	95% UCLs (Assuming Gamma Distribution)	
nu hat	188.6763	Approximate Gamma UCL	0.509324
nu star	178.4581	Adjusted Gamma UCL	0.512169
Approx.Chi Square Value (.05)	148.555		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	147.7298	Shapiro-Wilk Test Statisitic	0.991012
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.900422		
Maximum of log data	0.693147	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.139712	95% H-UCL	0.534886
Standard Deviation of log data	0.756994	95% Chebyshev (MVUE) UCL	0.643833
Variance of log data	0.57304	97.5% Chebyshev (MVUE) UCL	0.739425
		99% Chebyshev (MVUE) UCL	0.927199
		95% Non-parametric UCLs	
		CLT UCL	0.509036
		Adj-CLT UCL (Adjusted for skewness)	0.527252
		Mod-t UCL (Adjusted for skewness)	0.513551
		Jackknife UCL	0.51071
		Standard Bootstrap UCL	0.50518
		Bootstrap-t UCL	0.535889
RECOMMENDATION		Hall's Bootstrap UCL	0.563492
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	0.511327
		BCA Bootstrap UCL	0.534796
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.649381
		97.5% Chebyshev (Mean, Sd) UCL	0.746913
		99% Chebyshev (Mean, Sd) UCL	0.938495

Molybdenum

Data File		Variable:	Molybdenum
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.200576
Number of Unique Samples	7	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.105	Data not normal at 5% significance level	
Maximum	1.9		
Mean	0.154592	95% UCL (Assuming Normal Distribution)	
Median	0.11	Student's-t UCL	0.216526
Standard Deviation	0.258487		
Variance	0.066815	Gamma Distribution Test	
Coefficient of Variation	1.67206	A-D Test Statistic	14.96138
Skewness	6.69994	A-D 5% Critical Value	0.761322
		K-S Test Statistic	0.471499
Gamma Statistics		K-S 5% Critical Value	0.128065
k hat	2.19121	Data do not follow gamma distribution	
k star (bias corrected)	2.070659	at 5% significance level	
Theta hat	0.070551		
Theta star	0.074658	95% UCLs (Assuming Gamma Distribution)	
nu hat	214.7386	Approximate Gamma UCL	0.183499
nu star	202.9246	Adjusted Gamma UCL	0.184457
Approx.Chi Square Value (.05)	170.9568		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	170.0696	Shapiro-Wilk Test Statisitic	0.320312
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.253795		
Maximum of log data	0.641854	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.112176	95% H-UCL	0.151761
Standard Deviation of log data	0.457149	95% Chebyshev (MVUE) UCL	0.173737
Variance of log data	0.208985	97.5% Chebyshev (MVUE) UCL	0.190938
		99% Chebyshev (MVUE) UCL	0.224725
		95% Non-parametric UCLs	
		CLT UCL	0.215331
		Adj-CLT UCL (Adjusted for skewness)	0.253096
		Mod-t UCL (Adjusted for skewness)	0.222417
		Jackknife UCL	0.216526
		Standard Bootstrap UCL	0.214068
		Bootstrap-t UCL	0.713944
RECOMMENDATION		Hall's Bootstrap UCL	0.705167
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.227347
		BCA Bootstrap UCL	0.276327
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.315552
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.385199
		99% Chebyshev (Mean, Sd) UCL	0.522008

Nickel

Data File		Variable:	Nickel
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.583048
Number of Unique Samples	49	Shapiro-Wilk 5% Critical Value	0.947
Minimum	11.9	Data not normal at 5% significance level	
Maximum	389		
Mean	61.89796	95% UCL (Assuming Normal Distribution)	
Median	41.4	Student's-t UCL	79.21146
Standard Deviation	72.25899		
Variance	5221.361	Gamma Distribution Test	
Coefficient of Variation	1.167389	A-D Test Statistic	3.253279
Skewness	3.058265	A-D 5% Critical Value	0.766402
		K-S Test Statistic	0.203866
Gamma Statistics		K-S 5% Critical Value	0.128703
k hat	1.596803	Data do not follow gamma distribution	
k star (bias corrected)	1.512645	at 5% significance level	
Theta hat	38.76367		
Theta star	40.92034	95% UCLs (Assuming Gamma Distribution)	
nu hat	156.4867	Approximate Gamma UCL	75.77367
nu star	148.2393	Adjusted Gamma UCL	76.24112
Approx.Chi Square Value (.05)	121.0936		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	120.3512	Shapiro-Wilk Test Statisitic	0.912466
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	2.476538		
Maximum of log data	5.963579	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.780783	95% H-UCL	71.87603
Standard Deviation of log data	0.739626	95% Chebyshev (MVUE) UCL	86.34329
Variance of log data	0.547047	97.5% Chebyshev (MVUE) UCL	98.93493
		99% Chebyshev (MVUE) UCL	123.6688
		95% Non-parametric UCLs	
		CLT UCL	78.87731
		Adj-CLT UCL (Adjusted for skewness)	83.69625
		Mod-t UCL (Adjusted for skewness)	79.96312
		Jackknife UCL	79.21146
		Standard Bootstrap UCL	78.87502
		Bootstrap-t UCL	87.74245
RECOMMENDATION		Hall's Bootstrap UCL	84.59055
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	79.98776
		BCA Bootstrap UCL	82.26735
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	106.8936
		97.5% Chebyshev (Mean, Sd) UCL	126.3633
		99% Chebyshev (Mean, Sd) UCL	164.6076

Selenium

Data File		Variable:	Selenium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.481548
Number of Unique Samples	22	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.195	Data not normal at 5% significance level	
Maximum	3		
Mean	0.53051	95% UCL (Assuming Normal Distribution)	
Median	0.275	Student's-t UCL	0.686835
Standard Deviation	0.652432		
Variance	0.425668	Gamma Distribution Test	
Coefficient of Variation	1.229821	A-D Test Statistic	9.739821
Skewness	2.795299	A-D 5% Critical Value	0.766461
		K-S Test Statistic	0.383898
Gamma Statistics		K-S 5% Critical Value	0.128711
k hat	1.590802	Data do not follow gamma distribution	
k star (bias corrected)	1.507012	at 5% significance level	
Theta hat	0.333486		
Theta star	0.352028	95% UCLs (Assuming Gamma Distribution)	
nu hat	155.8986	Approximate Gamma UCL	0.649695
nu star	147.6871	Adjusted Gamma UCL	0.653711
Approx.Chi Square Value (.05)	120.5944		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	119.8535	Shapiro-Wilk Test Statisitic	0.613971
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.634756		
Maximum of log data	1.098612	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.980033	95% H-UCL	0.580266
Standard Deviation of log data	0.686343	95% Chebyshev (MVUE) UCL	0.692293
Variance of log data	0.471067	97.5% Chebyshev (MVUE) UCL	0.787528
		99% Chebyshev (MVUE) UCL	0.9746
		95% Non-parametric UCLs	
		CLT UCL	0.683818
		Adj-CLT UCL (Adjusted for skewness)	0.723587
		Mod-t UCL (Adjusted for skewness)	0.693038
		Jackknife UCL	0.686835
		Standard Bootstrap UCL	0.681126
		Bootstrap-t UCL	0.794071
RECOMMENDATION		Hall's Bootstrap UCL	0.695907
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.694184
		BCA Bootstrap UCL	0.706633
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.93678
		97.5% Chebyshev (Mean, Sd) UCL	1.112573
		99% Chebyshev (Mean, Sd) UCL	1.457884

Thallium

Data File		Variable:	Thallium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.814978
Number of Unique Samples	33	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.1	Data not normal at 5% significance level	
Maximum	3.3		
Mean	1.087449	95% UCL (Assuming Normal Distribution)	
Median	0.48	Student's-t UCL	1.320038
Standard Deviation	0.970724		
Variance	0.942304	Gamma Distribution Test	
Coefficient of Variation	0.892661	A-D Test Statistic	3.043805
Skewness	0.667311	A-D 5% Critical Value	0.775146
		K-S Test Statistic	0.218587
Gamma Statistics		K-S 5% Critical Value	0.129764
k hat	1.175031	Data do not follow gamma distribution	
k star (bias corrected)	1.116696	at 5% significance level	
Theta hat	0.925464		
Theta star	0.97381	95% UCLs (Assuming Gamma Distribution)	
nu hat	115.153	Approximate Gamma UCL	1.379206
nu star	109.4362	Adjusted Gamma UCL	1.389231
Approx.Chi Square Value (.05)	86.28602		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	85.66341	Shapiro-Wilk Test Statisitic	0.862114
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.302585		
Maximum of log data	1.193922	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.398614	95% H-UCL	1.642302
Standard Deviation of log data	1.039793	95% Chebyshev (MVUE) UCL	2.005009
Variance of log data	1.081169	97.5% Chebyshev (MVUE) UCL	2.38203
		99% Chebyshev (MVUE) UCL	3.122616
		95% Non-parametric UCLs	
		CLT UCL	1.315549
		Adj-CLT UCL (Adjusted for skewness)	1.329674
		Mod-t UCL (Adjusted for skewness)	1.322241
		Jackknife UCL	1.320038
		Standard Bootstrap UCL	1.306567
		Bootstrap-t UCL	1.335152
RECOMMENDATION		Hall's Bootstrap UCL	1.329466
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.316735
		BCA Bootstrap UCL	1.319082
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	1.691918
		97.5% Chebyshev (Mean, Sd) UCL	1.953473
		99% Chebyshev (Mean, Sd) UCL	2.467246

Vanadium

Data File		Variable:	Vanadium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.938435
Number of Unique Samples	49	Shapiro-Wilk 5% Critical Value	0.947
Minimum	21.9	Data not normal at 5% significance level	
Maximum	104		
Mean	53.38571	95% UCL (Assuming Normal Distribution)	
Median	50.7	Student's-t UCL	57.72317
Standard Deviation	18.10265		
Variance	327.7058	Gamma Distribution Test	
Coefficient of Variation	0.339092	A-D Test Statistic	0.331154
Skewness	0.910241	A-D 5% Critical Value	0.749839
		K-S Test Statistic	0.088457
Gamma Statistics		K-S 5% Critical Value	0.126552
k hat	9.40523	Data follow gamma distribution	
k star (bias corrected)	8.843005	at 5% significance level	
Theta hat	5.676173		
Theta star	6.037056	95% UCLs (Assuming Gamma Distribution)	
nu hat	921.7126	Approximate Gamma UCL	57.88332
nu star	866.6145	Adjusted Gamma UCL	58.0249
Approx.Chi Square Value (.05)	799.2775		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	797.3273	Shapiro-Wilk Test Statisitic	0.985531
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	3.086487		
Maximum of log data	4.644391	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.92344	95% H-UCL	58.24205
Standard Deviation of log data	0.333219	95% Chebyshev (MVUE) UCL	64.73077
Variance of log data	0.111035	97.5% Chebyshev (MVUE) UCL	69.63464
		99% Chebyshev (MVUE) UCL	79.26734
		95% Non-parametric UCLs	
		CLT UCL	57.63946
		Adj-CLT UCL (Adjusted for skewness)	57.99878
		Mod-t UCL (Adjusted for skewness)	57.77922
		Jackknife UCL	57.72317
		Standard Bootstrap UCL	57.52229
		Bootstrap-t UCL	58.06277
RECOMMENDATION		Hall's Bootstrap UCL	58.28263
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	57.62041
		BCA Bootstrap UCL	57.73265
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	64.65823
		97.5% Chebyshev (Mean, Sd) UCL	69.53586
		99% Chebyshev (Mean, Sd) UCL	79.11701

Zinc

Data File		Variable:	Zinc
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	49	Shapiro-Wilk Test Statisitic	0.92019
Number of Unique Samples	42	Shapiro-Wilk 5% Critical Value	0.947
Minimum	39.1	Data not normal at 5% significance level	
Maximum	228		
Mean	112.1204	95% UCL (Assuming Normal Distribution)	
Median	109	Student's-t UCL	119.9333
Standard Deviation	32.60775		
Variance	1063.265	Gamma Distribution Test	
Coefficient of Variation	0.290828	A-D Test Statistic	1.134969
Skewness	1.044643	A-D 5% Critical Value	0.749091
		K-S Test Statistic	0.132178
Gamma Statistics		K-S 5% Critical Value	0.126454
k hat	12.12422	Data do not follow gamma distribution	
k star (bias corrected)	11.39553	at 5% significance level	
Theta hat	9.247637		
Theta star	9.838982	95% UCLs (Assuming Gamma Distribution)	
nu hat	1188.174	Approximate Gamma UCL	120.3771
nu star	1116.762	Adjusted Gamma UCL	120.6355
Approx.Chi Square Value (.05)	1040.163		
Adjusted Level of Significance	0.045102	Lognormal Distribution Test	
Adjusted Chi Square Value	1037.935	Shapiro-Wilk Test Statisitic	0.927667
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	3.666122		
Maximum of log data	5.429346	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	4.677767	95% H-UCL	121.4352
Standard Deviation of log data	0.300384	95% Chebyshev (MVUE) UCL	133.7978
Variance of log data	0.090231	97.5% Chebyshev (MVUE) UCL	143.0635
		99% Chebyshev (MVUE) UCL	161.2643
		95% Non-parametric UCLs	
		CLT UCL	119.7825
		Adj-CLT UCL (Adjusted for skewness)	120.5254
		Mod-t UCL (Adjusted for skewness)	120.0492
		Jackknife UCL	119.9333
		Standard Bootstrap UCL	119.6832
		Bootstrap-t UCL	121.0558
RECOMMENDATION		Hall's Bootstrap UCL	121.6386
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	119.9367
		BCA Bootstrap UCL	120.0796
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	132.4252
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	141.2112
		99% Chebyshev (Mean, Sd) UCL	158.4694

Statistical Data Summary and Selection of the 95% UCL
Vadose Zone Soil (0–7 feet bgs)

Chemical	Frequency of Detections	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Arithmetic Mean (mg/kg)	Standard Deviation (mg/kg)	Mean of Log Data (mg/kg)	Standard Deviation of Log Data (mg/kg)	Arithmetic 95% UCL (mg/kg)	Land's 95% UCL (mg/kg)	Gamma 95% UCL (mg/kg)	Approximate Chebyshev Limit on 95% UCL (mg/kg)	ProUCL Recommendation	Distribution Dependent 95% UCL (mg/kg)	Final 95% UCL (mg/kg)	Basis for Final 95% UCL
Volatile Organic Compounds															
Acenaphthene	454/646	2.30E-04	2.90E+00	1.87E-02	1.19E-01	-5.66E+00	1.59E+00	2.64E-02	1.45E-02	2.08E-02	3.92E-02	Data are Non-parametric (0.05)	3.92E-02	3.92E-02	Statistics
Acenaphthylene	515/646	1.60E-04	1.20E+00	1.86E-02	6.52E-02	-5.41E+00	1.59E+00	2.29E-02	1.85E-02	2.06E-02	2.98E-02	Data are Non-parametric (0.05)	2.98E-02	2.98E-02	Statistics
Anthracene	529/646	2.30E-04	5.00E+00	3.15E-02	2.13E-01	-4.92E+00	1.52E+00	4.53E-02	2.70E-02	3.48E-02	6.81E-02	Data are Non-parametric (0.05)	6.81E-02	6.81E-02	Statistics
Benzene	2/120	1.00E-03	3.00E-03	2.59E-03	3.55E-04	-5.96E+00	1.44E-01	2.65E-03	2.65E-03	2.65E-03	2.73E-03	Data are Non-parametric (0.05)	2.73E-03	2.73E-03	Statistics
Benzo(g,h,i)Perylene	596/646	3.40E-04	1.30E+01	1.62E-01	7.82E-01	-2.99E+00	1.41E+00	2.12E-01	1.54E-01	1.77E-01	2.96E-01	Data are Non-parametric (0.05)	2.96E-01	2.96E-01	Statistics
Dichloromethane	5/120	8.00E-04	2.00E-03	2.55E-03	4.60E-04	-5.99E+00	2.24E-01	2.62E-03	2.66E-03	2.64E-03	2.74E-03	Data are Non-parametric (0.05)	2.74E-03	2.00E-03	Maximum
Fluorene	496/646	1.70E-04	1.80E-01	1.46E-02	3.56E-02	-5.59E+00	1.53E+00	1.69E-02	1.41E-02	1.60E-02	2.07E-02	Data are Non-parametric (0.05)	2.07E-02	2.07E-02	Statistics
2-Methylnaphthalene	520/646	2.40E-04	2.60E-01	1.60E-02	3.69E-02	-5.33E+00	1.43E+00	1.84E-02	1.54E-02	1.75E-02	2.23E-02	Data are Non-parametric (0.05)	2.23E-02	2.23E-02	Statistics
Naphthalene	538/646	2.40E-04	1.60E+00	2.33E-02	8.39E-02	-4.89E+00	1.35E+00	2.87E-02	2.12E-02	2.55E-02	3.77E-02	Data are Non-parametric (0.05)	3.77E-02	3.77E-02	Statistics
Phenanthrene	569/646	3.10E-04	2.40E+01	1.01E-01	9.55E-01	-3.64E+00	1.38E+00	1.63E-01	7.77E-02	1.11E-01	2.65E-01	Data are Non-parametric (0.05)	2.65E-01	2.65E-01	Statistics
Pyrene	613/646	2.90E-04	4.70E+01	3.30E-01	2.64E+00	-2.73E+00	1.55E+00	5.01E-01	2.53E-01	3.67E-01	7.82E-01	Data are Non-parametric (0.05)	7.82E-01	7.82E-01	Statistics
Xylenes (total)	3/120	5.00E-04	3.00E-03	5.14E-03	9.16E-04	-5.30E+00	3.07E-01	5.28E-03	5.49E-03	5.34E-03	5.50E-03	Data are Non-parametric (0.05)	5.50E-03	3.00E-03	Maximum
Semivolatile Organic Compounds															
Benzo(a)Anthracene	574/646	2.30E-04	1.50E+01	1.03E-01	7.00E-01	-3.62E+00	1.46E+00	1.49E-01	9.02E-02	1.14E-01	2.24E-01	Data are Non-parametric (0.05)	2.24E-01	2.24E-01	Statistics
Benzo(a)Pyrene	600/646	1.70E-04	2.10E+01	1.62E-01	1.04E+00	-3.24E+00	1.55E+00	2.29E-01	1.53E-01	1.79E-01	3.41E-01	Data are Non-parametric (0.05)	3.41E-01	3.41E-01	Statistics
Benzo(b)Fluoranthene	614/646	2.30E-04	1.20E+01	1.33E-01	6.26E-01	-3.16E+00	1.43E+00	1.74E-01	1.36E-01	1.46E-01	2.41E-01	Data are Non-parametric (0.05)	2.41E-01	2.41E-01	Statistics
Benzo(k)Fluoranthene	560/646	2.40E-04	1.30E+01	1.05E-01	6.40E-01	-3.61E+00	1.51E+00	1.46E-01	9.84E-02	1.16E-01	2.15E-01	Data are Non-parametric (0.05)	2.15E-01	2.15E-01	Statistics
1,2-Benzphenanthracene	599/646	1.90E-04	1.80E+01	1.49E-01	8.71E-01	-3.06E+00	1.37E+00	2.05E-01	1.37E-01	1.63E-01	2.98E-01	Data are Non-parametric (0.05)	2.98E-01	2.98E-01	Statistics
Dibenz(A,H)Anthracene	539/646	2.30E-04	1.70E+00	2.91E-02	8.98E-02	-4.54E+00	1.34E+00	3.49E-02	2.97E-02	3.16E-02	4.45E-02	Data are Non-parametric (0.05)	4.45E-02	4.45E-02	Statistics
Fluoranthene	592/646	3.80E-04	3.50E+01	2.57E-01	1.93E+00	-2.92E+00	1.56E+00	3.82E-01	2.11E-01	2.85E-01	5.88E-01	Data are Non-parametric (0.05)	5.88E-01	5.88E-01	Statistics
Indeno(1,2,3-C,D)Pyrene	566/646	2.70E-04	1.40E+01	1.52E-01	7.82E-01	-3.21E+00	1.53E+00	2.02E-01	1.52E-01	1.67E-01	2.86E-01	Data are Non-parametric (0.05)	2.86E-01	2.86E-01	Statistics
Phenol	2/120	2.00E-01	3.00E-01	1.33E+01	3.46E+01	1.12E+00	1.86E+00	1.85E+01	2.90E+01	1.69E+01	2.70E+01	Data are Non-parametric (0.05)	2.70E+01	3.00E-01	Maximum
Pesticides/Polychlorinated Biphenyls															
Aroclor 1016	1/123	4.70E-02	4.70E-02	1.88E-02	2.87E-03	-3.98E+00	1.07E-01	1.92E-02	1.91E-02	1.91E-02	1.99E-02	Data are Non-parametric (0.05)	1.99E-02	1.99E-02	Statistics
Aroclor 1260	9/123	5.00E-03	2.00E-02	1.79E-02	2.95E-03	-4.04E+00	2.32E-01	1.84E-02	1.87E-02	1.85E-02	1.91E-02	Data are Non-parametric (0.05)	1.91E-02	1.91E-02	Statistics
4,4-DDD	3/123	4.00E-04	5.00E-03	8.85E-03	7.66E-03	-5.31E+00	1.17E+00	1.00E-02	1.27E-02	1.04E-02	1.19E-02	Data are Non-parametric (0.05)	1.19E-02	5.00E-03	Maximum
4,4-DDE	8/123	1.00E-04	3.00E-02	8.84E-03	7.88E-03	-5.37E+00	1.30E+00	1.00E-02	1.43E-02	1.04E-02	1.19E-02	Data are Non-parametric (0.05)	1.19E-02	1.19E-02	Statistics
4,4-DDT	5/123	2.00E-04	2.60E-03	8.96E-03	7.68E-03	-5.30E+00	1.20E+00	1.01E-02	1.32E-02	1.05E-02	1.20E-02	Data are Non-parametric (0.05)	1.20E-02	2.60E-03	Maximum
Dieldrin	1/123	5.00E-04	5.00E-04	8.96E-03	7.68E-03	-5.29E+00	1.17E+00	1.01E-02	1.28E-02	1.05E-02	1.20E-02	Data are Non-parametric (0.05)	1.20E-02	5.00E-04	Maximum
Endosulfan Sulfate	1/123	4.00E-03	4.00E-03	1.49E-02	1.28E-02	-4.77E+00	1.16E+00	1.68E-02	2.11E-02	1.75E-02	2.00E-02	Data are Non-parametric (0.05)	2.00E-02	4.00E-03	Maximum
Heptachlor	1/123	5.00E-04	5.00E-04	5.07E-03	4.35E-03	-5.86E+00	1.16E+00	5.72E-03	7.18E-03	5.93E-03	6.78E-03	Data are Non-parametric (0.05)	6.78E-03	5.00E-04	Maximum
Metals															
Antimony	17/120	1.40E-01	3.20E+00	1.62E+00	1.19E+00	3.43E-02	1.08E+00	1.80E+00	2.32E+00	1.87E+00	2.10E+00	Data are Non-parametric (0.05)	2.10E+00	2.10E+00	Statistics
Arsenic	120/120	2.30E+00	4.24E+01	1.06E+01	7.37E+00	2.18E+00	6.03E-01	1.18E+01	1.17E+01	1.17E+01	1.36E+01	Assuming gamma distribution (0.05)	1.17E+01	1.17E+01	Statistics
Barium	120/120	3.09E+01	4.76E+02	1.67E+02	1.05E+02	4.91E+00	6.72E-01	1.82E+02	1.91E+02	1.84E+02	2.08E+02	Data follow gamma distribution (0.05)	1.84E+02	1.84E+02	Statistics
Beryllium	75/120	6.50E-03	6.60E-01	1.98E-01	1.39E-01	-1.87E+00	7.82E-01	2.19E-01	2.42E-01	2.21E-01	2.53E-01	Data are Non-parametric (0.05)	2.53E-01	2.53E-01	Statistics
Cadmium	98/120	1.70E-02	1.50E+00	2.75E-01	2.19E-01	-1.59E+00	8.19E-01	3.08E-01	3.33E-01	3.08E-01	3.62E-01	Data follow gamma distribution (0.05)	3.08E-01	3.08E-01	Statistics
Chromium	120/120	3.00E+00	1.97E+02	5.77E+01	3.86E+01	3.83E+00	6.99E-01	6.36E+01	6.69E+01	6.38E+01	7.31E+01	Data follow gamma distribution (0.05)	6.38E+01	6.38E+01	Statistics
Cobalt	120/120	5.50E+00	2.86E+01	1.49E+01	5.06E+00	2.65E+00	3.40E-01	1.57E+01	1.58E+01	1.57E+01	1.69E+01	Data follow gamma distribution (0.05)	1.57E+01	1.57E+01	Statistics
Copper	120/120	3.60E+00	1.18E+02	3.54E+01	2.09E+01	3.39E+00	6.26E-01	3.86E+01	4.03E+01	3.88E+01	4.37E+01	Data follow gamma distribution (0.05)	3.88E+01	3.88E+01	Statistics
Iron	120/120	1.05E+04	6.70E+04	3.39E+04	1.20E+04	1.04E+01	3.77E-01	3.57E+04	3.61E+04	3.58E+04	3.86E+04	Data are Non-parametric (0.05)	3.86E+04	3.86E+04	Statistics
Lead	120/120	6.10E+00	1.68E+02	2.84E+01	3.07E+01	2.99E+00	7.71E-01	3.30E+01	3.10E+01	3.22E+01	4.06E+01	Data are Non-parametric (0.05)	4.06E+01	4.06E+01	Statistics
Mercury	97/120	1.30E-01	2.40E+00	6.24E-01	5.35E-01	-8.16E-01	8.58E-01	7.05E-01	7.52E-01	7.06E-01	8.36E-01	Assuming gamma distribution (0.05)	7.06E-01	7.06E-01	Statistics
Molybdenum	4/120	4.70E-01	2.50E+00	1.58E-01	2.77E-01	-2.10E+00	4.68E-01	2.00E-01	1.47E-01	1.76E-01	2.68E-01	Data are Non-parametric (0.05)	2.68E-01	2.68E-01	Statistics
Nickel	120/120	2.40E+00	4.74E+02	9.47E+01	1.02E+02	4.10E+00	9.43E-01	1.10E+02	1.13E+02	1.09E+02	1.35E+02	Data are Non-parametric (0.05)	1.35E+02	1.35E+02	Statistics
Selenium	13/120	8.80E-01	3.10E+00	5.19E-01	5.88E-01	-9.57E-01	6.50E-01	6.08E-01	5.32E-01	5.83E-01	7.53E-01	Data are Non-parametric (0.05)	7.53E-01	7.53E-01	Statistics
Thallium	44/120	4.80E-01	3.70E+00	8.73E-01	9.07E-01	-6.35E-01	9.81E-01	1.01E+00	1.04E+00	1.01E+00	1.23E+00	Data are Non-parametric (0.05)	1.23E+00	1.23E+00	Statistics
Vanadium	120/120	2.09E+01	1.04E+02	4.85E+01	1.77E+01	3.82E+00	3.63E-01	5.12E+01	5.14E+01	5.12E+01	5.55E+01	Data follow gamma distribution (0.05)	5.12E+01	5.12E+01	Statistics
Zinc	120/120	2.75E+01	9.01E+02	1.03E+02	8.34E+01	4.50E+00	4.96E-01	1.16E+02	1.11E+02	1.12E+02	1.37E+02	Data are Non-parametric (0.05)	1.37E+02	1.37E+02	Statistics

Acronyms/Abbreviations:

bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
UCL – upper confidence limit

Acenaphthene

Data File		Variable:	Acenaphthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.438337
Number of Unique Samples	184	Lilliefors 5% Critical Value	0.034859
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	2.9		
Mean	0.018719	95% UCL (Assuming Normal Distribution)	
Median	0.00275	Student's-t UCL	0.026441
Standard Deviation	0.119142		
Variance	0.014195	Gamma Distribution Test	
Coefficient of Variation	6.364685	A-D Test Statistic	1.8E+308
Skewness	22.12771	A-D 5% Critical Value	0.848859
		K-S Test Statistic	0.235661
Gamma Statistics		K-S 5% Critical Value	0.03971
k hat	0.392846	Data do not follow gamma distribution	
k star (bias corrected)	0.392054	at 5% significance level	
Theta hat	0.04765		
Theta star	0.047746	95% UCLs (Assuming Gamma Distribution)	
nu hat	507.5571	Approximate Gamma UCL	0.020824
nu star	506.5333	Adjusted Gamma UCL	0.020829
Approx.Chi Square Value (.05)	455.3306		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	455.2235	Lilliefors Test Statisitic	0.122546
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	1.064711	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.658142	95% H-UCL	0.014483
Standard Deviation of log data	1.588157	95% Chebyshev (MVUE) UCL	0.017234
Variance of log data	2.522242	97.5% Chebyshev (MVUE) UCL	0.019386
		99% Chebyshev (MVUE) UCL	0.023614
		95% Non-parametric UCLs	
		CLT UCL	0.02643
		Adj-CLT UCL (Adjusted for skewness)	0.03079
		Mod-t UCL (Adjusted for skewness)	0.027121
		Jackknife UCL	0.026441
		Standard Bootstrap UCL	0.02654
		Bootstrap-t UCL	0.041315
RECOMMENDATION		Hall's Bootstrap UCL	0.05525
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.027331
		BCA Bootstrap UCL	0.032758
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.039152
		97.5% Chebyshev (Mean, Sd) UCL	0.047993
		99% Chebyshev (Mean, Sd) UCL	0.06536

Acenaphthylene

Data File		Variable:	Acenaphthylene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.388512
Number of Unique Samples	184	Lilliefors 5% Critical Value	0.034859
Minimum	0.00016	Data not normal at 5% significance level	
Maximum	1.2		
Mean	0.01863	95% UCL (Assuming Normal Distribution)	
Median	0.0035	Student's-t UCL	0.022856
Standard Deviation	0.065218		
Variance	0.004253	Gamma Distribution Test	
Coefficient of Variation	3.500761	A-D Test Statistic	33.18994
Skewness	11.87299	A-D 5% Critical Value	0.834505
		K-S Test Statistic	0.17378
Gamma Statistics		K-S 5% Critical Value	0.039414
k hat	0.452112	Data do not follow gamma distribution	
k star (bias corrected)	0.451044	at 5% significance level	
Theta hat	0.041206		
Theta star	0.041303	95% UCLs (Assuming Gamma Distribution)	
nu hat	584.1283	Approximate Gamma UCL	0.020571
nu star	582.7489	Adjusted Gamma UCL	0.020576
Approx.Chi Square Value (.05)	527.743		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	527.6275	Lilliefors Test Statisitic	0.067457
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.740337		
Maximum of log data	0.182322	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.410272	95% H-UCL	0.018528
Standard Deviation of log data	1.587277	95% Chebyshev (MVUE) UCL	0.022046
Variance of log data	2.519449	97.5% Chebyshev (MVUE) UCL	0.024797
		99% Chebyshev (MVUE) UCL	0.030202
		95% Non-parametric UCLs	
		CLT UCL	0.02285
		Adj-CLT UCL (Adjusted for skewness)	0.024131
		Mod-t UCL (Adjusted for skewness)	0.023056
		Jackknife UCL	0.022856
		Standard Bootstrap UCL	0.022845
		Bootstrap-t UCL	0.02543
RECOMMENDATION		Hall's Bootstrap UCL	0.031377
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.022934
		BCA Bootstrap UCL	0.024714
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.029814
		97.5% Chebyshev (Mean, Sd) UCL	0.034654
		99% Chebyshev (Mean, Sd) UCL	0.044161

Anthracene

Data File		Variable:	Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.441733
Number of Unique Samples	192	Lilliefors 5% Critical Value	0.034859
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	5		
Mean	0.031502	95% UCL (Assuming Normal Distribution)	
Median	0.007	Student's-t UCL	0.045329
Standard Deviation	0.213349		
Variance	0.045518	Gamma Distribution Test	
Coefficient of Variation	6.772582	A-D Test Statistic	1.8E+308
Skewness	20.71819	A-D 5% Critical Value	0.836762
		K-S Test Statistic	0.165932
Gamma Statistics		K-S 5% Critical Value	0.039461
k hat	0.442793	Data do not follow gamma distribution	
k star (bias corrected)	0.441769	at 5% significance level	
Theta hat	0.071143		
Theta star	0.071308	95% UCLs (Assuming Gamma Distribution)	
nu hat	572.0891	Approximate Gamma UCL	0.034822
nu star	570.7657	Adjusted Gamma UCL	0.03483
Approx.Chi Square Value (.05)	516.3405		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	516.2263	Lilliefors Test Statisitic	0.041096
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	1.609438	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.919835	95% H-UCL	0.026995
Standard Deviation of log data	1.520672	95% Chebyshev (MVUE) UCL	0.031886
Variance of log data	2.312444	97.5% Chebyshev (MVUE) UCL	0.035683
		99% Chebyshev (MVUE) UCL	0.043141
		95% Non-parametric UCLs	
		CLT UCL	0.045309
		Adj-CLT UCL (Adjusted for skewness)	0.05262
		Mod-t UCL (Adjusted for skewness)	0.046469
		Jackknife UCL	0.045329
		Standard Bootstrap UCL	0.045669
		Bootstrap-t UCL	0.093462
RECOMMENDATION		Hall's Bootstrap UCL	0.105175
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.048095
		BCA Bootstrap UCL	0.058837
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.068091
		97.5% Chebyshev (Mean, Sd) UCL	0.083923
		99% Chebyshev (Mean, Sd) UCL	0.115022

Benzene

Data File		Variable:	Benzene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.146629
Number of Unique Samples	28	Lilliefors 5% Critical Value	0.08088
Minimum	0.001	Data not normal at 5% significance level	
Maximum	0.0043		
Mean	0.002593	95% UCL (Assuming Normal Distribution)	
Median	0.00255	Student's-t UCL	0.002647
Standard Deviation	0.000355		
Variance	1.26E-07	Gamma Distribution Test	
Coefficient of Variation	0.137	A-D Test Statistic	3.271319
Skewness	0.75676	A-D 5% Critical Value	0.750369
		K-S Test Statistic	0.138981
Gamma Statistics		K-S 5% Critical Value	0.084054
k hat	51.72215	Data do not follow gamma distribution	
k star (bias corrected)	50.43466	at 5% significance level	
Theta hat	5.01E-05		
Theta star	5.14E-05	95% UCLs (Assuming Gamma Distribution)	
nu hat	12413.32	Approximate Gamma UCL	0.002649
nu star	12104.32	Adjusted Gamma UCL	0.002649
Approx.Chi Square Value (.05)	11849.48		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	11846.46	Lilliefors Test Statisitic	0.140739
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-6.907755		
Maximum of log data	-5.44914	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.96467	95% H-UCL	0.002653
Standard Deviation of log data	0.144093	95% Chebyshev (MVUE) UCL	0.002744
Variance of log data	0.020763	97.5% Chebyshev (MVUE) UCL	0.002809
		99% Chebyshev (MVUE) UCL	0.002936
		95% Non-parametric UCLs	
		CLT UCL	0.002646
		Adj-CLT UCL (Adjusted for skewness)	0.002649
		Mod-t UCL (Adjusted for skewness)	0.002647
		Jackknife UCL	0.002647
		Standard Bootstrap UCL	0.002645
		Bootstrap-t UCL	0.00265
RECOMMENDATION		Hall's Bootstrap UCL	0.002656
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.002648
		BCA Bootstrap UCL	0.002652
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.002734
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.002795
		99% Chebyshev (Mean, Sd) UCL	0.002916

Benzo(g,h,i)Perylene

Data File		Variable:	Benzo(g,h,i)Perylene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.418314
Number of Unique Samples	197	Lilliefors 5% Critical Value	0.034859
Minimum	0.00034	Data not normal at 5% significance level	
Maximum	13		
Mean	0.161646	95% UCL (Assuming Normal Distribution)	
Median	0.053	Student's-t UCL	0.212342
Standard Deviation	0.782248		
Variance	0.611912	Gamma Distribution Test	
Coefficient of Variation	4.839275	A-D Test Statistic	1.8E+308
Skewness	13.82054	A-D 5% Critical Value	0.819129
		K-S Test Statistic	0.140413
Gamma Statistics		K-S 5% Critical Value	0.039078
k hat	0.536392	Data do not follow gamma distribution	
k star (bias corrected)	0.534933	at 5% significance level	
Theta hat	0.301357		
Theta star	0.302179	95% UCLs (Assuming Gamma Distribution)	
nu hat	693.0186	Approximate Gamma UCL	0.177015
nu star	691.1336	Adjusted Gamma UCL	0.177051
Approx.Chi Square Value (.05)	631.1252		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	630.9988	Lilliefors Test Statisitic	0.044343
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.986565		
Maximum of log data	2.564949	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.993795	95% H-UCL	0.154467
Standard Deviation of log data	1.408214	95% Chebyshev (MVUE) UCL	0.180171
Variance of log data	1.983066	97.5% Chebyshev (MVUE) UCL	0.199881
		99% Chebyshev (MVUE) UCL	0.238598
		95% Non-parametric UCLs	
		CLT UCL	0.21227
		Adj-CLT UCL (Adjusted for skewness)	0.230152
		Mod-t UCL (Adjusted for skewness)	0.215132
		Jackknife UCL	0.212342
		Standard Bootstrap UCL	0.211802
		Bootstrap-t UCL	0.273563
RECOMMENDATION		Hall's Bootstrap UCL	0.277659
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.214774
		BCA Bootstrap UCL	0.240522
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.2958
		97.5% Chebyshev (Mean, Sd) UCL	0.353849
		99% Chebyshev (Mean, Sd) UCL	0.467874

Dichloromethane

Data File		Variable:	Dichloromethane
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.15506
Number of Unique Samples	33	Lilliefors 5% Critical Value	0.08088
Minimum	0.0008	Data not normal at 5% significance level	
Maximum	0.0043		
Mean	0.002555	95% UCL (Assuming Normal Distribution)	
Median	0.00255	Student's-t UCL	0.002624
Standard Deviation	0.00046		
Variance	2.11E-07	Gamma Distribution Test	
Coefficient of Variation	0.17996	A-D Test Statistic	7.545584
Skewness	-0.586597	A-D 5% Critical Value	0.749937
		K-S Test Statistic	0.174603
Gamma Statistics		K-S 5% Critical Value	0.084087
k hat	24.26882	Data do not follow gamma distribution	
k star (bias corrected)	23.66766	at 5% significance level	
Theta hat	0.000105		
Theta star	0.000108	95% UCLs (Assuming Gamma Distribution)	
nu hat	5824.517	Approximate Gamma UCL	0.002635
nu star	5680.237	Adjusted Gamma UCL	0.002636
Approx.Chi Square Value (.05)	5506.027		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	5503.969	Lilliefors Test Statisitic	0.199132
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.130899		
Maximum of log data	-5.44914	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.99061	95% H-UCL	0.002656
Standard Deviation of log data	0.223597	95% Chebyshev (MVUE) UCL	0.002796
Variance of log data	0.049996	97.5% Chebyshev (MVUE) UCL	0.002896
		99% Chebyshev (MVUE) UCL	0.003092
		95% Non-parametric UCLs	
		CLT UCL	0.002624
		Adj-CLT UCL (Adjusted for skewness)	0.002621
		Mod-t UCL (Adjusted for skewness)	0.002624
		Jackknife UCL	0.002624
		Standard Bootstrap UCL	0.002623
		Bootstrap-t UCL	0.002624
RECOMMENDATION		Hall's Bootstrap UCL	0.002625
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.002623
		BCA Bootstrap UCL	0.00262
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.002738
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.002817
		99% Chebyshev (Mean, Sd) UCL	0.002972

Fluorene

Data File		Variable:	Fluorene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.342959
Number of Unique Samples	182	Lilliefors 5% Critical Value	0.034859
Minimum	0.00017	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.014563	95% UCL (Assuming Normal Distribution)	
Median	0.002825	Student's-t UCL	0.01687
Standard Deviation	0.035591		
Variance	0.001267	Gamma Distribution Test	
Coefficient of Variation	2.443927	A-D Test Statistic	42.45868
Skewness	4.788248	A-D 5% Critical Value	0.829987
		K-S Test Statistic	0.214332
Gamma Statistics		K-S 5% Critical Value	0.039322
k hat	0.470763	Data do not follow gamma distribution	
k star (bias corrected)	0.469609	at 5% significance level	
Theta hat	0.030935		
Theta star	0.031011	95% UCLs (Assuming Gamma Distribution)	
nu hat	608.2256	Approximate Gamma UCL	0.016048
nu star	606.7344	Adjusted Gamma UCL	0.016052
Approx.Chi Square Value (.05)	550.5837		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	550.4658	Lilliefors Test Statisitic	0.103668
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.679712		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.591271	95% H-UCL	0.014121
Standard Deviation of log data	1.534596	95% Chebyshev (MVUE) UCL	0.016705
Variance of log data	2.354986	97.5% Chebyshev (MVUE) UCL	0.018714
		99% Chebyshev (MVUE) UCL	0.022661
		95% Non-parametric UCLs	
		CLT UCL	0.016866
		Adj-CLT UCL (Adjusted for skewness)	0.017148
		Mod-t UCL (Adjusted for skewness)	0.016914
		Jackknife UCL	0.01687
		Standard Bootstrap UCL	0.016854
		Bootstrap-t UCL	0.01719
RECOMMENDATION		Hall's Bootstrap UCL	0.017225
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.016957
		BCA Bootstrap UCL	0.017194
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.020667
		97.5% Chebyshev (Mean, Sd) UCL	0.023308
		99% Chebyshev (Mean, Sd) UCL	0.028496

2-Methylnaphthalene

Data File		Variable:	2-Methylnaphthalene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.334828
Number of Unique Samples	170	Lilliefors 5% Critical Value	0.034859
Minimum	0.00024	Data not normal at 5% significance level	
Maximum	0.3		
Mean	0.015992	95% UCL (Assuming Normal Distribution)	
Median	0.0037	Student's-t UCL	0.018385
Standard Deviation	0.036923		
Variance	0.001363	Gamma Distribution Test	
Coefficient of Variation	2.308822	A-D Test Statistic	38.92727
Skewness	4.65446	A-D 5% Critical Value	0.820185
		K-S Test Statistic	0.201038
Gamma Statistics		K-S 5% Critical Value	0.039105
k hat	0.526222	Data do not follow gamma distribution	
k star (bias corrected)	0.524811	at 5% significance level	
Theta hat	0.03039		
Theta star	0.030472	95% UCLs (Assuming Gamma Distribution)	
nu hat	679.8792	Approximate Gamma UCL	0.017528
nu star	678.0552	Adjusted Gamma UCL	0.017532
Approx.Chi Square Value (.05)	618.6286		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	618.5034	Lilliefors Test Statisitic	0.085228
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.334872		
Maximum of log data	-1.203973	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.333246	95% H-UCL	0.015446
Standard Deviation of log data	1.431719	95% Chebyshev (MVUE) UCL	0.018065
Variance of log data	2.049819	97.5% Chebyshev (MVUE) UCL	0.020077
		99% Chebyshev (MVUE) UCL	0.024031
		95% Non-parametric UCLs	
		CLT UCL	0.018382
		Adj-CLT UCL (Adjusted for skewness)	0.018666
		Mod-t UCL (Adjusted for skewness)	0.018429
		Jackknife UCL	0.018385
		Standard Bootstrap UCL	0.018365
		Bootstrap-t UCL	0.018765
RECOMMENDATION		Hall's Bootstrap UCL	0.018543
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.018411
		BCA Bootstrap UCL	0.01869
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.022324
		97.5% Chebyshev (Mean, Sd) UCL	0.025064
		99% Chebyshev (Mean, Sd) UCL	0.030446

Naphthalene

Data File		Variable:	Naphthalene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.391804
Number of Unique Samples	167	Lilliefors 5% Critical Value	0.034859
Minimum	0.00024	Data not normal at 5% significance level	
Maximum	1.6		
Mean	0.023281	95% UCL (Assuming Normal Distribution)	
Median	0.00615	Student's-t UCL	0.028719
Standard Deviation	0.083902		
Variance	0.007039	Gamma Distribution Test	
Coefficient of Variation	3.603845	A-D Test Statistic	1.8E+308
Skewness	13.18927	A-D 5% Critical Value	0.817328
		K-S Test Statistic	0.164208
Gamma Statistics		K-S 5% Critical Value	0.039031
k hat	0.553752	Data do not follow gamma distribution	
k star (bias corrected)	0.552213	at 5% significance level	
Theta hat	0.042042		
Theta star	0.04216	95% UCLs (Assuming Gamma Distribution)	
nu hat	715.448	Approximate Gamma UCL	0.025457
nu star	713.4588	Adjusted Gamma UCL	0.025462
Approx.Chi Square Value (.05)	652.4701		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	652.3415	Lilliefors Test Statisitic	0.064825
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.334872		
Maximum of log data	0.470004	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.88936	95% H-UCL	0.02124
Standard Deviation of log data	1.350074	95% Chebyshev (MVUE) UCL	0.024611
Variance of log data	1.822699	97.5% Chebyshev (MVUE) UCL	0.02718
		99% Chebyshev (MVUE) UCL	0.032227
		95% Non-parametric UCLs	
		CLT UCL	0.028711
		Adj-CLT UCL (Adjusted for skewness)	0.030541
		Mod-t UCL (Adjusted for skewness)	0.029004
		Jackknife UCL	0.028719
		Standard Bootstrap UCL	0.028663
		Bootstrap-t UCL	0.032375
RECOMMENDATION		Hall's Bootstrap UCL	0.053292
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.028999
		BCA Bootstrap UCL	0.030956
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.03767
		97.5% Chebyshev (Mean, Sd) UCL	0.043896
		99% Chebyshev (Mean, Sd) UCL	0.056126

Phenanthrene

Data File		Variable:	Phenanthrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.457996
Number of Unique Samples	191	Lilliefors 5% Critical Value	0.034859
Minimum	0.00031	Data not normal at 5% significance level	
Maximum	24		
Mean	0.101026	95% UCL (Assuming Normal Distribution)	
Median	0.028	Student's-t UCL	0.162906
Standard Deviation	0.954806		
Variance	0.911654	Gamma Distribution Test	
Coefficient of Variation	9.451078	A-D Test Statistic	1.8E+308
Skewness	24.43237	A-D 5% Critical Value	0.828944
		K-S Test Statistic	0.192343
Gamma Statistics		K-S 5% Critical Value	0.0393
k hat	0.475068	Data do not follow gamma distribution	
k star (bias corrected)	0.473894	at 5% significance level	
Theta hat	0.212656		
Theta star	0.213183	95% UCLs (Assuming Gamma Distribution)	
nu hat	613.7875	Approximate Gamma UCL	0.111279
nu star	612.2704	Adjusted Gamma UCL	0.111303
Approx.Chi Square Value (.05)	555.8588		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	555.7403	Lilliefors Test Statisitic	0.041182
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.078938		
Maximum of log data	3.178054	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.640119	95% H-UCL	0.077702
Standard Deviation of log data	1.381734	95% Chebyshev (MVUE) UCL	0.090359
Variance of log data	1.909189	97.5% Chebyshev (MVUE) UCL	0.100039
		99% Chebyshev (MVUE) UCL	0.119052
		95% Non-parametric UCLs	
		CLT UCL	0.162817
		Adj-CLT UCL (Adjusted for skewness)	0.201403
		Mod-t UCL (Adjusted for skewness)	0.168925
		Jackknife UCL	0.162906
		Standard Bootstrap UCL	0.164038
		Bootstrap-t UCL	0.486974
RECOMMENDATION		Hall's Bootstrap UCL	0.393228
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.174889
		BCA Bootstrap UCL	0.221574
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.264774
		97.5% Chebyshev (Mean, Sd) UCL	0.335628
		99% Chebyshev (Mean, Sd) UCL	0.474806

Pyrene

Data File		Variable:	Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.450147
Number of Unique Samples	211	Lilliefors 5% Critical Value	0.034859
Minimum	0.00029	Data not normal at 5% significance level	
Maximum	47		
Mean	0.33044	95% UCL (Assuming Normal Distribution)	
Median	0.0665	Student's-t UCL	0.501218
Standard Deviation	2.635111		
Variance	6.94381	Gamma Distribution Test	
Coefficient of Variation	7.974563	A-D Test Statistic	1.8E+308
Skewness	16.47736	A-D 5% Critical Value	0.845866
		K-S Test Statistic	0.179696
Gamma Statistics		K-S 5% Critical Value	0.039648
k hat	0.405203	Data do not follow gamma distribution	
k star (bias corrected)	0.404354	at 5% significance level	
Theta hat	0.81549		
Theta star	0.817204	95% UCLs (Assuming Gamma Distribution)	
nu hat	523.5229	Approximate Gamma UCL	0.36698
nu star	522.425	Adjusted Gamma UCL	0.367065
Approx.Chi Square Value (.05)	470.4068		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	470.2979	Lilliefors Test Statisitic	0.039861
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.14563		
Maximum of log data	3.850148	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.727924	95% H-UCL	0.253445
Standard Deviation of log data	1.5488	95% Chebyshev (MVUE) UCL	0.300295
Variance of log data	2.398781	97.5% Chebyshev (MVUE) UCL	0.33678
		99% Chebyshev (MVUE) UCL	0.408449
		95% Non-parametric UCLs	
		CLT UCL	0.500973
		Adj-CLT UCL (Adjusted for skewness)	0.572791
		Mod-t UCL (Adjusted for skewness)	0.512421
		Jackknife UCL	0.501218
		Standard Bootstrap UCL	0.508503
		Bootstrap-t UCL	1.05237
RECOMMENDATION		Hall's Bootstrap UCL	1.142779
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.51443
		BCA Bootstrap UCL	0.606847
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.782357
		97.5% Chebyshev (Mean, Sd) UCL	0.977903
		99% Chebyshev (Mean, Sd) UCL	1.362013

Xylenes (total)

Data File		Variable:	Xylenes (total)
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.230583
Number of Unique Samples	23	Lilliefors 5% Critical Value	0.08088
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.0085		
Mean	0.00514	95% UCL (Assuming Normal Distribution)	
Median	0.005	Student's-t UCL	0.005279
Standard Deviation	0.000916		
Variance	8.38E-07	Gamma Distribution Test	
Coefficient of Variation	0.178105	A-D Test Statistic	12.77224
Skewness	-1.325805	A-D 5% Critical Value	0.750495
		K-S Test Statistic	0.245002
Gamma Statistics		K-S 5% Critical Value	0.084136
k hat	17.00354	Data do not follow gamma distribution	
k star (bias corrected)	16.58401	at 5% significance level	
Theta hat	0.000302		
Theta star	0.00031	95% UCLs (Assuming Gamma Distribution)	
nu hat	4080.85	Approximate Gamma UCL	0.005336
nu star	3980.162	Adjusted Gamma UCL	0.005338
Approx.Chi Square Value (.05)	3834.522		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	3832.806	Lilliefors Test Statisitic	0.294303
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-4.767689	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.300315	95% H-UCL	0.005493
Standard Deviation of log data	0.307458	95% Chebyshev (MVUE) UCL	0.005883
Variance of log data	0.094531	97.5% Chebyshev (MVUE) UCL	0.006166
		99% Chebyshev (MVUE) UCL	0.006722
		95% Non-parametric UCLs	
		CLT UCL	0.005278
		Adj-CLT UCL (Adjusted for skewness)	0.005267
		Mod-t UCL (Adjusted for skewness)	0.005277
		Jackknife UCL	0.005279
		Standard Bootstrap UCL	0.005278
		Bootstrap-t UCL	0.005273
RECOMMENDATION		Hall's Bootstrap UCL	0.005271
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.005278
		BCA Bootstrap UCL	0.00527
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.005505
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.005662
		99% Chebyshev (Mean, Sd) UCL	0.005972

Benzo(a)Anthracene

Data File		Variable:	Benzo(a)Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.441378
Number of Unique Samples	206	Lilliefors 5% Critical Value	0.034859
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	15		
Mean	0.103459	95% UCL (Assuming Normal Distribution)	
Median	0.03	Student's-t UCL	0.148823
Standard Deviation	0.699969		
Variance	0.489957	Gamma Distribution Test	
Coefficient of Variation	6.765688	A-D Test Statistic	1.8E+308
Skewness	17.81987	A-D 5% Critical Value	0.829163
		K-S Test Statistic	0.164291
Gamma Statistics		K-S 5% Critical Value	0.039305
k hat	0.474167	Data do not follow gamma distribution	
k star (bias corrected)	0.472997	at 5% significance level	
Theta hat	0.21819		
Theta star	0.21873	95% UCLs (Assuming Gamma Distribution)	
nu hat	612.6239	Approximate Gamma UCL	0.113969
nu star	611.1123	Adjusted Gamma UCL	0.113993
Approx.Chi Square Value (.05)	554.7552		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	554.6367	Lilliefors Test Statisitic	0.048158
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	2.70805	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.619288	95% H-UCL	0.090198
Standard Deviation of log data	1.463445	95% Chebyshev (MVUE) UCL	0.105864
Variance of log data	2.141671	97.5% Chebyshev (MVUE) UCL	0.117948
		99% Chebyshev (MVUE) UCL	0.141686
		95% Non-parametric UCLs	
		CLT UCL	0.148758
		Adj-CLT UCL (Adjusted for skewness)	0.169389
		Mod-t UCL (Adjusted for skewness)	0.152041
		Jackknife UCL	0.148823
		Standard Bootstrap UCL	0.147864
		Bootstrap-t UCL	0.256841
RECOMMENDATION		Hall's Bootstrap UCL	0.29084
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.153052
		BCA Bootstrap UCL	0.184808
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.223502
		97.5% Chebyshev (Mean, Sd) UCL	0.275445
		99% Chebyshev (Mean, Sd) UCL	0.377477

Benzo(a)Pyrene

Data File		Variable:	Benzo(a)Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.438531
Number of Unique Samples	200	Lilliefors 5% Critical Value	0.034859
Minimum	0.00017	Data not normal at 5% significance level	
Maximum	21		
Mean	0.161778	95% UCL (Assuming Normal Distribution)	
Median	0.043	Student's-t UCL	0.229483
Standard Deviation	1.044691		
Variance	1.09138	Gamma Distribution Test	
Coefficient of Variation	6.457556	A-D Test Statistic	1.8E+308
Skewness	16.51256	A-D 5% Critical Value	0.83379
		K-S Test Statistic	0.152722
Gamma Statistics		K-S 5% Critical Value	0.0394
k hat	0.455064	Data do not follow gamma distribution	
k star (bias corrected)	0.453983	at 5% significance level	
Theta hat	0.355506		
Theta star	0.356353	95% UCLs (Assuming Gamma Distribution)	
nu hat	587.9426	Approximate Gamma UCL	0.178581
nu star	586.5456	Adjusted Gamma UCL	0.17862
Approx.Chi Square Value (.05)	531.3569		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	531.2411	Lilliefors Test Statisitic	0.042738
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.679712		
Maximum of log data	3.044522	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.238081	95% H-UCL	0.152718
Standard Deviation of log data	1.55091	95% Chebyshev (MVUE) UCL	0.180991
Variance of log data	2.405321	97.5% Chebyshev (MVUE) UCL	0.203014
		99% Chebyshev (MVUE) UCL	0.246274
		95% Non-parametric UCLs	
		CLT UCL	0.229386
		Adj-CLT UCL (Adjusted for skewness)	0.257919
		Mod-t UCL (Adjusted for skewness)	0.233934
		Jackknife UCL	0.229483
		Standard Bootstrap UCL	0.229586
		Bootstrap-t UCL	0.387709
RECOMMENDATION		Hall's Bootstrap UCL	0.491212
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.238033
		BCA Bootstrap UCL	0.262771
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.340941
		97.5% Chebyshev (Mean, Sd) UCL	0.418465
		99% Chebyshev (Mean, Sd) UCL	0.570746

Benzo(b)Fluoranthene

Data File		Variable:	Benzo(b)Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.415918
Number of Unique Samples	195	Lilliefors 5% Critical Value	0.034859
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	12		
Mean	0.133261	95% UCL (Assuming Normal Distribution)	
Median	0.0455	Student's-t UCL	0.173862
Standard Deviation	0.626479		
Variance	0.392476	Gamma Distribution Test	
Coefficient of Variation	4.701154	A-D Test Statistic	1.8E+308
Skewness	15.09527	A-D 5% Critical Value	0.817893
		K-S Test Statistic	0.128518
Gamma Statistics		K-S 5% Critical Value	0.039045
k hat	0.548311	Data do not follow gamma distribution	
k star (bias corrected)	0.546796	at 5% significance level	
Theta hat	0.243039		
Theta star	0.243712	95% UCLs (Assuming Gamma Distribution)	
nu hat	708.4174	Approximate Gamma UCL	0.145783
nu star	706.4609	Adjusted Gamma UCL	0.145812
Approx.Chi Square Value (.05)	645.7778		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	645.6498	Lilliefors Test Statisitic	0.035757
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	2.484907	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.157608	95% H-UCL	0.136152
Standard Deviation of log data	1.432202	95% Chebyshev (MVUE) UCL	0.159239
Variance of log data	2.051204	97.5% Chebyshev (MVUE) UCL	0.176988
		99% Chebyshev (MVUE) UCL	0.211853
		95% Non-parametric UCLs	
		CLT UCL	0.173804
		Adj-CLT UCL (Adjusted for skewness)	0.189446
		Mod-t UCL (Adjusted for skewness)	0.176302
		Jackknife UCL	0.173862
		Standard Bootstrap UCL	0.173595
		Bootstrap-t UCL	0.232037
RECOMMENDATION		Hall's Bootstrap UCL	0.211368
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.176439
		BCA Bootstrap UCL	0.201217
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.240701
		97.5% Chebyshev (Mean, Sd) UCL	0.287191
		99% Chebyshev (Mean, Sd) UCL	0.37851

Benzo(k)Fluoranthene

Data File		Variable:	Benzo(k)Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.435114
Number of Unique Samples	198	Lilliefors 5% Critical Value	0.034859
Minimum	0.00024	Data not normal at 5% significance level	
Maximum	13		
Mean	0.104872	95% UCL (Assuming Normal Distribution)	
Median	0.031	Student's-t UCL	0.14638
Standard Deviation	0.640463		
Variance	0.410192	Gamma Distribution Test	
Coefficient of Variation	6.107083	A-D Test Statistic	1.8E+308
Skewness	16.41269	A-D 5% Critical Value	0.829158
		K-S Test Statistic	0.147753
Gamma Statistics		K-S 5% Critical Value	0.039304
k hat	0.474187	Data do not follow gamma distribution	
k star (bias corrected)	0.473016	at 5% significance level	
Theta hat	0.221162		
Theta star	0.221709	95% UCLs (Assuming Gamma Distribution)	
nu hat	612.649	Approximate Gamma UCL	0.115526
nu star	611.1373	Adjusted Gamma UCL	0.11555
Approx.Chi Square Value (.05)	554.779		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	554.6606	Lilliefors Test Statisitic	0.061651
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.334872		
Maximum of log data	2.564949	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.605655	95% H-UCL	0.098393
Standard Deviation of log data	1.508182	95% Chebyshev (MVUE) UCL	0.116059
Variance of log data	2.274613	97.5% Chebyshev (MVUE) UCL	0.129754
		99% Chebyshev (MVUE) UCL	0.156656
		95% Non-parametric UCLs	
		CLT UCL	0.14632
		Adj-CLT UCL (Adjusted for skewness)	0.163707
		Mod-t UCL (Adjusted for skewness)	0.149092
		Jackknife UCL	0.14638
		Standard Bootstrap UCL	0.145961
		Bootstrap-t UCL	0.252699
RECOMMENDATION		Hall's Bootstrap UCL	0.254854
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.151041
		BCA Bootstrap UCL	0.172312
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.214711
		97.5% Chebyshev (Mean, Sd) UCL	0.262238
		99% Chebyshev (Mean, Sd) UCL	0.355596

1,2-Benzphenanthracene

Data File		Variable:	1,2-Benzphenanthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.432191
Number of Unique Samples	188	Lilliefors 5% Critical Value	0.034859
Minimum	0.00019	Data not normal at 5% significance level	
Maximum	18		
Mean	0.149022	95% UCL (Assuming Normal Distribution)	
Median	0.05	Student's-t UCL	0.205496
Standard Deviation	0.871394		
Variance	0.759327	Gamma Distribution Test	
Coefficient of Variation	5.84742	A-D Test Statistic	1.8E+308
Skewness	16.9314	A-D 5% Critical Value	0.818563
		K-S Test Statistic	0.157459
Gamma Statistics		K-S 5% Critical Value	0.039063
k hat	0.541847	Data do not follow gamma distribution	
k star (bias corrected)	0.540363	at 5% significance level	
Theta hat	0.275026		
Theta star	0.275781	95% UCLs (Assuming Gamma Distribution)	
nu hat	700.0665	Approximate Gamma UCL	0.163115
nu star	698.1488	Adjusted Gamma UCL	0.163147
Approx.Chi Square Value (.05)	637.8307		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	637.7036	Lilliefors Test Statisitic	0.05456
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.568486		
Maximum of log data	2.890372	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.061529	95% H-UCL	0.136833
Standard Deviation of log data	1.373378	95% Chebyshev (MVUE) UCL	0.158971
Variance of log data	1.886166	97.5% Chebyshev (MVUE) UCL	0.175886
		99% Chebyshev (MVUE) UCL	0.209112
		95% Non-parametric UCLs	
		CLT UCL	0.205415
		Adj-CLT UCL (Adjusted for skewness)	0.229819
		Mod-t UCL (Adjusted for skewness)	0.209303
		Jackknife UCL	0.205496
		Standard Bootstrap UCL	0.205019
		Bootstrap-t UCL	0.3636
RECOMMENDATION		Hall's Bootstrap UCL	0.381315
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.209218
		BCA Bootstrap UCL	0.24837
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.298465
		97.5% Chebyshev (Mean, Sd) UCL	0.363129
		99% Chebyshev (Mean, Sd) UCL	0.490149

Dibenz(A,H)Anthracene

Data File		Variable:	Dibenz(A,H)Anthracene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.374078
Number of Unique Samples	184	Lilliefors 5% Critical Value	0.034859
Minimum	0.00023	Data not normal at 5% significance level	
Maximum	1.7		
Mean	0.029078	95% UCL (Assuming Normal Distribution)	
Median	0.00955	Student's-t UCL	0.034901
Standard Deviation	0.089849		
Variance	0.008073	Gamma Distribution Test	
Coefficient of Variation	3.089931	A-D Test Statistic	1.8E+308
Skewness	12.76491	A-D 5% Critical Value	0.811067
		K-S Test Statistic	0.131263
Gamma Statistics		K-S 5% Critical Value	0.038868
k hat	0.614087	Data do not follow gamma distribution	
k star (bias corrected)	0.612267	at 5% significance level	
Theta hat	0.047352		
Theta star	0.047492	95% UCLs (Assuming Gamma Distribution)	
nu hat	793.3999	Approximate Gamma UCL	0.03165
nu star	791.0487	Adjusted Gamma UCL	0.031656
Approx.Chi Square Value (.05)	726.7668		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	726.631	Lilliefors Test Statisitic	0.041143
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.377431		
Maximum of log data	0.530628	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.540521	95% H-UCL	0.029716
Standard Deviation of log data	1.341303	95% Chebyshev (MVUE) UCL	0.034397
Variance of log data	1.799095	97.5% Chebyshev (MVUE) UCL	0.037963
		99% Chebyshev (MVUE) UCL	0.044966
		95% Non-parametric UCLs	
		CLT UCL	0.034893
		Adj-CLT UCL (Adjusted for skewness)	0.03679
		Mod-t UCL (Adjusted for skewness)	0.035197
		Jackknife UCL	0.034901
		Standard Bootstrap UCL	0.03471
		Bootstrap-t UCL	0.038794
RECOMMENDATION		Hall's Bootstrap UCL	0.059141
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.035687
		BCA Bootstrap UCL	0.036976
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.044487
		97.5% Chebyshev (Mean, Sd) UCL	0.051154
		99% Chebyshev (Mean, Sd) UCL	0.064251

Fluoranthene

Data File		Variable:	Fluoranthene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.447122
Number of Unique Samples	204	Lilliefors 5% Critical Value	0.034859
Minimum	0.00038	Data not normal at 5% significance level	
Maximum	35		
Mean	0.257012	95% UCL (Assuming Normal Distribution)	
Median	0.052	Student's-t UCL	0.382126
Standard Deviation	1.930498		
Variance	3.726821	Gamma Distribution Test	
Coefficient of Variation	7.511305	A-D Test Statistic	1.8E+308
Skewness	16.34529	A-D 5% Critical Value	0.842845
		K-S Test Statistic	0.173895
Gamma Statistics		K-S 5% Critical Value	0.039586
k hat	0.417678	Data do not follow gamma distribution	
k star (bias corrected)	0.41677	at 5% significance level	
Theta hat	0.615336		
Theta star	0.616676	95% UCLs (Assuming Gamma Distribution)	
nu hat	539.6397	Approximate Gamma UCL	0.284971
nu star	538.4669	Adjusted Gamma UCL	0.285036
Approx.Chi Square Value (.05)	485.6381		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	485.5274	Lilliefors Test Statisitic	0.062272
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.875339		
Maximum of log data	3.555348	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.923188	95% H-UCL	0.211367
Standard Deviation of log data	1.556811	95% Chebyshev (MVUE) UCL	0.250659
Variance of log data	2.423662	97.5% Chebyshev (MVUE) UCL	0.281287
		99% Chebyshev (MVUE) UCL	0.341449
		95% Non-parametric UCLs	
		CLT UCL	0.381946
		Adj-CLT UCL (Adjusted for skewness)	0.434139
		Mod-t UCL (Adjusted for skewness)	0.390267
		Jackknife UCL	0.382126
		Standard Bootstrap UCL	0.379495
		Bootstrap-t UCL	0.872496
RECOMMENDATION		Hall's Bootstrap UCL	0.943077
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.391782
		BCA Bootstrap UCL	0.466389
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.58809
		97.5% Chebyshev (Mean, Sd) UCL	0.731347
		99% Chebyshev (Mean, Sd) UCL	1.012749

Indeno(1,2,3-C,D)Pyrene

Data File		Variable:	Indeno(1,2,3-C,D)Pyrene
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	646	Lilliefors Test Statisitic	0.423307
Number of Unique Samples	205	Lilliefors 5% Critical Value	0.034859
Minimum	0.00027	Data not normal at 5% significance level	
Maximum	14		
Mean	0.151509	95% UCL (Assuming Normal Distribution)	
Median	0.048	Student's-t UCL	0.202179
Standard Deviation	0.781833		
Variance	0.611263	Gamma Distribution Test	
Coefficient of Variation	5.160314	A-D Test Statistic	1.8E+308
Skewness	14.23871	A-D 5% Critical Value	0.826757
		K-S Test Statistic	0.147619
Gamma Statistics		K-S 5% Critical Value	0.039255
k hat	0.484098	Data do not follow gamma distribution	
k star (bias corrected)	0.482882	at 5% significance level	
Theta hat	0.312971		
Theta star	0.313759	95% UCLs (Assuming Gamma Distribution)	
nu hat	625.4549	Approximate Gamma UCL	0.16673
nu star	623.8836	Adjusted Gamma UCL	0.166765
Approx.Chi Square Value (.05)	566.9284		
Adjusted Level of Significance	0.049628	Lognormal Distribution Test	
Adjusted Chi Square Value	566.8087	Lilliefors Test Statisitic	0.048939
		Lilliefors 5% Critical Value	0.034859
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.217089		
Maximum of log data	2.639057	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.205821	95% H-UCL	0.151583
Standard Deviation of log data	1.527501	95% Chebyshev (MVUE) UCL	0.179182
Variance of log data	2.333259	97.5% Chebyshev (MVUE) UCL	0.200624
		99% Chebyshev (MVUE) UCL	0.242743
		95% Non-parametric UCLs	
		CLT UCL	0.202106
		Adj-CLT UCL (Adjusted for skewness)	0.220519
		Mod-t UCL (Adjusted for skewness)	0.205051
		Jackknife UCL	0.202179
		Standard Bootstrap UCL	0.202052
		Bootstrap-t UCL	0.262947
RECOMMENDATION		Hall's Bootstrap UCL	0.231213
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.209113
		BCA Bootstrap UCL	0.225759
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.285592
		97.5% Chebyshev (Mean, Sd) UCL	0.34361
		99% Chebyshev (Mean, Sd) UCL	0.457575

Phenol

Data File		Variable:	Phenol
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.3532
Number of Unique Samples	47	Lilliefors 5% Critical Value	0.08088
Minimum	0.2	Data not normal at 5% significance level	
Maximum	270		
Mean	13.25217	95% UCL (Assuming Normal Distribution)	
Median	2.8	Student's-t UCL	18.49568
Standard Deviation	34.64906		
Variance	1200.558	Gamma Distribution Test	
Coefficient of Variation	2.614596	A-D Test Statistic	4.837869
Skewness	6.557152	A-D 5% Critical Value	0.832967
		K-S Test Statistic	0.168367
Gamma Statistics		K-S 5% Critical Value	0.089822
k hat	0.442679	Data do not follow gamma distribution	
k star (bias corrected)	0.437167	at 5% significance level	
Theta hat	29.9363		
Theta star	30.31371	95% UCLs (Assuming Gamma Distribution)	
nu hat	106.2429	Approximate Gamma UCL	16.89892
nu star	104.9202	Adjusted Gamma UCL	16.94884
Approx.Chi Square Value (.05)	82.2786		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	82.03625	Lilliefors Test Statisitic	0.1723
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.609438		
Maximum of log data	5.598422	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.121596	95% H-UCL	28.98135
Standard Deviation of log data	1.855276	95% Chebyshev (MVUE) UCL	35.33717
Variance of log data	3.44205	97.5% Chebyshev (MVUE) UCL	43.47593
		99% Chebyshev (MVUE) UCL	59.46293
		95% Non-parametric UCLs	
		CLT UCL	18.45486
		Adj-CLT UCL (Adjusted for skewness)	20.47791
		Mod-t UCL (Adjusted for skewness)	18.81123
		Jackknife UCL	18.49568
		Standard Bootstrap UCL	18.41821
		Bootstrap-t UCL	27.94022
RECOMMENDATION		Hall's Bootstrap UCL	46.90286
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	18.85171
		BCA Bootstrap UCL	20.82821
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	27.03942
		97.5% Chebyshev (Mean, Sd) UCL	33.00517
		99% Chebyshev (Mean, Sd) UCL	44.72374

Aroclor 1016

Data File		Variable:	Aroclor 1016
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.290125
Number of Unique Samples	13	Lilliefors 5% Critical Value	0.079888
Minimum	0.017	Data not normal at 5% significance level	
Maximum	0.047		
Mean	0.018776	95% UCL (Assuming Normal Distribution)	
Median	0.018	Student's-t UCL	0.019206
Standard Deviation	0.002873		
Variance	8.25E-06	Gamma Distribution Test	
Coefficient of Variation	0.153018	A-D Test Statistic	1.8E+308
Skewness	8.044982	A-D 5% Critical Value	0.750273
		K-S Test Statistic	0.265667
Gamma Statistics		K-S 5% Critical Value	0.083276
k hat	71.06263	Data do not follow gamma distribution	
k star (bias corrected)	69.33482	at 5% significance level	
Theta hat	0.000264		
Theta star	0.000271	95% UCLs (Assuming Gamma Distribution)	
nu hat	17481.41	Approximate Gamma UCL	0.019116
nu star	17056.36	Adjusted Gamma UCL	0.01912
Approx.Chi Square Value (.05)	16753.64		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	16750.13	Lilliefors Test Statisitic	0.250788
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-4.074542		
Maximum of log data	-3.057608	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-3.982206	95% H-UCL	0.019055
Standard Deviation of log data	0.106561	95% Chebyshev (MVUE) UCL	0.019537
Variance of log data	0.011355	97.5% Chebyshev (MVUE) UCL	0.019878
		99% Chebyshev (MVUE) UCL	0.020547
		95% Non-parametric UCLs	
		CLT UCL	0.019203
		Adj-CLT UCL (Adjusted for skewness)	0.019403
		Mod-t UCL (Adjusted for skewness)	0.019237
		Jackknife UCL	0.019206
		Standard Bootstrap UCL	0.019196
		Bootstrap-t UCL	0.019663
RECOMMENDATION		Hall's Bootstrap UCL	0.020958
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.01928
		BCA Bootstrap UCL	0.019504
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.019906
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.020394
		99% Chebyshev (Mean, Sd) UCL	0.021354

Aroclor 1260

Data File		Variable:	Aroclor 1260
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.352584
Number of Unique Samples	18	Lilliefors 5% Critical Value	0.079888
Minimum	0.005	Data not normal at 5% significance level	
Maximum	0.025		
Mean	0.017931	95% UCL (Assuming Normal Distribution)	
Median	0.018	Student's-t UCL	0.018372
Standard Deviation	0.002954		
Variance	8.73E-06	Gamma Distribution Test	
Coefficient of Variation	0.16475	A-D Test Statistic	19.76497
Skewness	-2.45399	A-D 5% Critical Value	0.749979
		K-S Test Statistic	0.390449
Gamma Statistics		K-S 5% Critical Value	0.083315
k hat	24.00449	Data do not follow gamma distribution	
k star (bias corrected)	23.42443	at 5% significance level	
Theta hat	0.000747		
Theta star	0.000765	95% UCLs (Assuming Gamma Distribution)	
nu hat	5905.104	Approximate Gamma UCL	0.018494
nu star	5762.41	Adjusted Gamma UCL	0.018501
Approx.Chi Square Value (.05)	5586.936		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	5584.914	Lilliefors Test Statisitic	0.404819
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-5.298317		
Maximum of log data	-3.688879	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.042204	95% H-UCL	0.018698
Standard Deviation of log data	0.232437	95% Chebyshev (MVUE) UCL	0.019704
Variance of log data	0.054027	97.5% Chebyshev (MVUE) UCL	0.020426
		99% Chebyshev (MVUE) UCL	0.021844
		95% Non-parametric UCLs	
		CLT UCL	0.018369
		Adj-CLT UCL (Adjusted for skewness)	0.018306
		Mod-t UCL (Adjusted for skewness)	0.018363
		Jackknife UCL	0.018372
		Standard Bootstrap UCL	0.018366
		Bootstrap-t UCL	0.018337
RECOMMENDATION		Hall's Bootstrap UCL	0.018326
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.018358
		BCA Bootstrap UCL	0.018313
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.019092
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.019594
		99% Chebyshev (Mean, Sd) UCL	0.020581

4,4-DDD

Data File		Variable:	4,4-DDD
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.324237
Number of Unique Samples	23	Lilliefors 5% Critical Value	0.079888
Minimum	0.0004	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.008852	95% UCL (Assuming Normal Distribution)	
Median	0.00205	Student's-t UCL	0.009997
Standard Deviation	0.007658		
Variance	5.86E-05	Gamma Distribution Test	
Coefficient of Variation	0.865027	A-D Test Statistic	17.22799
Skewness	0.176521	A-D 5% Critical Value	0.78342
		K-S Test Statistic	0.299915
Gamma Statistics		K-S 5% Critical Value	0.086031
k hat	0.995008	Data do not follow gamma distribution	
k star (bias corrected)	0.97616	at 5% significance level	
Theta hat	0.008897		
Theta star	0.009069	95% UCLs (Assuming Gamma Distribution)	
nu hat	244.772	Approximate Gamma UCL	0.010357
nu star	240.1353	Adjusted Gamma UCL	0.010376
Approx.Chi Square Value (.05)	205.2534		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	204.8744	Lilliefors Test Statisitic	0.305814
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.824046		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.307515	95% H-UCL	0.012671
Standard Deviation of log data	1.174456	95% Chebyshev (MVUE) UCL	0.015511
Variance of log data	1.379346	97.5% Chebyshev (MVUE) UCL	0.017989
		99% Chebyshev (MVUE) UCL	0.022858
		95% Non-parametric UCLs	
		CLT UCL	0.009988
		Adj-CLT UCL (Adjusted for skewness)	0.01
		Mod-t UCL (Adjusted for skewness)	0.009999
		Jackknife UCL	0.009997
		Standard Bootstrap UCL	0.009964
		Bootstrap-t UCL	0.010047
RECOMMENDATION		Hall's Bootstrap UCL	0.009961
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.010002
		BCA Bootstrap UCL	0.010007
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.011862
		97.5% Chebyshev (Mean, Sd) UCL	0.013164
		99% Chebyshev (Mean, Sd) UCL	0.015722

4,4-DDE

Data File		Variable:	4,4-DDE
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.316808
Number of Unique Samples	27	Lilliefors 5% Critical Value	0.079888
Minimum	0.0001	Data not normal at 5% significance level	
Maximum	0.03		
Mean	0.008836	95% UCL (Assuming Normal Distribution)	
Median	0.00205	Student's-t UCL	0.010014
Standard Deviation	0.007883		
Variance	6.21E-05	Gamma Distribution Test	
Coefficient of Variation	0.892139	A-D Test Statistic	14.32065
Skewness	0.299224	A-D 5% Critical Value	0.787793
		K-S Test Statistic	0.286918
Gamma Statistics		K-S 5% Critical Value	0.086311
k hat	0.904834	Data do not follow gamma distribution	
k star (bias corrected)	0.888185	at 5% significance level	
Theta hat	0.009765		
Theta star	0.009948	95% UCLs (Assuming Gamma Distribution)	
nu hat	222.5891	Approximate Gamma UCL	0.01042
nu star	218.4934	Adjusted Gamma UCL	0.01044
Approx.Chi Square Value (.05)	185.2763		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	184.9167	Lilliefors Test Statisitic	0.287708
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-9.21034		
Maximum of log data	-3.506558	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.374614	95% H-UCL	0.014328
Standard Deviation of log data	1.296021	95% Chebyshev (MVUE) UCL	0.017703
Variance of log data	1.679671	97.5% Chebyshev (MVUE) UCL	0.020777
		99% Chebyshev (MVUE) UCL	0.026816
		95% Non-parametric UCLs	
		CLT UCL	0.010005
		Adj-CLT UCL (Adjusted for skewness)	0.010025
		Mod-t UCL (Adjusted for skewness)	0.010017
		Jackknife UCL	0.010014
		Standard Bootstrap UCL	0.010002
		Bootstrap-t UCL	0.010018
RECOMMENDATION		Hall's Bootstrap UCL	0.010057
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.010037
		BCA Bootstrap UCL	0.010107
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.011934
		97.5% Chebyshev (Mean, Sd) UCL	0.013274
		99% Chebyshev (Mean, Sd) UCL	0.015908

4,4-DDT

Data File		Variable:	4,4-DDT
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.319149
Number of Unique Samples	23	Lilliefors 5% Critical Value	0.079888
Minimum	0.0002	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.00896	95% UCL (Assuming Normal Distribution)	
Median	0.0021	Student's-t UCL	0.010109
Standard Deviation	0.007684		
Variance	5.9E-05	Gamma Distribution Test	
Coefficient of Variation	0.857604	A-D Test Statistic	16.97353
Skewness	0.146098	A-D 5% Critical Value	0.78394
		K-S Test Statistic	0.301811
Gamma Statistics		K-S 5% Critical Value	0.086065
k hat	0.984281	Data do not follow gamma distribution	
k star (bias corrected)	0.965694	at 5% significance level	
Theta hat	0.009103		
Theta star	0.009278	95% UCLs (Assuming Gamma Distribution)	
nu hat	242.1332	Approximate Gamma UCL	0.010492
nu star	237.5608	Adjusted Gamma UCL	0.010512
Approx.Chi Square Value (.05)	202.873		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	202.4961	Lilliefors Test Statisitic	0.307993
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-8.517193		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.302497	95% H-UCL	0.013202
Standard Deviation of log data	1.198454	95% Chebyshev (MVUE) UCL	0.016195
Variance of log data	1.436292	97.5% Chebyshev (MVUE) UCL	0.018829
		99% Chebyshev (MVUE) UCL	0.024001
		95% Non-parametric UCLs	
		CLT UCL	0.0101
		Adj-CLT UCL (Adjusted for skewness)	0.01011
		Mod-t UCL (Adjusted for skewness)	0.01011
		Jackknife UCL	0.010109
		Standard Bootstrap UCL	0.01009
		Bootstrap-t UCL	0.010186
RECOMMENDATION		Hall's Bootstrap UCL	0.010081
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.010126
		BCA Bootstrap UCL	0.010092
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.01198
		97.5% Chebyshev (Mean, Sd) UCL	0.013287
		99% Chebyshev (Mean, Sd) UCL	0.015854

Dieldrin

Data File		Variable:	Dieldrin
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.327521
Number of Unique Samples	21	Lilliefors 5% Critical Value	0.079888
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.0255		
Mean	0.008963	95% UCL (Assuming Normal Distribution)	
Median	0.00205	Student's-t UCL	0.010111
Standard Deviation	0.00768		
Variance	5.9E-05	Gamma Distribution Test	
Coefficient of Variation	0.856827	A-D Test Statistic	17.9968
Skewness	0.147662	A-D 5% Critical Value	0.783033
		K-S Test Statistic	0.304532
Gamma Statistics		K-S 5% Critical Value	0.086005
k hat	1.005558	Data do not follow gamma distribution	
k star (bias corrected)	0.986453	at 5% significance level	
Theta hat	0.008913		
Theta star	0.009086	95% UCLs (Assuming Gamma Distribution)	
nu hat	247.3674	Approximate Gamma UCL	0.010477
nu star	242.6673	Adjusted Gamma UCL	0.010497
Approx.Chi Square Value (.05)	207.5957		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	207.2144	Lilliefors Test Statisitic	0.311437
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-3.669077	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.288302	95% H-UCL	0.012769
Standard Deviation of log data	1.166712	95% Chebyshev (MVUE) UCL	0.01562
Variance of log data	1.361217	97.5% Chebyshev (MVUE) UCL	0.018102
		99% Chebyshev (MVUE) UCL	0.022978
		95% Non-parametric UCLs	
		CLT UCL	0.010102
		Adj-CLT UCL (Adjusted for skewness)	0.010112
		Mod-t UCL (Adjusted for skewness)	0.010112
		Jackknife UCL	0.010111
		Standard Bootstrap UCL	0.010072
		Bootstrap-t UCL	0.010144
RECOMMENDATION		Hall's Bootstrap UCL	0.010137
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.010048
		BCA Bootstrap UCL	0.010106
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.011981
		97.5% Chebyshev (Mean, Sd) UCL	0.013287
		99% Chebyshev (Mean, Sd) UCL	0.015853

Endosulfan Sulfate

Data File		Variable:	Endosulfan Sulfate
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.323989
Number of Unique Samples	30	Lilliefors 5% Critical Value	0.079888
Minimum	0.002	Data not normal at 5% significance level	
Maximum	0.042		
Mean	0.014937	95% UCL (Assuming Normal Distribution)	
Median	0.0035	Student's-t UCL	0.01685
Standard Deviation	0.012796		
Variance	0.000164	Gamma Distribution Test	
Coefficient of Variation	0.856613	A-D Test Statistic	18.19762
Skewness	0.144816	A-D 5% Critical Value	0.782913
		K-S Test Statistic	0.298635
Gamma Statistics		K-S 5% Critical Value	0.085997
k hat	1.010153	Data do not follow gamma distribution	
k star (bias corrected)	0.990935	at 5% significance level	
Theta hat	0.014787		
Theta star	0.015074	95% UCLs (Assuming Gamma Distribution)	
nu hat	248.4977	Approximate Gamma UCL	0.017455
nu star	243.7701	Adjusted Gamma UCL	0.017487
Approx.Chi Square Value (.05)	208.6161		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	208.2339	Lilliefors Test Statisitic	0.309441
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-6.214608		
Maximum of log data	-3.170086	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-4.774626	95% H-UCL	0.021125
Standard Deviation of log data	1.159781	95% Chebyshev (MVUE) UCL	0.025826
Variance of log data	1.345092	97.5% Chebyshev (MVUE) UCL	0.029908
		99% Chebyshev (MVUE) UCL	0.037928
		95% Non-parametric UCLs	
		CLT UCL	0.016835
		Adj-CLT UCL (Adjusted for skewness)	0.016851
		Mod-t UCL (Adjusted for skewness)	0.016852
		Jackknife UCL	0.01685
		Standard Bootstrap UCL	0.016888
		Bootstrap-t UCL	0.016858
RECOMMENDATION		Hall's Bootstrap UCL	0.01684
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.016795
		BCA Bootstrap UCL	0.016826
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.019966
		97.5% Chebyshev (Mean, Sd) UCL	0.022142
		99% Chebyshev (Mean, Sd) UCL	0.026417

Heptachlor

Data File		Variable:	Heptachlor
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	123	Lilliefors Test Statisitic	0.327467
Number of Unique Samples	16	Lilliefors 5% Critical Value	0.079888
Minimum	0.0005	Data not normal at 5% significance level	
Maximum	0.0145		
Mean	0.005073	95% UCL (Assuming Normal Distribution)	
Median	0.00115	Student's-t UCL	0.005723
Standard Deviation	0.004349		
Variance	1.89E-05	Gamma Distribution Test	
Coefficient of Variation	0.857414	A-D Test Statistic	18.3319
Skewness	0.149563	A-D 5% Critical Value	0.782953
		K-S Test Statistic	0.303406
Gamma Statistics		K-S 5% Critical Value	0.086
k hat	1.008605	Data do not follow gamma distribution	
k star (bias corrected)	0.989425	at 5% significance level	
Theta hat	0.005029		
Theta star	0.005127	95% UCLs (Assuming Gamma Distribution)	
nu hat	248.1168	Approximate Gamma UCL	0.005928
nu star	243.3985	Adjusted Gamma UCL	0.005939
Approx.Chi Square Value (.05)	208.2723		
Adjusted Level of Significance	0.048049	Lognormal Distribution Test	
Adjusted Chi Square Value	207.8903	Lilliefors Test Statisitic	0.309525
		Lilliefors 5% Critical Value	0.079888
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.600902		
Maximum of log data	-4.233607	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-5.855587	95% H-UCL	0.007181
Standard Deviation of log data	1.161088	95% Chebyshev (MVUE) UCL	0.00878
Variance of log data	1.348125	97.5% Chebyshev (MVUE) UCL	0.010169
		99% Chebyshev (MVUE) UCL	0.012898
		95% Non-parametric UCLs	
		CLT UCL	0.005718
		Adj-CLT UCL (Adjusted for skewness)	0.005723
		Mod-t UCL (Adjusted for skewness)	0.005724
		Jackknife UCL	0.005723
		Standard Bootstrap UCL	0.005731
		Bootstrap-t UCL	0.005727
RECOMMENDATION		Hall's Bootstrap UCL	0.005728
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.005738
		BCA Bootstrap UCL	0.005701
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.006782
		97.5% Chebyshev (Mean, Sd) UCL	0.007522
		99% Chebyshev (Mean, Sd) UCL	0.008975

Antimony

Data File		Variable:	Antimony
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.251764
Number of Unique Samples	61	Lilliefors 5% Critical Value	0.08088
Minimum	0.09	Data not normal at 5% significance level	
Maximum	3.5		
Mean	1.624458	95% UCL (Assuming Normal Distribution)	
Median	1.7	Student's-t UCL	1.804852
Standard Deviation	1.192036		
Variance	1.42095	Gamma Distribution Test	
Coefficient of Variation	0.733805	A-D Test Statistic	9.729862
Skewness	-0.03905	A-D 5% Critical Value	0.776642
		K-S Test Statistic	0.264972
Gamma Statistics		K-S 5% Critical Value	0.086338
k hat	1.24919	Data do not follow gamma distribution	
k star (bias corrected)	1.223516	at 5% significance level	
Theta hat	1.300409		
Theta star	1.327697	95% UCLs (Assuming Gamma Distribution)	
nu hat	299.8057	Approximate Gamma UCL	1.87105
nu star	293.6439	Adjusted Gamma UCL	1.874244
Approx.Chi Square Value (.05)	254.9435		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	254.5091	Lilliefors Test Statisitic	0.264503
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.407946		
Maximum of log data	1.252763	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.034255	95% H-UCL	2.32359
Standard Deviation of log data	1.081447	95% Chebyshev (MVUE) UCL	2.820749
Variance of log data	1.169528	97.5% Chebyshev (MVUE) UCL	3.243817
		99% Chebyshev (MVUE) UCL	4.074851
		95% Non-parametric UCLs	
		CLT UCL	1.803447
		Adj-CLT UCL (Adjusted for skewness)	1.803033
		Mod-t UCL (Adjusted for skewness)	1.804787
		Jackknife UCL	1.804852
		Standard Bootstrap UCL	1.800739
		Bootstrap-t UCL	1.798651
RECOMMENDATION		Hall's Bootstrap UCL	1.799726
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.794
		BCA Bootstrap UCL	1.799167
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	2.098783
		97.5% Chebyshev (Mean, Sd) UCL	2.304024
		99% Chebyshev (Mean, Sd) UCL	2.707179

Arsenic

Data File		Variable:	Arsenic
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.160182
Number of Unique Samples	84	Lilliefors 5% Critical Value	0.08088
Minimum	2.3	Data not normal at 5% significance level	
Maximum	42.4		
Mean	10.64167	95% UCL (Assuming Normal Distribution)	
Median	9	Student's-t UCL	11.75639
Standard Deviation	7.3661		
Variance	54.25943	Gamma Distribution Test	
Coefficient of Variation	0.692194	A-D Test Statistic	1.187479
Skewness	2.116819	A-D 5% Critical Value	0.759983
		K-S Test Statistic	0.076508
Gamma Statistics		K-S 5% Critical Value	0.084958
k hat	2.832824	Data follow approximate gamma distibution	
k star (bias corrected)	2.767559	at 5% significance level	
Theta hat	3.756558		
Theta star	3.845146	95% UCLs (Assuming Gamma Distribution)	
nu hat	679.8777	Approximate Gamma UCL	11.67532
nu star	664.2141	Adjusted Gamma UCL	11.68835
Approx.Chi Square Value (.05)	605.4093		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	604.7341	Lilliefors Test Statisitic	0.05012
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	0.832909		
Maximum of log data	3.747148	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.178013	95% H-UCL	11.74733
Standard Deviation of log data	0.602631	95% Chebyshev (MVUE) UCL	13.30551
Variance of log data	0.363164	97.5% Chebyshev (MVUE) UCL	14.4901
		99% Chebyshev (MVUE) UCL	16.817
		95% Non-parametric UCLs	
		CLT UCL	11.74772
		Adj-CLT UCL (Adjusted for skewness)	11.88656
		Mod-t UCL (Adjusted for skewness)	11.77805
		Jackknife UCL	11.75639
		Standard Bootstrap UCL	11.77015
		Bootstrap-t UCL	11.91444
RECOMMENDATION		Hall's Bootstrap UCL	11.9417
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	11.8275
		BCA Bootstrap UCL	11.8825
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	13.57272
		97.5% Chebyshev (Mean, Sd) UCL	14.84099
		99% Chebyshev (Mean, Sd) UCL	17.33226

Barium

Data File		Variable:	Barium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.119892
Number of Unique Samples	112	Lilliefors 5% Critical Value	0.08088
Minimum	30.9	Data not normal at 5% significance level	
Maximum	476		
Mean	166.5475	95% UCL (Assuming Normal Distribution)	
Median	148.5	Student's-t UCL	182.4245
Standard Deviation	104.915		
Variance	11007.16	Gamma Distribution Test	
Coefficient of Variation	0.629941	A-D Test Statistic	0.497664
Skewness	0.984608	A-D 5% Critical Value	0.761678
		K-S Test Statistic	0.055726
Gamma Statistics		K-S 5% Critical Value	0.085101
k hat	2.5676	Data follow gamma distribution	
k star (bias corrected)	2.508966	at 5% significance level	
Theta hat	64.86505		
Theta star	66.38094	95% UCLs (Assuming Gamma Distribution)	
nu hat	616.224	Approximate Gamma UCL	183.6023
nu star	602.1518	Adjusted Gamma UCL	183.8179
Approx.Chi Square Value (.05)	546.2181		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	545.5773	Lilliefors Test Statisitic	0.073131
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	3.430756		
Maximum of log data	6.165418	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	4.908085	95% H-UCL	191.1363
Standard Deviation of log data	0.672353	95% Chebyshev (MVUE) UCL	219.0987
Variance of log data	0.452059	97.5% Chebyshev (MVUE) UCL	240.6359
		99% Chebyshev (MVUE) UCL	282.9417
		95% Non-parametric UCLs	
		CLT UCL	182.3009
		Adj-CLT UCL (Adjusted for skewness)	183.2207
		Mod-t UCL (Adjusted for skewness)	182.568
		Jackknife UCL	182.4245
		Standard Bootstrap UCL	182.1624
		Bootstrap-t UCL	183.7652
RECOMMENDATION		Hall's Bootstrap UCL	183.6159
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	183.1258
		BCA Bootstrap UCL	183.0283
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	208.2944
		97.5% Chebyshev (Mean, Sd) UCL	226.3583
		99% Chebyshev (Mean, Sd) UCL	261.8413

Beryllium

Data File		Variable:	Beryllium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.196195
Number of Unique Samples	56	Lilliefors 5% Critical Value	0.08088
Minimum	0.00475	Data not normal at 5% significance level	
Maximum	0.66		
Mean	0.198269	95% UCL (Assuming Normal Distribution)	
Median	0.1375	Student's-t UCL	0.21925
Standard Deviation	0.138641		
Variance	0.019221	Gamma Distribution Test	
Coefficient of Variation	0.699259	A-D Test Statistic	2.876808
Skewness	1.267712	A-D 5% Critical Value	0.764306
		K-S Test Statistic	0.131401
Gamma Statistics		K-S 5% Critical Value	0.085324
k hat	2.15643	Data do not follow gamma distribution	
k star (bias corrected)	2.108075	at 5% significance level	
Theta hat	0.091943		
Theta star	0.094052	95% UCLs (Assuming Gamma Distribution)	
nu hat	517.5433	Approximate Gamma UCL	0.220579
nu star	505.938	Adjusted Gamma UCL	0.220862
Approx.Chi Square Value (.05)	454.7661		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	454.1823	Lilliefors Test Statisitic	0.160592
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-5.349611		
Maximum of log data	-0.415515	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.867564	95% H-UCL	0.24211
Standard Deviation of log data	0.781571	95% Chebyshev (MVUE) UCL	0.28248
Variance of log data	0.610853	97.5% Chebyshev (MVUE) UCL	0.314276
		99% Chebyshev (MVUE) UCL	0.376734
		95% Non-parametric UCLs	
		CLT UCL	0.219086
		Adj-CLT UCL (Adjusted for skewness)	0.220651
		Mod-t UCL (Adjusted for skewness)	0.219494
		Jackknife UCL	0.21925
		Standard Bootstrap UCL	0.21908
		Bootstrap-t UCL	0.221999
RECOMMENDATION		Hall's Bootstrap UCL	0.221111
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.219346
		BCA Bootstrap UCL	0.222088
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.253436
		97.5% Chebyshev (Mean, Sd) UCL	0.277306
		99% Chebyshev (Mean, Sd) UCL	0.324196

Cadmium

Data File		Variable:	Cadmium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.140362
Number of Unique Samples	67	Lilliefors 5% Critical Value	0.08088
Minimum	0.017	Data not normal at 5% significance level	
Maximum	1.5		
Mean	0.274717	95% UCL (Assuming Normal Distribution)	
Median	0.235	Student's-t UCL	0.307808
Standard Deviation	0.218665		
Variance	0.047815	Gamma Distribution Test	
Coefficient of Variation	0.795967	A-D Test Statistic	0.523822
Skewness	2.163028	A-D 5% Critical Value	0.766778
		K-S Test Statistic	0.068341
Gamma Statistics		K-S 5% Critical Value	0.085546
k hat	1.846272	Data follow gamma distribution	
k star (bias corrected)	1.80567	at 5% significance level	
Theta hat	0.148795		
Theta star	0.152141	95% UCLs (Assuming Gamma Distribution)	
nu hat	443.1052	Approximate Gamma UCL	0.308352
nu star	433.3609	Adjusted Gamma UCL	0.308781
Approx.Chi Square Value (.05)	386.0898		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	385.5528	Lilliefors Test Statisitic	0.077256
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-4.074542		
Maximum of log data	0.405465	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.58664	95% H-UCL	0.33324
Standard Deviation of log data	0.818578	95% Chebyshev (MVUE) UCL	0.391007
Variance of log data	0.67007	97.5% Chebyshev (MVUE) UCL	0.43688
		99% Chebyshev (MVUE) UCL	0.52699
		95% Non-parametric UCLs	
		CLT UCL	0.30755
		Adj-CLT UCL (Adjusted for skewness)	0.311762
		Mod-t UCL (Adjusted for skewness)	0.308465
		Jackknife UCL	0.307808
		Standard Bootstrap UCL	0.307082
		Bootstrap-t UCL	0.311963
RECOMMENDATION		Hall's Bootstrap UCL	0.313809
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	0.309383
		BCA Bootstrap UCL	0.310367
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.361726
		97.5% Chebyshev (Mean, Sd) UCL	0.399375
		99% Chebyshev (Mean, Sd) UCL	0.473329

Chromium

Data File		Variable:	Chromium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.132648
Number of Unique Samples	112	Lilliefors 5% Critical Value	0.08088
Minimum	3	Data not normal at 5% significance level	
Maximum	197		
Mean	57.72167	95% UCL (Assuming Normal Distribution)	
Median	45.4	Student's-t UCL	63.55921
Standard Deviation	38.5744		
Variance	1487.984	Gamma Distribution Test	
Coefficient of Variation	0.668283	A-D Test Statistic	0.709151
Skewness	1.228587	A-D 5% Critical Value	0.762635
		K-S Test Statistic	0.073336
Gamma Statistics		K-S 5% Critical Value	0.085182
k hat	2.417839	Data follow gamma distribution	
k star (bias corrected)	2.362948	at 5% significance level	
Theta hat	23.87325		
Theta star	24.42782	95% UCLs (Assuming Gamma Distribution)	
nu hat	580.2813	Approximate Gamma UCL	63.82705
nu star	567.1076	Adjusted Gamma UCL	63.90437
Approx.Chi Square Value (.05)	512.8609		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	512.2403	Lilliefors Test Statisitic	0.050889
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	1.098612		
Maximum of log data	5.283204	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.834808	95% H-UCL	66.91371
Standard Deviation of log data	0.698501	95% Chebyshev (MVUE) UCL	77.03802
Variance of log data	0.487903	97.5% Chebyshev (MVUE) UCL	84.87604
		99% Chebyshev (MVUE) UCL	100.2723
		95% Non-parametric UCLs	
		CLT UCL	63.51376
		Adj-CLT UCL (Adjusted for skewness)	63.93575
		Mod-t UCL (Adjusted for skewness)	63.62503
		Jackknife UCL	63.55921
		Standard Bootstrap UCL	63.34575
		Bootstrap-t UCL	64.05007
RECOMMENDATION		Hall's Bootstrap UCL	63.90384
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	63.715
		BCA Bootstrap UCL	63.7525
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	73.07085
		97.5% Chebyshev (Mean, Sd) UCL	79.71246
		99% Chebyshev (Mean, Sd) UCL	92.7586

Cobalt

Data File		Variable:	Cobalt
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.113174
Number of Unique Samples	85	Lilliefors 5% Critical Value	0.08088
Minimum	5.5	Data not normal at 5% significance level	
Maximum	28.6		
Mean	14.92583	95% UCL (Assuming Normal Distribution)	
Median	14.05	Student's-t UCL	15.69178
Standard Deviation	5.061363		
Variance	25.61739	Gamma Distribution Test	
Coefficient of Variation	0.339101	A-D Test Statistic	0.444026
Skewness	0.781226	A-D 5% Critical Value	0.752479
		K-S Test Statistic	0.069319
Gamma Statistics		K-S 5% Critical Value	0.084274
k hat	9.058491	Data follow gamma distribution	
k star (bias corrected)	8.837584	at 5% significance level	
Theta hat	1.647717		
Theta star	1.688904	95% UCLs (Assuming Gamma Distribution)	
nu hat	2174.038	Approximate Gamma UCL	15.71104
nu star	2121.02	Adjusted Gamma UCL	15.72072
Approx.Chi Square Value (.05)	2015.016		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	2013.775	Lilliefors Test Statisitic	0.051083
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	1.704748		
Maximum of log data	3.353407	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.646882	95% H-UCL	15.78461
Standard Deviation of log data	0.340027	95% Chebyshev (MVUE) UCL	17.0174
Variance of log data	0.115618	97.5% Chebyshev (MVUE) UCL	17.91538
		99% Chebyshev (MVUE) UCL	19.67929
		95% Non-parametric UCLs	
		CLT UCL	15.68582
		Adj-CLT UCL (Adjusted for skewness)	15.72102
		Mod-t UCL (Adjusted for skewness)	15.69727
		Jackknife UCL	15.69178
		Standard Bootstrap UCL	15.70392
		Bootstrap-t UCL	15.72024
RECOMMENDATION		Hall's Bootstrap UCL	15.74511
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	15.70833
		BCA Bootstrap UCL	15.7625
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	16.93981
		97.5% Chebyshev (Mean, Sd) UCL	17.81125
		99% Chebyshev (Mean, Sd) UCL	19.52304

Copper

Data File		Variable:	Copper
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.101194
Number of Unique Samples	111	Lilliefors 5% Critical Value	0.08088
Minimum	3.6	Data not normal at 5% significance level	
Maximum	118		
Mean	35.42667	95% UCL (Assuming Normal Distribution)	
Median	31.05	Student's-t UCL	38.58348
Standard Deviation	20.86016		
Variance	435.1462	Gamma Distribution Test	
Coefficient of Variation	0.588826	A-D Test Statistic	0.547904
Skewness	1.320619	A-D 5% Critical Value	0.758912
		K-S Test Statistic	0.067318
Gamma Statistics		K-S 5% Critical Value	0.084868
k hat	3.000684	Data follow gamma distribution	
k star (bias corrected)	2.931222	at 5% significance level	
Theta hat	11.8062		
Theta star	12.08597	95% UCLs (Assuming Gamma Distribution)	
nu hat	720.164	Approximate Gamma UCL	38.7632
nu star	703.4933	Adjusted Gamma UCL	38.80522
Approx.Chi Square Value (.05)	642.9402		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	642.2441	Lilliefors Test Statisitic	0.097646
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.280934		
Maximum of log data	4.770685	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.391679	95% H-UCL	40.30044
Standard Deviation of log data	0.625793	95% Chebyshev (MVUE) UCL	45.83056
Variance of log data	0.391617	97.5% Chebyshev (MVUE) UCL	50.05265
		99% Chebyshev (MVUE) UCL	58.34613
		95% Non-parametric UCLs	
		CLT UCL	38.5589
		Adj-CLT UCL (Adjusted for skewness)	38.8042
		Mod-t UCL (Adjusted for skewness)	38.62174
		Jackknife UCL	38.58348
		Standard Bootstrap UCL	38.56892
		Bootstrap-t UCL	38.86613
RECOMMENDATION		Hall's Bootstrap UCL	39.079
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	38.715
		BCA Bootstrap UCL	38.83333
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	43.72716
		97.5% Chebyshev (Mean, Sd) UCL	47.31879
		99% Chebyshev (Mean, Sd) UCL	54.37385

Iron

Data File		Variable:	Iron
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.10298
Number of Unique Samples	102	Lilliefors 5% Critical Value	0.08088
Minimum	10500	Data not normal at 5% significance level	
Maximum	67000		
Mean	33865.83	95% UCL (Assuming Normal Distribution)	
Median	30900	Student's-t UCL	35676.55
Standard Deviation	11965.17		
Variance	1.43E+08	Gamma Distribution Test	
Coefficient of Variation	0.353311	A-D Test Statistic	1.568338
Skewness	0.25022	A-D 5% Critical Value	0.753247
		K-S Test Statistic	0.119201
Gamma Statistics		K-S 5% Critical Value	0.084329
k hat	7.63857	Data do not follow gamma distribution	
k star (bias corrected)	7.453161	at 5% significance level	
Theta hat	4433.531		
Theta star	4543.822	95% UCLs (Assuming Gamma Distribution)	
nu hat	1833.257	Approximate Gamma UCL	35812.95
nu star	1788.759	Adjusted Gamma UCL	35837.01
Approx.Chi Square Value (.05)	1691.506		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	1690.37	Lilliefors Test Statisitic	0.129045
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	9.259131		
Maximum of log data	11.11245	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	10.36328	95% H-UCL	36148.53
Standard Deviation of log data	0.377425	95% Chebyshev (MVUE) UCL	39262.67
Variance of log data	0.142449	97.5% Chebyshev (MVUE) UCL	41543.46
		99% Chebyshev (MVUE) UCL	46023.64
		95% Non-parametric UCLs	
		CLT UCL	35662.45
		Adj-CLT UCL (Adjusted for skewness)	35689.11
		Mod-t UCL (Adjusted for skewness)	35680.7
		Jackknife UCL	35676.55
		Standard Bootstrap UCL	35632.49
		Bootstrap-t UCL	35660.62
RECOMMENDATION		Hall's Bootstrap UCL	35702.04
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	35625
		BCA Bootstrap UCL	35675
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	38626.91
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	40687.03
		99% Chebyshev (Mean, Sd) UCL	44733.74

Lead

Data File		Variable:	Lead
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.262585
Number of Unique Samples	104	Lilliefors 5% Critical Value	0.08088
Minimum	6.1	Data not normal at 5% significance level	
Maximum	168		
Mean	28.39833	95% UCL (Assuming Normal Distribution)	
Median	17.6	Student's-t UCL	33.04704
Standard Deviation	30.71857		
Variance	943.6302	Gamma Distribution Test	
Coefficient of Variation	1.081703	A-D Test Statistic	5.422623
Skewness	2.669676	A-D 5% Critical Value	0.769439
		K-S Test Statistic	0.172082
Gamma Statistics		K-S 5% Critical Value	0.085795
k hat	1.568407	Data do not follow gamma distribution	
k star (bias corrected)	1.534753	at 5% significance level	
Theta hat	18.10648		
Theta star	18.50353	95% UCLs (Assuming Gamma Distribution)	
nu hat	376.4177	Approximate Gamma UCL	32.19999
nu star	368.3406	Adjusted Gamma UCL	32.24881
Approx.Chi Square Value (.05)	324.8529		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	324.3611	Lilliefors Test Statisitic	0.116205
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.808289		
Maximum of log data	5.123964	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.99484	95% H-UCL	30.96922
Standard Deviation of log data	0.770663	95% Chebyshev (MVUE) UCL	36.07167
Variance of log data	0.593921	97.5% Chebyshev (MVUE) UCL	40.08107
		99% Chebyshev (MVUE) UCL	47.95676
		95% Non-parametric UCLs	
		CLT UCL	33.01085
		Adj-CLT UCL (Adjusted for skewness)	33.74107
		Mod-t UCL (Adjusted for skewness)	33.16094
		Jackknife UCL	33.04704
		Standard Bootstrap UCL	32.89471
		Bootstrap-t UCL	34.14361
RECOMMENDATION		Hall's Bootstrap UCL	34.14663
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	33.33917
		BCA Bootstrap UCL	33.96333
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	40.62159
		97.5% Chebyshev (Mean, Sd) UCL	45.91061
		99% Chebyshev (Mean, Sd) UCL	56.29986

Mercury

Data File		Variable:	Mercury
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.167293
Number of Unique Samples	83	Lilliefors 5% Critical Value	0.08088
Minimum	0.055	Data not normal at 5% significance level	
Maximum	2.4		
Mean	0.6235	95% UCL (Assuming Normal Distribution)	
Median	0.45	Student's-t UCL	0.704507
Standard Deviation	0.535292		
Variance	0.286537	Gamma Distribution Test	
Coefficient of Variation	0.858527	A-D Test Statistic	0.992889
Skewness	1.500721	A-D 5% Critical Value	0.769139
		K-S Test Statistic	0.073672
Gamma Statistics		K-S 5% Critical Value	0.085767
k hat	1.599728	Data follow approximate gamma distibution	
k star (bias corrected)	1.56529	at 5% significance level	
Theta hat	0.389754		
Theta star	0.398329	95% UCLs (Assuming Gamma Distribution)	
nu hat	383.9346	Approximate Gamma UCL	0.706066
nu star	375.6696	Adjusted Gamma UCL	0.707125
Approx.Chi Square Value (.05)	331.7395		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	331.2425	Lilliefors Test Statisitic	0.036585
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.900422		
Maximum of log data	0.875469	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.816426	95% H-UCL	0.751749
Standard Deviation of log data	0.85842	95% Chebyshev (MVUE) UCL	0.887252
Variance of log data	0.736885	97.5% Chebyshev (MVUE) UCL	0.995856
		99% Chebyshev (MVUE) UCL	1.209189
		95% Non-parametric UCLs	
		CLT UCL	0.703876
		Adj-CLT UCL (Adjusted for skewness)	0.711029
		Mod-t UCL (Adjusted for skewness)	0.705622
		Jackknife UCL	0.704507
		Standard Bootstrap UCL	0.70441
		Bootstrap-t UCL	0.712356
RECOMMENDATION		Hall's Bootstrap UCL	0.707723
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	0.704417
		BCA Bootstrap UCL	0.713708
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.836499
		97.5% Chebyshev (Mean, Sd) UCL	0.928663
		99% Chebyshev (Mean, Sd) UCL	1.109703

Molybdenum

Data File		Variable:	Molybdenum
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.458891
Number of Unique Samples	18	Lilliefors 5% Critical Value	0.08088
Minimum	0.0485	Data not normal at 5% significance level	
Maximum	2.5		
Mean	0.157738	95% UCL (Assuming Normal Distribution)	
Median	0.11	Student's-t UCL	0.199609
Standard Deviation	0.276687		
Variance	0.076556	Gamma Distribution Test	
Coefficient of Variation	1.754097	A-D Test Statistic	33.09292
Skewness	7.353931	A-D 5% Critical Value	0.764574
		K-S Test Statistic	0.431787
Gamma Statistics		K-S 5% Critical Value	0.085346
k hat	2.114585	Data do not follow gamma distribution	
k star (bias corrected)	2.067276	at 5% significance level	
Theta hat	0.074595		
Theta star	0.076302	95% UCLs (Assuming Gamma Distribution)	
nu hat	507.5005	Approximate Gamma UCL	0.175676
nu star	496.1463	Adjusted Gamma UCL	0.175904
Approx.Chi Square Value (.05)	445.4835		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	444.9059	Lilliefors Test Statisitic	0.382632
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.026191		
Maximum of log data	0.916291	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.101533	95% H-UCL	0.147395
Standard Deviation of log data	0.467927	95% Chebyshev (MVUE) UCL	0.162906
Variance of log data	0.218956	97.5% Chebyshev (MVUE) UCL	0.174428
		99% Chebyshev (MVUE) UCL	0.197062
		95% Non-parametric UCLs	
		CLT UCL	0.199283
		Adj-CLT UCL (Adjusted for skewness)	0.217401
		Mod-t UCL (Adjusted for skewness)	0.202435
		Jackknife UCL	0.199609
		Standard Bootstrap UCL	0.199181
		Bootstrap-t UCL	0.344189
RECOMMENDATION		Hall's Bootstrap UCL	0.364158
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.202083
		BCA Bootstrap UCL	0.222408
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.267834
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.315473
		99% Chebyshev (Mean, Sd) UCL	0.409051

Nickel

Data File		Variable:	Nickel
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.249555
Number of Unique Samples	111	Lilliefors 5% Critical Value	0.08088
Minimum	2.4	Data not normal at 5% significance level	
Maximum	474		
Mean	94.7225	95% UCL (Assuming Normal Distribution)	
Median	52.9	Student's-t UCL	110.0975
Standard Deviation	101.5977		
Variance	10322.1	Gamma Distribution Test	
Coefficient of Variation	1.072583	A-D Test Statistic	4.222255
Skewness	1.825162	A-D 5% Critical Value	0.776828
		K-S Test Statistic	0.159937
Gamma Statistics		K-S 5% Critical Value	0.086351
k hat	1.242089	Data do not follow gamma distribution	
k star (bias corrected)	1.216593	at 5% significance level	
Theta hat	76.26063		
Theta star	77.85885	95% UCLs (Assuming Gamma Distribution)	
nu hat	298.1014	Approximate Gamma UCL	109.1469
nu star	291.9822	Adjusted Gamma UCL	109.3338
Approx.Chi Square Value (.05)	253.3949		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	252.9619	Lilliefors Test Statisitic	0.091701
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	0.875469		
Maximum of log data	6.161207	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	4.09719	95% H-UCL	112.9695
Standard Deviation of log data	0.943461	95% Chebyshev (MVUE) UCL	134.9029
Variance of log data	0.89012	97.5% Chebyshev (MVUE) UCL	152.859
		99% Chebyshev (MVUE) UCL	188.1304
		95% Non-parametric UCLs	
		CLT UCL	109.9778
		Adj-CLT UCL (Adjusted for skewness)	111.6289
		Mod-t UCL (Adjusted for skewness)	110.355
		Jackknife UCL	110.0975
		Standard Bootstrap UCL	109.7806
		Bootstrap-t UCL	112.0104
RECOMMENDATION		Hall's Bootstrap UCL	112.3087
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	110.3842
		BCA Bootstrap UCL	111.7183
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	135.1494
		97.5% Chebyshev (Mean, Sd) UCL	152.6421
		99% Chebyshev (Mean, Sd) UCL	187.0032

Selenium

Data File		Variable:	Selenium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.341555
Number of Unique Samples	43	Lilliefors 5% Critical Value	0.08088
Minimum	0.12	Data not normal at 5% significance level	
Maximum	3.1		
Mean	0.519208	95% UCL (Assuming Normal Distribution)	
Median	0.28	Student's-t UCL	0.60814
Standard Deviation	0.587658		
Variance	0.345342	Gamma Distribution Test	
Coefficient of Variation	1.131835	A-D Test Statistic	19.53689
Skewness	2.977262	A-D 5% Critical Value	0.767138
		K-S Test Statistic	0.329556
Gamma Statistics		K-S 5% Critical Value	0.085579
k hat	1.808647	Data do not follow gamma distribution	
k star (bias corrected)	1.768986	at 5% significance level	
Theta hat	0.28707		
Theta star	0.293506	95% UCLs (Assuming Gamma Distribution)	
nu hat	434.0753	Approximate Gamma UCL	0.583496
nu star	424.5567	Adjusted Gamma UCL	0.584318
Approx.Chi Square Value (.05)	377.7805		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	377.2494	Lilliefors Test Statisitic	0.306524
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.120264		
Maximum of log data	1.131402	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.956685	95% H-UCL	0.531846
Standard Deviation of log data	0.650005	95% Chebyshev (MVUE) UCL	0.607349
Variance of log data	0.422506	97.5% Chebyshev (MVUE) UCL	0.665255
		99% Chebyshev (MVUE) UCL	0.779
		95% Non-parametric UCLs	
		CLT UCL	0.607447
		Adj-CLT UCL (Adjusted for skewness)	0.623027
		Mod-t UCL (Adjusted for skewness)	0.61057
		Jackknife UCL	0.60814
		Standard Bootstrap UCL	0.60915
		Bootstrap-t UCL	0.626669
RECOMMENDATION		Hall's Bootstrap UCL	0.62586
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.614458
		BCA Bootstrap UCL	0.618917
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.753044
		97.5% Chebyshev (Mean, Sd) UCL	0.854225
		99% Chebyshev (Mean, Sd) UCL	1.052975

Thallium

Data File		Variable:	Thallium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.301467
Number of Unique Samples	54	Lilliefors 5% Critical Value	0.08088
Minimum	0.085	Data not normal at 5% significance level	
Maximum	3.7		
Mean	0.87325	95% UCL (Assuming Normal Distribution)	
Median	0.3025	Student's-t UCL	1.010574
Standard Deviation	0.907435		
Variance	0.823438	Gamma Distribution Test	
Coefficient of Variation	1.039147	A-D Test Statistic	9.975569
Skewness	1.246716	A-D 5% Critical Value	0.779513
		K-S Test Statistic	0.267291
Gamma Statistics		K-S 5% Critical Value	0.086549
k hat	1.139245	Data do not follow gamma distribution	
k star (bias corrected)	1.116319	at 5% significance level	
Theta hat	0.766516		
Theta star	0.782258	95% UCLs (Assuming Gamma Distribution)	
nu hat	273.4188	Approximate Gamma UCL	1.012787
nu star	267.9167	Adjusted Gamma UCL	1.014601
Approx.Chi Square Value (.05)	231.0044		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	230.5914	Lilliefors Test Statisitic	0.238296
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.465104		
Maximum of log data	1.308333	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.634794	95% H-UCL	1.042755
Standard Deviation of log data	0.981257	95% Chebyshev (MVUE) UCL	1.251238
Variance of log data	0.962866	97.5% Chebyshev (MVUE) UCL	1.423645
		99% Chebyshev (MVUE) UCL	1.762305
		95% Non-parametric UCLs	
		CLT UCL	1.009505
		Adj-CLT UCL (Adjusted for skewness)	1.019578
		Mod-t UCL (Adjusted for skewness)	1.012145
		Jackknife UCL	1.010574
		Standard Bootstrap UCL	1.005407
		Bootstrap-t UCL	1.022674
RECOMMENDATION		Hall's Bootstrap UCL	1.024357
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.011375
		BCA Bootstrap UCL	1.010792
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	1.234329
		97.5% Chebyshev (Mean, Sd) UCL	1.390567
		99% Chebyshev (Mean, Sd) UCL	1.697469

Vanadium

Data File		Variable:	Vanadium
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.098267
Number of Unique Samples	111	Lilliefors 5% Critical Value	0.08088
Minimum	20.9	Data not normal at 5% significance level	
Maximum	104		
Mean	48.47	95% UCL (Assuming Normal Distribution)	
Median	46.85	Student's-t UCL	51.1561
Standard Deviation	17.74973		
Variance	315.053	Gamma Distribution Test	
Coefficient of Variation	0.3662	A-D Test Statistic	0.389537
Skewness	0.846855	A-D 5% Critical Value	0.753117
		K-S Test Statistic	0.060073
Gamma Statistics		K-S 5% Critical Value	0.084319
k hat	7.879019	Data follow gamma distribution	
k star (bias corrected)	7.687599	at 5% significance level	
Theta hat	6.151781		
Theta star	6.304959	95% UCLs (Assuming Gamma Distribution)	
nu hat	1890.965	Approximate Gamma UCL	51.21207
nu star	1845.024	Adjusted Gamma UCL	51.24594
Approx.Chi Square Value (.05)	1746.235		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	1745.081	Lilliefors Test Statisitic	0.05721
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	3.039749		
Maximum of log data	4.644391	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.816145	95% H-UCL	51.44994
Standard Deviation of log data	0.363434	95% Chebyshev (MVUE) UCL	55.72793
Variance of log data	0.132084	97.5% Chebyshev (MVUE) UCL	58.85466
		99% Chebyshev (MVUE) UCL	64.99653
		95% Non-parametric UCLs	
		CLT UCL	51.13519
		Adj-CLT UCL (Adjusted for skewness)	51.26904
		Mod-t UCL (Adjusted for skewness)	51.17698
		Jackknife UCL	51.1561
		Standard Bootstrap UCL	51.11947
		Bootstrap-t UCL	51.15991
RECOMMENDATION		Hall's Bootstrap UCL	51.28321
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	51.17917
		BCA Bootstrap UCL	51.26417
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	55.53282
		97.5% Chebyshev (Mean, Sd) UCL	58.58891
		99% Chebyshev (Mean, Sd) UCL	64.592

Zinc

Data File		Variable:	Zinc
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	120	Lilliefors Test Statisitic	0.22002
Number of Unique Samples	103	Lilliefors 5% Critical Value	0.08088
Minimum	27.5	Data not normal at 5% significance level	
Maximum	901		
Mean	103.4842	95% UCL (Assuming Normal Distribution)	
Median	96.1	Student's-t UCL	116.1035
Standard Deviation	83.38855		
Variance	6953.65	Gamma Distribution Test	
Coefficient of Variation	0.80581	A-D Test Statistic	2.276642
Skewness	7.476429	A-D 5% Critical Value	0.757059
		K-S Test Statistic	0.111717
Gamma Statistics		K-S 5% Critical Value	0.084673
k hat	3.732732	Data do not follow gamma distribution	
k star (bias corrected)	3.64497	at 5% significance level	
Theta hat	27.72344		
Theta star	28.39095	95% UCLs (Assuming Gamma Distribution)	
nu hat	895.8558	Approximate Gamma UCL	112.1589
nu star	874.7927	Adjusted Gamma UCL	112.2676
Approx.Chi Square Value (.05)	807.1332		
Adjusted Level of Significance	0.048	Lognormal Distribution Test	
Adjusted Chi Square Value	806.3519	Lilliefors Test Statisitic	0.113701
		Lilliefors 5% Critical Value	0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	3.314186		
Maximum of log data	6.803505	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	4.499529	95% H-UCL	110.5217
Standard Deviation of log data	0.495878	95% Chebyshev (MVUE) UCL	122.7915
Variance of log data	0.245895	97.5% Chebyshev (MVUE) UCL	131.9485
		99% Chebyshev (MVUE) UCL	149.9356
		95% Non-parametric UCLs	
		CLT UCL	116.0053
		Adj-CLT UCL (Adjusted for skewness)	121.5566
		Mod-t UCL (Adjusted for skewness)	116.9694
		Jackknife UCL	116.1035
		Standard Bootstrap UCL	115.904
		Bootstrap-t UCL	125.9355
RECOMMENDATION		Hall's Bootstrap UCL	172.0571
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	117.3917
		BCA Bootstrap UCL	122.7725
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	136.6654
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	151.023
		99% Chebyshev (Mean, Sd) UCL	179.2256

Statistical Data Summary and Selection of the 95% UCL
Surface Background Soil (0–2 feet bgs)

Chemical	Frequency of Detections	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Arithmetic Mean (mg/kg)	Standard Deviation (mg/kg)	Mean of Log Data (mg/kg)	Standard Deviation of Log Data (mg/kg)	Arithmetic 95% UCL (mg/kg)	Land's 95% UCL (mg/kg)	Gamma 95% UCL (mg/kg)	Approximate Chebyshev Limit on 95% UCL (mg/kg)	ProUCL Recommendation	Distribution Dependent 95% UCL (mg/kg)	Final 95% UCL (mg/kg)	Basis for Final 95% UCL
Arsenic	15/19	0.435	15.6	3.00E+00	3.75E+00	5.92E-01	9.91E-01	4.49E+00	5.44E+00	4.60E+00	6.75E+00	Data are lognormal (0.05)	5.44E+00	5.44E+00	Statistics
Cadmium	3/19	0.11	3.19	3.26E-01	7.04E-01	-1.84E+00	9.91E-01	6.06E-01	4.75E-01	5.42E-01	1.03E+00	Data are Non-parametric (0.05)	1.03E+00	1.03E+00	Statistics

Acronyms/Abbreviations:
bgs – below ground surface
mg/kg – milligrams per kilogram
UCL – upper confidence limit

Statistical Data Summary and Selection of the 95% UCL
Surface Background Soil (0–2 feet bgs)

ProUCL Recommendation	Mean	Standard Deviation	Mean of Log Data	Standard Deviation of Log Data	Student-t 95% UCL	Land-H 95% UCL	Gamma 95% UCL	Nonparametric Chebyshev 95% UCL
'Arsenic'!a42	'Arsenic'!d8	'Arsenic'!d10	'Arsenic'!d29	'Arsenic'!d30	'Arsenic'!i9	'Arsenic'!i29	'Arsenic'!i20	'Arsenic'!i44
'Cadmium'!a42	'Cadmium'!d8	'Cadmium'!d10	'Cadmium'!d29	'Cadmium'!d30	'Cadmium'!i9	'Cadmium'!i29	'Cadmium'!i20	'Cadmium'!i44

ARSENIC

Data File		Variable:	ARSENIC
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	19	Shapiro-Wilk Test Statisitic	0.654405
Number of Unique Samples	19	Shapiro-Wilk 5% Critical Value	0.901
Minimum	0.34	Data not normal at 5% significance level	
Maximum	15.6		
Mean	2.998947	95% UCL (Assuming Normal Distribution)	
Median	1.68	Student's-t UCL	4.489728
Standard Deviation	3.74736		
Variance	14.04271	Gamma Distribution Test	
Coefficient of Variation	1.249558	A-D Test Statistic	0.988623
Skewness	2.519569	A-D 5% Critical Value	0.76617
		K-S Test Statistic	0.261239
Gamma Statistics		K-S 5% Critical Value	0.203757
k hat	1.124491	Data do not follow gamma distribution	
k star (bias corrected)	0.982027	at 5% significance level	
Theta hat	2.666939		
Theta star	3.053834	95% UCLs (Assuming Gamma Distribution)	
nu hat	42.73064	Approximate Gamma UCL	4.599953
nu star	37.31703	Adjusted Gamma UCL	4.779894
Approx.Chi Square Value (.05)	24.3289		
Adjusted Level of Significance	0.03687	Lognormal Distribution Test	
Adjusted Chi Square Value	23.41303	Shapiro-Wilk Test Statisitic	0.950384
		Shapiro-Wilk 5% Critical Value	0.901
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-1.07881		
Maximum of log data	2.747271	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.591731	95% H-UCL	5.438436
Standard Deviation of log data	0.991419	95% Chebyshev (MVUE) UCL	5.993524
Variance of log data	0.982911	97.5% Chebyshev (MVUE) UCL	7.354058
		99% Chebyshev (MVUE) UCL	10.02656
		95% Non-parametric UCLs	
		CLT UCL	4.413034
		Adj-CLT UCL (Adjusted for skewness)	4.944014
		Mod-t UCL (Adjusted for skewness)	4.57255
		Jackknife UCL	4.489728
		Standard Bootstrap UCL	4.365771
		Bootstrap-t UCL	6.04799
RECOMMENDATION		Hall's Bootstrap UCL	5.667769
Data are lognormal (0.05)		Percentile Bootstrap UCL	4.530789
		BCA Bootstrap UCL	4.990526
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	6.746307
		97.5% Chebyshev (Mean, Sd) UCL	8.367793
		99% Chebyshev (Mean, Sd) UCL	11.55289

CADMIUM

Data File		Variable:	CADMIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	19	Shapiro-Wilk Test Statisitic	0.368769
Number of Unique Samples	18	Shapiro-Wilk 5% Critical Value	0.901
Minimum	0.04	Data not normal at 5% significance level	
Maximum	3.19		
Mean	0.325816	95% UCL (Assuming Normal Distribution)	
Median	0.1525	Student's-t UCL	0.605787
Standard Deviation	0.703762		
Variance	0.495281	Gamma Distribution Test	
Coefficient of Variation	2.16	A-D Test Statistic	2.414817
Skewness	4.160432	A-D 5% Critical Value	0.776151
		K-S Test Statistic	0.367249
Gamma Statistics		K-S 5% Critical Value	0.205603
k hat	0.818832	Data do not follow gamma distribution	
k star (bias corrected)	0.724631	at 5% significance level	
Theta hat	0.397903		
Theta star	0.44963	95% UCLs (Assuming Gamma Distribution)	
nu hat	31.11562	Approximate Gamma UCL	0.541592
nu star	27.53596	Adjusted Gamma UCL	0.567004
Approx.Chi Square Value (.05)	16.56533		
Adjusted Level of Significance	0.03687	Lognormal Distribution Test	
Adjusted Chi Square Value	15.8229	Shapiro-Wilk Test Statisitic	0.841438
		Shapiro-Wilk 5% Critical Value	0.901
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.218876		
Maximum of log data	1.160021	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.84402	95% H-UCL	0.475232
Standard Deviation of log data	0.990547	95% Chebyshev (MVUE) UCL	0.523936
Variance of log data	0.981183	97.5% Chebyshev (MVUE) UCL	0.642813
		99% Chebyshev (MVUE) UCL	0.876323
		95% Non-parametric UCLs	
		CLT UCL	0.591384
		Adj-CLT UCL (Adjusted for skewness)	0.756045
		Mod-t UCL (Adjusted for skewness)	0.631471
		Jackknife UCL	0.605787
		Standard Bootstrap UCL	0.586492
		Bootstrap-t UCL	1.765302
RECOMMENDATION		Hall's Bootstrap UCL	1.443828
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.635237
		BCA Bootstrap UCL	0.821553
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	1.029578
		97.5% Chebyshev (Mean, Sd) UCL	1.334096
		99% Chebyshev (Mean, Sd) UCL	1.932263

Statistical Data Summary and Selection of the 95% UCL
Vadose Zone Background Soil (0–7 feet bgs)

Chemical	Frequency of Detections	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Arithmetic Mean (mg/kg)	Standard Deviation (mg/kg)	Mean of Log Data (mg/kg)	Standard Deviation of Log Data (mg/kg)	Arithmetic 95% UCL (mg/kg)	Land's 95% UCL (mg/kg)	Gamma 95% UCL (mg/kg)	Approximate Chebyshev Limit on 95% UCL (mg/kg)	ProUCL Recommendation	Distribution Dependent 95% UCL (mg/kg)	Final 95% UCL (mg/kg)	Basis for Final 95% UCL
Antimony	16/51	0.7	8.6	1.99E+00	1.77E+00	2.59E-01	1.01E+00	2.41E+00	3.02E+00	2.48E+00	3.08E+00	Data are Non-parametric (0.05)	3.08E+00	3.08E+00	Statistics
Arsenic	41/51	0.435	15.6	2.57E+00	2.73E+00	5.75E-01	8.40E-01	3.21E+00	3.27E+00	3.15E+00	4.23E+00	Data are Non-parametric (0.05)	4.23E+00	4.23E+00	Statistics
Barium	51/51	6.91	156	4.18E+01	2.67E+01	3.58E+00	5.51E-01	4.80E+01	4.83E+01	4.78E+01	5.81E+01	Data are Non-parametric (0.05)	5.81E+01	5.81E+01	Statistics
Beryllium	26/51	0.246	1.47	4.97E-01	3.53E-01	-9.80E-01	8.09E-01	5.80E-01	6.64E-01	5.94E-01	7.12E-01	Data follow gamma distribution (0.05)	5.94E-01	5.94E-01	Statistics
Cadmium	11/51	0.1	3.19	3.41E-01	5.76E-01	-1.72E+00	1.02E+00	4.76E-01	4.25E-01	4.44E-01	6.92E-01	Data are Non-parametric (0.05)	6.92E-01	6.92E-01	Statistics
Chromium	51/51	15.6	66.7	3.05E+01	1.02E+01	3.37E+00	3.03E-01	3.29E+01	3.28E+01	3.28E+01	3.67E+01	Data are Non-parametric (0.05)	3.67E+01	3.67E+01	Statistics
Cobalt	45/51	3.02	49.7	6.19E+00	6.96E+00	1.60E+00	5.57E-01	7.82E+00	6.74E+00	7.26E+00	1.04E+01	Data are Non-parametric (0.05)	1.04E+01	1.04E+01	Statistics
Copper	48/51	3.12	49.1	9.82E+00	9.64E+00	2.04E+00	6.08E-01	1.21E+01	1.10E+01	1.16E+01	1.57E+01	Data are Non-parametric (0.05)	1.57E+01	1.57E+01	Statistics
Iron	51/51	4500	27900	1.02E+04	5.02E+03	9.14E+00	4.06E-01	1.14E+04	1.13E+04	1.13E+04	1.33E+04	Data are Non-parametric (0.05)	1.33E+04	1.33E+04	Statistics
Lead	47/51	0.474	165	9.87E+00	2.47E+01	1.42E+00	1.09E+00	1.57E+01	1.08E+01	1.34E+01	2.50E+01	Data are Non-parametric (0.05)	2.50E+01	2.50E+01	Statistics
Mercury	6/50	0.057	2.71	1.25E-01	3.79E-01	-2.78E+00	8.12E-01	2.15E-01	1.11E-01	1.65E-01	3.59E-01	Data are Non-parametric (0.05)	3.59E-01	3.59E-01	Statistics
Molybdenum	0/16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	51/51	11.5	80.4	2.76E+01	1.24E+01	3.25E+00	3.44E-01	3.05E+01	2.98E+01	3.01E+01	3.51E+01	Data are Non-parametric (0.05)	3.51E+01	3.51E+01	Statistics
Selenium	0/51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thallium	0/51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	51/51	10.5	55.3	2.27E+01	9.31E+00	3.06E+00	3.54E-01	2.49E+01	2.47E+01	2.48E+01	2.84E+01	Data are lognormal (0.05)	2.47E+01	2.47E+01	Statistics
Zinc	50/51	9.98	191	2.73E+01	2.66E+01	3.12E+00	5.24E-01	3.36E+01	2.99E+01	3.16E+01	4.36E+01	Data are Non-parametric (0.05)	4.36E+01	4.36E+01	Statistics

Acronyms/Abbreviations:
bgs – below ground surface
mg/kg – milligrams per kilogram
UCL – upper confidence limit

ANTIMONY

Data File		Variable:	ANTIMONY
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.267463
Number of Unique Samples	32	Lilliefors 5% Critical Value	0.124065
Minimum	0.23	Data not normal at 5% significance level	
Maximum	8.6		
Mean	1.993529	95% UCL (Assuming Normal Distribution)	
Median	1.3	Student's-t UCL	2.409627
Standard Deviation	1.773091		
Variance	3.143852	Gamma Distribution Test	
Coefficient of Variation	0.889423	A-D Test Statistic	1.146455
Skewness	1.423837	A-D 5% Critical Value	0.772319
		K-S Test Statistic	0.164314
Gamma Statistics		K-S 5% Critical Value	0.126981
k hat	1.30282	Data do not follow gamma distribution	
k star (bias corrected)	1.239255	at 5% significance level	
Theta hat	1.530165		
Theta star	1.608651	95% UCLs (Assuming Gamma Distribution)	
nu hat	132.8876	Approximate Gamma UCL	2.48434
nu star	126.404	Adjusted Gamma UCL	2.500355
Approx.Chi Square Value (.05)	101.4314		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	100.7818	Lilliefors Test Statisitic	0.135202
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.469676		
Maximum of log data	2.151762	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.259378	95% H-UCL	3.021735
Standard Deviation of log data	1.013732	95% Chebyshev (MVUE) UCL	3.694975
Variance of log data	1.027653	97.5% Chebyshev (MVUE) UCL	4.370069
		99% Chebyshev (MVUE) UCL	5.69616
		95% Non-parametric UCLs	
		CLT UCL	2.401918
		Adj-CLT UCL (Adjusted for skewness)	2.454811
		Mod-t UCL (Adjusted for skewness)	2.417877
		Jackknife UCL	2.409627
		Standard Bootstrap UCL	2.398384
		Bootstrap-t UCL	2.48705
RECOMMENDATION		Hall's Bootstrap UCL	2.4941
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	2.416765
		BCA Bootstrap UCL	2.453922
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	3.075767
		97.5% Chebyshev (Mean, Sd) UCL	3.544053
		99% Chebyshev (Mean, Sd) UCL	4.463908

ARSENIC

Data File		Variable:	ARSENIC
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.29368
Number of Unique Samples	46	Lilliefors 5% Critical Value	0.124065
Minimum	0.295	Data not normal at 5% significance level	
Maximum	15.6		
Mean	2.568176	95% UCL (Assuming Normal Distribution)	
Median	1.68	Student's-t UCL	3.207957
Standard Deviation	2.726257		
Variance	7.432475	Gamma Distribution Test	
Coefficient of Variation	1.061553	A-D Test Statistic	1.67438
Skewness	2.841618	A-D 5% Critical Value	0.767362
		K-S Test Statistic	0.193611
Gamma Statistics		K-S 5% Critical Value	0.126418
k hat	1.503941	Data do not follow gamma distribution	
k star (bias corrected)	1.428546	at 5% significance level	
Theta hat	1.707631		
Theta star	1.797756	95% UCLs (Assuming Gamma Distribution)	
nu hat	153.402	Approximate Gamma UCL	3.149706
nu star	145.7117	Adjusted Gamma UCL	3.168513
Approx.Chi Square Value (.05)	118.809		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	118.1038	Lilliefors Test Statisitic	0.130747
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.22078		
Maximum of log data	2.747271	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.575275	95% H-UCL	3.265653
Standard Deviation of log data	0.8401	95% Chebyshev (MVUE) UCL	3.960914
Variance of log data	0.705768	97.5% Chebyshev (MVUE) UCL	4.590143
		99% Chebyshev (MVUE) UCL	5.826143
		95% Non-parametric UCLs	
		CLT UCL	3.196103
		Adj-CLT UCL (Adjusted for skewness)	3.358412
		Mod-t UCL (Adjusted for skewness)	3.233274
		Jackknife UCL	3.207957
		Standard Bootstrap UCL	3.194877
		Bootstrap-t UCL	3.51351
RECOMMENDATION		Hall's Bootstrap UCL	3.615006
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	3.206961
		BCA Bootstrap UCL	3.421902
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	4.232196
		97.5% Chebyshev (Mean, Sd) UCL	4.952219
		99% Chebyshev (Mean, Sd) UCL	6.366564

BARIUM

Data File		Variable:	BARIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.245723
Number of Unique Samples	50	Lilliefors 5% Critical Value	0.124065
Minimum	6.91	Data not normal at 5% significance level	
Maximum	156		
Mean	41.77078	95% UCL (Assuming Normal Distribution)	
Median	32.4	Student's-t UCL	48.03646
Standard Deviation	26.69952		
Variance	712.8642	Gamma Distribution Test	
Coefficient of Variation	0.639191	A-D Test Statistic	1.853192
Skewness	2.115211	A-D 5% Critical Value	0.755707
		K-S Test Statistic	0.187446
Gamma Statistics		K-S 5% Critical Value	0.124955
k hat	3.377317	Data do not follow gamma distribution	
k star (bias corrected)	3.191723	at 5% significance level	
Theta hat	12.36804		
Theta star	13.08722	95% UCLs (Assuming Gamma Distribution)	
nu hat	344.4863	Approximate Gamma UCL	47.75783
nu star	325.5558	Adjusted Gamma UCL	47.94403
Approx.Chi Square Value (.05)	284.7433		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	283.6374	Lilliefors Test Statisitic	0.150362
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.93297		
Maximum of log data	5.049856	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.576906	95% H-UCL	48.2987
Standard Deviation of log data	0.550772	95% Chebyshev (MVUE) UCL	56.26913
Variance of log data	0.30335	97.5% Chebyshev (MVUE) UCL	62.66887
		99% Chebyshev (MVUE) UCL	75.23991
		95% Non-parametric UCLs	
		CLT UCL	47.92037
		Adj-CLT UCL (Adjusted for skewness)	49.10359
		Mod-t UCL (Adjusted for skewness)	48.22102
		Jackknife UCL	48.03646
		Standard Bootstrap UCL	47.86124
		Bootstrap-t UCL	49.65649
RECOMMENDATION		Hall's Bootstrap UCL	49.9936
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	47.71569
		BCA Bootstrap UCL	49.53157
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	58.06731
		97.5% Chebyshev (Mean, Sd) UCL	65.11883
		99% Chebyshev (Mean, Sd) UCL	78.97018

BERYLLIUM

Data File		Variable:	BERYLLIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.15708
Number of Unique Samples	45	Lilliefors 5% Critical Value	0.124065
Minimum	0.075	Data not normal at 5% significance level	
Maximum	1.47		
Mean	0.496598	95% UCL (Assuming Normal Distribution)	
Median	0.38	Student's-t UCL	0.579533
Standard Deviation	0.353405		
Variance	0.124895	Gamma Distribution Test	
Coefficient of Variation	0.711653	A-D Test Statistic	0.485771
Skewness	0.99173	A-D 5% Critical Value	0.763464
		K-S Test Statistic	0.091292
Gamma Statistics		K-S 5% Critical Value	0.12589
k hat	1.937119	Data follow gamma distribution	
k star (bias corrected)	1.836243	at 5% significance level	
Theta hat	0.256359		
Theta star	0.270442	95% UCLs (Assuming Gamma Distribution)	
nu hat	197.5862	Approximate Gamma UCL	0.593819
nu star	187.2968	Adjusted Gamma UCL	0.596919
Approx.Chi Square Value (.05)	156.6323		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	155.8188	Lilliefors Test Statisitic	0.128856
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.590267		
Maximum of log data	0.385262	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.979766	95% H-UCL	0.663798
Standard Deviation of log data	0.809148	95% Chebyshev (MVUE) UCL	0.802869
Variance of log data	0.654721	97.5% Chebyshev (MVUE) UCL	0.926802
		99% Chebyshev (MVUE) UCL	1.170244
		95% Non-parametric UCLs	
		CLT UCL	0.577996
		Adj-CLT UCL (Adjusted for skewness)	0.585339
		Mod-t UCL (Adjusted for skewness)	0.580678
		Jackknife UCL	0.579533
		Standard Bootstrap UCL	0.576651
		Bootstrap-t UCL	0.586945
RECOMMENDATION		Hall's Bootstrap UCL	0.586818
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	0.576853
		BCA Bootstrap UCL	0.584373
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.712305
		97.5% Chebyshev (Mean, Sd) UCL	0.805642
		99% Chebyshev (Mean, Sd) UCL	0.988984

CADMIUM

Data File		Variable:	CADMIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.328635
Number of Unique Samples	41	Lilliefors 5% Critical Value	0.124065
Minimum	0.04	Data not normal at 5% significance level	
Maximum	3.19		
Mean	0.340608	95% UCL (Assuming Normal Distribution)	
Median	0.158	Student's-t UCL	0.475768
Standard Deviation	0.575948		
Variance	0.331716	Gamma Distribution Test	
Coefficient of Variation	1.69094	A-D Test Statistic	3.380001
Skewness	3.774817	A-D 5% Critical Value	0.784487
		K-S Test Statistic	0.282421
Gamma Statistics		K-S 5% Critical Value	0.128332
k hat	0.913639	Data do not follow gamma distribution	
k star (bias corrected)	0.872968	at 5% significance level	
Theta hat	0.372803		
Theta star	0.390172	95% UCLs (Assuming Gamma Distribution)	
nu hat	93.19119	Approximate Gamma UCL	0.444163
nu star	89.04269	Adjusted Gamma UCL	0.447628
Approx.Chi Square Value (.05)	68.28272		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	67.75416	Lilliefors Test Statisitic	0.204057
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.218876		
Maximum of log data	1.160021	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.715703	95% H-UCL	0.424933
Standard Deviation of log data	1.022705	95% Chebyshev (MVUE) UCL	0.519634
Variance of log data	1.045926	97.5% Chebyshev (MVUE) UCL	0.615182
		99% Chebyshev (MVUE) UCL	0.802868
		95% Non-parametric UCLs	
		CLT UCL	0.473263
		Adj-CLT UCL (Adjusted for skewness)	0.518813
		Mod-t UCL (Adjusted for skewness)	0.482872
		Jackknife UCL	0.475768
		Standard Bootstrap UCL	0.470508
		Bootstrap-t UCL	0.659987
RECOMMENDATION		Hall's Bootstrap UCL	0.722407
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.4835
		BCA Bootstrap UCL	0.525186
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.692148
		97.5% Chebyshev (Mean, Sd) UCL	0.844259
		99% Chebyshev (Mean, Sd) UCL	1.143053

CHROMIUM

Data File		Variable:	CHROMIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.197276
Number of Unique Samples	46	Lilliefors 5% Critical Value	0.124065
Minimum	15.6	Data not normal at 5% significance level	
Maximum	66.7		
Mean	30.47647	95% UCL (Assuming Normal Distribution)	
Median	28.4	Student's-t UCL	32.87533
Standard Deviation	10.22212		
Variance	104.4918	Gamma Distribution Test	
Coefficient of Variation	0.33541	A-D Test Statistic	1.01798
Skewness	1.563858	A-D 5% Critical Value	0.749623
		K-S Test Statistic	0.154483
Gamma Statistics		K-S 5% Critical Value	0.124138
k hat	10.73035	Data do not follow gamma distribution	
k star (bias corrected)	10.11222	at 5% significance level	
Theta hat	2.840213		
Theta star	3.013826	95% UCLs (Assuming Gamma Distribution)	
nu hat	1094.495	Approximate Gamma UCL	32.81719
nu star	1031.447	Adjusted Gamma UCL	32.88759
Approx.Chi Square Value (.05)	957.8775		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	955.8272	Lilliefors Test Statisitic	0.13312
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	2.747271		
Maximum of log data	4.200205	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.369635	95% H-UCL	32.8198
Standard Deviation of log data	0.30295	95% Chebyshev (MVUE) UCL	36.13391
Variance of log data	0.091778	97.5% Chebyshev (MVUE) UCL	38.6131
		99% Chebyshev (MVUE) UCL	43.48298
		95% Non-parametric UCLs	
		CLT UCL	32.83089
		Adj-CLT UCL (Adjusted for skewness)	33.16581
		Mod-t UCL (Adjusted for skewness)	32.92758
		Jackknife UCL	32.87533
		Standard Bootstrap UCL	32.73243
		Bootstrap-t UCL	33.34226
RECOMMENDATION		Hall's Bootstrap UCL	33.22528
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	32.94706
		BCA Bootstrap UCL	33.24314
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	36.71573
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	39.41546
		99% Chebyshev (Mean, Sd) UCL	44.71856

COBALT

Data File		Variable:	COBALT
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.288257
Number of Unique Samples	45	Lilliefors 5% Critical Value	0.124065
Minimum	2.08	Data not normal at 5% significance level	
Maximum	49.7		
Mean	6.187745	95% UCL (Assuming Normal Distribution)	
Median	4.35	Student's-t UCL	7.821813
Standard Deviation	6.963153		
Variance	48.4855	Gamma Distribution Test	
Coefficient of Variation	1.125314	A-D Test Statistic	3.574097
Skewness	5.274462	A-D 5% Critical Value	0.760448
		K-S Test Statistic	0.215622
Gamma Statistics		K-S 5% Critical Value	0.125528
k hat	2.417592	Data do not follow gamma distribution	
k star (bias corrected)	2.288453	at 5% significance level	
Theta hat	2.559466		
Theta star	2.703899	95% UCLs (Assuming Gamma Distribution)	
nu hat	246.5944	Approximate Gamma UCL	7.256311
nu star	233.4222	Adjusted Gamma UCL	7.290018
Approx.Chi Square Value (.05)	199.0484		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	198.128	Lilliefors Test Statisitic	0.162766
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	0.732368		
Maximum of log data	3.906005	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.601722	95% H-UCL	6.737082
Standard Deviation of log data	0.556919	95% Chebyshev (MVUE) UCL	7.857992
Variance of log data	0.310159	97.5% Chebyshev (MVUE) UCL	8.75985
		99% Chebyshev (MVUE) UCL	10.53137
		95% Non-parametric UCLs	
		CLT UCL	7.791537
		Adj-CLT UCL (Adjusted for skewness)	8.561012
		Mod-t UCL (Adjusted for skewness)	7.941836
		Jackknife UCL	7.821813
		Standard Bootstrap UCL	7.755301
		Bootstrap-t UCL	10.68566
RECOMMENDATION		Hall's Bootstrap UCL	14.46981
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	7.922745
		BCA Bootstrap UCL	9.081275
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	10.43783
		97.5% Chebyshev (Mean, Sd) UCL	12.27685
		99% Chebyshev (Mean, Sd) UCL	15.88924

COPPER

Data File		Variable:	COPPER
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.307199
Number of Unique Samples	48	Lilliefors 5% Critical Value	0.124065
Minimum	3.12	Data not normal at 5% significance level	
Maximum	49.1		
Mean	9.819216	95% UCL (Assuming Normal Distribution)	
Median	6.9	Student's-t UCL	12.08248
Standard Deviation	9.644288		
Variance	93.01228	Gamma Distribution Test	
Coefficient of Variation	0.982185	A-D Test Statistic	4.014161
Skewness	3.049607	A-D 5% Critical Value	0.76157
		K-S Test Statistic	0.244743
Gamma Statistics		K-S 5% Critical Value	0.125658
k hat	2.226401	Data do not follow gamma distribution	
k star (bias corrected)	2.108508	at 5% significance level	
Theta hat	4.410353		
Theta star	4.656949	95% UCLs (Assuming Gamma Distribution)	
nu hat	227.0929	Approximate Gamma UCL	11.59553
nu star	215.0679	Adjusted Gamma UCL	11.65178
Approx.Chi Square Value (.05)	182.1217		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	181.2425	Lilliefors Test Statisitic	0.189524
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	1.137833		
Maximum of log data	3.893859	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.043264	95% H-UCL	10.97816
Standard Deviation of log data	0.607971	95% Chebyshev (MVUE) UCL	12.92295
Variance of log data	0.369629	97.5% Chebyshev (MVUE) UCL	14.51543
		99% Chebyshev (MVUE) UCL	17.64353
		95% Non-parametric UCLs	
		CLT UCL	12.04054
		Adj-CLT UCL (Adjusted for skewness)	12.65675
		Mod-t UCL (Adjusted for skewness)	12.17859
		Jackknife UCL	12.08248
		Standard Bootstrap UCL	11.98587
		Bootstrap-t UCL	13.41112
RECOMMENDATION		Hall's Bootstrap UCL	12.69654
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	12.16784
		BCA Bootstrap UCL	12.62078
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	15.70578
		97.5% Chebyshev (Mean, Sd) UCL	18.2529
		99% Chebyshev (Mean, Sd) UCL	23.25623

IRON

Data File		Variable:	IRON
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.249835
Number of Unique Samples	50	Lilliefors 5% Critical Value	0.124065
Minimum	4500	Data not normal at 5% significance level	
Maximum	27900		
Mean	10223.33	95% UCL (Assuming Normal Distribution)	
Median	8520	Student's-t UCL	11401.58
Standard Deviation	5020.791		
Variance	25208339	Gamma Distribution Test	
Coefficient of Variation	0.491111	A-D Test Statistic	1.83039
Skewness	1.966052	A-D 5% Critical Value	0.753066
		K-S Test Statistic	0.207251
Gamma Statistics		K-S 5% Critical Value	0.124463
k hat	5.73152	Data do not follow gamma distribution	
k star (bias corrected)	5.407443	at 5% significance level	
Theta hat	1783.704		
Theta star	1890.604	95% UCLs (Assuming Gamma Distribution)	
nu hat	584.615	Approximate Gamma UCL	11321.07
nu star	551.5592	Adjusted Gamma UCL	11354.61
Approx.Chi Square Value (.05)	498.0777		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	496.6066	Lilliefors Test Statisitic	0.178481
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	8.411833		
Maximum of log data	10.23638	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	9.142662	95% H-UCL	11262.58
Standard Deviation of log data	0.405806	95% Chebyshev (MVUE) UCL	12724.02
Variance of log data	0.164678	97.5% Chebyshev (MVUE) UCL	13846.44
		99% Chebyshev (MVUE) UCL	16051.2
		95% Non-parametric UCLs	
		CLT UCL	11379.75
		Adj-CLT UCL (Adjusted for skewness)	11586.56
		Mod-t UCL (Adjusted for skewness)	11433.84
		Jackknife UCL	11401.58
		Standard Bootstrap UCL	11362.15
		Bootstrap-t UCL	11702.29
RECOMMENDATION		Hall's Bootstrap UCL	11752
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	11377.45
		BCA Bootstrap UCL	11565.29
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	13287.86
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	14613.89
		99% Chebyshev (Mean, Sd) UCL	17218.61

LEAD

Data File		Variable:	LEAD
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.354473
Number of Unique Samples	49	Lilliefors 5% Critical Value	0.124065
Minimum	0.474	Data not normal at 5% significance level	
Maximum	165		
Mean	9.872235	95% UCL (Assuming Normal Distribution)	
Median	3.1	Student's-t UCL	15.66938
Standard Deviation	24.70302		
Variance	610.2393	Gamma Distribution Test	
Coefficient of Variation	2.502272	A-D Test Statistic	4.56027
Skewness	5.462908	A-D 5% Critical Value	0.797791
		K-S Test Statistic	0.222484
Gamma Statistics		K-S 5% Critical Value	0.129704
k hat	0.69616	Data do not follow gamma distribution	
k star (bias corrected)	0.668281	at 5% significance level	
Theta hat	14.18099		
Theta star	14.77257	95% UCLs (Assuming Gamma Distribution)	
nu hat	71.00832	Approximate Gamma UCL	13.41629
nu star	68.16469	Adjusted Gamma UCL	13.53761
Approx.Chi Square Value (.05)	50.15826		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	49.70877	Lilliefors Test Statisitic	0.150783
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-0.746548		
Maximum of log data	5.105945	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.420948	95% H-UCL	10.79888
Standard Deviation of log data	1.086472	95% Chebyshev (MVUE) UCL	13.19536
Variance of log data	1.180421	97.5% Chebyshev (MVUE) UCL	15.72903
		99% Chebyshev (MVUE) UCL	20.70592
		95% Non-parametric UCLs	
		CLT UCL	15.56197
		Adj-CLT UCL (Adjusted for skewness)	18.38935
		Mod-t UCL (Adjusted for skewness)	16.1104
		Jackknife UCL	15.66938
		Standard Bootstrap UCL	15.69511
		Bootstrap-t UCL	31.62933
RECOMMENDATION		Hall's Bootstrap UCL	37.58374
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	16.19353
		BCA Bootstrap UCL	19.13745
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	24.95017
		97.5% Chebyshev (Mean, Sd) UCL	31.4744
		99% Chebyshev (Mean, Sd) UCL	44.28999

MERCURY

Data File		Variable:	MERCURY
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	50	Shapiro-Wilk Test Statisitic	0.237086
Number of Unique Samples	31	Shapiro-Wilk 5% Critical Value	0.947
Minimum	0.0235	Data not normal at 5% significance level	
Maximum	2.71		
Mean	0.12483	95% UCL (Assuming Normal Distribution)	
Median	0.0525	Student's-t UCL	0.214809
Standard Deviation	0.3795		
Variance	0.14402	Gamma Distribution Test	
Coefficient of Variation	3.040134	A-D Test Statistic	6.995595
Skewness	6.730482	A-D 5% Critical Value	0.788125
		K-S Test Statistic	0.347287
Gamma Statistics		K-S 5% Critical Value	0.129814
k hat	0.847558	Data do not follow gamma distribution	
k star (bias corrected)	0.810038	at 5% significance level	
Theta hat	0.147282		
Theta star	0.154104	95% UCLs (Assuming Gamma Distribution)	
nu hat	84.75577	Approximate Gamma UCL	0.165059
nu star	81.00376	Adjusted Gamma UCL	0.166444
Approx.Chi Square Value (.05)	61.261		
Adjusted Level of Significance	0.0452	Lognormal Distribution Test	
Adjusted Chi Square Value	60.75129	Shapiro-Wilk Test Statisitic	0.806376
		Shapiro-Wilk 5% Critical Value	0.947
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.750755		
Maximum of log data	0.996949	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.775806	95% H-UCL	0.110831
Standard Deviation of log data	0.811667	95% Chebyshev (MVUE) UCL	0.134111
Variance of log data	0.658803	97.5% Chebyshev (MVUE) UCL	0.154988
		99% Chebyshev (MVUE) UCL	0.195996
		95% Non-parametric UCLs	
		CLT UCL	0.213108
		Adj-CLT UCL (Adjusted for skewness)	0.267693
		Mod-t UCL (Adjusted for skewness)	0.223324
		Jackknife UCL	0.214809
		Standard Bootstrap UCL	0.21326
		Bootstrap-t UCL	0.86405
RECOMMENDATION		Hall's Bootstrap UCL	0.570525
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	0.22687
		BCA Bootstrap UCL	0.30861
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	0.358769
		97.5% Chebyshev (Mean, Sd) UCL	0.459995
		99% Chebyshev (Mean, Sd) UCL	0.658834

NICKEL

Data File		Variable:	NICKEL
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.322647
Number of Unique Samples	42	Lilliefors 5% Critical Value	0.124065
Minimum	11.5	Data not normal at 5% significance level	
Maximum	80.4		
Mean	27.57255	95% UCL (Assuming Normal Distribution)	
Median	23.8	Student's-t UCL	30.48479
Standard Deviation	12.40974		
Variance	154.0016	Gamma Distribution Test	
Coefficient of Variation	0.450076	A-D Test Statistic	4.50559
Skewness	2.555253	A-D 5% Critical Value	0.751674
		K-S Test Statistic	0.27391
Gamma Statistics		K-S 5% Critical Value	0.124336
k hat	7.512269	Data do not follow gamma distribution	
k star (bias corrected)	7.083442	at 5% significance level	
Theta hat	3.670336		
Theta star	3.892535	95% UCLs (Assuming Gamma Distribution)	
nu hat	766.2514	Approximate Gamma UCL	30.13249
nu star	722.5111	Adjusted Gamma UCL	30.21013
Approx.Chi Square Value (.05)	661.1292		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	659.4303	Lilliefors Test Statisitic	0.244078
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	2.442347		
Maximum of log data	4.387014	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.248789	95% H-UCL	29.81073
Standard Deviation of log data	0.344292	95% Chebyshev (MVUE) UCL	33.176
Variance of log data	0.118537	97.5% Chebyshev (MVUE) UCL	35.71921
		99% Chebyshev (MVUE) UCL	40.71486
		95% Non-parametric UCLs	
		CLT UCL	30.43083
		Adj-CLT UCL (Adjusted for skewness)	31.09519
		Mod-t UCL (Adjusted for skewness)	30.58841
		Jackknife UCL	30.48479
		Standard Bootstrap UCL	30.42144
		Bootstrap-t UCL	31.59572
RECOMMENDATION		Hall's Bootstrap UCL	31.62906
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	30.50392
		BCA Bootstrap UCL	31.02549
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	35.14706
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	38.42455
		99% Chebyshev (Mean, Sd) UCL	44.86256

VANADIUM

Data File		Variable:	VANADIUM
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.186443
Number of Unique Samples	49	Lilliefors 5% Critical Value	0.124065
Minimum	10.5	Data not normal at 5% significance level	
Maximum	55.3		
Mean	22.70392	95% UCL (Assuming Normal Distribution)	
Median	20.9	Student's-t UCL	24.88778
Standard Deviation	9.305933		
Variance	86.60038	Gamma Distribution Test	
Coefficient of Variation	0.409882	A-D Test Statistic	1.384254
Skewness	1.867018	A-D 5% Critical Value	0.751509
		K-S Test Statistic	0.13859
Gamma Statistics		K-S 5% Critical Value	0.124321
k hat	7.723685	Data do not follow gamma distribution	
k star (bias corrected)	7.282423	at 5% significance level	
Theta hat	2.939519		
Theta star	3.117633	95% UCLs (Assuming Gamma Distribution)	
nu hat	787.8159	Approximate Gamma UCL	24.78079
nu star	742.8071	Adjusted Gamma UCL	24.84373
Approx.Chi Square Value (.05)	680.5527		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	678.8286	Lilliefors Test Statisitic	0.112361
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	2.351375		
Maximum of log data	4.012773	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.056407	95% H-UCL	24.74308
Standard Deviation of log data	0.353952	95% Chebyshev (MVUE) UCL	27.60351
Variance of log data	0.125282	97.5% Chebyshev (MVUE) UCL	29.77052
		99% Chebyshev (MVUE) UCL	34.02718
		95% Non-parametric UCLs	
		CLT UCL	24.84732
		Adj-CLT UCL (Adjusted for skewness)	25.21133
		Mod-t UCL (Adjusted for skewness)	24.94456
		Jackknife UCL	24.88778
		Standard Bootstrap UCL	24.85208
		Bootstrap-t UCL	25.39385
RECOMMENDATION		Hall's Bootstrap UCL	25.25374
Data are lognormal (0.05)		Percentile Bootstrap UCL	24.95098
		BCA Bootstrap UCL	25.16863
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	28.38396
Use Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	30.84172
Use H-UCL		99% Chebyshev (Mean, Sd) UCL	35.66952

ZINC

Data File		Variable:	ZINC
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	51	Lilliefors Test Statisitic	0.296914
Number of Unique Samples	46	Lilliefors 5% Critical Value	0.124065
Minimum	9	Data not normal at 5% significance level	
Maximum	191		
Mean	27.32118	95% UCL (Assuming Normal Distribution)	
Median	20.6	Student's-t UCL	33.57365
Standard Deviation	26.64327		
Variance	709.8636	Gamma Distribution Test	
Coefficient of Variation	0.975187	A-D Test Statistic	3.321466
Skewness	4.993068	A-D 5% Critical Value	0.758018
		K-S Test Statistic	0.203432
Gamma Statistics		K-S 5% Critical Value	0.125245
k hat	2.831726	Data do not follow gamma distribution	
k star (bias corrected)	2.678226	at 5% significance level	
Theta hat	9.648241		
Theta star	10.20122	95% UCLs (Assuming Gamma Distribution)	
nu hat	288.8361	Approximate Gamma UCL	31.63948
nu star	273.179	Adjusted Gamma UCL	31.77475
Approx.Chi Square Value (.05)	235.8943		
Adjusted Level of Significance	0.045294	Lognormal Distribution Test	
Adjusted Chi Square Value	234.8901	Lilliefors Test Statisitic	0.140345
		Lilliefors 5% Critical Value	0.124065
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	2.197225		
Maximum of log data	5.252273	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	3.120822	95% H-UCL	29.9228
Standard Deviation of log data	0.524348	95% Chebyshev (MVUE) UCL	34.68236
Variance of log data	0.274941	97.5% Chebyshev (MVUE) UCL	38.47121
		99% Chebyshev (MVUE) UCL	45.91367
		95% Non-parametric UCLs	
		CLT UCL	33.4578
		Adj-CLT UCL (Adjusted for skewness)	36.24498
		Mod-t UCL (Adjusted for skewness)	34.00839
		Jackknife UCL	33.57365
		Standard Bootstrap UCL	33.32986
		Bootstrap-t UCL	40.80641
RECOMMENDATION		Hall's Bootstrap UCL	57.12329
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	34.00157
		BCA Bootstrap UCL	36.83882
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	43.58337
		97.5% Chebyshev (Mean, Sd) UCL	50.62004
		99% Chebyshev (Mean, Sd) UCL	64.4422

Attachment I3
Air Modeling

Exposure Point Concentrations in Indoor Air
Johnson and Ettinger Model

Chemical	Units	Exposure Point Concentration
Soil[a]		
Acenaphthene	µg/m³	3.19E-03
Acenaphthylene	µg/m³	2.43E-03
Anthracene	µg/m³	6.86E-04
Benzene	µg/m³	1.08E-02
Benzo(g,h,i)Perylene	µg/m³	1.48E-04
Dichloromethane	µg/m³	7.87E-03
Fluorene	µg/m³	4.51E-04
2-Methylnaphthalene	µg/m³	8.22E-03
Naphthalene	µg/m³	1.83E-02
Phenanthrene	µg/m³	2.67E-03
Pyrene	µg/m³	3.92E-04
Xylenes (total)	µg/m³	1.18E-02
Groundwater[b]		
Acenaphthene	µg/m³	9.62E-03
Acenaphthylene	µg/m³	1.25E-02
Acetone	µg/m³	3.12E-04
Anthracene	µg/m³	2.20E-03
Benzene	µg/m³	1.84E-01
Benzo(g,h,i)perylene	µg/m³	1.01E-03
Carbon disulfide	µg/m³	5.46E-03
Dibenzofuran	µg/m³	7.86E-05
1,2-Dichloroethane	µg/m³	1.84E-03
Dichloromethane	µg/m³	3.05E-04
Ethylbenzene	µg/m³	6.94E-02
Fluorene	µg/m³	2.46E-03
4-Isopropyltoluene	µg/m³	2.57E-04
Methane	µg/m³	1.44E-01
Methylnaphthalene	µg/m³	2.39E-04
MTBE	µg/m³	5.13E-04
Naphthalene	µg/m³	5.26E-01
Phenanthrene	µg/m³	2.20E-03
Pyrene	µg/m³	5.47E-03
Styrene	µg/m³	3.62E-03
Toluene	µg/m³	5.56E-02
1,2,4-Trimethylbenzene	µg/m³	8.89E-03
1,3,5-Trimethylbenzene	µg/m³	4.00E-03
Xylenes (total)	µg/m³	9.57E-02

Notes:

[a] based on exposure point concentration in soil

[b] based on exposure point concentration in groundwater

Acronym/Abbreviation:

µg/m³ – micrograms per cubic meter

Soil to Indoor Air
Johnson and Ettinger Vapor Model Input Parameters

Parameters*	Residential Input Values	Reference
Chemical-Specific Parameters		
Soil concentrations (µg/kg)	Chemical-specific	
Organic carbon partition coefficient (cm^3/g)	Provided in Johnson & Ettinger VLOOKUP Tables	U.S. EPA 2004
Henry's law constant (unitless)		
Water diffusion coefficient (cm^2/s)		
Air diffusion coefficient (cm^2/s)		
Other chemical parameters: enthalpy of vaporization, water solubility, boiling point, critical temperature		
Soil Parameters		
Average soil temperature (degrees C)	19.4	Site specific average
Depth below grade to bottom of floor (cm)	15	U.S. EPA 2004
Depth below grade to top of contamination (cm)	15	U.S. EPA 2004
Depth below grade to bottom of contamination (cm)	213.36	Site specific (7 feet)
Soil vapor permeability (cm^2)	1.82E-08	Site specific
Soil stratum	A	
SCS soil type (sandy clay loam)	SCL	Site specific
Thickness of soil stratum (cm)	15	U.S. EPA 2004
Soil dry bulk density (g/cm^3)	1.68	Site specific
Soil total porosity (unitless)	0.37	Site specific
Soil water-filled porosity (unitless)	0.24	Site specific
Soil organic carbon fraction (unitless)	0.004	Site specific
Building Parameters		
Height of structure (cm)	488	Two story house for residential
Length of structure (cm)	1000	U.S. EPA 2004
Width of structure (cm)	1000	U.S. EPA 2004
Floor thickness (cm)	15	J&E 1991
Floor-wall seam crack width (cm)	0.1	U.S. EPA 2004
Soil building pressure differential (g/cm^2-sec)	40	U.S. EPA 2004
Indoor air exchange rate (1/h)	0.66	Murray and Burmaster 1995
Average vapor flow rate into building (L/min)	5	U.S. EPA 2004

Soil to Indoor Air
Johnson and Ettinger Vapor Model Input Parameters

Note:

* parameters listed are chemical and site specific; values calculated by the model and model defaults are not listed

Acronyms/Abbreviations:

cm – centimeter
cm^2 – square centimeters
cm^2/s – square centimeters per second
cm^3/g – cubic centimeters per gram
degrees C – degrees Celsius
g/cm^3 – grams per cubic centimeter
g/cm^2-sec – grams per square centimeter per second
J&E – Johnson and Ettinger
L/min – liters per minute
µg/kg – micrograms per kilogram
1/h – one exchange per hour
SCL – sandy clay loam
SCS – Soil Conservation Service
U.S. EPA – United States Environmental Protection Agency

References:

J&E 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Building. Paul C. Johnson and Robert A. Ettinger. *Environ. Sci. Technol*. 1991, 25, 1445-1452.

Murray, D.M. and D.E. Burmaster. 1995. Residential Air Exchange Rate in the United States: Empirical and Estimated Parametric Distribution by Season and Climatic Region. Risk Analysis. Data presented in U.S. EPA Exposure Factors Handbook, Volume III, 1997.

U.S. EPA 2004. Software Implementation of Johnson and Ettinger Model. Version 3.1. February.

Groundwater to Indoor Air
Johnson and Ettinger Vapor Model Input Parameters

Parameters*	Residential Input Values	Reference
Chemical-Specific Parameters		
Groundwater concentrations (µg/L)	Chemical-specific	
Organic carbon partition coefficient (cm^3/g)	Provided in Johnson & Ettinger VLOOKUP Tables	U.S. EPA 2004
Henry's law constant (unitless)		
Water diffusion coefficient (cm^2/s)		
Air diffusion coefficient (cm^2/s)		
Other chemical parameters:		
enthalpy of vaporization		
water solubility		
boiling point		
critical temperature		
Soil Parameters		
Average soil temperature (degrees C)	19.4	Site specific average
Depth below grade to bottom of floor (cm)	15	U.S. EPA 2004
Depth below grade to water table (cm)	213.36	Site specific (7 feet)
Soil vapor permeability (cm^2)	1.82E-08	Site specific
Soil stratum near the surface	A	
SCS soil type (sandy clay loam)	SCL	Site specific
Thickness of soil stratum (cm)	213.36	Site specific (7 feet)
Soil dry bulk density (g/cm^3)	1.68	Site specific
Soil total porosity (unitless)	0.37	Site specific
Soil water-filled porosity (unitless)	0.24	Site specific
Building Parameters		
Height of structure (cm)	488	Two story house for residential
Length of structure (cm)	1000	U.S. EPA 2004
Width of structure (cm)	1000	U.S. EPA 2004
Floor thickness (cm)	15	J&E 1991
Floor-wall seam crack width (cm)	0.1	U.S. EPA 2004
Soil building pressure differential (g/cm^2-sec)	40	U.S. EPA 2004
Indoor air exchange rate (1/h)	0.66	Murray and Burmaster 1995
Average vapor flow rate into building (L/min)	5	U.S. EPA 2004

Groundwater to Indoor Air
Johnson and Ettinger Vapor Model Input Parameters

Note:

* parameters listed are chemical and site specific; values calculated by the model and model defaults are not listed

Acronyms/Abbreviations:

cm – centimeter
cm^2 – square centimeters
cm^2/s – square centimeters per second
cm^3/g – cubic centimeters per gram
degrees C – degrees Celsius
g/cm^3 – grams per cubic centimeter
g/cm^2-sec – grams per square centimeter per second
J&E – Johnson and Ettinger
L/min – liters per minute
µg/L – micrograms per liter
1/h – one exchange per hour
S – sand
SCS – Soil Conservation Service
U.S. EPA – United States Environmental Protection Agency

References:

J&E 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Building. Paul C. Johnson and Robert A. Ettinger. *Environ. Sci. Technol*. 1991, 25, 1445-1452.

Murray, D.M. and D.E. Burmaster. 1995. Residential Air Exchange Rate in the United States: Empirical and Estimated Parametric Distribution by Season and Climatic Region. Risk Analysis. Data presented in U.S. EPA Exposure Factors Handbook, Volume III, 1997.

U.S. EPA 2004. Software Implementation of Johnson and Ettinger Model. Version 3.1. February.

Johnson and Ettinger Lookup Table for Chemicals Not in the Model by Default

Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Molecular weight, MW (g/mol)
Acenaphthylene	acenaphthene used as a surrogate										
Anthracene	values from U.S. EPA 2001										
Benzo(ghi)perylene	pyrene used as a surrogate										
p-Isopropyltoluene	cumene used as a surrogate										
Methane	methanol used as a surrogate										
Methanol	0.18[b]	0.15[b]	1.64E-5[b]	1E+6[b]	1.94E-4[b]	4.73E-6[b]	25	338[a]	513[a]	8415[a]	32.04[a]
Phenanthrene	anthracene used as a surrogate										
Total xylenes	p-xylene used a surrogate										

Notes:

[a] NIST 2003. National Institute of Standards and Technology Chemistry WebBook. http://webbook.nist.gov/chemistry/

[b] Texas Natual Resource Conservation Commission, Chapter 350 - Texas Risk Reduction Program, Figure 30 TAC §350.73 (e)

Source:

U.S. EPA 2001. Software Implementation of Johnson and Ettinger Model. Version 2.3. March.

Acronyms/Abbreviations:

atm-m³/mol – atmospheres-cubic meters per mol
°C – degrees Celsius
cal/mol – calories per mol
cm²/s – square centimeters per second
cm³/g – cubic centimeters per gram
g/mol – molecular weight of a substance expressed in grams
°K – degrees Kelvin
mg/L – milligrams per liter
NIST – National Institute of Standards and Technology
U.S. EPA – United States Environmental Protection Agency

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_n (µg/kg)	Chemical
83329	3.92E+01	Acenaphthene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.88	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	3.92E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	18,008	9.22E-05	3.84E-03	1.78E-04	4.71E-04	0.00E+00	0.00E+00	4.71E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.83E+01	5.28E+00	0.10	8.33E+01	4.71E-04	4.00E+02	#NUMI	NA	NA	6.65E+00	3.78E-08	5.55E+11	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.05E-04	NA	3.19E-03	3.19E-03	NA	2.1E-01

END

DATA ENTRY SHEET

SL-ADV
Version 3.1: 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_{si} (µg/kg)	Chemical
83329	2.98E+01	Acenaphthene

Surrogate for acenaphthylene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.98E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	16,008	9.22E-05	3.84E-03	1.78E-04	4.71E-04	0.00E+00	0.00E+00	4.71E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.83E+01	4.02E+00	0.10	8.33E+01	4.71E-04	4.00E+02	#NUMI	NA	NA	6.65E+00	3.78E-08	5.55E+11	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.05E-04	NA	2.43E-03	2.43E-03	NA	2.1E-01

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
120127	6.81E+01	Anthracene

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28): Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	6.81E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	18,233	3.61E-05	1.50E-03	1.78E-04	5.90E-04	0.00E+00	0.00E+00	5.90E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.18E+02	8.67E-01	0.10	8.33E+01	5.90E-04	4.00E+02	#NUMI	NA	NA	8.07E+00	4.47E-09	4.76E+12	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.91E-04	NA	6.86E-04	6.86E-04	NA	1.1E+00

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
71432	2.73E+00	Benzene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.73E+00	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	8,025	4.27E-03	1.78E-01	1.78E-04	7.24E-04	0.00E+00	0.00E+00	7.24E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
2.36E-01	1.24E+03	0.10	8.33E+01	7.24E-04	4.00E+02	#NUM!	NA	NA	9.69E+00	1.95E-04	1.10E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.08E-02	NA	1.08E-02	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_m (µg/kg)	Chemical	
129000	2.98E+02	Pyrene	Surrogate for benzo(g,h,i)perylene

MORE

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_T (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_T (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.62E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.68	0.37	0.24	0.004										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.96E+02	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	20,577	5.64E-06	2.35E-04	1.78E-04	2.16E-03	0.00E+00	0.00E+00	2.16E-03	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
4.20E+02	1.66E-01	0.10	8.33E+01	2.16E-03	4.00E+02	#NUMI	NA	NA	2.70E+01	7.21E-10	3.47E+13	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.96E-04	NA	1.48E-04	1.48E-04	NA	1.1E-01

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
75092	2.00E+00	Methylene chloride

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G26) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.68	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{slab} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.88	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based soil concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.00E+00	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	6,934	1.75E-03	7.27E-02	1.78E-04	8.37E-04	0.00E+00	0.00E+00	8.37E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
4.88E-02	7.45E+02	0.10	8.33E+01	8.37E-04	4.00E+02	#NUM!	NA	NA	1.10E+01	1.86E-04	1.18E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.87E-03	NA	7.87E-03	4.7E-07	3.0E+00

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
86737	2.07E+01	Fluorene

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_T (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_B (cm)	ENTER Totals must add up to value of L_T (cell G26) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.68	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.07E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	16,139	3.77E-05	1.57E-03	1.78E-04	6.14E-04	0.00E+00	0.00E+00	6.14E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
5.52E+01	5.86E-01	0.10	8.33E+01	6.14E-04	4.00E+02	#NUM!	NA	NA	8.37E+00	1.04E-08	2.06E+12	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF (µg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
7.70E-04	NA	4.51E-04	4.51E-04	NA	1.4E-01

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
91576	2.23E+01	2-Methylnaphthalene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.23E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	16,118	3.07E-04	1.28E-02	1.78E-04	4.65E-04	0.00E+00	0.00E+00	4.65E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.12E+01	2.51E+01	0.10	8.33E+01	4.65E-04	4.00E+02	#NUM!	NA	NA	6.59E+00	3.11E-07	6.75E+10	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.28E-04	NA	8.22E-03	8.22E-03	NA	7.0E-02

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_{si} (µg/kg)	Chemical
91203	3.77E+01	Naphthalene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
19.4	15	15	213.38	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	3.77E+01	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	12,816	3.18E-04	1.33E-02	1.78E-04	5.19E-04	0.00E+00	0.00E+00	5.19E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
8.00E+00	6.14E+01	0.10	8.33E+01	5.19E-04	4.00E+02	#NUMI	NA	NA	7.22E+00	5.03E-07	4.20E+10	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.98E-04	NA	1.83E-02	1.83E-02	NA	3.0E-03

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_{is} (µg/kg)	Chemical
120127	2.65E+02	Anthracene

Surrogate for phenanthrene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
19.4	15	15	213.36	15					1.62E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	2.65E+02	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	18,233	3.61E-05	1.50E-03	1.78E-04	5.90E-04	0.00E+00	0.00E+00	5.90E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.18E+02	3.37E+00	0.10	8.33E+01	5.90E-04	4.00E+02	#NUMI	NA	NA	8.07E+00	4.47E-09	4.76E+12	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.91E-04	NA	2.67E-03	2.67E-03	NA	1.1E+00

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
129000	7.82E+02	Pyrene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based soil concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	7.82E+02	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	20,577	5.64E-06	2.35E-04	1.78E-04	2.16E-03	0.00E+00	0.00E+00	2.16E-03	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
4.20E+02	4.38E-01	0.10	8.33E+01	2.16E-03	4.00E+02	#NUMI	NA	NA	2.70E+01	7.21E-10	3.47E+13	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.96E-04	NA	3.92E-04	3.92E-04	NA	1.1E-01

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_m (µg/kg)	Chemical
106423	3.00E+00	p-Xylene

MORE ↓

ENTER Average soil temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_1 (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_2 (cm)	ENTER Totals must add up to value of L_1 (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	15	213.36	15					1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
	1.66	0.37	0.24	0.004										

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.68	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based soil concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
9.46E+08	1	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	4,000	3.00E+00	8.95E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.00E+06	4.00E-04	15	10,138	5.51E-03	2.29E-01	1.78E-04	6.32E-04	0.00E+00	0.00E+00	6.32E-04	1	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.56E+00	4.01E+02	0.10	8.33E+01	6.32E-04	4.00E+02	#NUM!	NA	NA	8.58E+00	5.02E-05	4.25E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.18E-02	NA	1.18E-02	NA	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
83329	1.00E+02	Acenaphthene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-06

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\cdot s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	16,008	9.22E-05	3.84E-03	1.78E-04	4.71E-04	0.00E+00	0.00E+00	3.82E-04	4.57E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.84E+02	0.10	8.33E+01	4.71E-04	4.00E+02	#NUM!	2.51E-05	9.62E-03	NA	2.1E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
83329	1.30E+02	Acenaphthene

Surrogate for Acenaphthylene

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	16,008	9.22E-05	3.84E-03	1.78E-04	4.71E-04	0.00E+00	0.00E+00	3.82E-04	4.57E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.99E+02	0.10	8.33E+01	4.71E-04	4.00E+02	#NUM!	2.51E-05	1.25E-02	NA	2.1E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67641	3.00E+00	Acetone

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	7,442	3.04E-05	1.27E-03	1.78E-04	1.58E-03	0.00E+00	0.00E+00	1.71E-03	1.60E-03	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.80E+00	0.10	8.33E+01	1.58E-03	4.00E+02	#NUMI	8.21E-05	3.12E-04	NA	3.5E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
120127	5.90E+01	Anthracene

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	18,233	3.61E-05	1.50E-03	1.78E-04	5.90E-04	0.00E+00	0.00E+00	9.72E-04	6.21E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.53E+01	0.10	8.33E+01	5.90E-04	4.00E+02	#NUM!	3.37E-05	2.20E-03	NA	1.1E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	1.37E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	8,025	4.27E-03	1.78E-01	1.78E-04	7.24E-04	0.00E+00	0.00E+00	2.11E-05	1.35E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.44E+04	0.10	8.33E+01	7.24E-04	4.00E+02	#NUMI	7.58E-06	1.84E-01	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
129000	3.70E+01	Pyrene

Surrogate for benzo(ghi)perylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	20,577	5.64E-06	2.35E-04	1.78E-04	2.16E-03	0.00E+00	0.00E+00	5.80E-03	2.36E-03	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.70E+00	0.10	8.33E+01	2.16E-03	4.00E+02	#NUM!	1.16E-04	1.01E-03	NA	1.1E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75150	9.60E-01	Carbon disulfide

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.68	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	6,609	2.44E-02	1.02E+00	1.78E-04	8.52E-04	0.00E+00	0.00E+00	1.45E-05	9.98E-05	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.76E+02	0.10	8.33E+01	8.52E-04	4.00E+02	#NUMI	5.59E-06	5.46E-03	NA	7.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
132649	6.00E+00	Dibenzofuran

MORE

ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	87,043	7.55E-07	3.15E-05	1.78E-04	1.22E-02	0.00E+00	0.00E+00	3.59E-02	1.34E-02	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.89E-01	0.10	8.33E+01	1.22E-02	4.00E+02	1.06E+111	4.17E-04	7.86E-05	NA	1.4E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
107062	3.00E+00	1,2-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	8,419	7.44E-04	3.10E-02	1.78E-04	8.71E-04	0.00E+00	0.00E+00	7.27E-05	3.58E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.30E+01	0.10	8.33E+01	8.71E-04	4.00E+02	#NUM!	1.98E-05	1.84E-03	2.6E-05	NA

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092	3.10E-01	Methylene chloride

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	6,934	1.75E-03	7.27E-02	1.78E-04	8.37E-04	0.00E+00	0.00E+00	4.25E-05	2.44E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.25E+01	0.10	8.33E+01	8.37E-04	4.00E+02	#NUM!	1.35E-05	3.05E-04	4.7E-07	3.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	5.20E+01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	10,047	5.68E-03	2.37E-01	1.78E-04	6.16E-04	0.00E+00	0.00E+00	1.53E-05	1.01E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.23E+04	0.10	8.33E+01	6.16E-04	4.00E+02	#NUMI	5.64E-06	6.94E-02	NA	1.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
86737	4.50E+01	Fluorene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	16,139	3.77E-05	1.57E-03	1.78E-04	6.14E-04	0.00E+00	0.00E+00	9.50E-04	6.43E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.06E+01	0.10	8.33E+01	6.14E-04	4.00E+02	#NUM!	3.49E-05	2.46E-03	NA	1.4E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
98828	1.50E-01	Cumene

Surrogate for 4-Isopropyltoluene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	12,512	9.75E-03	4.06E-01	1.78E-04	5.33E-04	0.00E+00	0.00E+00	1.12E-05	7.53E-05	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.09E+01	0.10	8.33E+01	5.33E-04	4.00E+02	#NUMI	4.22E-06	2.57E-04	NA	4.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER initial groundwater conc., C_W (µg/L)	Chemical	
67561	3.00E+03	Methanol	Surrogate for Methane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.68	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	9,169	3.52E-06	1.47E-04	1.78E-04	8.29E-03	0.00E+00	0.00E+00	2.11E-02	9.00E-03	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.40E+02	0.10	8.33E+01	8.29E-03	4.00E+02	6.32E+163	3.28E-04	1.44E-01	NA	NA

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER initial groundwater conc., C_W (µg/L)	Chemical	Surrogate for Methylnaphthalene
91576	1.00E+00	2-Methylnaphthalene	

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	16,118	3.07E-04	1.28E-02	1.78E-04	4.65E-04	0.00E+00	0.00E+00	1.20E-04	3.39E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.28E+01	0.10	8.33E+01	4.65E-04	4.00E+02	#NUMI	1.87E-05	2.39E-04	NA	7.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
1634044	1.00E+00	MTBE

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	7,173	4.94E-04	2.06E-02	1.78E-04	8.70E-04	0.00E+00	0.00E+00	1.08E-04	4.54E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.06E+01	0.10	8.33E+01	8.70E-04	4.00E+02	#NUM!	2.49E-05	5.13E-04	NA	3.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	2.03E+03	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.62E-06

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	12,816	3.18E-04	1.33E-02	1.78E-04	5.19E-04	0.00E+00	0.00E+00	1.14E-04	3.54E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.69E+04	0.10	8.33E+01	5.19E-04	4.00E+02	#NUMI	1.95E-05	5.26E-01	NA	3.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
120127	2.50E+02	Anthracene

Surrogate for Phenanthrene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	18,233	3.61E-05	1.50E-03	1.78E-04	5.90E-04	0.00E+00	0.00E+00	9.72E-04	6.21E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.53E+01	0.10	8.33E+01	5.90E-04	4.00E+02	#NUMI	3.37E-05	2.20E-03	NA	1.1E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
129000	2.00E+02	Pyrene

MORE ↓

ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	20,577	5.64E-06	2.35E-04	1.78E-04	2.16E-03	0.00E+00	0.00E+00	5.80E-03	2.36E-03	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.70E+01	0.10	8.33E+01	2.16E-03	4.00E+02	#NUM!	1.16E-04	5.47E-03	NA	1.1E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100425	5.00E+00	Styrene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	10,346	1.96E-03	8.18E-02	1.78E-04	5.87E-04	0.00E+00	0.00E+00	2.70E-05	1.59E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.09E+02	0.10	8.33E+01	5.87E-04	4.00E+02	#NUM!	8.85E-06	3.62E-03	NA	1.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108883	4.00E+01	Toluene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.62E-06

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SCL	1.66	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.48E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	9,052	4.94E-03	2.06E-01	1.78E-04	7.15E-04	0.00E+00	0.00E+00	1.84E-05	1.21E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.24E+03	0.10	8.33E+01	7.15E-04	4.00E+02	#NUM!	6.75E-06	5.56E-02	NA	4.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95636	9.00E+00	1,2,4-Trimethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	11,574	4.23E-03	1.76E-01	1.78E-04	4.99E-04	0.00E+00	0.00E+00	1.58E-05	1.00E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.58E+03	0.10	8.33E+01	4.99E-04	4.00E+02	#NUM!	5.61E-06	8.89E-03	NA	6.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
108678	4.00E+00	1,3,5-Trimethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	11,556	4.04E-03	1.68E-01	1.78E-04	4.96E-04	0.00E+00	0.00E+00	1.70E-05	1.06E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.73E+02	0.10	8.33E+01	4.96E-04	4.00E+02	#NUMI	5.94E-06	4.00E-03	NA	6.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106423	7.00E+01	p-Xylene

Surrogate for Xylenes (total)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
19.4	15	213.36	213.36			A	SCL			1.82E-08

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SCL	1.68	0.370	0.24								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	488	0.1	0.66	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	198.36	0.130	ERROR	ERROR	#N/A	#N/A	#N/A	1.82E-08	25.86	0.37	0.037	0.333	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
8.95E+04	1.00E+06	4.00E-04	15	10,138	5.51E-03	2.29E-01	1.78E-04	6.32E-04	0.00E+00	0.00E+00	1.63E-05	1.06E-04	198.36

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.61E+04	0.10	8.33E+01	6.32E-04	4.00E+02	#NUMI	5.96E-06	9.57E-02	NA	1.0E-01

END

Attachment I4
Toxicity Profiles

Volatile Organic Compounds

Acenaphthene (see polycyclic aromatic hydrocarbons [PAHs])
Acenaphthylene (see polycyclic aromatic hydrocarbons [PAHs])
Acetone
Anthracene (see polycyclic aromatic hydrocarbons [PAHs])
Benzene
Benzo(g,h,i)Perylene (see polycyclic aromatic hydrocarbons [PAHs])
Carbon disulfide
Dibenzofuran (not available)
1,2-Dichloroethane
Dichloromethane (see methylene chloride)
Ethylbenzene
Fluorene (see polycyclic aromatic hydrocarbons [PAHs])
4-Isopropyltoluene (not available)
Methane (not available)
Methylnaphthalene (see polycyclic aromatic hydrocarbons [PAHs])
2-Methylnaphthalene (see polycyclic aromatic hydrocarbons [PAHs])
MTBE
Naphthalene (see polycyclic aromatic hydrocarbons [PAHs])
Phenanthrene (see polycyclic aromatic hydrocarbons [PAHs])
Pyrene (see polycyclic aromatic hydrocarbons [PAHs])
Styrene
Toluene
1,2,4-Trimethylbenzene (not available)
1,3,5-Trimethylbenzene (not available)
Xylenes (total) (see xylene)

Semivolatile Organic Compounds

Benzo(a)Anthracene (see polycyclic aromatic hydrocarbons [PAHs])
Benzo(a)Pyrene (see polycyclic aromatic hydrocarbons [PAHs])
Benzo(b)Fluoranthene (see polycyclic aromatic hydrocarbons [PAHs])
Benzo(k)Fluoranthene (see polycyclic aromatic hydrocarbons [PAHs])
1,2-Benzphenanthracene (see polycyclic aromatic hydrocarbons [PAHs])
Dibenz(A,H)Anthracene (see polycyclic aromatic hydrocarbons [PAHs])
Fluoranthene (see polycyclic aromatic hydrocarbons [PAHs])
Indeno(1,2,3-C,D)Pyrene (see polycyclic aromatic hydrocarbons [PAHs])
Phenol

Pesticides/Polychlorinated Biphenyls

Aroclor 1016 (see polychlorinated bipyenyls)
Aroclor 1260 (see polychlorinated bipyenyls)
4,4-DDD (see DDT, DDE and DDD)
4,4-DDE (see DDT, DDE and DDD)
4,4-DDT (see DDT, DDE and DDD)
Dieldrin (see aldrin and dieldrin)
Endosulfan Sulfate (see endosulfan)
Heptachlor (see heptachlor/heptachlor epoxide)

Metals

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron (not available)
Lead
Mercury
Molybdenum (not available)
Nickel
Selenium
Thallium
Vanadium
Zinc

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ACETONE

CAS # 67-64-1

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about acetone. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to acetone results mostly from breathing air, drinking water, or coming in contact with products or soil that contain acetone. Exposure to moderate-to-high amounts of acetone can irritate your eyes and respiratory system, and make you dizzy. Very high exposure may cause you to lose consciousness. This chemical has been found in at least 572 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is acetone?

(Pronounced ăs′ĭ-tōn′)

Acetone is a manufactured chemical that is also found naturally in the environment. It is a colorless liquid with a distinct smell and taste. It evaporates easily, is flammable, and dissolves in water. It is also called dimethyl ketone, 2-propanone, and beta-ketopropane.

Acetone is used to make plastic, fibers, drugs, and other chemicals. It is also used to dissolve other substances.

It occurs naturally in plants, trees, volcanic gases, forest fires, and as a product of the breakdown of body fat. It is present in vehicle exhaust, tobacco smoke, and landfill sites. Industrial processes contribute more acetone to the environment than natural processes.

What happens to acetone when it enters the environment?

- A large percentage (97%) of the acetone released during its manufacture or use goes into the air.
- In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days.
- It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air.
- Acetone doesn't bind to soil or build up in animals.
- It's broken down by microorganisms in soil and water.
- It can move into groundwater from spills or landfills.
- Acetone is broken down in water and soil, but the time required for this to happen varies.

How might I be exposed to acetone?

- Breathing low background levels in the environment.
- Breathing higher levels of contaminated air in the workplace or from using products that contain acetone (for example, household chemicals, nail polish, and paint).
- Drinking water or eating food containing acetone.
- Touching products containing acetone.
- For children, eating soil at landfills or hazardous waste sites that contain acetone.
- Smoking or breathing secondhand smoke.

How can acetone affect my health?

If you are exposed to acetone, it goes into your blood which then carries it to all the organs in your body. If it is a small amount, the liver breaks it down to chemicals that are not harmful and uses these chemicals to make energy for normal body functions. Breathing moderate- to-high levels

of acetone for short periods of time, however, can cause nose, throat, lung, and eye irritation; headaches; light-headedness; confusion; increased pulse rate; effects on blood; nausea; vomiting; unconsciousness and possibly coma; and shortening of the menstrual cycle in women.

Swallowing very high levels of acetone can result in unconsciousness and damage to the skin in your mouth. Skin contact can result in irritation and damage to your skin.

The smell and respiratory irritation or burning eyes that occur from moderate levels are excellent warning signs that can help you avoid breathing damaging levels of acetone.

Health effects from long-term exposures are known mostly from animal studies. Kidney, liver, and nerve damage, increased birth defects, and lowered ability to reproduce (males only) occurred in animals exposed long-term. It is not known if people would have these same effects.

How likely is acetone to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified acetone for carcinogenicity.

Acetone does not cause skin cancer in animals when applied to the skin. We don't know if breathing or swallowing acetone for long periods will cause cancer. Studies of workers exposed to it found no significant risk of death from cancer.

Is there a medical test to show whether I've been exposed to acetone?

Methods are available to measure the amount of acetone in your breath, blood, and urine. The test can tell you how much acetone you were exposed to, although the amount that people have naturally in their bodies varies with each person. The tests can't tell you if you will experience any health effects from the exposure.

The test must be performed within 2-3 days after exposure because acetone leaves your body within a few days. These tests are not routinely performed at your doctor's office, but your doctor can take blood or urine samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA requires that spills of 5,000 pounds or more of acetone be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum concentration limit in workplace air of 1,000 parts of acetone per million parts of air (1,000 ppm) for an 8-hour workday over a 40-hour week to protect workers. The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 250 ppm in workplace air for up to a 10-hour workday over a 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.
Evaporate: To change into a vapor or a gas.
Ingesting: Taking food or drink into your body.
Long-term: Lasting one year or longer.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for acetone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BENZENE

CAS # 71-43-2

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 1,001 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is benzene?

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

What happens to benzene when it enters the environment?

- Industrial processes are the main source of benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can attach to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

How might I be exposed to benzene?

- Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- Vapors (or gases) from products that contain benzene, such as glues, paints, furniture wax, and detergents, can also be a source of exposure.
- Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- Working in industries that make or use benzene.

How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

The major effect of benzene from long-term exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene will affect fertility in men.

How likely is benzene to cause cancer?

Long-term exposure to high levels of benzene in the air can cause leukemia, particularly acute myelogenous leukemia, often referred to as AML. This is a cancer of the blood-forming organs. The Department of Health and Human Services (DHHS) has determined that benzene is a known carcinogen. The International Agency for Research on Cancer (IARC) and the EPA have determined that benzene is carcinogenic to humans.

How can benzene affect children?

Children can be affected by benzene exposure in the same ways as adults. It is not known if children are more susceptible to benzene poisoning than adults.

Benzene can pass from the mother's blood to a fetus. Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

How can families reduce the risks of exposure to benzene?

Benzene exposure can be reduced by limiting contact with gasoline and cigarette smoke. Families are encouraged not to smoke in their house, in enclosed environments, or near their children.

Is there a medical test to determine whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is a test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood; however, since benzene disappears rapidly from the blood, this test is only useful for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. The metabolite S-phenylmercapturic acid in urine is a sensitive indicator of benzene exposure. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 5 parts benzene per billion parts of water (5 ppb).

The Occupational Safety and Health Administration (OSHA) has set limits of 1 part benzene per million parts of workplac air (1 ppm) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Benzene (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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CARBON DISULFIDE

CAS # 75-15-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about carbon disulfide. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to carbon disulfide can occur by breathing it in the air and by drinking water or eating foods that contain it. Breathing very high levels can be life threatening because of its effects on the nervous system. Breathing low levels for long periods may result in headaches, tiredness, trouble sleeping, and slight changes in the nerves. Carbon disulfide has been found in at least 210 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is carbon disulfide?

(Pronounced kär′bən dī-sŭl′fīd′)

Pure carbon disulfide is a colorless liquid with a pleasant odor that is like the smell of chloroform. The impure carbon disulfide that is usually used in most industrial processes is a yellowish liquid with an unpleasant odor, like that of rotting radishes.

Carbon disulfide evaporates at room temperature, and the vapor is more than twice as heavy as air. It easily explodes in air and also catches fire very easily.

In nature, small amounts of carbon disulfide are found in gases released to the earth's surface as, for example, in volcanic eruptions or over marshes. Commercial carbon disulfide is made by combining carbon and sulfur at very high temperatures.

What happens to carbon disulfide when it enters the environment?

- The amount of carbon disulfide released into the air through natural processes is difficult to judge because it is so small.
- Carbon disulfide evaporates rapidly when released to the environment.
- Most carbon disulfide in the air and surface water is from manufacturing and processing activities.
- It is found naturally in coastal and ocean waters.
- Carbon disulfide does not stay dissolved in water very long, and it also moves through soils fairly quickly.
- Carbon disulfide does not appear to be taken up in significant amounts by the organisms living in water.

How might I be exposed to carbon disulfide?

- The people most often exposed to carbon disulfide are workers in plants that use carbon disulfide in their manufacturing processes.
- People may be exposed by breathing air, drinking water, or eating foods that contain it.
- People may also be exposed through skin contact with soil, water, or other substances that contain carbon disulfide.

How can carbon disulfide affect my health?

At very high levels, carbon disulfide may be life-threatening because of its effects on the nervous system. People who

breathed carbon disulfide near an accident involving a railroad car showed changes in breathing and some chest pains.

Some workers who breathed high levels during working hours for at least 6 months had headaches, tiredness, and trouble sleeping. However, these workers may have been exposed to other chemicals besides carbon disulfide. Among workers who breathed lower levels, some developed very slight changes in their nerves.

Studies in animals indicate that carbon disulfide can affect the normal functions of the brain, liver, and heart. After pregnant rats breathed carbon disulfide in the air, some of the newborn rats died or had birth defects.

High concentrations of carbon disulfide have caused skin burns when the chemical accidentally touched people's skin.

How likely is carbon disulfide to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified carbon disulfide for carcinogenicity.

There are no definitive data in humans or animals that indicate a carcinogenic potential for carbon disulfide.

Is there a medical test to show whether I've been exposed to carbon disulfide?

One chemical test using urine can be done to tell whether the levels of breakdown substances from carbon disulfide are higher than normal. However, the test is not specific for carbon disulfide exposure.

A second test based on a specific breakdown substance is more sensitive and specific. It also requires special equipment and cannot tell you exactly how much carbon disulfide you were exposed to or predict whether harmful effects will occur.

These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA requires that spills or accidental releases into the environment of 100 pounds or more of carbon disulfide be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a limit of 20 parts of carbon disulfide per million parts of air (20 ppm) for an 8-hour workday for a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that workroom air levels of carbon disulfide not exceed 1 ppm for a 10-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Dissolve: To disappear gradually.

Evaporate: To change into vapor or a gas.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for Carbon Disulfide produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

1,2-DICHLOROETHANE

CAS #107-06-2

Division of Toxicology ToxFAQs™ September 2001

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-Dichloroethane. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethane usually occurs by breathing contaminated air in workplaces that use 1,2-dichloroethane. Breathing or ingesting high levels of 1,2-dichloroethane can cause damage to the nervous system, liver, kidneys, and lungs and may cause cancer. This substance has been found in at least 570 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is 1,2-dichloroethane?

1,2-Dichloroethane, also called ethylene dichloride, is a manufactured chemical that is not found naturally in the environment. It is a clear liquid and has a pleasant smell and sweet taste.

The most common use of 1,2-dichloroethane is in the production of vinyl chloride which is used to make a variety of plastic and vinyl products including polyvinyl chloride (PVC) pipes, furniture and automobile upholstery, wall coverings, housewares, and automobile parts. It is also used to as a solvent and is added to leaded gasoline to remove lead.

What happens to 1,2-dichloroethane when it enters the environment?

❑ Most of the 1,2-dichloroethane released to the environment is released to the air. In the air, 1,2-dichloroethane breaks down by reacting with other compounds formed by sunlight. It can stay in the air for more than 5 months before it is broken down.
❑ 1,2-Dichloroethane can also be released into rivers and lakes. It breaks down very slowly in water and most of it will evaporate to the air.
❑ 1,2-Dichloroethane released in soil will either evaporate into the air or travel down through the soil and enter underground water.

How might I be exposed to 1,2-dichloroethane?

❑ The general population may be exposed to 1,2-dichloroethane by breathing air or drinking water that contains 1,2-dichloroethane.
❑ People who work or live near a factory where 1,2-dichloroethane is used, may be exposed to higher than usual levels.
❑ People living near uncontrolled hazardous waste sites may also be exposed to higher than usual levels of 1,2-dichloroethane.

How can 1,2-dichloroethane affect my health?

Nervous system disorders, liver and kidney diseases, and lung effects have been reported in humans ingesting or inhaling large amounts of 1,2-dichloroethane.

In laboratory animals, breathing or ingesting large amounts of 1,2-dichloroethane have also caused nervous system disorders and liver, kidney, and lung effects. Animal studies also suggest that 1,2-dichloroethane may damage the

immune system. Kidney disease has also been seen in animals ingesting low doses of 1,2-dichloroethane for a long time. Studies in animals indicate that 1,2-dichloroethane does not affect reproduction.

How likely is 1,2-dichloroethane to cause cancer?

Human studies examining whether 1,2-dichloroethane can cause cancer have been considered inadequate. In animals, increases in the occurrence of stomach, mammary gland, liver, lung, and endometrium cancers have been seen following inhalation, oral, and dermal exposure.

The Department of Health and Human Services (DHHS) has determined that 1,2-dichloroethane may reasonably be expected to cause cancer. The EPA has determined that 1,2-dichloroethane is a probable human carcinogen and the International Agency for Cancer Research (IARC) considers it to be a possible human carcinogen.

How can 1,2-dichloroethane affect children?

We do not know if exposure to 1,2-dichloroethane will result in birth defects or other developmental effects in people. Studies in animals suggest that 1,2-dichloroethane does not produce birth defects.

It is likely that health effects seen in children exposed to high levels of 1,2-dichloroethane will be similar to the effects seen in adults.

How can families reduce the risk of exposure to 1,2-dichloroethane?

The general population is not likely to be exposed to large amounts of 1,2-dichloroethane. In the past, it was used in small amounts in household products such as cleaning agents, pesticides, and wallpaper and carpet glue. Risk of exposure from this source could be eliminated if these older products were immediately discarded.

Children should avoid playing in soils near uncontrolled hazardous waste sites where 1,2-dichloroethane may have been discarded.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethane?

Tests are available to measure 1,2-dichloroethane in breath, blood, breast milk, and urine of exposed people. Because 1,2-dichloroethane leaves the body fairly quickly, these tests need to be done within a couple of days of exposure. These tests cannot be used to predict the nature or severity of toxic effects. These tests are not usually done in the doctor's office.

Has the federal government made recommendations to protect human health?

The EPA allows 0.005 milligrams of 1,2-dichloroethane per liter of drinking water (0.005 mg/L).

The Occupational Safety and Health Administration has set a limit of 50 parts of 1,2-dichloroethane per million parts of air (50 ppm) in workplace air for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological Profile for 1,2-Dichloroethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

METHYLENE CHLORIDE

CAS # 75-09-2

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about methylene chloride. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to methylene chloride occurs mostly from breathing contaminated air, but may also occur through skin contact or by drinking contaminated water. Breathing in large amounts of methylene chloride can damage the central nervous system. Contact of eyes or skin with methylene chloride can result in burns. Methylene chloride has been found in at least 882 of 1,569 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is methylene chloride?

Methylene chloride is a colorless liquid with a mild, sweet odor. Another name for it is dichloromethane. Methylene chloride does not occur naturally in the environment.

Methylene chloride is used as an industrial solvent and as a paint stripper. It may also be found in some aerosol and pesticide products and is used in the manufacture of photographic film.

What happens to methylene chloride when it enters the environment?

❑ Methylene chloride is mainly released to the environment in air. About half of the methylene chloride in air disappears in 53 to 127 days.

❑ Methylene chloride does not easily dissolve in water, but small amounts may be found in drinking water.

❑ We do not expect methylene chloride to build up in plants or animals.

How might I be exposed to methylene chloride?

❑ The most likely way to be exposed to methylene chloride is by breathing contaminated air.

❑ Breathing the vapors given off by products containing methylene chloride. Exposure to high levels of methylene chloride is likely if methylene chloride or a product containing it is used in a room with inadequate ventilation.

How can methylene chloride affect my health?

If you breathe in large amounts of methylene chloride you may feel unsteady, dizzy, and have nausea and a tingling or numbness of your finger and toes. A person breathing smaller amounts of methylene chloride may become less attentive and less accurate in tasks requiring hand-eye coordination. Skin contact with methylene chloride causes burning and redness of the skin.

How likely is methylene chloride to cause cancer?

We do not know if methylene chloride can cause cancer in humans. An increased cancer risk was seen in mice

breathing large amounts of methylene chloride for a long time.

The World Health Organization (WHO) has determined that methylene chloride may cause cancer in humans.

The Department of Health and Human Services (DHHS) has determined that methylene chloride can be reasonably anticipated to be a cancer-causing chemical.

The EPA has determined that methylene chloride is a probable cancer-causing agent in humans.

How can methylene chloride affect children?

It is likely that health effects seen in children exposed to high amounts of methylene chloride will be similar to the effects seen in adults. We do not know if methylene chloride can affect the ability of people to have children or if it causes birth defects. Some birth defects have been seen in animals inhaling very high levels of methylene chloride.

How can families reduce the risk of exposure to methylene chloride?

❑ Families may be exposed to methylene chloride while using products such as paint removers. Such products should always be used in well-ventilated areas and skin contact should be avoided.
❑ Children should not be allowed to remain near indoor paint removal activities.

Is there a medical test to show whether I've been exposed to methylene chloride?

❑ Several tests can measure exposure to methylene chloride. These tests are not routinely available in your doctor's office.
❑ Methylene chloride can be detected in the air you breathe out and in your blood. These tests are only useful for detecting exposures that have occurred within a few days.
❑ It is also possible to measure carboxyhemoglobin (a chemical formed in the blood as methylene chloride breaks down in the body) in the blood or formic acid (a breakdown product of methylene chloride) in the urine. These tests are not specific for methylene chloride.

Has the federal government made recommendations to protect human health?

❑ The EPA requires that releases of methylene chloride of 1,000 pounds or more be reported to the federal government.
❑ The EPA recommends that exposure of children to methylene chloride be limited to less than 10 milligrams per liter of drinking water (10 mg/L) for 1 day or 2 mg/L for 10 days.
❑ The Food and Drug Administration (FDA) has established limits on the amounts of methylene chloride that can remain after processing of spices, hops extract, and decaffeinated coffee.
❑ The Occupational Safety and Health Administration (OSHA) has set limits of 25 parts methylene chloride per million parts of workplace air (25 ppm) for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for methylene chloride. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ETHYLBENZENE
CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

What happens to ethylbenzene when it enters the environment?

- Ethylbenzene moves easily into the air from water and soil.
- It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- In soil, it is broken down by soil bacteria.

How might I be exposed to ethylbenzene?

- Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- Drinking contaminated tap water.
- Working in an industry where ethylbenzene is used or made.
- Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

METHYL *TERT*-BUTYL ETHER (MTBE) CAS # 1634-04-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about methyl *tert*-butyl ether (MTBE). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Methyl *tert*-butyl ether (MTBE) is a flammable liquid which is used as an additive in unleaded gasoline. Drinking or breathing MTBE may cause nausea, nose and throat irritation, and nervous system effects. MTBE has been found in at least 11 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is methyl *tert*-butyl ether?

(Pronounced měth′əl tūr′shē-ĕr′ē byōōt′l ē′thər)

Methyl *tert*-butyl ether (MTBE) is a flammable liquid with a distinctive, disagreeable odor. It is made from blending chemicals such as isobutylene and methanol, and has been used since the 1980s as an additive for unleaded gasolines to achieve more efficient burning.

MTBE is also used to dissolve gallstones. Patients treated in this way have MTBE delivered directly to their gall bladders through special tubes that are surgically inserted.

What happens to MTBE when it enters the environment?

- MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air.
- Small amounts of MTBE may dissolve in water and get into underground water.
- It remains in underground water for a long time.
- MTBE may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- MTBE may be broken down quickly in the air by sunlight.
- MTBE does not build up significantly in plants and animals.

How might I be exposed to MTBE?

- Touching the skin or breathing contaminated air while pumping gasoline.
- Breathing exhaust fumes while driving a car.
- Breathing air near highways or in cities.
- Drinking, swimming, or showering in water that has been contaminated with MTBE.
- Receiving MTBE treatment for gallstones.

How can MTBE affect my health?

Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE while pumping gasoline, driving their cars, or working

in gas stations have reported having headaches, nausea, dizziness, and mental confusion. However, the actual levels of exposure in these cases are unknown. In addition, these symptoms may have been caused by exposure to other chemicals.

There are no data on the effects in people of drinking MTBE. Studies with rats and mice suggest that drinking MTBE may cause gastrointestinal irritation, liver and kidney damage, and nervous system effects.

How likely is MTBE to cause cancer?

There is no evidence that MTBE causes cancer in humans. One study with rats found that breathing high levels of MTBE for long periods may cause kidney cancer. Another study with mice found that breathing high levels of MTBE for long periods may cause liver cancer.

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified MTBE as to its carcinogenicity.

Is there a medical test to show whether I've been exposed to MTBE?

MTBE and its breakdown product, butyl alcohol, can be detected in your breath, blood, or urine for up to 1 or 2 days after exposure. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment. There is no other test specific to determining MTBE exposure.

Has the federal government made recommendations to protect human health?

The EPA has issued guidelines recommending that, to protect children, drinking water levels of MTBE not exceed 4 milligrams per liter of water (4 mg/L) for an exposure of 1-10 days, and 3 mg/L for longer-term exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for Methyl *tert*-Butyl Ether produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

STYRENE
CAS # 100-42-5

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about styrene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to styrene is most likely to occur from breathing indoor air that is contaminated with styrene vapors from building materials, tobacco smoke, and consumer products. People who work where styrene is used or manufactured are likely to be exposed by breathing workplace air. Breathing styrene is most likely to affect the nervous system. Styrene has been found in at least 213 of 1,416 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is styrene?

(Pronounced stī′rēn)

Styrene is primarily a synthetic chemical. It is also known as vinylbenzene, ethenylbenzene, cinnamene, or phenylethylene. It's a colorless liquid that evaporates easily and has a sweet smell. It often contains other chemicals that give it a sharp, unpleasant smell.

It dissolves in some liquids but doesn't dissolve easily in water. Billions of pounds are produced each year to make products such as rubber, plastic, insulation, fiberglass, pipes, automobile parts, food containers, and carpet backing.

Most of these products contain styrene linked together in a long chain (polystyrene) as well as unlinked styrene. Low levels of styrene also occur naturally in a variety of foods such as fruits, vegetables, nuts, beverages, and meats.

What happens to styrene when it enters the environment?

- Styrene enters the environment during the manufacture, use, and disposal of styrene-based products. It can be found in air, water, and soil.
- It is quickly broken down in the air, usually within 1 to 2 days.
- It evaporates from shallow soils and surface water.
- It doesn't stick easily to soils and sediments.
- It's broken down by bacteria in the soil and water.
- It's not expected to build up in animals.
- Styrene breaks down to half the amount within a few days in surface water; in groundwater, however, it takes between 6 weeks and 7.5 months.

How might I be exposed to styrene?

- Breathing indoor air that is contaminated with styrene vapors from building materials, consumer products, and tobacco smoke.
- Breathing contaminated workplace air.
- Drinking contaminated water.
- Living near industrial facilities or hazardous waste sites.
- Smoking cigarettes or eating a lot of food packaged in polystyrene containers.

How can styrene affect my health?

If you breathe high levels of styrene for a short time, you're most likely to experience nervous system effects such as depression, concentration problems, muscle weakness, tiredness, and nausea, and possibly eye, nose, and throat irritation.

When animals breathed styrene vapors in short-term studies, they damaged the lining of their noses. Long-term exposure damaged their livers, but there is no evidence that this will occur in people because there is no information on human health effects of breathing low levels for a long time.

There is also little information on human health effects from eating or touching styrene. Animal studies show that ingestion of high levels of styrene over several weeks can cause damage to the liver, kidneys, brain, and lungs. When styrene was applied to the skin of rabbits, it caused irritation.

There is no information as to whether breathing, ingesting, or touching styrene affects fetal development or human reproduction.

In animal studies, short-term exposure to very high levels resulted in some reproductive and developmental effects.

How likely is styrene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that styrene is possibly carcinogenic to humans.

Several studies of workers have shown that breathing styrene may cause leukemia. There is no information on the carcinogenicity of styrene in people who swallow it or get it on their skin.

Studies in animals that breathed or ate styrene suggest that it is weakly carcinogenic.

Is there a medical test to show whether I've been exposed to styrene?

Styrene and its breakdown products can be measured in your blood, urine, and body tissues. Styrene leaves your body quickly. If you are tested within one day, the actual amount of exposure can be estimated. However, it is difficult to predict if the exposure will affect your health.

The test for styrene and its breakdown products require special equipment and are not usually available at your doctor's office, but may be ordered by the doctor. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has determined that 0.1 part of styrene per million parts of water (0.1 ppm) is the maximum amount that may be present in drinking water. The EPA also requires that spills or accidental releases into the environment of 1,000 pounds or more of styrene be reported.

The Occupational Health and Safety Administration (OSHA) has limited workers' exposure to an average of 100 ppm for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogen: A substance that can cause cancer.

CAS: Chemical Abstracts Service.

Ingesting: Taking food or drink into your body.

Leukemia: Cancer of the blood-forming tissues.

Long-term: Lasting one year or longer.

Polystyrene: A long chain of styrene molecules joined together.

ppm: Parts per million.

Short-term: Lasting 14 days or less.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for styrene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

❑ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

❑ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

❑ Toluene does not usually stay in the environment long.

❑ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

❑ Working with gasoline, kerosene, heating oil, paints, and lacquers.

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and

hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults. Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

- ❑ Use toluene-containing products in well-ventilated areas.
- ❑ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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XYLENE

CAS # 1330-20-7

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. Xylene has been found in at least 844 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

There are three forms of xylene in which the methyl groups vary on the benzene ring: *meta*-xylene, *ortho*-xylene, and *para*-xylene (*m*-, *o*-, and *p*-xylene). These different forms are referred to as isomers.

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar. Chemical industries produce xylene from petroleum. It is one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- Xylene evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and other animals living in xylene-contaminated water.

How might I be exposed to xylene?

- Using a variety of consumer products including gasoline, pain, varnish, shellac, rust preventives, and cigarette smoke. Xylene can be absorbed through the respiratory tract and through the skin.
- Ingesting xylene-contaminated food or water, although these levels are likely to be very low.
- Working in a job that involves the use of xylene such as painters, paint industry workers, biomedical laboratory workers, automobile garage workers, metal workers, and furniture refinishers.

How can xylene affect my health?

No health effects have been noted at the background levels that people are exposed to on a daily basis.

High levels of exposure for short or long periods can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

How likely is xylene to cause cancer?

Both the International Agency for Research on Cancer (IARC) and the EPA have found that there is insufficient information to determine whether or not xylene is carcinogenic.

How can xylene affect children?

The effects of xylene have not been studied in children, but it is likely that they would be similar to those seen in exposed adults. Although there is no direct evidence, children may be more sensitive to acute inhalation exposure than adults because their narrower airways would be more sensitive to swelling effects.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How can families reduce the risks of exposure to xylene?

- ❑ Exposure to xylene as solvents (in paints or gasoline) can be reduced if the products are used with adequate ventilation and if they are stored in tightly closed containers out of the reach of small children.
- ❑ Sometimes older children sniff household chemicals in attempt to get high. Talk with your children about the dangers of sniffing xylene.
- ❑ If products containing xylene are spilled on the skin, then the excess should be wiped off and the area cleaned with soap and water.

Is there a medical test to determine whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA set a limit of 10 parts xylene per million parts drinking water (10 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 100 parts xylene per million parts of workplace air (100 ppm) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Xylene (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry. Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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PHENOL
CAS # 108-95-2

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about phenol. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Phenol is a manufactured substance found in a number of consumer products. Skin exposure to high levels of phenol has resulted in liver damage, diarrhea, dark urine, and hemolytic anemia. Phenol has been found in at least 481 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is phenol?

(Pronounced fē′ nôl′)

Phenol is a manufactured substance. It is a colorless-to-white solid when pure. The commercial product is a liquid. It has sickeningly sweet and tarry odor.

You can taste and smell it at levels lower than those that are associated with harmful effects. Phenol evaporates more slowly than water, and a moderate amount can form a solution with water. Phenol can catch fire.

Phenol is used primarily in the formation of phenolic resins. It is also used in the manufacture of nylon and other synthetic fibers. It is also used in slimicides (chemicals that kill bacteria and fungi in slimes), as a disinfectant, as an antiseptic, and in medicinal preparations, such as mouthwash and sore throat lozenges.

What happens to phenol when it enters the environment?

- Following small, single releases, phenol does not remain in the air long (generally, half is removed from the air in less than a day).
- It generally remains in the soil only about 2 to 5 days.
- It can remain in water for longer than 9 days.
- Larger or repeated releases can remain in the air, water and soil for much longer periods of time.
- Small amounts of phenol may be found in organisms that live in contaminated water.

How might I be exposed to phenol?

- You may be exposed to phenol if you work with or manufacture it.
- You may be exposed to very low levels in your home because it is found in a number of products, including some medicines, lotions, and ointments.
- Low levels of phenol are found in some foods, including smoked summer sausage, fried chicken, mountain cheese, and some species of fish.
- Phenol enters the lungs when you inhale tobacco smoke.
- It can be present in low levels in air and drinking water.

How can phenol affect my health?

In people, the effects of breathing phenol in air are not known. People who had skin exposure to high levels had liver damage, diarrhea, dark urine, and hemolytic anemia.

In animals, breathing air with high levels of phenol re-

sulted in irritation of the lungs. Repeated exposures led to muscle tremors and loss of coordination. Exposure to high levels of phenol for several weeks caused paralysis and severe injury to the heart, liver, kidneys, and lungs, and in some cases, death.

Phenol can have beneficial effects when used medically as an antiseptic or anesthetic.

How likely is phenol to cause cancer?

It is not known if phenol causes cancer in people. Cancer occured in mice when phenol was applied to the skin several times each week for the lifetime of the animal. Phenol did not cause cancer in mice or rats when they drank water containing it for 2 years. The International Agency for Research on Cancer (IARC) has determined that phenol is not classifiable as to its carcinogenicity to humans.

How can phenol affect children?

Children are exposed to phenol in the same way adults are. Children are at greater risk of accidently ingesting home products that contain phenol. The effects of exposure to phenol on the human fetus are not known. Pregnant animals that drank water containing high concentrations of phenol gave birth to babies that had low birth weights and minor birth defects.

How can families reduce the risk of exposure to phenol?

If your doctor finds that you have been exposed to high levels of phenol, ask if children may also be exposed. Your doctor may need to ask your state department of health to investigate.

Is there a medical test to show whether I've been exposed to phenol?

There is a urine test that can tell if you have been exposed to phenol recently (within 1 or 2 days). However, the test cannot tell if you were exposed only to phenol since many substances are converted to phenol in the body.

Has the federal government made recommendations to protect human health?

EPA has a lifetime health advisory for adults for phenol in drinking water of 4 milligrams per liter (4 mg/L). EPA also recommends that the level of phenol in surface water (lakes, streams) should be limited to 3.5 mg/L to protect people from drinking contaminated water or eating contaminated fish.

The Occupational Safety and Health Administration (OSHA) has set a limit of 5 parts per million (5 ppm) for workers during an 8-hour workshift in a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that workroom air be limited to 5 ppm over a 10-hour workday and that concentrations should not exceed 16 ppm during a 15-minute period.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological profile for phenol. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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DDT, DDE, AND DDD

CAS # 50-29-3, 72-55-9, 72-54-8

Division of Toxicology ToxFAQs™ September 2002

This fact sheet answers the most frequently asked health questions (FAQs) about DDT, DDE, and DDD. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to DDT, DDE, and DDD occurs mostly from eating foods containing small amounts of these compounds, particularly meat, fish and poultry. High levels of DDT can affect the nervous system causing excitability, tremors and seizures. In women, DDE can cause a reduction in the duration of lactation and an increased chance of having a premature baby. DDT, DDE, and DDD have been found in at least 441 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are DDT, DDE, and DDD?

DDT (dichlorodiphenyltrichloroethane) is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. DDT is a white, crystalline solid with no odor or taste. Its use in the U.S. was banned in 1972 because of damage to wildlife, but is still used in some countries.

DDE (dichlorodiphenyldichloroethylene) and DDD (dichlorodiphenyldichloroethane) are chemicals similar to DDT that contaminate commercial DDT preparations. DDE has no commercial use. DDD was also used to kill pests, but its use has also been banned. One form of DDD has been used medically to treat cancer of the adrenal gland.

What happens to DDT, DDE, and DDD when they enter the environment?

- DDT entered the environment when it was used as a pesticide; it still enters the environment due to current use in other countries.
- DDE enters the environment as contaminant or breakdown product of DDT; DDD also enters the environment as a breakdown product of DDT.
- DDT, DDE, and DDD in air are rapidly broken down by sunlight. Half of what's in air breaks down within 2 days.
- They stick strongly to soil; most DDT in soil is broken down slowly to DDE and DDD by microorganisms; half the DDT in soil will break down in 2-15 years, depending on the type of soil.
- Only a small amount will go through the soil into groundwater; they do not dissolve easily in water.
- DDT, and especially DDE, build up in plants and in fatty tissues of fish, birds, and other animals.

How might I be exposed to DDT, DDE, and DDD?

- Eating contaminated foods, such as root and leafy vegetables, fatty meat, fish, and poultry, but levels are very low.
- Eating contaminated imported foods from countries that still allow the use of DDT to control pests.
- Breathing contaminated air or drinking contaminated water near waste sites and landfills that may contain higher levels of these chemicals.
- Infants fed on breast milk from mothers who have been exposed.
- Breathing or swallowing soil particles near waste sites or landfills that contain these chemicals.

How can DDT, DDE, and DDD affect my health?

DDT affects the nervous system. People who accidentally swallowed large amounts of DDT became excitable and had tremors and seizures. These effects went away after the exposure stopped. No effects were seen in people who took small daily doses of DDT by capsule for 18 months.

A study in humans showed that women who had high amounts of a form of DDE in their breast milk were unable to

breast feed their babies for as long as women who had little DDE in the breast milk. Another study in humans showed that women who had high amounts of DDE in breast milk had an increased chance of having premature babies.
In animals, short-term exposure to large amounts of DDT in food affected the nervous system, while long-term exposure to smaller amounts affected the liver. Also in animals, short-term oral exposure to small amounts of DDT or its breakdown products may also have harmful effects on reproduction.

How likely are DDT, DDE, and DDD to cause cancer?

Studies in DDT-exposed workers did not show increases in cancer. Studies in animals given DDT with the food have shown that DDT can cause liver cancer.
The Department of Health and Human Services (DHHS) determined that DDT may reasonable be anticipated to be a human carcinogen. The International Agency for Research on Cancer (IARC) determined that DDT may possibly cause cancer in humans. The EPA determined that DDT, DDE, and DDD are probable human carcinogens.

How can DDT, DDE, and DDD affect children?

There are no studies on the health effects of children exposed to DDT, DDE, or DDD. We can assume that children exposed to large amounts of DDT will have health effects similar to the effects seen in adults. However, we do not know whether children differ from adults in their susceptibility to these substances.
There is no evidence that DDT, DDE, or DDD cause birth defects in people. A study showed that teenage boys whose mothers had higher DDE amounts in the blood when they were pregnant were taller than those whose mothers had lower DDE levels. However, a different study found the opposite in preteen girls. The reason for the discrepancy between these studies is unknown.
Studies in rats have shown that DDT and DDE can mimic the action of natural hormones and in this way affect the development of the reproductive and nervous systems. Puberty was delayed in male rats given high amounts of DDE as juveniles. This could possibly happen in humans.
A study in mice showed that exposure to DDT during the first weeks of life may cause neurobehavioral problems later in life.

How can families reduce the risk of exposure to DDT,DDE, and DDE?

- ❑ Most families will be exposed to DDT by eating food or drinking liquids contaminated with small amounts of DDT.
- ❑ Cooking will reduce the amount of DDT in fish.
- ❑ Washing fruit and vegetables will remove most DDT from their surface.
- ❑ Follow health advisories that tell you about consumption of fish and wildlife caught in contaminated areas.

Is there a medical test to show whether I've been exposed to DDT, DDE, and DDD?

Laboratory tests can detect DDT, DDE, and DDD in fat, blood, urine, semen, and breast milk. These tests may show low, moderate, or excessive exposure to these compounds, but cannot tell the exact amount you were exposed to, or whether you will experience adverse effects. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) sets a limit of 1 milligram of DDT per cubic meter of air (1 mg/m^3) in the workplace for an 8-hour shift, 40-hour workweek.
The Food and Drug Administration (FDA) has set limits for DDT, DDE, and DDD in foodstuff at or above which the agency will take legal action to remove the products from the market.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for DDT/DDE/DDD (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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ALDRIN and DIELDRIN

CAS # 309-00-2 and 60-57-1

Division of Toxicology ToxFAQs™ September 2002

This fact sheet answers the most frequently asked health questions (FAQs) about aldrin and dieldrin. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to aldrin and dieldrin happens mostly from eating contaminated foods, such as root crops, fish, or seafood. Aldrin and dieldrin build up in the body after years of exposure and can affect the nervous system. Aldrin has been found in at least 207 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA). Dieldrin has been found in at least 287 of the 1,613 sites.

What are aldrin and dieldrin?

Aldrin and dieldrin are insecticides with similar chemical structures. They are discussed together in this fact sheet because aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Neither substance occurs naturally in the environment.

From the 1950s until 1970, aldrin and dieldrin were widely used pesticides for crops like corn and cotton. Because of concerns about damage to the environment and potentially to human health, EPA banned all uses of aldrin and dieldrin in 1974, except to control termites. In 1987, EPA banned all uses.

What happens to aldrin and dieldrin when they enter the environment?

- Sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment.
- They bind tightly to soil and slowly evaporate to the air.
- Dieldrin in soil and water breaks down very slowly.
- Plants take in and store aldrin and dieldrin from the soil.
- Aldrin rapidly changes to dieldrin in plants and animals.
- Dieldrin is stored in the fat and leaves the body very slowly.

How might I be exposed to aldrin or dieldrin?

- Dieldrin is everywhere in the environment, but at very low levels.
- Eating food like fish or shellfish from lakes or streams contaminated with either chemical, or contaminated root crops, dairy products, or meats.
- Air, surface water, or soil near waste sites may contain higher levels.
- Living in homes that were once treated with aldrin or dieldrin to control termites.

How can aldrin and dieldrin affect my health?

People who have intentionally or accidentally ingested large amounts of aldrin or dieldrin have suffered convulsions and some died. Health effects may also occur after a longer period of exposure to smaller amounts because these chemicals build up in the body.

Some workers exposed to moderate levels in the air for a long time had headaches, dizziness, irritability, vomiting, and uncontrolled muscle movements. Workers removed from the source of exposure rapidly recovered from most of these effects.

Animals exposed to high amounts of aldrin or dieldrin also had nervous system effects. In animals, oral exposure to lower levels for a long period also affected the liver and decreased their ability to fight infections. We do not know whether aldrin or dieldrin affect the ability of people to fight disease.

Studies in animals have given conflicting results about whether aldrin and dieldrin affect reproduction in male animals and whether these chemicals may damage the sperm.

We do not know whether aldrin or dieldrin affect reproduction in humans.

How likely are aldrin and dieldrin to cause cancer?

There is no conclusive evidence that aldrin or dieldrin cause cancer in humans. Aldrin and dieldrin have been shown to cause liver cancer in mice. The International Agency for Research on Cancer (IARC) has determined that aldrin and dieldrin are not classifiable as to human carcinogenicity. The EPA has determined that aldrin and dieldrin are probable human carcinogens.

How can aldrin and dieldrin affect children?

Children can be exposed to aldrin and dieldrin in the same way as adults. There are no known unique exposure pathways for children. Children who swallowed amounts of aldrin or dieldrin much larger than those found in the environment suffered convulsions and some died, as occurred in adults. However, we do not know whether children are more susceptible than adults to the effects of aldrin or dieldrin.

We do not know whether aldrin or dieldrin cause birth defects in humans. Pregnant animals that ingested aldrin or dieldrin had some babies with low birth weight and some with alterations in the skeleton. Dieldrin has been found in human breast milk, therefore, it can be passed to suckling infants.

How can families reduce the risk of exposure to aldrin and dieldrin?

❑ Since aldrin and dieldrin are no longer produced or used, exposure to these compounds will occur only from past usage.

❑ Because aldrin and dieldrin were applied to the basement of some homes for termite protection, before buying a home families should investigate what, if any, pesticides have been used within the home.

Is there a medical test to show whether I've been exposed to aldrin and dieldrin?

There are laboratory tests that can measure aldrin and dieldrin in your blood, urine, and body tissues. Because aldrin changes to dieldrin fairly quickly in the body, the test has to be done shortly after you are exposed to aldrin. Since dieldrin can stay in the body for months, measurements of dieldrin can be made much longer after exposure to either aldrin or dieldrin. The tests cannot tell you whether harmful health effects will occur. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The EPA limits the amount of aldrin and dieldrin that may be present in drinking water to 0.001 and 0.002 milligrams per liter (mg/L) of water, respectively, for protection against health effects other than cancer. The EPA has determined that a concentration of aldrin and dieldrin of 0.0002 mg/L in drinking water limits the lifetime risk of developing cancer from exposure to each compound to 1 in 10,000.

The Occupational Safety and Health Administration (OSHA) sets a maximum average of 0.25 milligrams of aldrin and dieldrin per cubic meter of air (0.25 mg/m^3) in the workplace during an 8-hour shift, 40 hour week. The National Institute for Occupational Safety and Health (NIOSH) also recommends a limit of 0.25 mg/m^3 for both compounds for up to a 10-hour work day, 40-hour week.

The Food and Drug Administration (FDA) regulates the residues of aldrin and dieldrin in raw foods. The allowable range is from 0 to 0.1 ppm, depending on the type of food product.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Aldrin/Dieldrin (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ENDOSULFAN
CAS # 33213-65-9

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about endosulfan. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to endosulfan happens mostly from eating contaminated food, but may also occur from skin contact, breathing contaminated air, or drinking contaminated water. Endosulfan affects the function of the central nervous system. Endosulfan has been found in at least 164 of 1,577 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is endosulfan?
(Pronounced en′do-sul-fān)

Endosulfan is a pesticide. It is a cream- to brown-colored solid that may appear in the form of crystals or flakes. It has a smell like turpentine, but does not burn. It does not occur naturally in the environment.

Endosulfan is used to control insects on food and non-food crops and also as a wood preservative.

What happens to endosulfan when it enters the environment?

❑ Endosulfan enters the air, water, and soil during its manufacture and use. It is often sprayed onto crops and the spray may travel long distances before it lands on crops, soil, or water.

❑ Endosulfan on crops usually breaks down in a few weeks, but endosulfan sticks to soil particles and may take years to completely break down.

❑ Endosulfan does not dissolve easily in water. Endosulfan in surface water is attached to soil particles floating in water or attached to soil at the bottom.

❑ Endosulfan can build up in the bodies of animals that live in endosulfan-contaminated water;

How might I be exposed to endosulfan?

❑ Eating food contaminated with endosulfan, but levels in foods are very low.

❑ People working in industries involved in making endosulfan or as pesticide applicators.

❑ Skin contact with soil containing endosulfan.

How can endosulfan affect my health?

Endosulfan affects the central nervous system and prevents it from working properly. Hyperactivity, nausea, dizziness, headache, or convulsions have been observed in adults exposed to high doses. Severe poisoning may result in death.

Studies of the effects of endosulfan on animals suggest that long-term exposure to endosulfan can also damage the kidneys, testes, and liver and may possibly affect the body's ability to fight infection. However, it is not known if these effects also occur in humans.

How likely is endosulfan to cause cancer?

We do not know if endosulfan can cause cancer in humans. Studies in animals have provided inconclusive results.

How can endosulfan affect children?

We do not know if children are more sensitive to endosulfan than adults. We do not know if endosulfan can affect the ability of people to have children or if it causes birth defects. Large amounts of endosulfan damaged the testes of animals, but it is not known if this damaged their ability to reproduce. Some birth defects have been seen in the offspring of animals ingesting endosulfan during pregnancy.

How can families reduce the risk of exposure to endosulfan?

❑ Fresh fruits and vegetables should be washed before being eaten.

❑ Children should not play on grasses that were recently treated with endosulfan. Carefully follow the directions on the pesticide label about how long to wait before re-entering the treated area.

❑ People working in a factory making endosulfan and people using endosulfan should wash clothing, skin, and hair before going home.

❑ Pesticides should be used according to the directions on the label and stored in the original container in a place that children cannot reach.

Is there a medical test to show whether I've been exposed to endosulfan?

Endosulfan and its breakdown products can be detected in your blood, urine, and body tissues if you have been exposed to a large amount. These tests are not usually available at your doctors office, but your doctor can send the samples to a laboratory that can perform the tests. Because endosulfan leaves the body fairly quickly, these methods are useful only for finding exposures that have occurred within the last few days.

Has the federal government made recommendations to protect human health?

The EPA recommends that the amount of endosulfan in rivers, lakes, and streams should not be more than 74 parts per billion (74 ppb).

The Food and Drug Administration (FDA) allows no more than 24 parts per million (24 ppm) endosulfan on dried tea.

EPA allows no more than 0.1 to 2 ppm endosulfan on other raw agricultural products.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Endosulfan. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

HEPTACHLOR AND HEPTACHLOR EPOXIDE

CAS # 76-44-8 and 1024-57-3

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about heptachlor and heptachlor epoxide. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: The primary exposure to heptachlor and heptachlor epoxide is from contaminated foods and milk. At high levels, they can cause damage to your liver and nervous system. Children appear to be very sensitive to heptachlor and heptachlor epoxide toxicity. Exposure during gestation and infancy can result in damage to the nervous system and the immune systems. Heptachlor has been found in at least 206 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA). Heptachlor epoxide has been found in at least 195 NPL sites.

What are heptachlor and heptachlor epoxide?

Heptachlor is a manufactured chemical and doesn't occur naturally. Pure heptachlor is a white powder that smells like camphor (mothballs). The less pure grade is tan. Trade names include Heptagran®, Basaklor®, Drinox®, Soleptax®, Termide®, and Velsicol 104®.

Heptachlor was used extensively in the past for killing insects in homes, buildings, and on food crops, especially corn. These uses stopped in 1988. Currently it can only be used for fire ant control in power transformers.

Heptachlor epoxide is also a white powder. Bacteria and animals break down heptachlor to form heptachlor epoxide. The epoxide is more likely to be found in the environment than heptachlor.

What happens to heptachlor and heptachlor epoxide when they enter the environment?

- ❑ Heptachlor doesn't dissolve easily in water; heptachlor epoxide dissolves more easily
- ❑ They stick strongly to soil particles and evaporate slowly to air.
- ❑ Heptachlor epoxide can stay in the soil and water for many years.
- ❑ Plants can take up heptachlor from the soil. Levels of heptachlor and heptachlor epoxide can build up in the tissues of fish and cattle.

How might I be exposed to heptachlor or heptachlor epoxide?

- ❑ Eating fish, dairy products, and fatty meats from animals exposed to heptachlor in their food.
- ❑ Breast milk from mothers who had high exposures can expose breastfed infants.

How can heptachlor and heptachlor epoxide affect my health?

Liver damage, excitability, and decreases in fertility have been observed in animals ingesting heptachlor. The effects are worse when the exposure levels were high or when exposure lasted many weeks.

Although there is very little information on heptachlor epoxide, it is likely that similar effects would also occur after exposure to this compound.

How likely are heptachlor and heptachlor epoxide to cause cancer?

Lifetime exposure to heptachlor resulted in liver tumors in animals. The International Agency for Research on Cancer (IARC) and the EPA have classified heptachlor as a possible human carcinogen. EPA also considers heptachlor epoxide as a possible human carcinogen.

How can heptachlor and heptachlor epxide affect children?

Animals exposed to heptachlor during gestation and infancy may be very sensitive to heptachlor and heptachlor epoxide. Changes in nervous system and immune function were found in these animals. Exposure to higher doses of heptachlor in animals can also result in decreases in body weight and death in newborn animals.

How can families reduce the risks of exposure to heptachlor and heptachlor epoxide?

❑ People who live in homes where heptachlor was used for termite control or on farms where heptachlor was used on crops may have a higher risk of exposure through contaminated crops, soil, water, and air. To avoid exposure from contaminated soil, you should discourage your children from eating dirt. Make sure they wash their hands frequently and before eating. Discourage children from putting their hands in their mouths or other hand-to-mouth activities.

❑ Heptachlor and heptachlor epoxide are also persistent in food and milk. Eating fish from contaminated water can increase exposure to heptachlor. Do not fish or eat fish from contaminated water. Local fishing advisories can tell you if the water is contaminated.

Is there a medical test to determine whether I've been exposed to heptachlor and heptachlor epoxide?

Laboratory tests can detect heptachlor and heptachlor epoxide in blood, fat, breast milk, and body tissues after exposure to high levels of those chemicals. These tests are not commonly available at your doctor's office. Most often, the test for heptachlor epoxide is used because heptachlor is quickly changed into heptachlor epoxide in your body. Blood samples are used most often because they are easy to collect. These tests are specific for heptachlor and heptachlor epoxide.

Methods for measuring heptachlor and heptachlor epoxide in body fat are more precise and can detect lower levels than tests that measure levels in blood. If heptachlor or heptachlor epoxide is found in your blood or fat, it is not possible to tell when you were exposed to these chemicals or if harmful health effects will occur.

Has the federal government made recommendations to protect human health?

The EPA requires that drinking water should not contain more than 0.0004 milligrams heptachlor per liter of water (0.0004 mg/L) and 0.0002 mg heptachlor epoxide per liter of water (0.0002 mg/L).

The FDA controls the amount of heptachlor and heptachlor epoxide on raw food crops and on edible seafood. The limit on food crops is from 0.01 to 0.05 parts heptachlor per million parts food (0.01-0.05 ppm) depending on the type of food product. The limit on edible seafood is 0.3 ppm.

The Occupational Safety and Health Administration (OSHA) has a set limit of 0.5 milligrams heptachlor per cubic meter of workplace air (0.5 mg/m^3) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Heptachlor and Heptachlor Epoxide (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

❑ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.

❑ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.

❑ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

❑ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

❑ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.

❑ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.

❑ Breathing air near hazardous waste sites and drinking contaminated well water.

❑ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

❑ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.

❑ Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.

❑ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.

❑ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ANTIMONY
CAS # 7440-36-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about antimony. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to antimony occurs in the workplace or from skin contact with soil at hazardous waste sites. Breathing high levels of antimony for a long time can irritate the eyes and lungs, and can cause problems with the lungs, heart, and stomach. This chemical has been found in at least 403 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is antimony?

(Pronounced ăn′tə-mō′nē)

Antimony is a silvery-white metal that is found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys or combined with oxygen to form antimony oxide.

Little antimony is currently mined in the United States. It is brought into this country from other countries for processing. However, there are companies in the United States that produce antimony as a by-product of smelting lead and other metals.

Antimony isn't used alone because it breaks easily, but when mixed into alloys, it is used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is added to textiles and plastics to prevent them from catching fire. It is also used in paints, ceramics, and fireworks, and as enamels for plastics, metal, and glass.

What happens to antimony when it enters the environment?

- Antimony is released to the environment from natural sources and from industry.
- In the air, antimony is attached to very small particles that may stay in the air for many days.
- Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum.
- Antimony is found at low levels in some rivers, lakes, and streams.

How might I be exposed to antimony?

- Because antimony is found naturally in the environment, the general population is exposed to low levels of it every day, primarily in food, drinking water, and air.
- It may be found in air near industries that process or release it, such as smelters, coal-fired plants, and refuse incinerators.
- In polluted areas containing high levels of antimony, it may be found in the air, water, and soil.
- Workers in industries that process it or use antimony ore may be exposed to higher levels.

How can antimony affect my health?

Exposure to antimony at high levels can result in a variety of adverse health effects.

Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers.

In short-term studies, animals that breathed very high levels of antimony died. Animals that breathed high levels

had lung, heart, liver, and kidney damage. In long-term studies, animals that breathed very low levels of antimony had eye irritation, hair loss, lung damage, and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed very high levels of antimony for a few months.

Ingesting large doses of antimony can cause vomiting. We don't know what other effects may be caused by ingesting it. Long-term animal studies have reported liver damage and blood changes when animals ingested antimony. Antimony can irritate the skin if it is left on it.

Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

How likely is antimony to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified antimony as to its human carcinogenicity.

Lung cancer has been observed in some studies of rats that breathed high levels of antimony. No human studies are available. We don't know whether antimony will cause cancer in people.

Is there a medical test to show whether I've been exposed to antimony?

Tests are available to measure antimony levels in the body. Antimony can be measured in the urine, feces, and blood for several days after exposure. However, these tests cannot tell you how much antimony you have been exposed to or whether you will experience any health effects. Some tests are not usually performed in most doctors' offices and may require special equipment to conduct them.

Has the federal government made recommendations to protect human health?

The EPA allows 0.006 parts of antimony per million parts of drinking water (0.006 ppm). The EPA requires that discharges or spills into the environment of 5,000 pounds or more of antimony be reported.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 0.5 milligrams of antimony per cubic meter of air (0.5 mg/m^3) for an 8-hour workday, 40-hour workweek.

The American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety and Health (NIOSH) currently recommend the same guidelines for the workplace as OSHA.

Glossary

Carcinogenicity: Ability to cause cancer.
CAS: Chemical Abstracts Service.
Ingestion: Taking food or drink into your body.
Long-term: Lasting one year or more.
Milligram (mg): One thousandth of a gram.
Parasite: An organism living in or on another organism.
ppm: Parts per million.
Short-term: Lasting 14 days or less.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for antimony. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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ARSENIC

CAS # 7440-38-2

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 784 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenic (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and it therefore may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the lungs, bladder, liver, kidney and prostate. Inhalation of inorganic arsenic can cause increase risk of lung cancer. The Department of Health and Human Services (DHHS) has determined that inorganic arsenic is a known carcinogen. The International Agency for Research on Cancer (IARC), and the EPA have determined that inorganic arsenic is carcinogenic to humans.

How can arsenic affect children?

There is also some evidence that suggests that long-term exposure to arsenic in children may result in lower IQ scores. There is some information suggesting that children may be less efficient at converting inorganic arsenic to the less harmful organic forms. For this reason, children may be more susceptible to health effects from inorganic arsenic than adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

How can families reduce the risks of exposure to arsenic?

❑ If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.

❑ If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

Is there a medical test to determine whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Arsenic (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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BARIUM

CAS # 7440-39-3

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about barium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to barium occurs mostly in the workplace or from drinking contaminated water. Ingesting drinking water containing levels of barium above the EPA drinking water guidelines for relatively short periods of time can cause gastrointestinal disturbances and muscle weakness. Ingesting high levels for a long time can damage the kidneys. Barium has been found in at least 798 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is barium?

Barium is a silvery-white metal which exists in nature only in ores containing mixtures of elements. It combines with other chemicals such as sulfur or carbon and oxygen to form barium compounds.

Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, ceramics, glass, and rubber.

Barium sulfate is sometimes used by doctors to perform medical tests and to take x-rays of the gastrointestinal tract.

What happens to barium when it enters the environment?

- Barium gets into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil.
- The length of time that barium will last in air, land, water, or sediments depends on the form of barium released.
- Barium compounds, such as barium sulfate and barium carbonate, that do not dissolve well in water can last a long time in the environment.
- Barium compounds, such as barium chloride, barium nitrate, or barium hydroxide, that dissolve easily in water usually do not last in these forms for a long time in the environment. The barium in these compounds that is dissolved in water quickly combines with sulfate or carbonate that are naturally found in water and become the longer lasting forms (barium sulfate and barium carbonate).
- Fish and aquatic organisms can accumulate barium.

How might I be exposed to barium?

- Ingesting small amounts present in your food and water or breathing air containing very low levels of barium.
- Living in areas with unusually high natural levels of barium in the drinking water.
- Working in a job that involves barium production or use.

How can barium affect my health?

The health effects of the different barium compounds depend on how well the compound dissolves in water or in the stomach contents. Barium compounds that do not dissolve well, such as barium sulfate, are not generally harmful.

Barium has been found to potentially cause gastrointestinal disturbances and muscular weakness when people are exposed to it at levels above the EPA drinking water standards for relatively short periods of time. Some people who eat or drink amounts of barium above background

levels found in food and water for a short period may experience vomiting, abdominal cramps, diarrhea, difficulties in breathing, increased or decreased blood pressure, numbness around the face, and muscle weakness. Eating or drinking very large amounts of barium compounds that easily dissolve can cause changes in heart rhythm or paralysis and possibly death. Animals that drank barium over long periods had damage to the kidneys, decreases in body weight, and some died.

How likely is barium to cause cancer?

The Department of Health and Human Services and the International Agency for Research on Cancer have not classified barium as to its carcinogenicity. The EPA has determined that barium is not likely to be carcinogenic to humans following ingestion and that there is insufficient information to determine whether it will be carcinogenic to humans following inhalation exposure.

How can barium affect children?

We do not know whether children will be more or less sensitive than adults to barium toxicity. A study in rats that swallowed barium found a decrease in newborn body weight; we do not know if a similar effect would be seen in humans.

How can families reduce the risks of exposure to barium?

❑ The greatest potential source of barium exposure is through food and drinking water. However, the amount of barium in foods and drinking water are typically too low to be of concern.

Is there a medical test to determine whether I've been exposed to barium?

There is no routine medical test to determine whether you have been exposed to barium. Doctors can measure barium in body tissues and fluids, such as bones, blood, urine, and feces, using very complex instruments. These tests cannot be used to predict the extent of the exposure or potential health effects.

Geometric mean barium level measured in the U.S. general population aged 6 and older is reported by CDC as 1.44 μg/g creatinine (measured in urine).

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2.0 milligrams barium per liter of drinking water (2.0 mg/L), which is the same as 2 ppm.

The Occupational Safety and Health Administration (OSHA) has set Permissible Exposure Limits (PELs) of 0.5 milligrams of soluble barium compounds per cubic meter of workplace air (0.5 mg/m^3) for 8 hour shifts and 40 hour work weeks. The OSHA limits for barium sulfate dust are 15 mg/m^3 of total dust and 5 mg/m^3 for respirable fraction.

The National Institute for Occupational Safety and Health (NIOSH) has set Recommended Exposure Limits (RELs) of 0.5 mg/m^3 for soluble barium compounds. The NIOSH has set RELs of 10 mg/m^3 (total dust) for barium sulfate and 5 mg/m^3 (respirable fraction).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Barium and Compounds (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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BERYLLIUM

CAS #7440-41-7

Division of Toxicology ToxFAQs™ September 2002

This fact sheet answers the most frequently asked health questions (FAQs) about beryllium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: People working or living near beryllium industries have the greatest potential for exposure to beryllium. Lung damage has been observed in people exposed to high levels of beryllium in the air. About 1-15% of all people occupationally-exposed to beryllium in air become sensitive to beryllium and may develop chronic beryllium disease (CBD), an irreversible and sometimes fatal scarring of the lungs. CBD may be completely asymptomatic or begin with coughing, chest pain, shortness of breath, weakness, and/or fatigue. Beryllium has been found in at least 535 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is beryllium?

Beryllium is a hard, grayish metal naturally found in mineral rocks, coal, soil, and volcanic dust. Beryllium ore is mined, and the beryllium is purified for use in nuclear weapons and reactors, aircraft and space vehicle structures, instruments, x-ray machines, and mirrors. Beryllium oxide is used to make speciality ceramics for electrical and high-technology applications. Beryllium alloys are used in automobiles, computers, sports equipment (golf clubs), and dental bridges.

What happens to beryllium when it enters the environment?

❑ Beryllium dust enters the air from burning coal and oil. This beryllium dust will eventually settle over the land and water.
❑ It enters water from erosion of rocks and soil, and from industrial waste. Some beryllium compounds will dissolve in water, but most stick to particles and settle to the bottom.
❑ Most beryllium in soil does not dissolve in water and remains bound to soil.
❑ Beryllium does not accumulate in the food chain.

How might I be exposed to beryllium?

❑ The general population is normally exposed to low levels of beryllium in air, food, and water.
❑ People working in industries where beryllium is mined, processed, machined, or converted into metal, alloys, and other chemicals may be exposed to high levels of beryllium. People living near these industries may also be exposed to higher than normal levels of beryllium in air.
❑ People living near uncontrolled hazardous waste sites may be exposed to higher than normal levels of beryllium.

How can beryllium affect my health?

Beryllium can be harmful if you breathe it. The effects depend on how much you are exposed to, for how long, and individual susceptibility. If beryllium air levels are high enough (greater than 1000 ug/m^3), an acute condition can result. This condition resembles pneumonia and is called acute beryllium disease Occupational and community air standards are effective in preventing acute lung damage.

Some exposed workers (1-15%) become sensitive to beryllium. These individuals may develop an inflammatory reaction in the respiratory system. This condition is called chronic beryllium disease (CBD), and can occur years after exposure to higher than normal levels of beryllium (greater than 0.2 ug/m^3). This disease can make you feel weak and tired, and can cause difficulty in breathing. It can also result in anorexia, weight loss, and may also lead to right side heart

enlargement and heart disease in advanced cases. Some people who are sensitized to beryllium may not have any symptoms. The general population is unlikely to develop chronic beryllium disease because ambient air levels of beryllium are normally very low (0.00003-0.0002 ug/m^3).

Swallowing beryllium has not been reported to cause effects in humans because very little beryllium is absorbed from the stomach and intestines. Ulcers have been seen in dogs ingesting beryllium in the diet. Beryllium contact with skin that has been scraped or cut may cause rashes or ulcers.

How likely is beryllium to cause cancer?

Long term exposure to beryllium can increase the risk of developing lung cancer in people.

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have determined that beryllium is a human carcinogen. The EPA has determined that beryllium is a probable human carcinogen. EPA has estimated that lifetime exposure to 0.04 ug/m^3 beryllium can result in a one in a thousand chance of developing cancer.

How can beryllium affect children?

It is likely that the health effects seen in children exposed to beryllium will be similar to the effects seen in adults. We do not know whether children differ from adults in their susceptibility to beryllium.

We do not know if exposure to beryllium will result in birth defects or other developmental effects in people. The studies on developmental effects in animals are not conclusive.

How can families reduce the risk of exposure to beryllium?

❑ Individuals working at facilities that use beryllium should make sure that contaminated clothing and objects are not brought home.

❑ Children should avoid playing in soils near uncontrolled hazardous waste sites where beryllium may have been discarded.

Is there a medical test to show whether I've been exposed to beryllium?

Beryllium can be measured in samples from your blood, urine, skin, or lungs. These tests are rarely done because they are not reliable measures of your exposure over time. Also, these tests do not show if you have become sensitized to beryllium.

Another test, the beryllium lymphocyte proliferation test (BeLPT), can help your doctor decide if you are sensitized to beryllium. This test is only done in a few specialized laboratories, but doctors familiar with the test can collect blood samples and send them for testing by overnight carrier. The BeLPT is most often done for people who work with beryllium. It is also useful for separating chronic beryllium disease from diagnoses that resemble it (for example, sarcoidosis). Depending on your exposure history, clinical findings, and test results, your doctor may also recommend additional specialized testing.

Has the federal government made recommendations to protect human health?

The EPA restricts the amount of beryllium that industries may release into the air to 0.01 ug/m^3, averaged over a 30-day period.

The Occupational Safety and Health Administration (OSHA) sets a limit of 2 ug/m^3 for an 8-hour work shift measured as a personal sample.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Beryllium Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

CADMIUM
CAS # 7440-43-9

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about cadmium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to cadmium happens mostly in the workplace where cadmium products are made. The general population is exposed from breathing cigarette smoke or eating cadmium contaminated foods. Cadmium damages the lungs, can cause kidney disease, and may irritate the digestive tract. This substance has been found in at least 776 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is cadmium?

(Pronounced kăd′mē-əm)

Cadmium is a natural element in the earth's crust. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide).

All soils and rocks, including coal and mineral fertilizers, contain some cadmium. Most cadmium used in the United States is extracted during the production of other metals like zinc, lead, and copper. Cadmium does not corrode easily and has many uses, including batteries, pigments, metal coatings, and plastics.

What happens to cadmium when it enters the environment?

- Cadmium enters air from mining, industry, and burning coal and household wastes.
- Cadmium particles in air can travel long distances before falling to the ground or water.
- It enters water and soil from waste disposal and spills or leaks at hazardous waste sites.
- It binds strongly to soil particles.
- Some cadmium dissolves in water.
- It doesn't break down in the environment, but can change forms.
- Fish, plants, and animals take up cadmium from the environment.
- Cadmium stays in the body a very long time and can build up from many years of exposure to low levels.

How might I be exposed to cadmium?

- Breathing contaminated workplace air (battery manufacturing, metal soldering or welding).
- Eating foods containing it; low levels in all foods (highest in shellfish, liver, and kidney meats).
- Breathing cadmium in cigarette smoke (doubles the average daily intake).
- Drinking contaminated water.
- Breathing contaminated air near the burning of fossil fuels or municipal waste.

How can cadmium affect my health?

Breathing high levels of cadmium severely damages the lungs and can cause death. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease.

Other long-term effects are lung damage and fragile bones. Animals given cadmium in food or water had high blood pressure, iron-poor blood, liver disease, and nerve or brain damage.

We don't know if humans get any of these diseases from eating or drinking cadmium. Skin contact with cadmium is not known to cause health effects in humans or animals.

How likely is cadmium to cause cancer?

The Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens.

How can cadmium affect children?

The health effects in children are expected to be similar to those in adults (kidney, lung and intestinal damage).

We don't know if cadmium causes birth defects in people. Cadmium does not readily go from a pregnant woman's body into the developing child, but some portion can cross the placenta. It can also be found in breast milk. The babies of animals exposed to high levels of cadmium during pregnancy had changes in behavior and learning ability. Cadmium may also affect birth weight and the skeleton in developing animals.

Animal studies also indicate that more cadmium is absorbed into the body if the diet is low in calcium, protein, or iron, or is high in fat. A few studies show that younger animals absorb more cadmium and are more likely to lose bone and bone strength than adults.

How can families reduce the risk of exposure to cadmium?

In the home, store substances that contain cadmium safely, and keep nickel-cadmium batteries out of reach of young children. If you work with cadmium, use all safety precautions to avoid carrying cadmium-containing dust home from work on your clothing, skin, hair, or tools.

A balanced diet can reduce the amount of cadmium taken into the body from food and drink.

Is there a medical test to show whether I've been exposed to cadmium?

Tests are available in some medical laboratories that measure cadmium in blood, urine, hair, or nails. Blood levels show recent exposure to cadmium, and urine levels show both recent and earlier exposure. The reliability of tests for cadmium levels in hair or nails is unknown.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 5 parts of cadmium per billion parts of drinking water (5 ppb). EPA doesn't allow cadmium in pesticides.

The Food and Drug Administration (FDA) limits the amount of cadmium in food colors to 15 parts per million (15 ppm).

The Occupational Safety and Health Administration (OSHA) limits workplace air to 100 micrograms cadmium per cubic meter (100 $\mu g/m^3$) as cadmium fumes and 200 μg cadmium/m^3 as cadmium dust.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for cadmium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

CHROMIUM
CAS # 7440-47-3

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about chromium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and can cause cancer. Chromium has been found at 1,036 of the 1,591 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is chromium?

Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases. Chromium is present in the environment in several different forms. The most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds.

Chromium(III) occurs naturally in the environment and is an essential nutrient. Chromium(VI) and chromium(0) are generally produced by industrial processes.

The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- Chromium enters the air, water, and soil mostly in the chromium(III) and chromium(VI) forms.
- In air, chromium compounds are present mostly as fine dust particles which eventually settle over land and water.
- Chromium can strongly attach to soil and only a small amount can dissolve in water and move deeper in the soil to underground water.
- Fish do not accumulate much chromium in their bodies from water.

How might I be exposed to chromium?

- Eating food containing chromium(III).
- Breathing contaminated workplace air or skin contact during use in the workplace.
- Drinking contaminated well water.
- Living near uncontrolled hazardous waste sites containing chromium or industries that use chromium.

How can chromium affect my health?

Chromium(III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium(VI) can cause irritation to the nose, such as runny nose, nosebleeds, and ulcers and holes in the nasal septum.

Ingesting large amounts of chromium(VI) can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death.

Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

Several studies have shown that chromium(VI) compounds can increase the risk of lung cancer. Animal studies have also shown an increased risk of cancer.

The World Health Organization (WHO) has determined that chromium(VI) is a human carcinogen.

The Department of Health and Human Services (DHHS) has determined that certain chromium(VI) compounds are known to cause cancer in humans.

The EPA has determined that chromium(VI) in air is a human carcinogen.

How can chromium affect children?

We do not know if exposure to chromium will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to chromium(VI).

It is likely that health effects seen in children exposed to high amounts of chromium will be similar to the effects seen in adults.

How can families reduce the risk of exposure to chromium?

❑ Children should avoid playing in soils near uncontrolled hazardous waste sites where chromium may have been discarded.

❑ Although chromium(III) is an essential nutrient, you should avoid excessive use of dietary supplements containing chromium.

Is there a medical test to show whether I've been exposed to chromium?

Since chromium(III) is an essential element and naturally occurs in food, there will always be some level of chromium in your body. There are tests to measure the level of chromium in hair, urine, and blood. These tests are most useful for people exposed to high levels. These tests cannot determine the exact levels of chromium that you may have been exposed to or predict how the levels in your tissues will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 100 μg chromium(III) and chromium(VI) per liter of drinking water (100 μg/L).

The Occupational Safety and Health Administration (OSHA) has set limits of 500 μg water soluble chromium(III) compounds per cubic meter of workplace air (500 $\mu g/m^3$), 1,000 $\mu g/m^3$ for metallic chromium(0) and insoluble chromium compounds, and 52 $\mu g/m^3$ for chromium(VI) compounds for 8-hour work shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Chromium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

COBALT

CAS #7440-48-4

Division of Toxicology ToxFAQs™ April 2004

This fact sheet answers the most frequently asked health questions (FAQs) about cobalt. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: The general population is exposed to low levels of cobalt in air, water, and food. Cobalt has both beneficial and harmful effects on health. At low levels, it is part of vitamin B12, which is essential for good health. At high levels, it may harm the lungs and heart. This chemical has been found in at least 426 of the 1,636 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is cobalt?

Cobalt is a naturally occurring element found in rocks, soil, water, plants, and animals. Cobalt is used to produce alloys used in the manufacture of aircraft engines, magnets, grinding and cutting tools, artificial hip and knee joints. Cobalt compounds are also used to color glass, ceramics and paints, and used as a drier for porcelain enamel and paints.

Radioactive cobalt is used for commercial and medical purposes. ^{60}Co (read as cobalt sixty) is used for sterilizing medical equipment and consumer products, radiation therapy for treating cancer patients, manufacturing plastics, and irradiating food. ^{57}Co is used in medical and scientific research. It takes about 5.27 years for half of ^{60}Co to give off its radiation and about 272 days for ^{57}Co; this is called the half-life.

What happens to cobalt when it enters the environment?

❑ Cobalt enters the environment from natural sources and the burning of coal or oil or the production of cobalt alloys.
❑ In the air, cobalt will be associated with particles that settle to the ground within a few days.
❑ Cobalt released into water or soil will stick to particles. Some cobalt compounds may dissolve.
❑ Cobalt cannot be destroyed. It can change form or attach to or separate from particles. Radioactive decay is a way of decreasing the amount of radioactive cobalt in the environment.

How might I be exposed to cobalt?

❑ You can be exposed to low levels of cobalt by breathing air, eating food, or drinking water. Food and drinking water are the largest sources of exposure to cobalt for the general population.
❑ Working in industries that make or use cutting or grinding tools; mine, smelt, refine, or process cobalt metal or ores; or that produce cobalt alloys or use cobalt.
❑ The general population is rarely exposed to radioactive cobalt unless a person is undergoing radiation therapy. However, workers at nuclear facilities, irradiation facilities, or nuclear waste storage sites may be exposed to radiation from these sources.

How can cobalt affect my health?

Cobalt can benefit or harm human health. Cobalt is beneficial for humans because it is part of vitamin B12.

Exposure to high levels of cobalt can result in lung and heart effects and dermatitis. Liver and kidney effects have also been observed in animals exposed to high levels of cobalt.

Exposure to large amounts of radiation from radioactive cobalt can damage cells in your body from the radiation.

You might also experience acute radiation syndrome that includes nausea, vomiting, diarrhea, bleeding, coma, and even death. This would be a rare event.

How likely is cobalt to cause cancer?

Nonradioactive cobalt has not been found to cause cancer in humans or animals following exposure in food or water. Cancer has been shown, however, in animals that breathed cobalt or when cobalt was placed directly into the muscle or under the skin. Based on the laboratory animal data, the International Agency for Research on Cancer (IARC) has determined that cobalt and cobalt compounds are possibly carcinogenic to humans.

Exposure to high levels of cobalt radiation can cause changes in the genetic materials within cells and may result in the development of some types of cancer.

How can cobalt affect children?

We do not know whether children differ from adults in their susceptibility to cobalt. However, it is likely that health effects in children would be similar those in adults. Studies in animals suggest that children may absorb more cobalt than adults from foods and liquids containing cobalt.

We do not know if exposure to cobalt will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to nonradioactive cobalt. Exposure to cobalt radiation can also result in developmental effects.

How can families reduce the risk of exposure to cobalt?

Children should avoid playing in soils near hazardous waste sites where cobalt may be present.

Is there a medical test to show whether I've been exposed to cobalt?

Cobalt levels can be tested in the urine and blood within a couple of days of exposure. Your doctor can take samples, but must send them to a laboratory to be tested. The amount of cobalt in your blood or urine can be used to estimate how much cobalt you were exposed to. However, these tests cannot predict whether you will experience any health effects.

Two types of tests are available for radioactive cobalt. One is to see if you have been exposed to a large dose of radiation, and the other is to see if radioactive cobalt is in your body. The first looks for changes in blood cell counts or in your chromosomes that occur at 3 to 5 times the annual occupational dose limit. It cannot tell if the radiation came from cobalt. The second type of test involves examining your blood, feces, saliva, urine, and even your entire body. It is to see if cobalt is being excreted from or remains inside your body. Either the doctor's office collects and sends the samples to a special lab for testing, or you must go to the lab for testing.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.1 milligrams of nonradioactive cobalt per cubic meter of workplace air (0.1 mg/m^3) for an 8-hour workday and 40-hour work week.

The Nuclear Regulatory Commission limits radioactive cobalt in workplace air to 1×10^{-5} microcurie per milliliter (μCi/mL) for ^{57}Co and 7×10^{-8} μCi/mL for ^{60}Co. EPA has set an average annual drinking water limit of 1000 picocurie per liter (pCi/L) for ^{57}Co or 100 pCi/L for ^{60}Co so the public radiation dose will not exceed 4 millirem.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Cobalt Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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COPPER

CAS # 7440-50-8

Division of Toxicology ToxFAQs™ September 2004

This fact sheet answers the most frequently asked health questions (FAQs) about copper. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Copper is a metal that occurs naturally in the environment, and also in plants and animals. Low levels of copper are essential for maintaining good health. High levels can cause harmful effects such as irritation of the nose, mouth and eyes, vomiting, diarrhea, stomach cramps, nausea, and even death. Copper has been found in at least 906 of the 1,647 National Priority Sites identified by the Environmental Protection Agency (EPA).

What is copper?

Copper is a metal that occurs naturally throughout the environment, in rocks, soil, water, and air. Copper is an essential element in plants and animals (including humans), which means it is necessary for us to live. Therefore, plants and animals must absorb some copper from eating, drinking, and breathing.

Copper is used to make many different kinds of products like wire, plumbing pipes, and sheet metal. U.S. pennies made before 1982 are made of copper, while those made after 1982 are only coated with copper. Copper is also combined with other metals to make brass and bronze pipes and faucets.

Copper compounds are commonly used in agriculture to treat plant diseases like mildew, for water treatment and, as preservatives for wood, leather, and fabrics.

What happens to copper when it enters the environment?

- Copper is released into the environment by mining, farming, and manufacturing operations and through waste water releases into rivers and lakes. Copper is also released from natural sources, like volcanoes, windblown dusts, decaying vegetation, and forest fires.
- Copper released into the environment usually attaches to particles made of organic matter, clay, soil, or sand.
- Copper does not break down in the environment. Copper compounds can break down and release free copper into the air, water, and foods.

How might I be exposed to copper?

- You may be exposed to copper from breathing air, drinking water, eating foods, or having skin contact with copper, particulates attached to copper, or copper-containing compounds.
- Drinking water may have high levels of copper if your house has copper pipes and acidic water.
- Lakes and rivers that have been treated with copper compounds to control algae, or that receive cooling water from power plants, can have high levels of copper. Soils can also contain high levels of copper, especially if they are near copper smelting plants.
- You may be exposed to copper by ingesting copper-containing fungicides, or if you live near a copper mine or where copper is processed into bronze or brass.
- You may be exposed to copper if you work in copper mines or if you grind metals containing copper.

How can copper affect my health?

Everyone must absorb small amounts of copper every day because copper is essential for good health. High levels of copper can be harmful. Breathing high levels of copper can cause irritation of your nose and throat. Ingesting high levels of copper can cause nausea, vomiting, and diarrhea. Very-high doses of copper can cause damage to your liver and kidneys, and can even cause death.

How likely is copper to cause cancer?

We do not know whether copper can cause cancer in humans. The EPA has determined that copper is not classifiable as to human carcinogenicity.

How can copper affect children?

Exposure to high levels of copper will result in the same type of effects in children and adults. We do not know if these effects would occur at the same dose level in children and adults. Studies in animals suggest that the young children may have more severe effects than adults, but we don't know if this would also be true in humans. There is a very small percentage of infants and children who are unusually sensitive to copper.

We do not know if copper can cause birth defects or other developmental effects in humans. Studies in animals suggest that high levels of copper may cause a decrease in fetal growth.

How can families reduce the risk of exposure to copper?

The most likely place to be exposed to copper is through drinking water, especially if your water is corrosive and you have copper pipes in your house. The best way to lower the level of copper in your drinking water is to let the water run for at least 15 seconds first thing in the morning before drinking or using it. This reduces the levels of copper in tap water dramatically.

If you work with copper, wear the necessary protective clothing and equipment, and always follow safety procedures. Shower and change your clothes before going home each day.

Is there a medical test to show whether I've been exposed to copper?

Copper is found throughout the body; in hair, nails, blood, urine, and other tissues. High levels of copper in these samples can show that you have been exposed to higher-than normal levels of copper. These tests cannot tell whether you will experience harmful effects. Tests to measure copper levels in the body are not usually available at a doctor's office because they require special equipment, but the doctor can send samples to a specialty laboratory.

Has the federal government made recommendations to protect human health?

The EPA requires that levels of copper in drinking water be less than 1.3 mg of copper per one liter of drinking water (1.3 mg/L).

The U.S. Department of Agriculture has set the recommended daily allowance for copper at 900 micrograms of copper per day (μg/day) for people older than eight years old.

The Occupational Safety and Health Administration (OSHA) requires that levels of copper in the air in workplaces not exceed 0.1 mg of copper fumes per cubic meter of air (0.1 mg/m^3) and 1.0 mg/m^3 for copper dusts.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Copper. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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LEAD

CAS # 7439-92-1

Division of Toxicology and Environmental Medicine ToxFAQs™ September 2005

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,280 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.
- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such stained glass.
- Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on

Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risks of exposure to lead?

- ❑ Avoid exposure to sources of lead.
- ❑ Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint.
- ❑ If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- ❑ Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children
- ❑ If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to determine whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3-6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a lead level of 10 µg/dL to be a level of concern for children.

EPA limits lead in drinking water to 15 µg per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for lead (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs April 1999

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?
(Pronounced mŭr′kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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NICKEL

CAS # 7440-02-0

Division of Toxicology ToxFAQs™ September 2003

This fact sheet answers the most frequently asked health questions (FAQs) about nickel. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Nickel is a naturally occurring element. Pure nickel is a hard, silvery-white metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of nickel compounds developed chronic bronchitis and lung and nasal sinus cancers. Ingesting large amounts of nickel affected the reproduction and development in rats and mice. Nickel has been found in at least 862 of the 1,636 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is nickel?

Nickel is a very abundant natural element. Pure nickel is a hard, silvery-white metal. Nickel can be combined with other metals, such as iron, copper, chromium, and zinc, to form alloys. These alloys are used to make coins, jewelry, and items such as valves and heat exchangers. Most nickel is used to make stainless steel.

Nickel can combine with other elements such as chlorine, sulfur, and oxygen to form nickel compounds. Many nickel compounds dissolve fairly easy in water and have a green color. Nickel compounds are used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions. Nickel is found in all soil and is emitted from volcanoes. Nickel is also found in meteorites and on the ocean floor. Nickel and its compounds have no characteristic odor or taste.

What happens to nickel when it enters the environment?

- Nickel is released into the atmosphere by industries that make or use nickel, nickel alloys, or nickel compounds. It is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators.
- In the air, it attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow; this usually takes many days.
- Nickel released in industrial waste water ends up in soil or sediment where it strongly attaches to particles containing iron or manganese.
- Nickel does not appear to accumulate in fish or in other animals used as food.

How might I be exposed to nickel?

- By eating food containing nickel, which is the major source of exposure for most people.
- By skin contact with soil, bath or shower water, or metals containing nickel, as well as by handling coins or touching jewelry containing nickel.
- By drinking water that contains small amounts of nickel.
- By breathing air or smoking tobacco containing nickel.
- Higher exposure may occur if you work in industries that process or use nickel.

How can nickel affect my health?

The most common harmful health effect of nickel in humans is an allergic reaction. Approximately 10-15% of the population is sensitive to nickel. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin. Once a person is sensitized to nickel, further contact with the metal will produce a reaction. The most common reaction is a skin rash at the site of contact. The skin rash may also occur at

a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they eat nickel in food or water or breathe dust containing it.

People working in nickel refineries or nickel-processing plants have experienced chronic bronchitis and reduced lung function. These persons breathed amounts of nickel much higher than levels found in the environment. Workers who drank water containing high amounts of nickel had stomach aches and suffered adverse effects to their blood and kidneys.

Damage to the lung and nasal cavity has been observed in rats and mice breathing nickel compounds. Eating or drinking large amounts of nickel has caused lung disease in dogs and rats and has affected the stomach, blood, liver, kidneys, and immune system in rats and mice, as well as their reproduction and development.

How likely is nickel to cause cancer?

Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants. The Department of Health and Human Services (DHHS) has determined that nickel metal may reasonably be anticipated to be a carcinogen and that nickel compounds are known human carcinogens. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

How can nickel affect children?

It is likely that the health effects seen in children exposed to nickel will be similar to those seen in adults. We do not know whether children differ from adults in their susceptibility to nickel. Human studies that examined whether nickel can harm the fetus are inconclusive. Animal studies have found increases in newborn deaths and decreased newborn weight after ingesting very high amounts of nickel. Nickel can be transferred from the mother to an infant in breast milk and can cross the placenta.

How can families reduce the risks of exposure to nickel?

- Avoiding jewelry containing nickel will eliminate risks of exposure to this source of the metal.
- Exposures of the general population from other sources, such as foods and drinking water, are almost always too low to be of concern.

Is there a medical test to determine whether I've been exposed to nickel?

There are tests available to measure nickel in your blood, feces, and urine. More nickel was measured in the urine of workers who were exposed to nickel compounds that dissolve easily in water than in the urine of workers exposed to nickel compounds that are hard to dissolve. This means that it is easier to tell if you have been exposed to soluble nickel compounds than less-soluble compounds. The nickel measurements do not accurately predict potential health effects from exposure to nickel.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 0.7 milligrams of nickel per liter of water (0.7 mg/L). To protect workers, the Occupational Safety and Health Administration (OSHA) has set a limit of 1 mg of nickel per cubic meter of air (1 mg/m^3) for metallic nickel and nickel compounds in workplace air during an 8-hour workday, 40-hour workweek

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological Profile for Nickel (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

SELENIUM

CAS # 7782-49-2

Division of Toxicology ToxFAQs™ September 2003

This fact sheet answers the most frequently asked health questions (FAQs) about selenium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: People may be exposed to low levels of selenium daily through food and water. Selenium is a trace mineral needed in small amounts for good health, but exposure to much higher levels can result in neurological effects and brittle hair and deformed nails. Occupational inhalation exposure to selenium vapors may cause dizziness, fatigue, irritation of mucous membranes, and respiratory effects. This substance has been found in at least 508 of the 1,636 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is selenium?

Selenium is a naturally occurring mineral element that is distributed widely in nature in most rocks and soils. In its pure form, it exists as metallic gray to black hexagonal crystals, but in nature it is usually combined with sulfide or with silver, copper, lead, and nickel minerals. Most processed selenium is used in the electronics industry, but it is also used: as a nutritional supplement; in the glass industry; as a component of pigments in plastics, paints, enamels, inks, and rubber; in the preparation of pharmaceuticals; as a nutritional feed additive for poultry and livestock; in pesticide formulations; in rubber production; as an ingredient in antidandruff shampoos; and as a constituent of fungicides. Radioactive selenium is used in diagnostic medicine.

What happens to selenium when it enters the environment?

❑ Selenium occurs naturally in the environment and can be released by both natural and manufacturing processes.
❑ Selenium dust can enter the air from burning coal and oil. This selenium dust will eventually settle over the land and water.
❑ It also enters water from rocks and soil, and from agricultural and industrial waste. Some selenium compounds will dissolve in water, and some will settle to the bottom as particles.
❑ Insoluble forms of selenium will remain in soil, but soluble forms are very mobile and may enter surface water from soils.
❑ Selenium may accumulate up the food chain.

How might I be exposed to selenium?

❑ The general population is exposed to very low levels of selenium in air, food, and water. The majority of the daily intake comes from food.
❑ People working in or living near industries where selenium is produced, processed, or converted into commercial products may be exposed to higher levels of selenium in the air.
❑ People living in the vicinity of hazardous waste sites or coal burning plants may also be exposed to higher levels of selenium.

How can selenium affect my health?

Selenium has both beneficial and harmful effects. Low doses of selenium are needed to maintain good health. However, exposure to high levels can cause adverse health effects. Short-term oral exposure to high concentrations of selenium may cause nausea, vomiting, and diarrhea. Chronic oral exposure to high concentrations of selenium compounds can produce a disease called selenosis. The major signs of selenosis are hair loss, nail brittleness, and neurological abnormalities (such as numbness and other odd sensations

in the extremities).
Brief exposures to high levels of elemental selenium or selenium dioxide in air can result in respiratory tract irritation, bronchitis, difficulty breathing, and stomach pains. Longer-term exposure to either of these air-borne forms can cause respiratory irritation, bronchial spasms, and coughing.
Levels of these forms of selenium that would be necessary to produce such effects are normally not seen outside of the workplace.
Animal studies have shown that very high amounts of selenium can affect sperm production and the female reproductive cycle. We do not know if similar effects would occur in humans.

How likely is selenium to cause cancer?

Studies of laboratory animals and people show that most selenium compounds probably do not cause cancer. In fact, studies in humans suggest that lower-than-normal selenium levels in the diet might increase the risk of cancer.
The International Agency for Research on Cancer (IARC) has determined that selenium and selenium compounds are not classifiable as to their carcinogenicity to humans.
The EPA has determined that one specific form of selenium, selenium sulfide, is a probable human carcinogen. Selenium sulfide is not present in foods and is a very different chemical from the organic and inorganic selenium compounds found in foods and in the environment.

How can selenium affect children?

It is likely that the health effects seen in children exposed to selenium will be similar to the effects seen in adults. However, one study found that children may be less susceptible to the health effects of selenium than adults. Selenium compounds have not been shown to cause birth defects in humans or in other mammals.

How can families reduce the risk of exposure to selenium?

❑ Certain dietary supplements and shampoos contain selenium; these should be used according to the manufacturer's directions.
❑ Children living near waste sites that contain selenium or coal burning plants should be encouraged to wash their hands before eating and to avoid putting their unwashed hands in their mouths.

Is there a medical test to show whether I've been exposed to selenium?

Low levels of selenium are normally found in body tissues and urine. Blood and urine tests for selenium are most useful for people who have recently been exposed to high levels. Toenail clippings can be used to determine longer-term exposure. These tests are not usually available at your doctor's office, but your doctor can send the samples to a laboratory that can perform the tests. None of these tests, however, can predict whether you will experience any health effects.

Has the federal government made recommendations to protect human health?

The EPA restricts the amount of selenium allowed in public water supplies to 50 parts total selenium per billion parts of water (50 ppb).
The Occupational Safety and Health Administration (OSHA) sets a limit of 0.2 mg selenium/m^3 of workroom air for an 8-hour work shift.
ATSDR and the EPA have determined that 5 micrograms of selenium per kilogram of body weight taken daily would not be expected to cause any adverse health effects over a lifetime of such intake.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological Profile for Selenium (Update) Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

THALLIUM
CAS # 7440-28-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about thallium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to thallium occurs mainly from eating food. Exposure to higher levels of thallium may occur in the workplace. Breathing high levels of thallium may result in effects on the nervous system, while ingesting high levels of it results in vomiting, diarrhea, temporary hair loss, and other effects. This chemical has been found in at least 210 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is thallium?

(Pronounced thăl′ē-əm)

Pure thallium is a bluish-white metal that is found in trace amounts in the earth's crust. In the past, thallium was obtained as a by-product from smelting other metals; however, it has not been produced in the United States since 1984. Currently, all the thallium is obtained from imports and from thallium reserves.

In its pure form, thallium is odorless and tasteless. It can also be found combined with other substances such as bromine, chlorine, fluorine, and iodine. When it's combined, it appears colorless-to-white or yellow.

Thallium is used mostly in manufacturing electronic devices, switches, and closures, primarily for the semiconductor industry. It also has limited use in the manufacture of special glass and for certain medical procedures.

What happens to thallium when it enters the environment?

- Thallium enters the environment primarily from coal-burning and smelting, in which it is a trace contaminant of the raw materials.
- It stays in the air, water, and soil for a long time and is not broken down.
- Some thallium compounds are removed from the atmosphere in rain and snow.
- It's absorbed by plants and enters the food chain.
- It builds up in fish and shellfish.

How might I be exposed to thallium?

- Eating food contaminated with thallium may be a major source of exposure for most people.
- Breathing workplace air in industries that use thallium
- Smoking cigarettes.
- Living near hazardous waste sites containing thallium (may result in higher than normal exposures).
- Touching or, for children, eating soil contaminated with thallium.
- Breathing low levels in air and water.

How can thallium affect my health?

Exposure to high levels of thallium can result in harmful health effects. A study on workers exposed on the job over several years reported nervous system effects, such as numbness of fingers and toes, from breathing thallium.

Studies in people who ingested large amounts of thallium over a short time have reported vomiting, diarrhea, temporary hair loss, and effects on the nervous system, lungs, heart, liver,

and kidneys. It has caused death. It is not known what the effects are from ingesting low levels of thallium over a long time.

Birth defects were not reported in the children of mothers exposed to low levels from eating vegetables and fruits contaminated with thallium. Studies in rats, however, exposed to high levels of thallium, showed adverse developmental effects.

It is not known if breathing or ingesting thallium affects human reproduction. Studies showed that rats that ingested thallium for several weeks had some adverse reproductive effects. Animal data suggest that the male reproductive system may be susceptible to damage by low levels of thallium.

There is no information available on the health effects of skin contact with thallium in people or animals.

How likely is thallium to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified thallium as to its human carcinogenicity.

No studies are available in people or animals on the carcinogenic effects of breathing, ingesting, or touching thallium.

Is there a medical test to show whether I've been exposed to thallium?

There are medical tests available to measure levels of thallium in urine and hair. In addition, thallium can also be measured in blood; however, this is not a good indicator of exposure since thallium only stays in blood a very short time.

These tests require special equipment that is not usually available in most doctor's offices. In addition, these tests cannot determine if adverse health effects will occur from the exposure to thallium.

Has the federal government made recommendations to protect human health?

The EPA requires that discharges or accidental spills into the environment of 1,000 pounds or more of thallium be reported.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 0.1 milligrams per cubic meter (0.1 mg/m^3) for thallium in workplace air. The American Conference of Governmental Industrial Hygienists (ACGIH) has established the same guidelines as OSHA for the workplace.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that 15 mg/m^3 of thallium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for thallium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

VANADIUM
CAS # 7440-62-2

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about vanadium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Everyone is exposed to low levels of vanadium in air, water, and food; however, most people are exposed mainly from food. Breathing high levels of vanadium may cause lung irritation, chest pain, coughing, and other effects. This chemical has been found in at least 385 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is vanadium?

(Pronounced və-nā/dē-əm)

Vanadium is a compound that occurs in nature as a white-to-gray metal, and is often found as crystals. Pure vanadium has no smell. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride. Vanadium and vanadium compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits.

Vanadium is mostly combined with other metals to make special metal mixtures called alloys. Vanadium in the form of vanadium oxide is a component in special kinds of steel that is used for automobile parts, springs, and ball bearings. Most of the vanadium used in the United States is used to make steel. Vanadium oxide is a yellow-orange powder, dark-gray flakes, or yellow crystals. Vanadium is also mixed with iron to make important parts for aircraft engines.

Small amounts of vanadium are used in making rubber, plastics, ceramics, and other chemicals.

What happens to vanadium when it enters the environment?

- Vanadium mainly enters the environment from natural sources and from the burning of fuel oils.
- It stays in the air, water, and soil for a long time.
- It does not dissolve well in water.
- It combines with other elements and particles.
- It sticks to soil sediments.
- Low levels have been found in plants, but it is not likely to build up in the tissues of animals.

How might I be exposed to vanadium?

- Exposure to very low levels in air, water, and food.
- Eating higher levels of it in certain foods.
- Breathing air near an industry that burns fuel oil or coal; these industries release vanadium oxide into the air.
- Working in industries that process it or make products containing it.
- Breathing contaminated air or drinking contaminated water near waste sites or landfills containing vanadium.
- Vanadium is not readily absorbed by the body from the stomach, gut, or contact with the skin.

How can vanadium affect my health?

Exposure to high levels of vanadium can cause harmful health effects. The major effects from breathing high levels of vanadium are on the lungs, throat, and eyes. Workers who breathed it for short and long periods sometimes had lung irritation, coughing, wheezing, chest pain, runny nose, and a

sore throat. These effects stopped soon after they stopped breathing the contaminated air. Similar effects have been observed in animal studies. No other significant health effects of vanadium have been found in people.

We do not know the health effects in people of ingesting vanadium. Animals that ingested very large doses have died. Lower, but still high levels of vanadium in the water of pregnant animals resulted in minor birth defects. Some animals that breathed or ingested vanadium over a long term had minor kidney and liver changes.

The amounts of vanadium given in these animal studies that resulted in harmful effects are much higher than those likely to occur in the environment.

How likely is vanadium to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified vanadium as to its human carcinogenicity.

No human studies are available on the carcinogenicity of vanadium. No increase in tumors was noted in a long-term animal study where the animals were exposed to vanadium in the drinking water.

Is there a medical test to show whether I've been exposed to vanadium?

There are medical tests available to measure levels of vanadium in urine and blood. These tests are not routinely performed at doctors' offices because they require special equipment, but your doctor can take samples and send them to a testing laboratory. These tests can't determine if harmful health effects will occur from the exposure to vanadium.

Another indicator of high vanadium exposure in people is that their tongues may have a green color on top.

Has the federal government made recommendations to protect human health?

The EPA requires discharges or spills of 1,000 pounds or more of vanadium into the environment to be reported.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 0.05 milligrams per cubic meter (0.05 mg/m^3) for vanadium pentoxide dust and 0.1 mg/m^3 for vanadium pentoxide fumes in workplace air for an 8-hour workday, 40-hour workweek.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an occupational exposure limit of 0.05 mg/m^3 for vanadium pentoxide.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that 35 mg/m^3 of vanadium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for vanadium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ZINC
CAS # 7440-66-6

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about zinc. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Exposure to large amounts of zinc can be harmful. However, zinc is an essential element for our bodies, so too little zinc can also be harmful. This chemical has been found in at least 801 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is zinc?

(Pronounced zĭngk)

Zinc is one of the most common elements in the earth's crust. It's found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

- Some is released into the environment by natural processes, but most comes from activities of people like mining, steel production, coal burning, and burning of waste.
- It attaches to soil, sediments, and dust particles in the air.
- Rain and snow remove zinc dust particles from the air.
- Zinc compounds can move into the groundwater and into lakes, streams, and rivers.
- Most of the zinc in soil stays bound to soil particles.
- It builds up in fish and other organisms, but it doesn't build up in plants.

How might I be exposed to zinc?

- Ingesting small amounts present in your food and water.
- Drinking contaminated water near manufacturing or waste sites.
- Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust.
- Eating too many dietary supplements that contain zinc.
- Breathing zinc particles in the air at manufacturing sites.

How can zinc affect my health?

Zinc is an essential element in our diet. **Too** little zinc can cause health problems, but too much zinc is also harmful.

The recommended dietary allowance (RDA) for zinc is 15 milligrams a day for men (15 mg/day); 12 mg/day for women; 10 mg/day for children; and 5 mg/day for infants. Not enough zinc in your diet can result in a loss of appetite, a decreased sense of taste and smell, slow wound healing and

skin sores, or a damaged immune system. Young men who don't get enough zinc may have poorly developed sex organs and slow growth. If a pregnant woman doesn't get enough zinc, her babies may have growth retardation.

Too much zinc, however, can also be damaging to your health. Harmful health effects generally begin at levels from 10-15 times the RDA (in the 100 to 250 mg/day range). Eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia, pancreas damage, and lower levels of high density lipoprotein cholesterol (the good form of cholesterol).

Breathing large amounts of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. We do not know the long-term effects of breathing high levels of zinc.

It is not known if high levels of zinc affect human reproduction or cause birth defects. Rats that were fed large amounts of zinc became infertile or had smaller babies. Irritation was also observed on the skin of rabbits, guinea pigs, and mice when exposed to some zinc compounds. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified zinc for carcinogenicity.

Is there a medical test to show whether I've been exposed to zinc?

Zinc can be measured in your blood or feces. This can tell you how much zinc you have been exposed to. Zinc can also be measured in urine, saliva, and hair. The amount of zinc in your hair tells us something about long-term exposure, but the relationship between levels in your hair and the amount that you were exposed to is not clear. These tests are not routinely performed at doctors' offices, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

EPA recommends that there be no more than 5 parts of zinc in 1 million parts of drinking water (5 ppm) because of taste. EPA also requires that releases of more than 1,000 (or in some cases 5,000) pounds of zinc or its compounds into the environment be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum concentration limit for zinc chloride fumes in workplace air of 1 milligram of zinc per cubic meter of air (1 mg/m^3) for an 8-hour workday over a 40-hour work week and 5 mg/m^3 for zinc oxide fumes. The National Institute for Occupational Safety and Health (NIOSH) has set the same standards for up to a 10-hour workday over a 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogenicity: Ability to cause cancer.

Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for zinc. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Attachment I5
Calculation of Site-Specific DTSC Value for Lead

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL
INCLUDING INGESTION OF HOMEGROWN PRODUCE

USER'S GUIDE to version 7

INPUT		
MEDIUM	LEVEL	
Lead in Air (ug/m^3)	0.055	site specific
Lead in Soil/Dust (ug/g)	61.5	site specific
Lead in Water (ug/l)	7	site specific
% Home-grown Produce	7%	default
Respirable Dust (ug/m^3)	1.5	default

OUTPUT	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-9
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	0.9	1.6	2.0	2.4	2.7	798	1185
BLOOD Pb, CHILD	1.8	3.3	3.9	4.7	5.4	184	285
BLOOD Pb, PICA CHILD	2.2	4.1	4.8	5.9	6.7	118	183
BLOOD Pb, OCCUPATIONAL	0.7	1.3	1.6	1.9	2.2	4122	6110

EXPOSURE PARAMETERS	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	9.6E-05	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	27.7	

Click here for REFERENCES

PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percen
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.05	6%	6.3E-4	0.04	5%
Inhalation, bckg		0.09	10%		0.06	9%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.39	43%		0.39	54%
Food Ingestion, bckg		0.22	24%		0.23	32%
Food Ingestion	2.4E-3	0.15	16%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	7.0E-3	0.43	24%	1.4E-2	0.87	39%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.07	4%		0.07	3%
Water Ingestion		0.45	25%		0.45	20%
Food Ingestion, bckg		0.50	28%		0.50	23%
Food Ingestion	5.5E-3	0.34	19%		0.34	15%

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL
EXCLUDING INGESTION OF HOMEGROWN PRODUCE

USER'S GUIDE to version 7

INPUT		
MEDIUM	LEVEL	
Lead in Air (ug/m^3)	0.055	site specific
Lead in Soil/Dust (ug/g)	61.5	site specific
Lead in Water (ug/l)	7	site specific
% Home-grown Produce	0%	default
Respirable Dust (ug/m^3)	1.5	default

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-9
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	0.8	1.4	1.7	2.0	2.3	2856	4247
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	322	502
BLOOD Pb, PICA CHILD	1.9	3.5	4.2	5.1	5.8	162	252
BLOOD Pb, OCCUPATIONAL	0.7	1.3	1.6	1.9	2.2	4122	6110

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	9.6E-05	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	27.7	

Click here for REFERENCES

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percen
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.05	7%	6.3E-4	0.04	5%
Inhalation, bckg		0.09	12%		0.06	9%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.39	51%		0.39	54%
Food Ingestion, bckg		0.23	30%		0.23	32%
Food Ingestion	0.0E+0	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	7.0E-3	0.43	29%	1.4E-2	0.87	45%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.07	5%		0.07	4%
Water Ingestion		0.45	30%		0.45	23%
Food Ingestion, bckg		0.54	36%		0.54	28%
Food Ingestion	0.0E+0	0.00	0%		0.00	0%

Air Resources Board

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Monitoring Sites
with Ambient Toxics Summaries
Lead

Southern California | Northern California | Mexico

Southern California

Site Name	Address	Latitude	Longitude
Azusa	803 Loren Avenue	34:08:09 N	117:55:22 W
Burbank-W Palm Avenue	228 West Palm Avenue	34:10:34 N	118:18:58 W
Calexico-Ethel Street	1029 Ethel Street - Calexico High School	32:40:34 N	115:29:00 W
Chula Vista	80 East J Street	32:37:22 N	117:03:22 W
El Cajon-Redwood Avenue	1155 Redwood Avenue	32:47:27 N	116:56:29 W
El Monte-9528 Telstar	915 Flair Drive	34:04:12 N	118:04:03 W
Fontana-Arrow Highway	14360 Arrow Blvd	34:06:01 N	117:29:24 W
Los Angeles-North Main Street	1630 North Main Street	34:04:02 N	118:14:31 W
North Long Beach	3648 North Long Beach Boulevard	33:49:27 N	118:11:22 W
Riverside-Rubidoux	5888 Mission Boulevard	33:58:55 N	117:22:21 W
Santa Barbara-W Carillo Street	3 West Carrillo Street	34:25:15 N	119:42:03 W
Simi Valley-Cochran Street	5400 Cochran Street	34:16:39 N	118:41:05 W
Upland-San Bernardino Road	1350 San Bernardino Road	34:06:13 N	117:37:45 W

Northern California

Site Name	Address	Latitude	Longitude
Bakersfield-5558 California Avenue	5558 California Avenue	35:21:22 N	119:02:25 W
Bakersfield-Chester Avenue	225 Chester Avenue	35:21:28 N	119:01:08 W
Chico-Manzanita Avenue	468 Manzanita Avenue	39:45:25 N	121:51:34 W
Chico-Salem Street	101 Salem Street	39:43:48 N	121:50:33 W
Citrus Heights-Sunrise Blvd	7400 Sunrise Boulevard	38:41:56 N	121:16:16 W
Concord-2975 Treat Blvd	2975 Treat Boulevard	37:56:21 N	122:01:29 W
Fremont-Chapel Way	40733 Chapel Way	37:32:09 N	121:57:42 W
Fresno-1st Street	3425 North First Street	36:46:55 N	119:46:22 W
Fresno-Olive Street	3250 East Olive Street	36:43:31 N	119:45:00 W
Merced-Health Dept	240 East First Street	37:18:22 N	120:28:50 W
Modesto-14th Street	814 14th Street	37:38:31 N	120:59:42 W
Modesto-I Street (Courthouse)	1100 I Street	37:38:24 N	120:59:51 W
Modesto-Oakdale Road	921 Oakdale Road	37:39:25 N	120:57:30 W
Richmond-13th Street	1144 13th Street	37:57:03 N	122:21:25 W
Roseville-N Sunrise Blvd	151 North Sunrise Avenue - Suite 510	38:44:49 N	121:15:57 W
San Francisco-Arkansas Street	10 Arkansas Street	37:45:58 N	122:23:52 W
San Jose-4th Street	120B North 4th Street	37:20:24 N	121:53:15 W
San Jose-Jackson Street	156B Jackson Street	37:20:54 N	121:53:41 W
San Pablo-El Portal	Unit 759 El Portal Shopping Center	37:57:52 N	122:20:21 W
Stockton-Hazelton Street	1601 East Hazelton Street-Health	37:57:03 N	121:16:08 W

Department

Mexico

Site Name	Address	Latitude	Longitude
Mexicali-Calzada Benito Juarez	UABC, Calzada Benito Juarez	32:37:45 N	115:26:49 W
Rosarito	East of Benito Juarez Blvd	32:20:36 N	117:03:17 W

Toxics Statistics Home

Data Descriptions Page

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Air Resources Board

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View a Different Substance
Order a Data CD

Annual Toxics Summary

Richmond-13th Street

Lead

nanograms per cubic meter

Year	Months Present	Minimum	Median	Mean	90th Percentile	Maximum	Standard Deviation	Number of Observations	Detection Limit	Estimated Risk
2002	----------							0		
2001	----------							0		
2000	----------							0		
1999	----------							0		
1998	----------							0		
1997	----------	7				21	4.8	9	4	
1996	----------	2	8	10.2	19	24	6.1	27	4	0.1
1995	----------	2	8	8.5	16	27	5.9	29	4	0.1
1994	----------	2	11	11.7	21	27	5.7	28	4	0.1
1993	----------	2	13		23	27	7.4	28	4	
1992	----------	2	16	14.6	24	35	7.8	30	4	0.2
1991	----------	5	22	29.8	67	96	23.9	30	4	0.4
1990	----------	2	17	25.7	58	130	28.4	27	1	0.3
1989	----------	0.5	25		44	62	14.3	50	1	

Toxics Statistics Home

Notes: Values below the Limit of Detection (LoD) assumed to be ½ LoD.
Means and risks shown only for years with data in all 12 months.
Risks shown only for those substances with unit risk factors.

Data Descriptions Page

Air Resources Board

View a Different Site
View a Different Substance
Order a Data CD

Annual Toxics Summary

San Francisco-Arkansas Street

Lead

nanograms per cubic meter

Year	Months Present	Minimum	Median	Mean	90th Percentile	Maximum	Standard Deviation	Number of Observations	Detection Limit	Estimated Risk
2002	----------	1.5	7	8.3	16	23	5.7	30	3	0.1
2001	----------	2	7	8.4	17	19	5.4	31	4	0.1
2000	----------	2	15		28	55	12.4	19	4	
1999	----------	2	8		13	18	4.3	20	4	
1998	----------	2	8	8.6	16	20	4.6	26	4	0.1
1997	----------	2	11	11.8	23	30	7.7	28	4	0.1
1996	----------	2	9	12.1	21	30	7.5	26	4	0.1
1995	----------	2	12	15.9	31	100	18.6	30	4	0.2
1994	----------	2	10	12.2	22	43	8.8	30	4	0.1
1993	----------	2	14	16.4	29	32	8.8	27	4	0.2
1992	----------	2	9		17	25	6.3	16	4	
1991	----------	6	24		58	63	17.8	25	4	
1990	----------	3	17	27.5	56	100	23.0	29	1	0.3
1989	----------	4	21	34.1	65	118	25.0	56	1	0.4

Toxics Statistics Home

Notes: Values below the Limit of Detection (LoD) assumed to be ½ LoD.
Means and risks shown only for years with data in all 12 months.
Risks shown only for those substances with unit risk factors.

Data Descriptions Page

Air Resources Board

Annual Toxics Summary

San Pablo-El Portal

Lead

nanograms per cubic meter

Year	Months Present	Minimum	Median	Mean	90th Percentile	Maximum	Standard Deviation	Number of Observations	Detection Limit	Estimated Risk
2002	----------							0		
2001	----------							0		
2000	----------	2				12	4.3	5	4	
1999	----------	2	5	5.1	10	16	3.8	26	4	0.06
1998	----------	2	2		8	11	2.9	27	4	
1997	----------	2	4		8	11	3.0	19	4	
1996	----------							0		
1995	----------							0		
1994	----------							0		
1993	----------							0		
1992	----------							0		
1991	----------							0		
1990	----------							0		
1989	----------							0		

Toxics Statistics Home

Notes: Values below the Limit of Detection (LoD) assumed to be ½ LoD.
Means and risks shown only for years with data in all 12 months.
Risks shown only for those substances with unit risk factors.

Data Descriptions Page

This report contains important information about your drinking water. Translate it, or speak with someone who understands it. To request a copy of this report in Spanish or Chinese, please call (510) 287-0138.

Este informe contiene importante información sobre el agua potable que usted consume. Traduzcalo, hable con alguien que lo comprenda, o solicite un ejemplar de este informe en español llamando al (510) 287-0138.

這份報告包含有您飲用水的重要資訊。請翻譯該內容，或與了解內容的人討論，或查詢收取 (510) 287-0138 供取中文報告。

この報告書には、あなたの飲料水に関する重要な情報が含まれています。和訳するか、理解できる人に相談してください。

본 보고서에는 귀하의 음료수에 관한 중요한 정보가 나와 있습니다. 번역을 부탁하거나 그 내용을 이해하시는 분으로부터 설명을 들으십시오.

[illegible]

[illegible]

Здесь содержится информация о вашей питьевой воде. Переведите ее, или обратитесь к тому, кто это понимает.

U ovom izvještaju nalaze se važne informacije o vašoj vodi za piće. Prevedite ga ili zagovarajte se sekim ko razumije ovaj izvještaj.

Báo cáo này có các thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu được bản báo cáo này.

Ce rapport contient des informations importantes concernant votre eau potable. Faites-le traduire ou adressez-vous à quelqu'un qui est en mesure de le comprendre.

Ang ulat na ito ay naglalaman ng importanteng impormasyon tungkol sa inyong inumin na tubig. Isalin ito, o makipag-usap sa isang taong unintindihin ito.

Ten raport zawiera ważne informacje dotyczące wody pitnej. Przetłumacz go, lub porozmawiaj z kimś, kto go rozumie.

Η έκθεση αυτή περιέχει σημαντικές πληροφορίες σχετικά με το πόσιμο νερό σας. Μεταφράστε την έκθεση ή μιλήστε με κάποιο άτομο που την κατανοεί.

Daim ntawv qhia no muaj cov lus qhia tseem ceeb ntsig txog koj cov dej haus. Muab txhais, los nis ntsog ib tug neeg uas nkag nisb tsog qhov no thum.

דו"ח זה מכיל מידע חשוב על מי שתייה. תרגמו אותו או שוחו מישהו שמבין את הנכתב.

يحتوي هذا التقرير على معلومات هامة حول مياه الشرب التي تتناولها. ترجم التقرير أو خاطب إلى شخص يستطيع فهمه.

این گزارش حاوی اطلاعات مهمی درمورد آب آشامیدنی است. آن را ترجمه کنید یا از کسی که مطالب آن را می فهمد سئوال کنید.

اس رپورٹ میں آپ کے پینے کے پانی سے متعلق اہم معلومات ہیں۔ اس کا ترجمہ کریں، یا کسی ایسے شخص سے بات کریں جو اسے سمجھتا ہو۔

Public Participation

[illegible] decisions affecting [illegible] and other matters is [illegible] EBMUD Board [illegible] the second and fourth [illegible] at 1:15 p.m., 2nd floor, [illegible]

[illegible] about water quality [illegible] quality concern, call [illegible] 866-403-2683) to talk [illegible] representative.

Additional Contacts

California Department of Health Services [illegible] (510) 540-2158

U.S. Environmental Protection Agency Safe [illegible] (800) 426-4791

[illegible]
[illegible] (510) 287-8000
[illegible] (925) 313-6712

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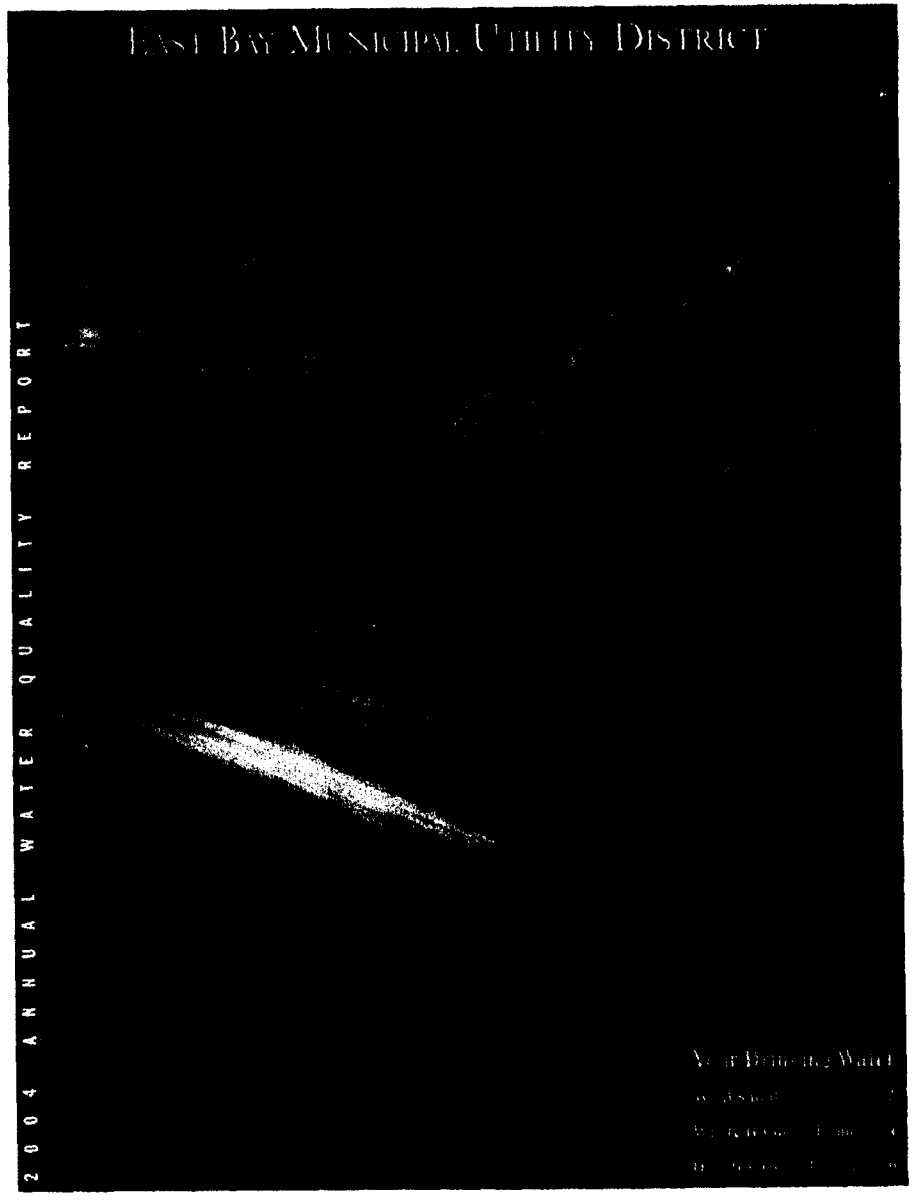
EAST BAY MUNICIPAL UTILITY DISTRICT

2004 ANNUAL WATER QUALITY REPORT



Your Drinking Water

WHAT'S IN YOUR WATER

TABLE BELOW LISTS ALL DRINKING WATER CONSTITUENTS DETECTED AT THE SOURCE, THE TREATMENT PLANT OR THE DISTRIBUTION SYSTEM IN 2004, EXCEPT FOR LEAD AND COPPER, WHICH WERE SAMPLED AT CUSTOMER TAPS

Primary Health Related Constituents	MCL or (MRDL)	PHG (MCLG) or (MRDLG)	Average	Walnut Creek	Lafayette	Orinda	San Pablo	Sobrante	USL	Typical Sources
Microbiological Constituents										
Total Coliforms, percent positive detected	5%	(zero)	<0.3%	NR	NR	NR	NR	NR	NR	Naturally present in the environment
Turbidity (NTU), maximum level, except for Average	TT = 1 NTU	NS	0.05	0.10	0.06	0.06	0.09	0.09	0.10	Soil runoff
Turbidity, percent of time water had less than 1 NTU	TT = 1 NTU 95% of the time	NS	NR	100%	100%	100%	100%	100%	100%	Soil runoff
Inorganic Constituents										
Aluminum (ug/L)	1000	600	<50	<50	<50	<50	<50	<50-54	<50-126	Erosion of natural deposits; residue from some surface water treatment processes
Fluoride (mg/L) *	2	1	<0.1	<0.1	<0.1	<0.1-0.16	0.11	0.11	0.16	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Chloramine Residual as Cl2 (mg/L), maximum level, except for Average	[4]	[4]	1.9	2.2	2.1	2.6	2.5	3.4	3.0	Drinking water disinfectant added for treatment
* Fluoride reported above reflect levels in the source waters. Fluoride was added in the range of 0.9 to 1.0 mg/L, to help prevent dental cavities in consumers.										
Organic Constituents										
Acrylamide in treatment chemical (one hundredth of one percent)	TT = 0 @ max. dose allowed	(zero)	<5	0	0	<5	0	0	0	Added to water during water treatment
TOC - Control of DBP precursors	TT	NS	NR	NR	NR	NR	NR	Met reqmt	Met reqmt	Various natural and man-made sources
Haloacetic acids, 5 species (ug/L)	60	NS	19	18-22	15-23	13-18	6	5-14	7-24	By-product of drinking water chlorination
Trihalomethanes (ug/L)	80	NS	37	37-44	39-50	32-47	30	24-46	17-45	By-product of drinking water chlorination
Constituents which have Secondary MCLs										
Aluminum (ug/L)	200	NS	<50	<50	<50	<50	<50	<50-54	<50-126	Erosion of natural deposits; residue from some surface water treatment processes
Chloride (mg/L)	500	NS	8	4	4	4-4	15	14	15	Runoff/leaching from natural deposits; seawater influence
Color, color units	15	NS	2.8	2	<1	<1-7	1	6	1	Naturally-occurring organic and inorganic materials
Odor-Threshold (T.O.N.) **	3	NS	2.2	1.1	1.6	1.3	3	2.8-4.0	1.6	Naturally-occurring organic materials
Specific Conductance (umho/cm)	1600	NS	203	59	59	57-267	296	307	366	Runoff/leaching from natural deposits; seawater influence
Sulfate (mg/L)	500	NS	23	1.0	1.0	1.5-48	33	38	39	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (mg/L)	1000	NS	97	41	40	41-170	180	180	210	Runoff/leaching from natural deposits
Turbidity (NTU)	5	NS	0.05	0.10	0.06	0.06	0.09	0.09	0.10	Soil runoff
**MCL exceedances for T.O.N. did not coincide with increase of odor complaints or detection by customers.										

Unregulated Constituents	AL	PHG (MCLG)	Average	Walnut Creek	Lafayette	Orinda	San Pablo	Sobrante	USL	Typical Sources
Boron (ug/L)	1000	NS	<100	<100	<100	<100	<100	<100	100 - 121	Runoff/leaching from natural deposits

Lead and Copper: Sampled last in 2002. Required every three years	AL	PHG	90th percentile Level Found	# of Sites found above the AL	
Copper (ug/L)	1300	170	64	No sites out of 55 Sites	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ug/L)	15	2	7	No sites out of 55 Sites	Internal corrosion of household plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

EBMUD tests your water extensively to make sure it is safe to drink. We look for more than 100 substances in the water, including bacteria, pesticides and herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water-treatment processes. Only the substances that we detect are listed in this chart, which shows the measured level of substances for each treatment plant (the map on p. 4-5 shows which treatment plant normally serves your neighborhood). In 2004 EBMUD met or surpassed all state and federal water quality requirements for public health protection.

2004 ANNUAL WATER QUALITY REPORT

TERMS USED

AL = regulatory action level. The concentration that, if exceeded, triggers treatment or other requirements that a water system must follow.

Cl_2 = chlorine in equivalent measured form.

DBP = disinfection by-product. Trihalomethanes (THMs), haloacetic acids (HAAs) and bromate are disinfection by-products, formed when chlorine and/or ozone reacts with natural constituents in water.

EBMUD samples for disinfection by-products at the water treatment plants and in the distribution system.

MCL = maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the color, taste, and appearance of drinking water.

MCLG = maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

mg/L = milligrams per liter, or parts per million (ppm).

MRDL = maximum residual disinfectant level. The level of a disinfectant added for water treatment that may not be exceeded at the customer's tap.

MRDLG = maximum residual disinfectant level goal. The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set by the U.S. Environmental Protection Agency.

NA = not applicable

NR = not required for meeting regulations

NS = no standard (MCL or PHG for example) established.

NTU = nephelometric turbidity units

PHG = Public Health Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Primary Drinking Water Standard or PDWS. MCLs and MRDLs for contaminants that affect health, along with their monitoring, water treatment and reporting requirements.

Secondary Drinking Water Standard. MCLs set to protect the odor, taste, and appearance of drinking water.

TOC = total organic carbon. A measurement of natural and man-made organic material in the water. TOC reacts with disinfectants to form DBPs.

T.O.N. = threshold odor number. A measurement of odors in water.

TT = treatment technique. A required process intended to reduce the level of a contaminant in drinking water.

ug/L = micrograms per liter, or parts per billion (ppb).

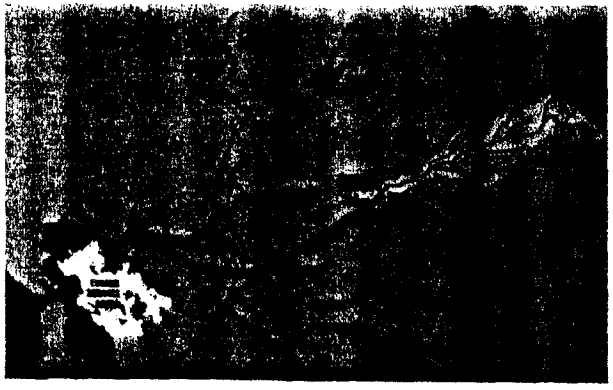
umhos/cm = micromhos per centimeter. A measure of conductance.

USL = Upper 95th Limit

90th percentile = 90% of samples had lower values than indicated.

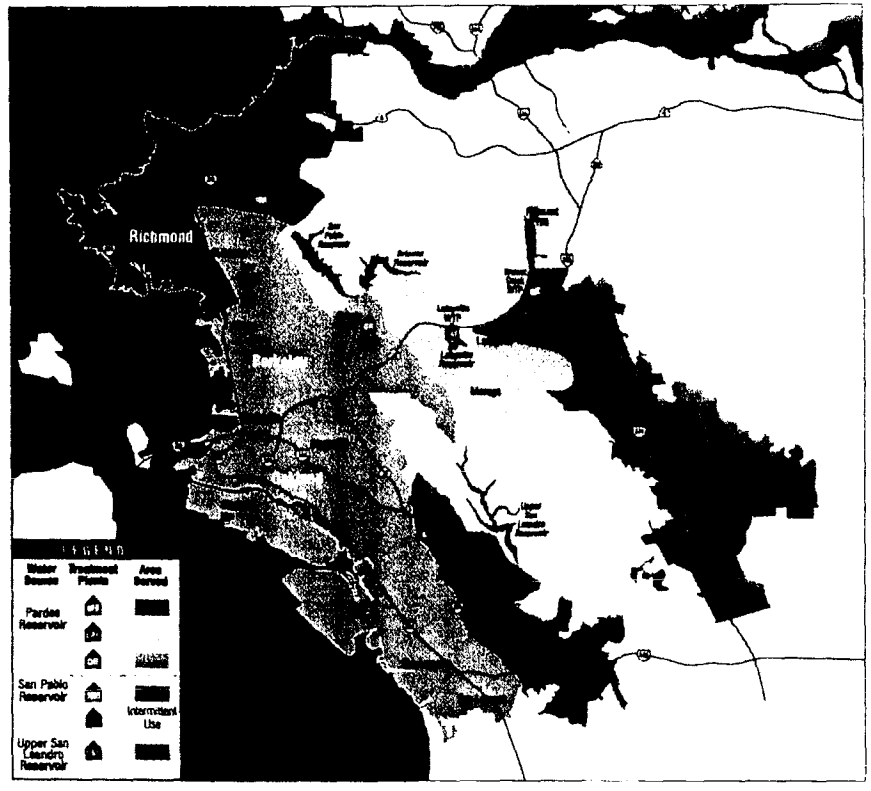
WHERE YOUR WATER COMES FROM

One of the most important factors in water quality is its source: the purer the source, the better the water. Ninety percent of EBMUD's water comes from the 577-square-mile watershed of the Mokelumne River, which collects Sierra Nevada snowmelt and flows into Pardee Reservoir in the Sierra foothills near the town of Valley Springs. The watershed on the west slope of the Sierra Nevada



is mostly undeveloped land, little affected by human activity. The water travels to the East Bay in pipelines and is protected from pesticides, agricultural and urban runoff, municipal sewage and industrial discharges. Local East Bay watershed rainfall and runoff accounts for about 10 percent of the District's water supply.

Before the water comes to your tap, EBMUD takes many steps to ensure its quality and safety. This includes carefully managing and protecting watershed lands, treating the water, sampling and monitoring, analyzing results of the sampling and adjusting treatment, flushing pipes and reservoirs, and repairing pipes.



OTHER WATER QUALITY PARAMETERS	Walnut Creek	Lafayette	Orinda	San Pablo	Sobrante	USL
Alkalinity, Bicarbonate (mg/L as CaCO3)	19.2	18.2	20.2-68.8	93.1	79.6	114
Alkalinity, Carbonate (mg/L as CaCO3)	1.1	0.9	0.2-1.8	2.8	3.9	5.4
Calcium (mg/L)	3.8-6.0	4.2-5.0	4.0-8.0	18.5-23.3	17.2-23.0	23.0-30.9
Hardness (mg/L as CaCO3)	10-26	14-24	15-30	85-94	82-99	98-130
Magnesium (mg/L)	0.7-1.0	0.7-1.0	0.8-1.7	5.2-7.8	5.6-7.5	9.5-13.0
pH (pH units)	8.4-9.1	8.8-9.0	8.9-9.5	8.5-9.0	8.5-8.8	8.6-9.0
Potassium (mg/L)	0.5-0.6	0.5-0.6	0.5-0.7	1.1-1.4	1.1-1.4	1.4-1.7
Silica (mg/L)	8.8-11.0	9.0-11.0	8.7-10.9	10.7-11.6	10.8-11.9	4.8-9.9
Sodium (mg/L)	4.8-5.3	4.8-5.7	5.6-16.0	22.9-28.8	22.7-28.9	24.8-30.0

The table above provides information that is useful for certain industrial and home applications. Information on the hardness of water in "grains per gallon" can be useful to improve the function of dishwashers, cooling equipment and other process applications. To convert the hardness values into grains per gallon, divide the values shown in the tables in milligrams per liter by 17. For example, water hardness in areas served by the Orinda Water Treatment Plant had a range of 15 to 30 mg/L, which is equivalent to 0.9 to 1.8 grains per gallon

In addition to the substances listed above, in 2004 EBMUD detected 2.5 ug/L of arsenic in Chabot Reservoir. The Maximum Contaminant Level for arsenic is 50 ug/L and its Public Health Goal is 0.004 ug/L. Chabot is an emergency standby reservoir that has not been used as a water source for more than 20 years.

PROTECTION FROM DROUGHT

The Mokelumne River watershed provides EBMUD with high-quality water, but the amount of supply is not enough to meet our customer needs in times of severe drought. EBMUD drought protections include adding new water sources and squeezing the most out of existing ones. We're making significant progress on our project to use Sacramento River water during drought years. Construction plans are being developed on this cooperative project with the City and County of Sacramento and facilities will be in place to deliver water in late 2009.

We also have some of the most active water conservation and water recycling programs in the state, and we are investigating underground aquifer water storage (for use in dry years) and desalination of ocean, Bay or Delta water.

Wise water use is important all the time. Remember these easy ways to save both water and money:

- ✓ Find leaks and fix them – they are huge water wasters. Toilet flap leaks (at the bottom of the tank) are especially wasteful.
- ✓ Use a broom instead of a hose to clean your driveway.
- ✓ Use the right amount of water for your lawn or garden.

Visit www.ebmud.com or call us at 1-866-40-EBMUD for tips on outdoor watering needs and more ways to save water.

PROTECTION FROM EARTHQUAKES

EBMUD has upgraded many facilities during the 10-year Seismic Improvement Program, and will continue seismic improvements as needed to protect the water system against damage from earthquakes. Dozens of reinforced water distribution reservoirs, flexible pipe connections, and well-anchored pumps are in place to reduce earthquake damage and speed recovery of the water system, protecting our customers and the local economy from long service disruptions following major earthquakes.

This past year work began on one of the program's most important elements – the upgrade of the Claremont Tunnel. The tunnel is the main pipeline bringing treated water to 800,000 customers west of the Oakland-Berkeley hills. A new 1,500-foot section of tunnel will accomodate movement of the active Hayward Fault. Grout reinforcement and other minor repairs along the remaining sections of the existing 3.4-mile tunnel will complete the upgrade.

EBMUD shut down the tunnel this past winter to begin seismic upgrades, and another work period is scheduled next winter. To keep customer water supplies flowing during the work, we used different water sources, treatment sites, and pipes to serve 800,000 customers. During the preparations for the construction and the three months of work, some customers' water tasted different as a result of these changes. EBMUD water continued to meet all health-related water quality standards; there was one instance where our preparations resulted in an atypical number of taste and odor calls. Staff modified operations to prevent a similar occurrence in the future. We appreciate the continued patience of our customers as we modify our water system operations to accommodate this vital work.

How Your Water Is Treated

INFORMATION FROM THE USEPA AND CDHS

In order to ensure that tap water is safe to drink, the U. S. Environmental Protection Agency (USEPA) and the California Department of Health Services (CDHS) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The CDHS regulations also establish limits for contaminants in bottled water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the U.S. Environmental Protection Agency's Safe Drinking Water Hotline at (800) 426-4791.

CONTAMINANTS IN DRINKING WATER

The sources of drinking water—both tap water and bottled water—include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

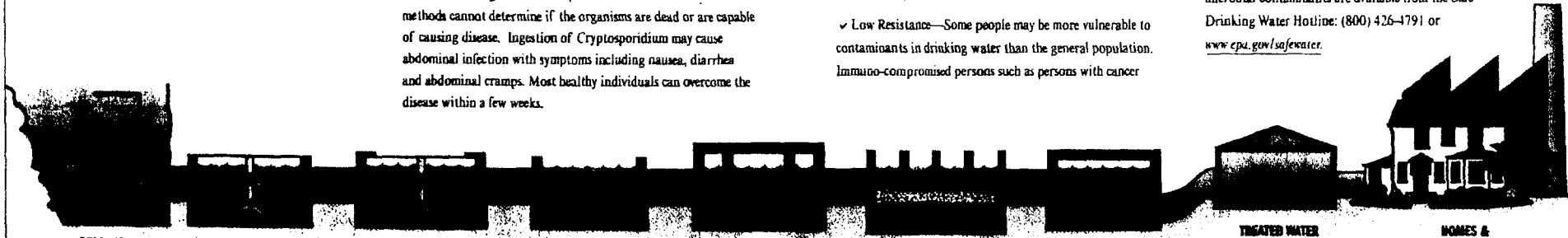
- ✓ Microbial contaminants, such as viruses, bacteria and protozoa, such as Cryptosporidium, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- ✓ Inorganic contaminants, such as salts and metals that can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- ✓ Synthetic organic contaminants such as pesticides and herbicides that may come from a variety of sources, including agriculture, urban storm water and residential uses.
- ✓ Volatile organic contaminants from industrial processes and petroleum production, and from gas stations, urban storm water runoff and septic systems.
- ✓ Radioactive contaminants that can be naturally occurring or be the result of oil and gas production, and mining activities.

Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing Cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal. Current test methods cannot determine if the organisms are dead or are capable of causing disease. Ingestion of Cryptosporidium may cause abdominal infection with symptoms including nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks.

Virtually all of EBMUD's water comes from the pristine watershed of the Mokelumne River. Pardee Dam & Reservoir are shown at left.

However, immuno-compromised people are at greater risk of developing life-threatening illness. We encourage immuno-compromised individuals to consult their physician regarding appropriate precautions to take to avoid infection. Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water.

✓ Low Resistance—Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and infants, can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline: (800) 426-4791 or *www.epa.gov/safewater.*



The Water Treatment Process

Source Water Protection EBMUD protects the watershed lands surrounding our reservoirs so that the water delivered to treatment plants is as clean as possible.

Coagulation Coagulants such as alum neutralize very small particles, allowing them to clump together.

Flocculation After coagulants are added, the water is gently mixed to cause sediment particles to combine and grow large enough to settle.

Sedimentation Water flows very slowly in sedimentation basins, allowing the particles to settle to the bottom.

Ozonation At the Sobrante and Upper San Leandro water treatment plants, ozone is used for disinfection, taste and odor control.

Filtration Water flows through filter beds made up of layers of coal (anthracite), and sand. The coal and sand trap any particles remaining in the water.

Disinfection The addition of chlorine and chloramines (chlorine and ammonia) kills any remaining microorganisms, providing protection against disease-causing organisms, such as bacteria or viruses.

Fluoridation Fluoride is added to prevent dental cavities.

Corrosion Control EBMUD adds calcium hydroxide (lime) or sodium hydroxide to the water to control corrosion in distribution pipes and consumers' plumbing. This also keeps substances like lead and copper from leaching out of plumbing into the drinking water.

APPENDIX J

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

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ACRONYMS/ABBREVIATIONS

BAF	bioaccumulation factor
bgs	below ground surface
BRAC	Base Realignment and Closure
BTAG	biological technical assistance group
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSM	conceptual site model
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
EBS	environmental baseline survey
EPC	exposure point concentration
ERA	ecological risk assessment
FISCA	former fleet industrial supply center
FS	feasibility study
g/day	grams per day
g/kg-day	grams per kilogram per day
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration (Program)
kg	kilogram
mg/kg	milligrams per kilogram
msl	mean sea level
NCP	National Oil and Hazard Substances Pollution Contingency Plan
NOAEL	no observed adverse effect level

ORNL	Oak Ridge National Laboratory
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RI	remedial investigation
SVOC	semivolatile organic compound
TRV	toxicity reference value
95% UCL	95 percent upper confidence limit of the arithmetic mean
EPA	United States Environmental Protection Agency
VOC	volatile organic compound

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Appendix J
Screening Level Ecological Risk Assessment

A screening-level ecological risk assessment (ERA) was conducted for this remedial investigation (RI) by the Navy to estimate the potential impacts of chemicals reported in soil at Installation Restoration (IR) Program Site 31, Alameda Point, Alameda, California. Figures and tables for this ERA are included at the end of this appendix.

The screening-level ERA is Tier 1 (Steps 1 and 2) of the Navy policy for conducting ERAs (DON 1999, 2001) and employs existing data and conservative assumptions regarding contaminant exposure to evaluate whether additional assessment is warranted. Step 1 develops the screening-level conceptual model through problem formulation and toxicity evaluation. Step 2 prepares the exposure estimate and risk calculations.

The Navy policy is consistent with the Ecological Risk Assessment Guidance for Superfund (U.S. Environmental Protection Agency [EPA] 1997) of the EPA. The Navy Tier 1 process is analogous to Steps 1 and 2 of the Superfund guidance, which also results in a screening-level ERA.

The State of California has also prepared guidance documents pertaining to ERAs (Cal/EPA 1996a,b). The Navy Tier 1 process is similar to the first two components of the California process (Scoping Assessment and Phase I Predictive Assessment). Following the process for ERA described in the Navy policy (DON 1999, 2001) is expected to be consistent with following the California process.

In the Navy Tier 1 process, the primary objective of Step 1 is to evaluate whether complete exposure pathways exist between chemicals and selected ecological receptors at IR Site 31. In Step 2 of the Tier 1 process, risks are estimated for those chemicals for which complete pathways were identified. At the conclusion of the Tier 1 process, a risk management decision is made regarding site status. The decision criteria identify the following three possible outcomes of the Tier 1 screening-level ERA.

- IR Site 31 poses an acceptable risk and no further action is warranted;
- IR Site 31 poses a potentially unacceptable risk that requires additional evaluation with a Tier 2-baseline ERA; and
- IR Site 31 poses a potentially unacceptable risk and accelerated site remediation is warranted.

This risk assessment report also includes an evaluation of refined exposure estimates described by EPA guidance (EPA 1997) and Step 3a of Navy policy (DON 1999, 2001).

The supplemental refined evaluation is presented in addition to the screening-level ERA (rather than as part of the screening-level ERA) and as an aid to the risk managers. The refined exposure estimates use exposure factors that are more realistic for the site than the most-conservative values used in Steps 1 and 2. This step provides a refined list of chemicals of potential ecological concern (COPECs).

An ERA based on chemicals reported in groundwater is not included in this report; this information is included in other reports (PRC and Versar 1996, ERRG 2004).

J1 Problem Formulation

Problem formulation evaluates the site characteristics, COPECs, fate and transport factors for the COPECs, ecological habitats and representative organisms, threatened and endangered species, and potential exposure pathways between COPECs and ecological receptors.

J1.1 Site Location and Description

Alameda Point is located on the western end of Alameda Island, which is located along the eastern margin of the San Francisco Bay near the city of Oakland in Alameda County, California (Figure J-1). IR Site 31 is located at the eastern end of Alameda Point and includes 24.9 acres of land. The land that is Alameda Point was created by filling natural bay tidelands and offshore areas with dredge spoils from the Oakland Estuary (now the Oakland Inner Harbor), Seaplane Lagoon, and the San Francisco Bay.

IR Site 31 is bounded to the north by IR Sites 25 and 30, to the east and south by non-Navy property (the former Fleet Industrial Supply Center [FISCA], Oakland Alameda Annex and Alameda Facility [Annex]) (Figure J-2). The site is currently a residential setting. Adjacent land is residential and schools.. The Navy formerly used this site for residential purposes as well as for parking and storage.

The site is primarily covered by pavement and buildings (Figure J-3). A portion of the site is occupied by landscaped vegetation such as shrubs and grass lawns.

The ground surface at IR Site 31 is flat, with an approximate elevation of 10 feet above mean sea level (MSL). Depth to groundwater at the site ranges from 5 to 9 feet bgs. No naturally occurring surface water bodies exist on Alameda Point.

J1.2 Ecological Setting

This section describes biological habitats; representative organisms; and rare, endangered, or threatened species in the vicinity of IR Site 31. Habitat descriptions are based on information presented in the California Wildlife Habitat Relationships System (CDFG 2001; Sawyer and Keeler-Wolf 1995; Mayer and Laudenslayer, Jr. 1988).

J1.2.1 Ecological Habitats at IR Site 31

The following ecological habitats occur within a 1-mile vicinity of IR Site 31.

- Barren habitat occurs at IR Site 31 as bare soil, paved areas, and buildings; and on adjacent land at Alameda Point and in the cities of Oakland and Alameda as roads, parking areas, buildings, and runways;
- Urban habitat occurs at IR Site 31 and on adjacent land at Alameda Point and in the cities of Oakland and Alameda as ornamental shrubs, trees, and landscaped areas;
- Nonnative grassland habitat occurs on Alameda Point far to the west of IR Site 31; and
- Estuarine habitat occurs in portions of San Francisco Bay, such as the Oakland Inner Harbor to the north of Alameda Point, Seaplane Lagoon to the southwest of IR Site 31, and the main San Francisco Bay to the south of Alameda Point.

Barren habitat generally offers little value to wildlife; it may serve as a corridor between other habitats or as a place of brief resting, but it is not a significant place of shelter.

Urban habitat generally supports few wildlife species due to human disturbances and limited vegetation. Vegetation includes grass lawns, ornamental trees, and landscaped shrubs. Typical animal representatives of the urban habitat include the house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), scrub jays (*Aphelocoma californica*), California ground squirrel (*Spermophilus beecheyi*), and feral cats. In addition, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis virginiana*) may occur occasionally.

Nonnative grassland habitat offers shelter, forage, and nesting opportunities for a variety of animal species. The northern harrier (*Circus cyaneus*), killdeer (*Charadrius vociferus*), California horned lark (*Eremophila alpestris*), and burrowing owl (*Athene cunicularia*) are avian species that nest in the grassland habitat of Alameda Point. Avian predators occurring in the grassland habitat include the red-tailed hawk (*Buteo jamaicensis*), northern harrier, American peregrine falcon (*Falco peregrinus anatum*), white-tailed kite (*Elanus leucurus*), and American kestrel (*Falco sparverius*). Prey species occurring in the grassland habitat include the rock dove (*Columba livia*), mourning dove (*Zenaida macroura*), black-tailed hare (*Lepus californicus*), rabbit (*Sylvilagus floridanus*), and California ground squirrel. Raccoon, striped skunk, and Virginia opossum may forage in the grassland region. Small areas of scrub habitat occur within the grassland habitat.

Estuarine habitat of San Francisco Bay exists in the intertidal and subtidal zones along the shoreline of Alameda Point and nearby areas. To the north of Alameda Point is the San Francisco Bay waterway known as the Oakland Inner Harbor, approximately 300 meters north of IR Site 31. An embayment known as Seaplane Lagoon is located approximately 1200 meters to the southwest of IR Site 31. The main body of San Francisco Bay is adjacent to the southern margin of Alameda Point. Predominant vegetation includes eelgrass (*Zostera marinara*), various marine algae, and phytoplankton. The estuarine habitat supports numerous invertebrates, including polychaete worms, amphipod crustaceans, clams, snails, and crabs. Representative fish species include topsmelt, anchovy, surfperch, and gobies. Numerous other fish species are also present. Fish and invertebrates occurring in the estuarine habitat represent a food source for many birds, including the California least tern, California brown pelican (*Pelecanus occidentalis californicus*), western grebe (*Aechmophorus occidentalis*), and western snowy plover (*Charadrius alexandrinus nivosus*).

J1.2.2 Threatened, Endangered, and Of-Concern Species

Special-status species for the screening-level ERA at IR Site 31 are those plant and animal species that are classified as threatened, endangered, or species-of concern by state or federal agencies, and that are known to occur or have the potential to occur in the terrestrial or aquatic habitats in the vicinity of IR Site 31 (CDFG 2002a,b,c,d). Table J-1 provides a list of these special-status species for Alameda Point. Local environmental impact reports were used to determine the likelihood of these species occurring at or in the vicinity of Alameda Point (LSA 2001, WRT 2002). Because of the barren and urban habitat at IR Site 31, the listed species are unlikely to occur at the site.

Point Reyes bird's-beak (*Cordylanthus maritimus palustris*), a small annual herb that grows along the fringe of coastal salt marshes, is a federally listed endangered species and has not been reported at Alameda Point since 1917. According to historical records, the grassland and scrub plant species Santa Cruz tarplant (*Holocarpha macradeni*), Kellogg's horkelia (*Horkelia cuneata sericea*), Contra Costa goldfields (*Lasthenia conjugens*), and Adobe sanicle (*Sanicula maritima*) have also not been observed in the area for many years. It is therefore unlikely that these species will occur at Alameda Point. In fact, none of the plant species on state or federal lists were reported in vegetation surveys at Alameda Point in 1995 and 1997 (TtEMI 2003).

Steelhead (*Oncorhynchus mykiss*) and Chinook salmon (*Oncorhynchus tshawytscha*) traverse the San Francisco Bay during migration from the ocean to the Sacramento River delta and freshwater rivers and streams (USACE et al. 1998). Green sturgeon (*Acipenser medirostris*) occur primarily in the northern portion of San Francisco Bay (San Pablo and Suisun Bays) and spawn in the rivers (USACE et al. 1998). Steelhead, salmon, and sturgeon may occasionally occur in the vicinity of Alameda Point.

The Alameda whipsnake (*Masticophus lateralis euryxanthus*) occurs primarily in scrub habitat and occasionally in grassland habitat. The Alameda whipsnake has not been observed at Alameda Point and is unlikely to occur there due to limited habitat.

Occasional observations of marine mammals such as seals and sea lions, including the Steller sea lion (*Eumetopias jubatus*), have been recorded in the area near Alameda Point. The Steller sea lion is not expected to occur regularly near Alameda Point. The salt marsh harvest mouse and salt marsh wandering shrew (*Sorex vagrans halicoetes*) inhabit salt marshes, but neither has been observed at Alameda Point. No salt marsh harvest mice were reported during a biological survey in 1995 (TtEMI 2003). The San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*) and Alameda Island mole (*Scapanus latimanus parvus*) are unlikely to occur at IR Site 31, based on infrequent sightings in the past. The California mastiff bat (*Eumops perotis californicus*) and Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*) may occur at Alameda Point roosting in abandoned buildings, but are unlikely to occur at IR Site 31.

Several sea birds, shore birds, and salt marsh birds such as the western snowy plover, California least tern, double-crested cormorant, California brown pelican, California clapper rail, California black rail (*Laterallus jamaicensis coturniculus*), salt marsh common yellowthroat, and Alameda song sparrow occur or may potentially occur at Alameda Point. However, the shore birds and marsh birds are not expected to occur at IR Site 31 because they prefer a salt marsh habitat. The sea birds such as cormorant, pelican, and tern may forage for fish in the bay at Oakland Inner Harbor or Seaplane Lagoon. Several birds occur in the grassland or scrub habitat areas of Alameda Point; these birds include the northern harrier (*Circus cyaneus*), merlin, burrowing owl, California horned lark (*Eremophilia alpestris actia*), loggerhead shrike (*Lanius ludovicianus*), white-tailed kite (*Elanus leucurus*), and American peregrine falcon.

J1.3 Identification of COPECs

Results from previous investigations at IR Site 31 indicate the presence of various organic and inorganic chemical compounds in soil. Soil samples have been analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Many of the reported SVOCs were polynuclear aromatic hydrocarbons (PAHs). Any chemical reported in at least one soil sample collected at IR Site 31 was included as a COPEC.

COPECs were identified from the verified and validated analytical data collected during this RI and previous investigations, except for the PAH data from the environmental baseline survey (EBS), which were not used because of elevated detection limits. These data were replaced with more current data from the PAH assessment (BEI 2004a,b).

No chemicals were excluded based on comparison to background or other screening criteria. Statistical comparison of metals concentrations in IR Site 31 soil to background concentrations are presented in Section 4 and Appendix H of the RI.

For screening-level ERA, COPECs in soil are typically identified using analytical data collected from soil samples located between 0 foot and 6 feet bgs (Cal/EPA 1998). The sampling approach included soil to depths near groundwater, which is shallow at Alameda Point. Therefore, COPECs in soil were identified using analytical data collected from soil samples located between 0 and 8 feet bgs. The sample depth midpoint did not exceed 6 ft for any sample; i.e. the deeper samples were collected with a top-depth of 4 ft and a bottom-depth of 8 ft, and a top-depth of 5 ft and a bottom-depth of 7 ft. The initial COPEC list for soil includes all chemical compounds that were reported at least once at a concentration greater than the detection limit (Table J-2). Compounds not reported above detection limits were eliminated as COPECs. Descriptive statistics are presented for the initial COPECs.

The most frequently identified chemicals are metals and PAHs. VOCs, SVOCs (other than PAHs), pesticides, and PCBs were reported in 10 percent or fewer of the soil samples. Fifteen metals were found to exceed Alameda Point background population concentrations (Appendix H). The maximum and average concentrations of commonly detected metals are higher in the upper 4 feet compared to the depth interval between 4 and 8 feet. This suggests that the majority of soil with metals above background was imported to IR Site 31 during construction of the Marina Village Housing that was completed in 1993. There is no horizontal pattern to higher levels of metals indicating a relationship with fill material and not a specific release.

Six soil samples were not included in the data used for COPEC identification because the data were not received from the laboratory until after this step had been completed. However, all of the detected compounds reported for these six soil samples (thirteen metals and methylene chloride) are on the list of COPECs based on analysis of the initial data set.

J1.4 Contaminant Fate and Transport

Fate-and-transport information describes how chemicals degrade and where they travel in the environment when they are intentionally or unintentionally released. Chemicals in the environment are analyzed in terms of a modeling system that indicates not only how the chemicals move through air, water, and soil (transport), but also how the chemicals change in the presence of other chemicals and particles (fate).

Physical processes influencing contaminant fate and transport include diffusion (e.g., random movement of molecules) and advection (e.g., flow of groundwater to surface water). Soil erosion, sedimentation, and sediment resuspension describe the

sequestering or transport of soil and sediment particles to which contaminants may be sorbed. The flat surface of IR Site 31 is essentially all paved. Therefore, soil erosion to the lagoon or bay is unlikely.

Chemical processes that affect contaminant fate and transport include various chemical reactions. Acid-base reactions affect the chemical form of the contaminant; precipitation reactions can result in sequestering of contaminants with carbonates, hydrous oxides, and sulfides; and oxidation-reduction reactions can alter the chemical form or speciation of a contaminant. Sorption reactions are dependent on the hydrophobic properties of contaminants and the likelihood of sorption of contaminants to soil and sediment particles; these reactions affect bioavailability and toxicity. Volatilization, hydrolysis, photolysis, and ligand complexation can also affect the persistence and properties of contaminants.

Biological processes may also affect contaminant fate and transport. Biotransformation is a chemical reaction occurring within an organism that alters the chemical form of a contaminant. Contaminants may transfer from the atmosphere, water, soil, and sediment to biota in the process of bioaccumulation.

VOCs in groundwater degrade slowly compared to the rate of volatilization of these compounds from surface water, soil, and sediment in to the atmosphere. Rates of degradation in the atmosphere are compound-specific, ranging from slow to rapid depending on rates of photooxidation. Bioconcentration of VOCs is not a significant process for aquatic or terrestrial organisms.

PAHs are composed of various combinations of fused benzene rings. Properties of PAH compounds vary with molecular weight. Higher-molecular-weight compounds are generally less mobile and less toxic than lower-molecular-weight compounds. PAHs in the atmosphere, water, or soil and sediment become associated with particulate material. PAHs in sediment and soil may transfer to plants or other biota. Environmental degradation occurs by chemical oxidation, photooxidation, and biological transformation. Soil- and sediment-bound PAHs can persist for an extended time. Biological transformation is likely the final fate of PAHs.

Pesticides generally have a cyclic structure and are characterized by the inclusion of chlorine atoms. The pesticides are persistent nonpolar organic compounds that exhibit high solubility in lipids. The pesticides adsorb strongly to soil or sediment particles. Volatilization, photolysis, and oxidation rates vary among the pesticides depending on structure; these are generally not significant pathways. Because of their lipophilic character the pesticides strongly bioaccumulate as well as biomagnify.

Metals vary widely in chemical form and properties; however, metals differ from organic compounds because none degrade in the environment, many exist naturally in

soil and sediment, and a few are essential nutrients for living organisms. The fate of metals in the environment is primarily dependent on sorption, chemical speciation, complexation, biotransformation, and bioaccumulation. Metals occurring in soil and sediment may be sorbed to particles (silt- and clay-size), bound in a ligand complex, bound in a precipitate (sulfides), or may exist in a free ionic state. Organisms can easily bioaccumulate available metals.

J1.5 Exposure Pathway Analysis

Exposure pathway analysis evaluates the potential for contact between the chemical compounds reported in IR Site 31 soil and the ecological receptors that are representative of the ecosystem at (or potentially at) the site.

Exposure of terrestrial organisms to soil at IR Site 31 is considered a potential occurrence. Potential exposure of terrestrial organisms to chemical compounds may occur by direct contact, inhalation, incidental soil ingestion, and ingestion of food items that have absorbed site contaminants. Exposure by direct (e.g., dermal) contact and inhalation is not readily estimated or evaluated for ecological receptors; exposure by ingestion is assumed to be a more significant contributor to total exposure than exposure by direct contact or inhalation. Therefore, direct contact and inhalation exposures for terrestrial receptors will not be evaluated in this risk assessment.

J1.6 Conceptual Site Model

The conceptual side model (CSM) can be described as a representation of the known, expected, and/or predicted relationships between site COPECs and ecological receptors. The CSM, based on current knowledge about IR Site 31, identifies the following:

- Contaminant sources;
- Fate and transport mechanisms;
- Exposure pathways; and
- Ecological receptors.

IR Site 31 investigations have reported the presence of VOCs, SVOCs, PAHs, pesticides, PCBs, and metals in soil. These are potential contaminates that could affect the ecological habitats and associated organisms occurring at IR Site 31.

Fate-and-transport mechanisms exist that provide models for potential exposure of terrestrial organisms to COPECs. Soil COPECs generally maintain persistent forms and stable concentrations by bonding with soil particles and materials. These soil COPECs may migrate with soil erosion patterns and may bioaccumulate in local biota. Transfer of soil COPECs to the biota of lower trophic levels (e.g., vegetation, invertebrates, and

small mammals) is estimated using bioaccumulation factors (BAFs). A BAF is a ratio of the concentration of a chemical compound in biota (e.g., plants) to the concentration in soil. Transfer to biota of higher trophic orders (e.g., predators) is estimated using receptor-specific exposure factors.

Representative terrestrial receptors for IR Site 31 were selected based on a conservative review of current site conditions, reuse plans, and potential habitat. The site currently includes residential areas; it is currently covered primarily by paved surfaces and buildings. The City of Alameda General Plan indicates the IR Site 31 area as "Medium-Density Residential" (LSA 2002). Adjacent sites of Alameda Point have been identified as residential. No native or natural habitat occurs or is expected to occur at IR Site 31 due to active human activities.

Receptors that would be representative of lower trophic levels such as plants or soil invertebrates are not applicable to IR Site 31 because the current and expected site conditions do not include areas that would represent habitat areas for these receptors. Current and expected vegetation would be limited to small landscaped areas.

This screening-level risk assessment evaluates birds and mammals of the major terrestrial feeding guilds as potential ecological receptors (Figure J-4). Assessment endpoints include growth and reproduction of omnivorous and herbivorous mammals, and omnivorous, invertebrate-feeding, and carnivorous birds. Exposure endpoints are hazard quotients for the following representative species. The deer mouse is a representative species for omnivorous mammals. The California ground squirrel is a representative species for herbivorous mammals. The Alameda song sparrow is a representative species for avian receptors that feed on a combination of invertebrates and plant material. The American robin is a representative species for avian receptors that feed primarily on terrestrial invertebrates. The red-tailed hawk is a representative species for avian predators (raptors) that feed on small mammals.

J2 Ecotoxicity of COPECS

COPECs were evaluated with ecotoxicity estimates. These values are preferentially based on a no-effect level for chronic exposures.

COPECs identified in soil are known or suspected to cause various adverse responses in terrestrial wildlife. Guideline toxicity reference values (TRVs) originally prepared by the Navy and the EPA Region 9 Biological Technical Assistance Group (BTAG) (EFA-West 1998) are included in ERA guidance documents by California Environmental Protection Agency (2000, 2002b). Wildlife TRVs are presented as an upper estimate and a lower estimate of effect thresholds. The low-TRV, based on no-observed-adverse-effect-level (NOAEL) data, represents a threshold below which no adverse effect is expected. The high-TRV, based on an approximate midpoint of the range of effect

levels, represents a threshold at which an adverse effect is likely to occur. TRVs used in this screening-level ERA are low-TRVs unless otherwise noted.

For compounds without a Navy-BTAG TRV, a TRV was selected from the scientific literature. If literature-based values were not chronic NOAEL values, a factor of 0.1 was used to convert to a chronic value, and a factor of 0.1 was used to convert to a NOAEL value, as necessary (Calabrese and Baldwin 1993). If an avian TRV was unavailable for a COPEC, the mammalian TRV was used with an adjustment factor of 0.1. TRVs are listed in Table J-3 for mammals and in Table J-4 for birds.

If the difference in body weight was more than two orders of magnitude (Cal/EPA 1999), wildlife TRVs were adjusted for the difference in sensitivity between test species (usually standard laboratory animals) and selected ecological receptors for the site (Table J-5). An allometric adjustment was used for mammalian and avian species (Sample and Arenal 1999) based on body weights of the test species described in the scientific literature. Scaling factors presented by Sample and Arenal (1999) indicate that mammalian sensitivity increases with increased body weight, and avian sensitivity increases with decreased body weight.

For mammals, TRVs were calculated using

$$TRV_{wildlife} = NOAEL_{test} * \left(BW_{test} / BW_{wildlife}\right)^{(1-0.94)}$$

For birds, TRVs were calculated using

$$TRV_{wildlife} = NOAEL_{test} * \left(BW_{test} / BW_{wildlife}\right)^{(1-1.2)}$$

where:

$TRV_{wildlife}$	=	toxicity reference value for wildlife species
$NOAEL_{test}$	=	no observed adverse effect level for test species
BW_{test}	=	body weight for test species
$BW_{wildlife}$	=	body weight for wildlife species

J3 Exposure Estimate

Exposure estimates represent the quantity of COPECs to which the representative ecological receptors are exposed.

J3.1 Soil COPEC Concentrations

Exposure estimates for wildlife were developed from reported soil concentrations for COPECs at IR Site 31. Maximum concentrations reported for each soil COPEC were assumed to represent the concentration throughout the site. Soil COPECs for IR Site 31 are listed in Table J-2.

Six soil samples were not included in the data used to develop exposure concentrations because the data were not received from the laboratory until after this step had been completed. However, maximum concentrations for all of the detected metals compounds reported for these six soil samples were less than the maximum concentrations developed based on analysis of the initial data set. The methylene chloride maximum detected concentration reported for these six soil samples were greater than the maximum concentrations developed based on analysis of the initial data set. This will be addressed in the uncertainty analysis.

J3.2 COPEC Concentrations in Terrestrial Biota

Tissue residue concentrations of the COPECs in prey species for IR Site 31 were estimated using soil-to-plant, soil-to-invertebrate, and soil-to-small-mammal BAF values (Table J-6).

J3.2.1 Soil-to-Plant Bioaccumulation Factors

Soil-to-plant BAF values for some inorganic COPECs were developed at Oak Ridge National Laboratory (ORNL). Median values were selected from those developed by Bechtel Jacobs Company LLC (BJC 1998), Efroymson et al. (2001), and Baes et al. (1984). Soil-to-plant BAF values for organic COPECs were estimated using Equation 5 of Travis and Arms (1988):

$$\text{Log soil-to-plant } BAF = 1.588 - (0.578 * \text{Log } K_{ow})$$

where:

K_{ow} = octanol-water partition coefficient

J3.2.2 Soil-to-Invertebrate Bioaccumulation Factors

Soil-to-invertebrate BAF values for some inorganic COPECs were developed at ORNL. Median values were selected from Sample et al. (1998a, 1999). The BAF values for antimony and thallium were selected from values recommended by EPA (1999). BAFs for pesticides and PCBs were estimated with median uptake factors for PCBs (Sample et al. 1999). BAF values for PAHs were selected from Beyer and Stafford (1993). The BAF values for SVOCs were estimated with the median uptake factor for 2,3,7,8-

tetrachlorodibenzo-p-dioxin (Sample et al. 1999). BAF values for VOCs were estimated using the equation of Southworth et al. (1978):

$$\text{Log soil-to-invertebrate } BAF = (0.819 * \text{Log } K_{ow}) - 1.146$$

where:

K_{ow} = octanol-water partition coefficient

J3.2.3 Soil-to-Small-Mammal Bioaccumulation Factors

Soil-to-small-mammal BAF values for some inorganic COPECs were developed at ORNL. Median values were selected from Sample et al. (1998b). Because BAF values for antimony, beryllium, and molybdenum were not available, a BAF value of 1 was assumed. Soil-to-small-mammal BAF values for organic COPECs were estimated using the median value for 2,3,7,8-tetrachlorodibenzo-p-dioxin from Sample et al. (1998b).

J3.3 Exposure Factors

Exposure factors for the ingestion pathway for terrestrial wildlife include ingestion rate, body weight, and site-use factors. These exposure factors are specific for each ecological receptor evaluated. Fractional intake, the dietary component, is specific for each receptor and ingested medium (food type). Gastrointestinal assimilation efficiency and bioavailability are specific to each receptor, ingested medium, and chemical compound. For this screening-level risk assessment, conservative assumptions are used for assimilation efficiency and site-use factors (values set to 1). The receptors are assumed to experience no reduction in bioavailability and are also assumed to feed only at an area influenced by conditions at IR Site 31.

Exposure factors (Table J-7) were selected from available scientific literature, such as the EPA Wildlife Exposure Factors Handbook (EPA 1993) and the California Wildlife Biology Exposure Factor and Toxicity database (Cal/EPA 2002a). Minimum values were used for body weight. Since little data are available for ingestion rates for the representative receptors, maximum ingestion rates are estimated from maximum body weight values with predictive equations (Nagy 2001).

Exposure dose was calculated with the following formula for each receptor and COPEC:

$$Dose = \frac{\sum_{k}^{i=1} [C * BAF_i * IR * FI_i * AE * SUF]}{BW}$$

where:

Dose	=	daily dose of COPEC per receptor; value is expressed as $mg_{chemical}/kg_{BW}$-day
C	=	concentration in medium (soil or water) using the maximum concentration, expressed as $mg_{chemical}/kg_{soil}$dry weight (dw) or $mg_{chemical}/L_{water}$
BAF_i	=	media-to-biota bioaccumulation factor, expressed as kg_{soil}dw /kg_{biota} dw or L_{water} /kg_{biota} dw
IR	=	receptor-specific ingestion rate, expressed as kg_{food}dw/day
FI_i	=	receptor-specific fractional intake rate for each ingested item (including incidental soil and food items); dietary composition
AE	=	chemical-specific gastrointestinal absorption efficiency (bioavailability) for each ingested medium (including soil and food items) for each representative species; value has no units; value assumed at 1
SUF	=	site use factor, receptor specific; value has no units; value assumed at 1
i, k	=	identifier and number of ingested media types (i.e., soil, food types)
BW	=	body weight of the animal, expressed as kg_{BW}

J4 Risk Estimation

The risk for potential ecological receptors is estimated by the hazard quotient (HQ), obtained by dividing the exposure dose estimate by the TRV.

$$HQ = \frac{Dose}{TRV}$$

where:

HQ	=	hazard quotient
Dose	=	daily exposure dose for a COPEC, milligrams per kilogram per day (mg/kg-day)
TRV	=	toxicity reference value, mg/kg-day

Hazard index (HI) values were calculated to assess the potential for a cumulative effect from multiple COPECs having similar modes of action. The HI was calculated as the sum of all of the individual HQ values for a group of COPECs (e.g., metals, PAHs).

The screening-level risk estimate for IR Site 31 assumes that the site could be occupied by a natural habitat in the future. Table J-8 lists the HQ (HQ-Low based on low-TRV) for each soil COPEC and potential terrestrial wildlife receptor (mammals and birds). Most of the HQ values for organic chemicals are less than or equal to 1, indicating that those COPECs are unlikely to represent an ecological risk for terrestrial wildlife. Nine PAH compounds, two pesticides, and most metals are presented with HQ values exceeding 1, indicating potentially unacceptable ecological risk. The COPECs with the highest HQ values from the five representative wildlife receptors are lead (HQ 900) and nickel (HQ 800). Potential risk to terrestrial wildlife receptors should be further evaluated with refined exposure point concentrations (EPCs) and refined exposure factors for the representative receptors.

J5 Uncertainty Analysis

Some uncertainties are inherent in the risk assessment process, while other uncertainties result from limitations of the studies upon which the assessment is based. It is important to identify the sources and effects of uncertainty in the risk assessment to provide defensible hazard assessments and impact evaluations and to minimize subjective interpretation of the nature and degree of potential hazards posed by COPECs. Most assumptions in the ERA process are intentionally conservative, so that the risk assessment more likely overestimates than underestimates the potential hazard for ecological receptors.

Assumptions must be made in assessments of exposure and risk when values are unknown or when multiple values are possible. The qualitative effects of the major assumptions in this risk assessment are discussed in the following subsections.

J5.1 Selection of Chemicals of Potential Ecological Concern

Some uncertainty exists in the selection of COPECs for a site. The sampling procedures and analytical methods used in this RI adhered to standard protocols and likely reported the COPECs for IR Site 31 appropriately. A large number of soil samples were analyzed and the number of COPECs is not likely underestimated.

J5.2 Exposure Pathways

This risk assessment did not take into account other potential exposure pathways such as inhalation and dermal contact. Little data regarding these two exposure pathways are available (site-specific and/or in the scientific literature). The dermal contact pathway was not evaluated quantitatively. It is possible that exposures to COPECs at

the site may have been underestimated for the selected receptors; however, the ingestion routes tend to be the significant drivers of exposures. Because it is impossible to account for all potential exposure pathways by all receptors, there may have been an underestimation of hazard for the selected receptors.

J5.3 Endpoint Receptor Selection

Uncertainty surrounds the selection of endpoints appropriate for the site because it is not feasible to evaluate all species and communities potentially at risk. The ecological endpoints selected for evaluation represent the broadest possible range of receptors (including special-status ecological receptors) that could be addressed with sufficient certainty to provide a basis for regulatory decision-making. Because of the wide range of ecological receptors selected, it is unlikely that the hazard would be underestimated for all the receptors potentially present at the site.

J5.4 Exposure Model

There are a number of caveats regarding the applicability, relevance, and usage of the exposure model for terrestrial wildlife. The life histories of the prey species are of critical importance for understanding the relationship of these species to the site and their potential exposure to contaminated media at the site. The model used in this assessment assumed that prey species would only be in contact with soil at this site.

J5.5 Exposure Estimates

Potential hazards of chemical exposures to the selected receptors are subject to uncertainty as a result of simplifying the assumptions used to estimate exposure.

The exposure estimate assumed that the EPC of a COPEC reported from soil would be consistent throughout the site area. The EPC is an estimation of a reasonable exposure value based on the available data. For the screening-level ERA, the EPC was estimated as the maximum measured value. This EPC would overestimate the exposure and the risk.

Six soil samples were not included in the data used to develop exposure concentrations because the data were not received from the laboratory until after this step had been completed. However, the metals concentrations from these data would have no impact on the estimated maximum concentration since none of the concentrations from these six soil samples was greater than the maximum concentrations developed based on analysis of the initial data set. The methylene chloride maximum detected concentration reported for these six soil samples was greater by a factor of 3 than the maximum concentrations developed based on analysis of the initial data set. This risk characterization for methylene chloride would not change since the maximum reported

HQ value is 0.004. An increase in the HQ value by a factor of 3 would give an HQ value of 0.012, which is still well below 1.

Exposure parameters for the selected receptors are based on minimum body weight values derived from the literature. Actual intake rates for the selected receptors are likely smaller than those used in this ERA, resulting in an overestimation of potential exposures to site COPECs.

Furthermore, assumptions regarding food items ingested by the selected receptors were restrictive (e.g., a wildlife receptor consumes only a few representative food items at the site) and did not account for a probable varied diet, resulting in an over- or underestimation of the risk.

BAFs were used to estimate wildlife exposures from ingestion of contaminated prey. The BAFs were taken from a review of scientific literature. Site-specific BAFs may be over- or underestimated by the generalized values.

There are uncertainties associated with how extensively a receptor will use a site. In this risk assessment, it was assumed that receptors would forage at IR Site 31 exclusively, which leads to an overestimation of the potential risk.

J5.6 Bioavailability

Because of the paucity of data on the amount of a chemical that may be bioavailable at any one site, the food chain modeling assumed a 100 percent bioavailability for all COPECs, compared with reference literature toxicity values. Exposure estimation assumed that COPECs were completely bioavailable (which is unlikely under natural conditions), resulting in an overestimation of hazard.

J5.7 Toxicity Reference Value Extrapolations

Uncertainties resulting from TRV extrapolation affect the evaluation of potential effects on sensitive or protected species and consideration of the bioavailability and toxicity of the forms of COPECs present at the site. Uncertainty can be introduced into the estimation of wildlife toxicity using TRVs as a result of the following:

- Extrapolation from acute or subchronic exposure to chronic exposure duration;
- Extrapolation from a more toxicologically sensitive species than a selected receptor;
- Extrapolation from lowest observed adverse effect level to NOAEL;
- Extrapolation across species of varying taxonomic relatedness, feeding habits, and body size;
- Extrapolation from representative species to sensitive or protected species; and

- Consideration of bioavailability, assimilation, and relative toxicity of chemical forms used in toxicity testing versus forms occurring in nature.

The risk assessment implemented adjustment factors when these conditions were encountered to minimize the likelihood of underestimating the risk.

J5.8 Uncertainty Analyses of Risk Characterization

The screening-level ERA overestimates the actual hazard of adverse ecological effects at IR Site 31 because of the conservative nature of the assumptions used. For COPECs with estimated exposures lower than the toxicity benchmark values, the probability of significant ecological hazard is very low. Potential risk from chemical exposures that exceed the toxicity benchmark values cannot be eliminated from consideration; however, marginal exceedances of the benchmark values would suggest that significant levels of risk at the population or community level are not likely.

J6 Refined Exposure Estimate (Step 3A)

This risk assessment includes a step for refined exposure estimates described by Step 3a of Navy policy (DON 1999, 2001) and EPA guidance (EPA 1997). The refined exposure estimate uses exposure factors that are more realistic for the site than the most-conservative values used for Steps 1 and 2.

Only COPECs with HQ values or COPEC classes (PAHs) with HI values exceeding 1 in the screening-level ERA (Step 2) were retained for further risk estimation using refined exposure estimates under Step 3A. Since none of the VOC, SVOC, and PCB compounds had HQ values exceeding 1 and none of the HI for these compound classes exceeded 1, they were not included in the Step 3A evaluation. Beryllium was not included in the Step 3A evaluation since its HQ did not exceed 1 after Step 2. The PAHs, pesticides, and most metals were evaluated in the Step 3A evaluation.

J6.1 Soil COPEC Concentrations

The refined EPCs for soil COPECs are the 95th percentile upper confidence limit of the arithmetic mean (95 percent UCL) representative of average exposures at IR Site 31 (Table J-2). The 95 percent UCL calculation was distribution dependent (Appendix I, Section I4.3.1). The maximum detected concentration was used as the refined EPC if the 95 percent UCL exceeded the maximum detected concentration. For the calculations, COPECs reported as not present at concentrations exceeding the detection limit were included as values with a concentration of one-half the detection limit. Details of the 95 percent UCL calculation for each COPEC are presented in Appendix I. Concentrations of inorganic COPECs were compared to background concentrations for Alameda Point (Appendix H).

Six soil samples were not included in the data used to develop the refined exposure concentrations because the data were not received from the laboratory until after this step had been completed. This will be addressed in the uncertainty analysis.

J6.2 Exposure Factors

Exposure factors for terrestrial wildlife (Table J-9) were refined to represent average site specific conditions more closely for IR Site 31. Body weights, ingestion rates, and site use factors were revised. The terrestrial site area was estimated as 10.1 hectares (24.9 acres).

J7 Refined Risk Estimation

Refined risk estimations were prepared for terrestrial wildlife receptors using the refined exposure estimates for IR Site 31. The refined risk estimate assumes that the site could be occupied by a natural habitat in the future.

During the refined risk estimation, inorganic COPECs with concentrations not statistically greater than the Alameda Point background concentrations were eliminated from further evaluation.

Table J-10 lists the refined HQ (refined HQ-Low based on low-TRV) for each soil COPEC and potential terrestrial wildlife receptor (mammals and birds). One pesticide and eleven metals are presented with refined HQ values exceeding 1, indicating potentially unacceptable ecological risk. The COPECs with the highest HQ values from the five representative wildlife receptors are lead (HQ 200) and nickel (HQ 100). The refined HQ value did not exceed 5 for the other seven metals and the pesticide (4,4'-DDE).

The refined HQ values for all of the PAHs and a few of the metals (arsenic, barium, molybdenum, and thallium) did not exceed 1, indicating that these COPECs are unlikely to represent an ecological risk for terrestrial wildlife. These compounds are eliminated from further evaluation.

Two metals (antimony and beryllium) were not statistically greater than the background concentrations and were eliminated from further evaluation.

J8 Uncertainty Analysis - Refined Exposure Estimates

For the refined exposure risk estimates, somewhat less conservative estimates were used for the exposure parameters. The soil EPCs were estimated with the 95% UCL of the arithmetic mean. The refined soil EPCs likely overestimate the exposure and risk, but not as much as the EPCs based on maximum concentrations.

Six soil samples were not included in the data used to develop the refined exposure concentrations because the data were not received from the laboratory until after this step had been completed. These data included many metals compounds which were already represented by a large number of samples. It is likely that these data would have minor impact on the calculated EPC value. The data also included one organic compound, methylene chloride, which was eliminated as a COPEC during the Tier 1 Steps 1 and 2.

Refined exposure factors for the selected avian and mammalian ecological receptors were based on average body-weight estimates. These exposure factors may over- or underestimate the exposure and risk. The exposure estimate was also refined based on a receptor foraging for a portion of time at the site, based on average foraging ranges published in the literature. Actual foraging ranges for the selected receptors are unknown, which may lead to an over- or underestimation of hazard for those receptors.

The refined exposure risk estimates more likely overestimate than underestimate the actual hazard of adverse ecological effects at IR Site 31 because of the conservative nature of the assumptions used. A few of the exposure parameters are as likely to overestimate as underestimate the exposure and risk, but the likelihood of overestimating the exposure that is associated with the majority of the exposure parameters leads to an overall likelihood of overestimating the exposure and risk. The conservative estimates of potential toxic effects were the same for the screening-level ERA as for the refined exposure risk estimates.

The risk characterization over estimates the current potential ecological risk since residences occupy the site rather than a natural habitat. Ecological receptors would use the site under current conditions much less than if a natural habitat were in place. To provide an estimate of potential ecological risk relevant to the current site conditions, a SUF of 0.1 can be applied to each representative ecological receptor. HQ values presented in Table J-10 can be adjusted by a factor of 0.1 to account for this assumption. This factor is generally appropriate because most of the ecological receptors have been modeled thus far with a SU F of 1. Applying the 0.1 SUF to the Table J-10 HQ would eliminate most COPECs from concern. The remaining COPECs would have lower HQ values (lead 20 and nickel 10).

J9 Risk Characterization and Summary

After Tier 1 Steps 1 and 2, this screening-level ERA indicated several organic and inorganic soil compounds as representing potentially unacceptable ecological risk to terrestrial wildlife. The aquatic life at the nearby Oakland Inner Harbor is not expected to have unacceptable risk based on exposure to soil compounds since most of the site is paved and runoff and groundwater transport are considered incomplete pathways. Exposure estimates were further analyzed according to the procedures of Step 3a to

refine the COPEC list including comparison to background. The refined risk estimates indicated potentially unacceptable ecological risk to terrestrial wildlife receptors from one organic and 10 inorganic soil COPECs.

Evaluation of the HQ values for background concentrations suggest that a portion of the potential risk to terrestrial receptors from IR Site 31 soil is accounted for by the background concentrations (Table J-11). Background concentrations of lead represent a maximum refined HQ of 100, which is approximately one half of the maximum refined HQ calculated for the site. Background concentrations of nickel represent a maximum refined HQ of 30, which is approximately one third of the maximum refined HQ calculated for the site.

The apparently unacceptable potential ecological risk to terrestrial receptors, as indicated by refined HQs ranging up to 200 for potential risk to the sparrow due to lead exposure from ingestion of soil invertebrates and incidental soil, may overstate the actual potential for ecological hazards at IR Site 31. Terrestrial receptors such as the sparrow were selected as a conservative representation of ecological receptors potentially occurring at the site. The risk characterization is most applicable if the site were converted to a natural ecological habitat. Continued current site use as a residential area limits the potential use of the site by ecological receptors because human activity is avoided by ecological receptors and the site surface is nearly completely paved or occupied by buildings. Little current ecological risk to terrestrial receptors is likely to exist due to the residential use and the absence of suitable natural habitat.

Due to the overestimation of the potential ecological risk at the site by this screening-level ERA and the unlikelihood of future development of terrestrial habitat at the site, no further investigation or assessment of ecological risk for soil at IR Site 31 is recommended.

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Table J-1

Special-Status Species Occurring or Potentially Occurring in the Habitats of Alameda Point

Scientific Name	Common Name	Status
Plants		
Cordylanthus maritimus palustris	Point Reyes bird's-beak	CNPS-1B
Holocarpha macradenia	Santa Cruz tarplant	FT/SE
Horkelia cuneata sericea	Kellogg's horkelia	CNPS-1B
Lasthenia conjugens	Contra Costa goldfields	FE/CNPS-1B
Sanicula maritime	Adobe sanicle	SR
Fish		
Acipenser medirostris	Green sturgeon	FSC/CSC
Eucyclogobius newberryi	Tidewater goby	FE/CSC
Hypomesus transpacificus	Delta smelt	FT/ST
Oncorhynchus mykiss	Steelhead	FT/CSC
Oncorhynchus tshawytscha	Chinook salmon, winter run	FE/SE
Spirinichus thaleichthys	Longfin smelt	FSC/CSC
Reptiles		
Masticophis lateralis euryxanthus	Alameda whipsnake	FT/ST
Mammals		
Corynorhinus townsendii townsendii	Townsend's western big-eared bat	FSC/CSC
Eumetopias jubatus	Steller sea lion	FT
Eumops perotis californicus	California mastiff bat	FSC/CSC
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	FSC/CSC
Reithrodontomys raviventris	Salt marsh harvest mouse	FE/SE
Scapanus latimanus parvus	Alameda Island mole	FSC/CSC
Sorex vagrans halicoetes	Salt marsh wandering shrew	FSC/CSC
Birds		
Athene cunicularia	Burrowing owl	FSC/CSC
Charadrius alexandrinus nivosus	Western snowy plover	FT/CSC
Circus cyaneus	Northern harrier	CSC
Elanus leucurus	White-tailed kite	FSC/CFP

Table J-1 (continued)

Special-Status Species Occurring or Potentially Occurring in the Habitats of Alameda Point

Scientific Name	Common Name	Status
Eremophilia alpestris actia	California horned lark	CSC
Falco columbarius	Merlin	CSC
Falco peregrinus anatum	American peregrine falcon	FSC/SE
Geothlypis trichas sinuosa	Salt marsh common yellowthroat	FSC/CSC
Lanius ludovicianus	Loggerhead shrike	FSC/CSC
Laterallus jamaicensis coturniculus	California black rail	FSC/ST
Melospiza melodia pusillula	Alameda song sparrow	FSC/CSC
Pelecanus occidentalis californicus	California brown pelican	FE/SE
Phalacrocorax auritus	Double-crested cormorant	CSC
Rallus longirostris obsoletus	California clapper rail	FE/SE
Sterna antillarum browni	California least tern	FE/SE

Acronyms/Abbreviations:
- 1B - plants rare, threatened, or endangered in California and elsewhere
- CFP - California Department of Fish and Game - fully protected
- CNPS - California Native Plant Society
- CSC - California special-concern species
- FE - federally listed - endangered
- FSC - federal special-concern species
- FT - federally listed - threatened
- SE - California state listed - endangered
- SR - California state listed - rare
- ST - California state listed - threatened

Table J-2

Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
Volatile Organic Compounds [b]								
benzene	NA	1.00E-03	3.00E-03	2.59E-03	3.55E-04	2.73E-03	2.73E-03	2/120
methylene chloride (dichloromethane)	NA	8.00E-04	2.00E-03	2.55E-03	4.60E-04	2.74E-03	2.00E-03	5/120
xylenes, total	NA	5.00E-04	3.00E-03	5.14E-03	9.16E-04	5.50E-03	3.00E-03	3/120
Semivolatile Organic Compounds [b]								
phenol	NA	2.00E-01	3.00E-01	1.33E+01	3.46E+01	2.70E+01	3.00E-01	2/120
Polynuclear Aromatic Hydrocarbons [b]								
acenaphthene	NA	2.30E-04	2.90E+00	1.87E-02	1.19E-01	3.92E-02	3.92E-02	454/646
acenaphthylene	NA	1.60E-04	1.20E+00	1.86E-02	6.52E-02	2.98E-02	2.98E-02	515/646
anthracene	NA	2.30E-04	5.00E+00	3.15E-02	2.13E-01	6.81E-02	6.81E-02	529/646
benzo(a)anthracene	NA	2.30E-04	1.50E+01	1.03E-01	7.00E-01	2.24E-01	2.24E-01	574/646
benzo(b)fluoranthene	NA	2.30E-04	1.20E+01	1.33E-01	6.26E-01	2.41E-01	2.41E-01	614/646
benzo(k)fluoranthene	NA	2.40E-04	1.30E+01	1.05E-01	6.40E-01	2.15E-01	2.15E-01	560/646
benzo(g,h,i)perylene	NA	3.40E-04	1.30E+01	1.62E-01	7.82E-01	2.96E-01	2.96E-01	596/646
benzo(a)pyrene	NA	1.70E-04	2.10E+01	1.62E-01	1.04E+00	3.41E-01	3.41E-01	600/646
chrysene (1,2-benzphenanthracene)	NA	1.90E-04	1.80E+01	1.49E-01	8.71E-01	2.98E-01	2.98E-01	599/646
dibenz(a,h)anthracene	NA	2.30E-04	1.70E+00	2.91E-02	8.98E-02	4.45E-02	4.45E-02	539/646
fluoranthene	NA	3.80E-04	3.50E+01	2.57E-01	1.93E+00	5.88E-01	5.88E-01	592/646
fluorene	NA	1.70E-04	1.80E-01	1.46E-02	3.56E-02	2.07E-02	2.07E-02	496/646
indeno(1,2,3-c,d)pyrene	NA	2.70E-04	1.40E+01	1.52E-01	7.82E-01	2.86E-01	2.86E-01	566/646
2-methylnaphthalene	NA	2.40E-04	2.60E-01	1.60E-02	3.69E-02	2.23E-02	2.23E-02	520/646
naphthalene	NA	2.40E-04	1.60E+00	2.33E-02	8.39E-02	3.77E-02	3.77E-02	538/646

Table J-2 (continued)

Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
phenanthrene	NA	3.10E-04	2.40E+01	1.01E-01	9.55E-01	2.65E-01	2.65E-01	569/646
pyrene	NA	2.90E-04	4.70E+01	3.30E-01	2.64E+00	7.82E-01	7.82E-01	613/646
Pesticides								
4,4'-DDD	NA	4.00E-04	5.00E-03	8.85E-03	7.66E-03	1.19E-02	5.00E-03	3/123
4,4'-DDE	NA	1.00E-04	3.00E-02	8.84E-03	7.88E-03	1.19E-02	1.19E-02	8/123
4,4'-DDT	NA	2.00E-04	2.60E-03	8.96E-03	7.68E-03	1.20E-02	2.60E-03	5/123
dieldrin	NA	5.00E-04	5.00E-04	8.96E-03	7.68E-03	1.20E-02	5.00E-04	1/123
endosulfan sulfate	NA	4.00E-03	4.00E-03	1.49E-02	1.28E-02	2.00E-02	4.00E-03	1/123
heptachlor	NA	5.00E-04	5.00E-04	5.07E-03	4.35E-03	6.78E-03	5.00E-04	1/123
Polychlorinated Biphenyls								
Aroclor 1016	NA	4.70E-02	4.70E-02	1.88E-02	2.87E-03	1.99E-02	1.99E-02	1/123
Aroclor 1260	NA	5.00E-03	2.00E-02	1.79E-02	2.95E-03	1.91E-02	1.91E-02	9/123
Metals								
antimony	<Bkgd	1.40E-01	3.20E+00	1.62E+00	1.19E+00	2.10E+00	2.10E+00	17/120
arsenic	>Bkgd	2.30E+00	4.24E+01	1.06E+01	7.37E+00	1.17E+01	1.17E+01	120/120
barium	>Bkgd	3.09E+01	4.76E+02	1.67E+02	1.05E+02	1.84E+02	1.84E+02	120/120
beryllium	<Bkgd	6.50E-03	6.60E-01	1.98E-01	1.39E-01	2.53E-01	2.53E-01	75/120
cadmium	>Bkgd	1.70E-02	1.50E+00	2.75E-01	2.19E-01	3.08E-01	3.08E-01	98/120
chromium	>Bkgd	3.00E+00	1.97E+02	5.77E+01	3.86E+01	6.38E+01	6.38E+01	120/120
cobalt	>Bkgd	5.50E+00	2.86E+01	1.49E+01	5.06E+00	1.57E+01	1.57E+01	120/120
copper	>Bkgd	3.60E+00	1.18E+02	3.54E+01	2.09E+01	3.88E+01	3.88E+01	120/120
iron	>Bkgd	1.05E+04	6.70E+04	3.39E+04	1.20E+04	3.86E+04	3.86E+04	120/120
lead	>Bkgd	6.10E+00	1.68E+02	2.84E+01	3.07E+01	4.06E+01	4.06E+01	120/120

Table J-2 (continued)

Soil COPECs for IR Site 31

COPEC	Background Comparison	Minimum Detection (mg/kg)	Maximum Detection (mg/kg)	Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Refined Exposure Point Concentration[a] (mg/kg)	Frequency of Detection
mercury	>Bkgd	1.30E-01	2.40E+00	6.24E-01	5.35E-01	7.06E-01	7.06E-01	97/120
molybdenum	>Bkgd	4.70E-01	2.50E+00	1.58E-01	2.77E-01	2.68E-01	2.68E-01	4/120
nickel	>Bkgd	2.40E+00	4.74E+02	9.47E+01	1.02E+02	1.35E+02	1.35E+02	120/120
selenium	>Bkgd	8.80E-01	3.10E+00	5.19E-01	5.88E-01	7.53E-01	7.53E-01	13/120
thallium	>Bkgd	4.80E-01	3.70E+00	8.73E-01	9.07E-01	1.23E+00	1.23E+00	44/120
vanadium	>Bkgd	2.09E+01	1.04E+02	4.85E+01	1.77E+01	5.12E+01	5.12E+01	120/120
zinc	>Bkgd	2.75E+01	9.01E+02	1.03E+02	8.34E+01	1.37E+02	1.37E+02	120/120

Note:
[a] Refined exposure point concentration, the lower value of the 95 percent UCL and maximum detected concentration
[b] Organic compounds are grouped into categories according to toxicity assessment protocols used in the ecological risk assessment

Acronyms/Abbreviations:
95% UCL - 95 percent upper confidence level of the arithmetic mean, distribution dependent
>Bkgd - site data were statistically greater than the background data; see Appendix H for statistical analyses details
<Bkgd - site data were not statistically greater than the background data; see Appendix H for statistical analyses details
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
IR - Installation Restoration (Program)
NA - not analyzed for statistical difference from background
mg/kg - milligrams per kilogram

Table J-3

Mammalian Toxicity Reference Values

COPEC[a]	TRV (mg/kg-day)	Species	Body Weight (kg)	BTAG[b]	Reference
Volatile Organic Compounds					
benzene	26.36	Mouse	0.03		Nawrot and Staples 1979
methylene chloride	5.85	Rat	0.35		NCA 1982
xylenes, total	2.1	Mouse	0.03		Marks et al. 1982
Semivolatile Organic Compounds					
phenol	60	rat	0.35		NTP 1983
Polynuclear Aromatic Hydrocarbons					
acenaphthene	50	Rat	0.2765		Navarro et al. 1991
acenaphthylene	50	Rat	0.2765		Navarro et al. 1991
anthracene	50	Rat	0.2765		Navarro et al. 1991
benz(a)anthracene	1.31	Mouse	0.0305		Neal and Rigdon 1967
benzo(b)fluoranthene	1.31	Mouse	0.0305		Neal and Rigdon 1967
benzo(k)fluoranthene	1.31	Mouse	0.0305		Neal and Rigdon 1967
benzo(g,h,i)perylene	1.31	Mouse	0.0305		Neal and Rigdon 1967
benzo(a)pyrene	1.31	Mouse	0.0305	BTAG	Neal and Rigdon 1967
chrysene	1.31	Mouse	0.0305		Neal and Rigdon 1967
dibenz(a,h)anthracene	1.31	Mouse	0.0305		Neal and Rigdon 1967
fluoranthene	1.31	Mouse	0.0305		Neal and Rigdon 1967
fluorene	50	Rat	0.2765		Navarro et al. 1991
indeno(1,2,3-cd)pyrene	1.31	Mouse	0.0305		Neal and Rigdon 1967
2-methylnaphthalene	50	Rat	0.2765		Navarro et al. 1991
naphthalene	50	Rat	0.2765	BTAG	Navarro et al. 1991
phenanthrene	50	Rat	0.2765		Navarro et al. 1991
pyrene	1.31	Mouse	0.0305		Neal and Rigdon 1967
Pesticides					
4,4'-DDD	0.8	Rat	0.32	BTAG	Fitzhugh 1948
4,4'-DDE	0.8	Rat	0.32	BTAG	Fitzhugh 1948
4,4'-DDT	0.8	Rat	0.32	BTAG	Fitzhugh 1948
dieldrin	0.02	Rat	0.35		Treon and Cleveland 1955
endosulfan sulfate	0.15	Rat	0.35		Dikshith et al 1984
heptachlor	0.129	Rat	0.1		Shain et al. 1977
PCBs					
Aroclor-1016	0.36	Mouse	0.02062	BTAG	Simmons and McKee 1992
Aroclor-1260	0.36	Mouse	0.02062	BTAG	Simmons and McKee 1992
Metals					
antimony	0.125	Mouse	0.03		Schroeder et al. 1968b
arsenic	0.32	Rat	0.332	BTAG	Schroeder et al. 1968a
barium	5.1	Rat	0.435		Perry et al. 1983
beryllium	0.66	Rat	0.35		Schroeder and Mitchner 1975

Table J-3 (continued)

Mammalian Toxicity Reference Values

COPEC[a]	TRV (mg/kg-day)	Species	Body Weight (kg)	BTAG[b]	Reference
cadmium	0.06	Mouse	0.0322	BTAG	Webster 1988
chromium	3.28	Rat	0.35		MacKenzie et al. 1958
cobalt	1.2	Rat	0.275	BTAG	Domingo et al. 1985
copper	2.67	Mouse	0.03	BTAG	Pocino et al. 1991
iron	NA	NA	NA		NA
lead	1	Rat	0.5506	BTAG	Fowler et al. 1980
mercury	0.25	Rat	0.1875	BTAG	Khera and Tabacova 1973
molybdenum	0.26	Mouse	0.03		Schroeder and Mitchner 1971
nickel	0.133	Rat	0.2486	BTAG	Smith et al. 1993
selenium	0.05	Rat	0.1865	BTAG	Harr et al. 1966
thallium	0.48	Rat	0.065	BTAG	Downs et al. 1960
vanadium	0.21	Rat	0.26		Domingo et al. 1986
zinc	9.6	Mouse	0.0255	BTAG	Aughey et al. 1977

Note:

[a] the following chemical surrogates were used:
chromium, hexavalent for chromium, total
benzo(a)pyrene for benz(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene
endosulfan for endosulfan sulfate
naphthalene for acenaphthene, acenaphthylene, anthracene, fluorene, phenanthrene, and 2-methylnaphthalene

[b] TRV presented by the BTAG are noted; other TRV were selected from scientific literature

Acronyms/Abbreviations:
BTAG - biological technical assistance group, US EPA Region IX
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
kg - kilograms
mg/kg-day - milligrams per kilogram per day
NA - not available
NCA - National Coffee Association
NTP - National Toxicology Program
TRV - toxicity reference value
EPA - United States Environmental Protection Agency

Table J-4
Avian Toxicity Reference Values

COPEC[a]	TRV (mg/kg-day)	Species	Body Weight (kg)	BTAG[b]	Reference
Volatile Organic Compounds					
benzene	2.636[c]	Mouse	0.03		Nawrot and Staples 1979
methylene chloride	0.585[c]	Rat	0.35		NCA 1982
xylenes, total	0.21[c]	Mouse	0.03		Marks et al. 1982
Semivolatile Organic Compounds					
phenol	1.13	Blackbird	0.074[d]		Schafer et al. 1983
Polynuclear Aromatic Hydrocarbons					
acenaphthene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
acenaphthylene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
anthracene	1.11	Blackbirds	0.074[d]		Schafer et al. 1983
benz(a)anthracene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
benzo(b)fluoranthene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
benzo(k)fluoranthene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
benzo(g,h,i)perylene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
benzo(a)pyrene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
chrysene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
dibenz(a,h)anthracene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
fluoranthene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
fluorene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
indeno(1,2,3-cd)pyrene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
2-methylnaphthalene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
naphthalene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
phenanthrene	1.13	Blackbirds	0.074[d]		Schafer et al. 1983
pyrene	1.01	Blackbirds	0.074[d]		Schafer et al. 1983
Pesticides					
4,4'-DDD	0.009	Pelican	3.5	BTAG	Anderson et al. 1975
4,4'-DDE	0.009	Pelican	3.5	BTAG	Anderson et al. 1975
4,4'-DDT	0.009	Pelican	3.5	BTAG	Anderson et al. 1975
dieldrin	0.077	Barn owl	0.466		Mendenhall et al. 1983
endosulfan sulfate	10	Partridge	0.4		Abiola 1992
heptachlor	2.14	Blackbird	0.064		Stickel et al. 1983
PCBs					
Aroclor-1016	0.088	Chicken	0.8	BTAG	Platonow and Reinhart 1973
Aroclor-1260	0.088	Chicken	0.8	BTAG	Platonow and Reinhart 1973

Table J-4 (continued)
Avian Toxicity Reference Values

COPEC[a]	TRV (mg/kg-day)	Species	Body Weight (kg)	BTAG[b]	Reference
Metals					
antimony	0.0125[c]	Mouse	0.03		Schroeder et al. 1968b
arsenic	5.5	Mallard	1.1722	BTAG	Stanley et al. 1994
barium	20.8	Day-old chick	0.121		Johnson et al. 1960
beryllium	0.066[c]	Rat	0.35		Schroeder and Mitchner 1975
cadmium	0.078	Mallard	0.7985	BTAG	Cain et al. 1983
chromium, total	1	Black duck	1.25		Haseltine et al. 1985
cobalt	0.237	Day-old chick	0.153		Diaz et al. 1994
copper	2.3	Broiler chick	0.639	BTAG	Norvel et al. 1975
iron	NA	NA	NA		NA
lead	0.014	Japanese quail	0.0935	BTAG	Edens et al. 1976
mercury	0.039	Mallard	1	BTAG	Heinz 1974
molybdenum	3.5	Chicken	1.5		Lepore and Miller 1965
nickel	1.38	Mallard	0.61375	BTAG	Cain and Pafford 1981
selenium	0.23	Mallard	1.1077	BTAG	Heinz et al. 1989
thallium	0.35	Starling	0.074		Schafer 1972
vanadium	11.4	Mallard	1.17		White and Dieter 1978
zinc	17.2	Mallard	0.955	BTAG	Gasaway and Buss 1972

Notes:
- [a] the following chemical surrogates were used:
  - acenaphthene for acenaphthylene, benz(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, and pyrene
  - chlordane for heptachlor
  - endosulfan for endosulfan sulfate
- [b] TRV presented by the BTAG are noted; other TRV were selected from scientific literature
- [c] avian TRV estimated from mammal TRV * 0.1
- [d] red-winged blackbird body weight from Beletsky 1996

Acronyms/Abbreviations:
- BTAG - biological technical assistance group, EPA Region IX
- COPEC - chemical of potential ecological concern
- DDD - dichlorodiphenyldichloroethane
- DDE - dichlorodiphenyldichloroethene
- DDT - dichlorodiphenyltrichloroethane
- kg - kilograms
- mg/kg-day - milligrams per kilogram per day
- NA - not available
- NCA - National Coffee Association
- TRV - toxicity reference value
- EPA - United States Environmental Protection Agency

Table J-5

Receptor-Specific Toxicity Reference Values for Terrestrial Wildlife

COPEC	Deer Mouse (mg/kg-day)	California Ground Squirrel (mg/kg-day)	Alameda Song Sparrow (mg/kg-day)	American Robin (mg/kg-day)	Red-tailed Hawk (mg/kg-day)
Volatile Organic Compounds					
benzene	2.6E+1	2.6E+1	2.6E+0	2.6E+0	2.6E+0
methylene chloride	5.9E+0	5.9E+0	5.9E-1	5.9E-1	5.9E-1
xylenes, total	2.1E+0	2.1E+0	2.1E-1	2.1E-1	2.1E-1
Semivolatile Organic Compounds					
phenol	6.0E+1	6.0E+1	1.1E+0	1.1E+0	1.1E+0
Polynuclear Aromatic Hydrocarbons					
acenaphthene	5.0E+1	5.0E+1	1.0E+0	1.0E+0	1.0E+0
acenaphthylene	5.0E+1	5.0E+1	1.0E+0	1.0E+0	1.0E+0
anthracene	5.0E+1	5.0E+1	1.1E+0	1.1E+0	1.1E+0
benz(a)anthracene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
benzo(b)fluoranthene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
benzo(k)fluoranthene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
benzo(g,h,i)perylene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
benzo(a)pyrene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
chrysene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
dibenz(a,h)anthracene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
fluoranthene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
fluorene	5.0E+1	5.0E+1	1.0E+0	1.0E+0	1.0E+0
indeno(1,2,3-cd)pyrene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
2-methylnaphthalene	5.0E+1	5.0E+1	1.0E+0	1.0E+0	1.0E+0
naphthalene	5.0E+1	5.0E+1	1.0E+0	1.0E+0	1.0E+0
phenanthrene	5.0E+1	5.0E+1	1.1E+0	1.1E+0	1.1E+0
pyrene	1.3E+0	1.3E+0	1.0E+0	1.0E+0	1.0E+0
Pesticides					
4,4-DDD	8.0E-1	8.0E-1	3.2E-3	9.0E-3	9.0E-3
4,4-DDE	8.0E-1	8.0E-1	3.2E-3	9.0E-3	9.0E-3
4,4-DDT	8.0E-1	8.0E-1	3.2E-3	9.0E-3	9.0E-3
dieldrin	2.0E-2	2.0E-2	7.7E-2	7.7E-2	7.7E-2
endosulfan sulfate	1.5E-1	1.5E-1	1.0E+1	1.0E+1	1.0E+1

Table J-5 (continued)

Receptor-Specific Toxicity Reference Values for Terrestrial Wildlife

COPEC	Deer Mouse (mg/kg-day)	California Ground Squirrel (mg/kg-day)	Alameda Song Sparrow (mg/kg-day)	American Robin (mg/kg-day)	Red-tailed Hawk (mg/kg-day)
heptachlor	1.3E-1	1.3E-1	2.1E+0	2.1E+0	2.1E+0
Polychlorinated Biphenyls					
Aroclor-1016	3.6E-1	3.6E-1	8.8E-2	8.8E-2	8.8E-2
Aroclor-1260	3.6E-1	3.6E-1	8.8E-2	8.8E-2	8.8E-2
Metals					
antimony	1.3E-1	1.3E-1	1.3E-2	1.3E-2	1.3E-2
arsenic	3.2E-1	3.2E-1	5.5E+0	5.5E+0	5.5E+0
barium	5.1E+0	5.1E+0	2.1E+1	2.1E+1	2.1E+1
beryllium	6.6E-1	6.6E-1	6.6E-2	6.6E-2	6.6E-2
cadmium	6.0E-2	6.0E-2	7.8E-2	7.8E-2	7.8E-2
chromium	3.3E+0	3.3E+0	1.0E+0	1.0E+0	1.0E+0
cobalt	1.2E+0	1.2E+0	2.4E-1	2.4E-1	2.4E-1
copper	2.7E+0	2.7E+0	2.3E+0	2.3E+0	2.3E+0
iron	NA	NA	NA	NA	NA
lead	1.0E+0	1.0E+0	1.4E-2	1.4E-2	1.4E-2
mercury	2.5E-1	2.5E-1	3.9E-2	3.9E-2	3.9E-2
molybdenum	2.6E-1	2.6E-1	3.5E+0	3.5E+0	3.5E+0
nickel	1.3E-1	1.3E-1	1.4E+0	1.4E+0	1.4E+0
selenium	5.0E-2	5.0E-2	2.3E-1	2.3E-1	2.3E-1
thallium	4.8E-1	4.8E-1	3.5E-1	3.5E-1	3.5E-1
vanadium	2.1E-1	2.1E-1	1.1E+1	1.1E+1	1.1E+1
zinc	9.6E+0	9.6E+0	1.7E+1	1.7E+1	1.7E+1

Acronyms/Abbreviations:
- COPEC - chemical of potential ecological concern
- DDD - dichlorodiphenyldichloroethane
- DDE - dichlorodiphenyldichloroethene
- DDT - dichlorodiphenyltrichloroethane
- mg/kg-day - milligrams per kilogram per day
- NA - not available

Table J-6

K_{ow} and Bioaccumulation Factors for IR Site 31 Soil COPECs

COPEC	Log K_{ow}[1]	Soil-to-Plant[2]	Ref	Soil-to-Invert[2]	Ref	Soil-to-Mammal[2]	Ref
Volatile Organic Compounds							
benzene	2.13	2.27E+0	a	3.97E+0	b	1.07E+0	c
methylene chloride	1.25	7.34E+0	a	7.55E-1	b	1.07E+0	c
xylenes, total	3.12	6.09E-1	a	2.57E+1	b	1.07E+0	c
Semivolatile Organic Compounds							
phenol	1.46	5.55E+0	a	1.1E+1	d	1.07E+0	c
Polynuclear Aromatic Hydrocarbons							
acenaphthene	3.92	2.1E-1	a	3.0E-1	e	1.07E+0	c
acenaphthylene	3.94	2.04E-1	a	2.2E-1	e	1.07E+0	c
anthracene	4.45	1.04E-1	a	3.2E-1	e	1.07E+0	c
benz(a)anthracene	5.76	1.81E-2	a	2.7E-1	e	1.07E+0	c
benzo(b)fluoranthene	5.78	1.77E-2	a	2.1E-1	e	1.07E+0	c
benzo(k)fluoranthene	6.11	1.14E-2	a	2.1E-1	e	1.07E+0	c
benzo(g,h,i)perylene	6.63	5.7E-3	a	1.5E-1	e	1.07E+0	c
benzo(a)pyrene	6.13	1.11E-2	a	3.4E-1	e	1.07E+0	c
chrysene	5.81	1.7E-2	a	4.4E-1	e	1.07E+0	c
dibenz(a,h)anthracene	6.75	4.86E-3	a	4.9E-1	e	1.07E+0	c
fluoranthene	5.16	4.03E-2	a	3.7E-1	e	1.07E+0	c
fluorene	4.18	1.49E-1	a	2.0E-1	e	1.07E+0	c
indeno(1,2,3-cd)pyrene	6.7	5.19E-3	a	4.1E-1	e	1.07E+0	c
2-methylnaphthalene	3.86	2.27E-1	a	2.0E-1	e	1.07E+0	c
naphthalene	3.3	4.79E-1	a	2.1E-1	e	1.07E+0	c
phenanthrene	4.46	1.02E-1	a	2.8E-1	e	1.07E+0	c
pyrene	4.88	5.85E-2	a	3.9E-1	e	1.07E+0	c
Pesticides							
4,4-DDD	6.02	1.28E-2	a	6.67E+0	d	1.07E+0	c
4,4-DDE	6.51	6.69E-3	a	6.67E+0	d	1.07E+0	c
4,4-DDT	6.91	3.93E-3	a	6.67E+0	d	1.07E+0	c
dieldrin	5.4	2.93E-2	a	6.67E+0	d	1.07E+0	c
endosulfan sulfate	3.66	2.97E-1	a	6.67E+0	d	1.07E+0	c
heptachlor	5.47	2.67E-2	a	6.67E+0	d	1.07E+0	c
Polychlorinated Biphenyls							
Aroclor-1016	5.62	2.19E-2	a	6.67E+0	d	1.07E+0	c
Aroclor-1260	8.27	6.43E-4	a	6.67E+0	d	1.07E+0	c
Metals							
antimony	NA	1.02E-2	f	1.3E+0	h	1.0E+0	i
arsenic	NA	3.8E-2	j	2.2E-1	d	2.5E-3	c
barium	NA	1.56E-1	f	9.1E-2	g	5.66E-2	c

Table J-6 (continued)

K_{ow} and Bioaccumulation Factors for IR Site 31 Soil COPECs

COPEC	Log K_{ow}[1]	Soil-to-Plant[2]	Ref	Soil-to-Invert[2]	Ref	Soil-to-Mammal[2]	Ref
beryllium	NA	1.0E-2	k	4.5E-2	g	1.0E+0	i
cadmium	NA	5.9E-1	j	7.71E+0	d	3.33E-1	c
chromium	NA	4.1E-2	f	3.1E-1	d	8.46E-2	c
cobalt	NA	7.45E-3	f	1.22E-1	g	2.05E-2	c
copper	NA	1.2E-1	j	5.2E-1	d	1.96E-1	c
iron	NA	4.25E-3	f	3.6E-2	g	1.24E-2	c
lead	NA	3.9E-2	j	2.7E-1	d	1.05E-1	c
mercury	NA	6.5E-1	j	1.69E+0	d	5.43E-2	c
molybdenum	NA	2.5E-1	k	9.53E-1	g	1.0E+0	i
nickel	NA	1.8E-2	j	1.06E+0	d	2.49E-1	c
selenium	NA	6.7E-1	j	9.9E-1	d	1.62E-1	c
thallium	NA	4.0E-3	k	1.3E+0	h	1.12E-1	c
vanadium	NA	4.85E-3	f	4.2E-2	g	1.23E-2	c
zinc	NA	3.7E-1	j	3.2E+0	d	7.72E-1	c

References:
- a - Travis and Arms 1988
- b - Southworth et al. 1978
- c - Sample et al. 1998b
- d - Sample et al. 1999
- e - Beyer and Stafford 1993
- f - BJC 1998
- g - Sample et al. 1998a
- h - U.S. EPA 1999
- i - assumed value
- j - Efroymson et al. 2001
- k - Baes et al. 1984

Note:
- [1] source: EPA 2000, experimental value preferred over modeled value
- [2] bioaccumulation factor units:
  kg soil/kg biota (plant, invertebrate, small mammal) (dry weight)

Acronyms/Abbreviations:
- BJC - Bechtel Jacobs Company LLC
- COPEC - chemical of potential ecological concern
- DDD - dichlorodiphenyldichloroethane
- DDE - dichlorodiphenyldichloroethene
- DDT - dichlorodiphenyltrichloroethane
- Invert - invertebrate
- IR - Installation Restoration (Program)
- kg - kilogram
- K_{ow} - octanol/water partition coefficient
- NA - not available
- Ref - reference

Table J-7

Exposure Factors for Representative Terrestrial Wildlife Receptor Species

Exposure Factor	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-Tailed Hawk
Minimum body weight, kg	0.0109 [a]	0.321 [b]	0.0199 [c]	0.0635 [d]	0.957 [e]
Maximum ingestion rate, kg /day	0.0044 [f]	0.047 [g]	0.00587 [h]	0.01493 [i]	0.10614 [j]
Fractional intake, soil	0.05 [k]	0.05 [k]	0.093 [l]	0.104 [m]	0.0035 [n]
Fractional intake, plant	0.5 [o]	0.8 [o]	0.5 [o]	0.17 [p]	0 [o]
Fractional intake, invertebrate	0.5 [o]	0.2 [o]	0.5 [o]	0.83 [p]	0 [o]
Fractional intake, small mammal	0 [o]	0 [o]	0 [o]	0 [o]	1 [o]

Notes:

[a] Morton et al. 1995 (as cited in Cal/Ecotox), minimum of range of adult males and females
[b] Tomich 1962 (as cited in Cal/Ecotox), minimum adult female
[c] Dunning 1993 (as cited in TtEMI 2003), minimum of adult males and females
[d] Clench and Leberman 1978 (as cited in U.S. EPA 1993), minimum of adult males and females, breeding and non-breeding
[e] Steenhof 1983 (as cited in EPA 1993), minimum of adult males and females
[f] Nagy 2001 (omnivorous mammals; grams of food per day dw = $0.432*BW_{(g)}^{0.678}$ using maximum body weight 30.2 grams Stebbins et al. 1980)
[g] Nagy 2001 (omnivorous mammals; grams of food per day dw = $0.432*BW_{(g)}^{0.678}$ using maximum body weight 1009 g Tomich 1962
[h] Nagy 2001 (passerines; grams of food per day dw = $0.630*BW_{(g)}^{0.683}$ using maximum body weight 26.25 g Smith et al. 1986
[i] Nagy 2001 (passerines; grams of food per day dw = $0.630*BW_{(g)}^{0.683}$ using maximum body weight 103 grams Clench and Leberman 1978)
[j] Nagy 2001 (carnivorous birds; grams of food per day dw = $0.849*BW_{(g)}^{0.663}$ using maximum body weight 1455 grams Preston and Beane 1993)
[k] Beyer et al. 1994, midpoint of two prairie dog values
[l] Beyer et al. 1994, for wild turkey
[m] Beyer et al. 1994, for American woodcock
[n] Pascoe et al. 1996, 0.35 percent for bald eagle
[o] assumed
[p] Wheelwright 1986 (as cited in EPA 1993), spring-conservative, western United States

Acronyms/Abbreviations:

$BW_{(g)}$ - body weight as grams
$BW_{(kg)}$ - body weight as kilograms
Cal/Ecotox - California Wildlife Biology, Exposure Factor, and Toxicity Database
dw - dry weight
kg - kilograms
kg /day dw - kilograms of food per day as dry weight
TtEMI - Tetra Tech EM, Inc.
EPA - United States Environmental Protection Agency

Table J-8

Terrestrial Wildlife Receptor-Specific Hazard Quotients (HQ-Low)

COPEC	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
Volatile Organic Compounds						
benzene	1E-04	4E-05	1E-03	1E-03	1E-04	1E-03
methylene chloride	6E-04	3E-04	4E-03	2E-03	4E-04	4E-03
xylenes, total	8E-03	1E-03	6E-02	7E-02	2E-03	7E-02
Semivolatile Organic Compounds						
phenol	2E-02	5E-03	7E-01	6E-01	3E-02	7E-01
Polynuclear Aromatic Hydrocarbons						
acenaphthene	7E-03	2E-03	3E-01	3E-01	3E-01	3E-01
acenaphthylene	3E-03	9E-04	1E-01	9E-02	1E-01	1E-01
anthracene	1E-02	3E-03	4E-01	4E-01	5E-01	5E-01
benz(a)anthracene	9E-01	2E-01	1E+00	1E+00	**2E+00**	**2E+00**
benzo(b)fluoranthene	6E-01	1E-01	7E-01	8E-01	1E+00	1E+00
benzo(k)fluoranthene	6E-01	1E-01	8E-01	8E-01	**2E+00**	**2E+00**
benzo(g,h,i)perylene	5E-01	1E-01	6E-01	7E-01	**2E+00**	**2E+00**
benzo(a)pyrene	1E+00	3E-01	**2E+00**	**2E+00**	**2E+00**	**2E+00**
chrysene	**2E+00**	3E-01	**2E+00**	**2E+00**	**2E+00**	**2E+00**
dibenz(a,h)anthracene	2E-01	3E-02	2E-01	2E-01	2E-01	2E-01
fluoranthene	**3E+00**	6E-01	**3E+00**	**3E+00**	**4E+00**	**4E+00**
fluorene	3E-04	1E-04	1E-02	1E-02	2E-02	2E-02
indeno(1,2,3-cd)pyrene	1E+00	2E-01	1E+00	1E+00	**2E+00**	**2E+00**
2-methylnaphthalene	5E-04	2E-04	2E-02	2E-02	3E-02	3E-02
naphthalene	5E-03	2E-03	2E-01	1E-01	2E-01	2E-01
phenanthrene	5E-02	1E-02	**2E+00**	**2E+00**	**3E+00**	**3E+00**
pyrene	**4E+00**	9E-01	**4E+00**	**5E+00**	**6E+00**	**6E+00**
Pesticides						
4,4-DDD	8E-03	1E-03	**2E+00**	7E-01	7E-02	**2E+00**
4,4-DDE	5E-02	8E-03	**9E+00**	**4E+00**	4E-01	**9E+00**
4,4-DDT	4E-03	7E-04	8E-01	4E-01	3E-02	8E-01
dieldrin	3E-02	5E-03	7E-03	9E-03	8E-04	3E-02
endosulfan sulfate	4E-02	6E-03	4E-04	5E-04	5E-05	4E-02
heptachlor	5E-03	8E-04	2E-04	3E-04	3E-05	5E-03
Polychlorinated Biphenyls						
Aroclor-1016	2E-01	3E-02	5E-01	7E-01	6E-02	7E-01
Aroclor-1260	8E-02	1E-02	2E-01	3E-01	3E-02	3E-01
Metals						
antimony	**7E+00**	1E+00	**6E+01**	**7E+01**	**3E+01**	**7E+01**

Table J-8 (continued)

Terrestrial Wildlife Receptor-Specific Hazard Quotients (HQ-Low)

COPEC	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
arsenic	**9E+00**	**2E+00**	5E-01	5E-01	5E-03	**9E+00**
barium	**6E+00**	**3E+00**	1E+00	1E+00	2E-01	**6E+00**
beryllium	3E-02	1E-02	4E-01	3E-01	1E+00	1E+00
cadmium	**4E+01**	**8E+00**	**2E+01**	**3E+01**	7E-01	**4E+01**
chromium	**5E+00**	1E+00	**2E+01**	**2E+01**	**2E+00**	**2E+01**
cobalt	1E+00	3E-01	**6E+00**	**6E+00**	3E-01	**6E+00**
copper	**7E+00**	**2E+00**	**6E+00**	**7E+00**	1E+00	**7E+00**
iron	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
lead	1E+01	**3E+00**	**9E+02**	**9E+02**	**1E+02**	**9E+02**
mercury	**5E+00**	1E+00	**2E+01**	**2E+01**	4E-01	**2E+01**
molybdenum	**3E+00**	6E-01	1E-01	2E-01	8E-02	**3E+00**
nickel	**8E+02**	**1E+02**	**6E+01**	**8E+01**	**1E+01**	**8E+02**
selenium	**2E+01**	**7E+00**	**4E+00**	**3E+00**	2E-01	**2E+01**
thallium	**2E+00**	4E-01	**2E+00**	**3E+00**	1E-01	**3E+00**
vanadium	**1E+01**	**5E+00**	3E-01	3E-01	2E-02	**1E+01**
zinc	**7E+01**	**1E+01**	**3E+01**	**3E+01**	**5E+00**	**7E+01**
Hazard Indices						
HI VOC	9E-03	1E-03	7E-02	7E-02	3E-03	7E-02
HI SVOC	2E-02	5E-03	7E-01	6E-01	3E-02	7E-01
HI PAH	**1E+01**	**3E+00**	**2E+01**	**2E+01**	**3E+01**	**3E+01**
HI Pesticides	1E-01	2E-02	**1E+01**	**5E+00**	5E-01	**1E+01**
HI PCBs	3E-01	4E-02	7E-01	1E+00	9E-02	1E+00
HI Metals	**1E+03**	**1E+02**	**1E+03**	**1E+03**	**2E+02**	**1E+03**

Note:
* bold font indicates hazard quotient greater than 1

Acronyms/Abbreviations:
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
HI - hazard index
HQ - hazard quotient
NA - not available
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenyls
SVOC - semivolatile organic compound
VOC - volatile organic compound

Table J-9

Refined Exposure Factors for Representative Terrestrial Wildlife Receptors

Exposure Factor	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-Tailed Hawk
Mean body weight, kg	0.0184 [a]	0.562 [b]	0.0235 [c]	0.0804 [d]	1.13 [e]
Mean ingestion rate, kg /day dw	0.0031 [f]	0.0316 [g]	0.00544 [h]	0.01261 [i]	0.08976 [j]
Fractional intake, soil	0.05 [k]	0.05 [k]	0.093 [l]	0.104 [m]	0.0035 [n]
Fractional intake, plant	0.5 [o]	0.8 [o]	0.5 [o]	0.17 [p]	0 [o]
Fractional intake, invertebrate	0.5 [o]	0.2 [o]	0.5 [o]	0.83 [p]	0 [o]
Fractional intake, small mammal	0 [o]	0 [o]	0 [o]	0 [o]	1 [o]
Home range, ha	0.091 [q]	0.2 [r]	0.0143 [s]	11 [t]	100 [u]
Site use factor	1 [v]	1 [v]	1 [v]	0.92 [v]	0.1 [v]

Notes:

[a] Hayes 1989 (as cited in Cal/Ecotox), mean adult both sex

[b] Holekamp and Nunes 1989 (as cited in Cal/Ecotox), mean female data

[c] Smith and Arcese 1988 (as cited in Cal/Ecotox), mean adult male & female

[d] Clench and Leberman 1978, Wheelwright 1986 (as cited in U.S. EPA 1993), mean of adult males and females, breeding and nonbreeding

[e] Craighead and Craighead 1956, Steenhof 1983, Springer and Osborne 1983 (as cited in U.S. EPA 1993), mean male and female adult values

[f] Nagy 2001 (omnivorous mammals; grams of food per day dw = $0.432*BW_{(g)}^{0.678}$ using mean body weight 18.4 g Hayes 1989)

[g] Nagy 2001 (omnivorous mammals; grams of food per day dw = $0.432*BW_{(g)}^{0.678}$ using mean body weight 562 g Holekamp & Nunes 1989)

[h] Nagy 2001 (passerines; grams of food per day dw = $0.630*BW_{(g)}^{0.683}$ using mean body weight 23.5 g Smith & Arcese. 1988)

[i] Nagy 2001 (passerines; grams of food per day dw = $0.630*BW_{(g)}^{0.683}$ using mean body weight 80.4 g Clench & Leberman 1978; Wheelwright)

[j] Nagy 2001 (carnivorous birds; grams of food per day dw = $0.849*BW_{(g)}^{0.663}$ using mean body weight 1130 g Craighead & Craighead 1956)

[k] Beyer et al. 1994, midpoint of two prairie dog values

[l] Beyer et al. 1994, for wild turkey

[m] Beyer et al. 1994, for American woodcock

[n] Pascoe et al. 1996, 0.35 percent for bald eagle

[o] assumed

[p] Wheelwright 1986 (U.S. EPA 1993) spring-conservative, western United States

[q] Storer et al. 1944, mean of male and female adult values

[r] Evans and Holdenreid 1943, Boellstorf and Owings 1995, Owings et al. 1977 (as cited in Cal/Ecotox), median value

[s] Haliburton and Mewaldt 1976, mean of male and female adult values

[t] mean of 5 values: 0.48 ha (Weatherhead and McRae 1990, deciduous forest), 2 ha (Haldeman et al. 1973, ponderosa pine forest), 4.4 ha (Gaines 1974, riparian), 20 ha (Haldeman et al. 1973, fir-pine-aspen forest), and 28.3 ha (Knupp et al. 1977, forest)

[u] U.S. EPA 1993, ">few hundred ha;" Zeiner et al. 1990, >1 km^2

[v] using total site area of 10.1 ha

Table J-9 (continued)

Refined Exposure Factors for Representative Terrestrial Wildlife Receptors

Acronyms and Abbreviations:

$BW_{(kg)}$ - body weight as kilograms
dw - dry weight
ha - hectares
kg - kilograms
kg /day dw - kilograms of food per day as dry weight
km - kilometer

Table J-10

Terrestrial Wildlife Receptor-Specific Refined Hazard Quotients (Refined HQ-Low)

COPEC	Background Comparison	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
Polynuclear Aromatic Hydrocarbons							
acenaphthene	NA	4E-05	1E-05	3E-03	2E-03	3E-04	3E-03
acenaphthylene	NA	3E-05	9E-06	2E-03	1E-03	3E-04	2E-03
anthracene	NA	6E-05	2E-05	4E-03	3E-03	5E-04	4E-03
benz(a)anthracene	NA	6E-03	1E-03	1E-02	1E-02	2E-03	1E-02
benzo(b)fluoranthene	NA	5E-03	1E-03	1E-02	1E-02	2E-03	1E-02
benzo(k)fluoranthene	NA	4E-03	9E-04	1E-02	9E-03	2E-03	1E-02
benzo(g,h,i)perylene	NA	5E-03	1E-03	1E-02	1E-02	3E-03	1E-02
benzo(a)pyrene	NA	1E-02	2E-03	2E-02	2E-02	3E-03	2E-02
chrysene	NA	1E-02	2E-03	2E-02	2E-02	3E-03	2E-02
dibenz(a,h)anthracene	NA	2E-03	3E-04	3E-03	3E-03	4E-04	3E-03
fluoranthene	NA	2E-02	4E-03	4E-02	4E-02	5E-03	4E-02
fluorene	NA	2E-05	5E-06	1E-03	9E-04	2E-04	1E-03
indeno(1,2,3-cd)pyrene	NA	9E-03	2E-03	2E-02	2E-02	2E-03	2E-02
2-methylnaphthalene	NA	2E-05	7E-06	2E-03	1E-03	2E-04	2E-03
naphthalene	NA	5E-05	2E-05	4E-03	2E-03	3E-04	4E-03
phenanthrene	NA	2E-04	6E-05	2E-02	1E-02	2E-03	2E-02
pyrene	NA	3E-02	6E-03	6E-02	5E-02	7E-03	6E-02
Pesticides							
4,4-DDD	NA	4E-03	5E-04	1E+00	5E-01	5E-03	1E+00
4,4-DDE	NA	9E-03	1E-03	**3E+00**	1E+00	1E-02	**3E+00**
4,4-DDT	NA	2E-03	3E-04	6E-01	2E-01	2E-03	6E-01
dieldrin	NA	1E-02	2E-03	5E-03	5E-03	6E-05	1E-02
endosulfan sulfate	NA	2E-02	2E-03	3E-04	3E-04	3E-06	2E-02
heptachlor	NA	2E-03	3E-04	2E-04	2E-04	2E-06	2E-03
Metals							
antimony	<Bkgd	**2E+00**	3E-01	**3E+01**	**3E+01**	1E+00	**3E+01**
arsenic	>Bkgd	1E+00	3E-01	1E-01	9E-02	1E-04	1E+00
barium	>Bkgd	1E+00	4E-01	4E-01	3E-01	4E-03	1E+00
cadmium	>Bkgd	**4E+00**	6E-01	**4E+00**	**4E+00**	1E-02	**4E+00**
chromium	>Bkgd	7E-01	2E-01	**4E+00**	**3E+00**	5E-02	**4E+00**

Table J-10 (continued)

Terrestrial Wildlife Receptor-Specific Refined Hazard Quotients (Refined HQ-Low)

COPEC	Background Comparison	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
cobalt	>Bkgd	3E-01	6E-02	**2E+00**	**2E+00**	1E-02	**2E+00**
copper	>Bkgd	9E-01	2E-01	**2E+00**	1E+00	3E-02	**2E+00**
iron	>Bkgd	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
lead	>Bkgd	1E+00	3E-01	**2E+02**	**1E+02**	**3E+00**	**2E+02**
mercury	>Bkgd	6E-01	1E-01	**5E+00**	**4E+00**	8E-03	**5E+00**
molybdenum	>Bkgd	1E-01	3E-02	1E-02	1E-02	6E-04	1E-01
nickel	>Bkgd	**1E+02**	**2E+01**	**1E+01**	**1E+01**	2E-01	**1E+02**
selenium	>Bkgd	**2E+00**	7E-01	7E-01	5E-01	4E-03	**2E+00**
thallium	>Bkgd	3E-01	5E-02	6E-01	6E-01	3E-03	6E-01
vanadium	>Bkgd	**3E+00**	9E-01	1E-01	9E-02	6E-04	**3E+00**
zinc	>Bkgd	**4E+00**	8E-01	**3E+00**	**3E+00**	5E-02	**4E+00**
Hazard Indices							
HI PAH	NA	1E-01	2E-02	2E-01	2E-01	3E-02	2E-01
HI Pesticides	NA	5E-02	6E-03	**5E+00**	**2E+00**	2E-02	**5E+00**
HI Metals	NA	**1E+02**	**2E+01**	**3E+02**	**2E+02**	**4E+00**	**3E+02**

Note:
* bold font indicates hazard quotient greater than 1

Acronyms/Abbreviations:
>Bkgd - site data were statistically greater than the background data; see Appendix H for statistical analyses details
<Bkgd - site data were not statistically greater than the background data; see Appendix H for statistical analyses details
COPEC - chemical of potential ecological concern
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
HI - hazard index
HQ - hazard quotient
NA - not available
PAH - polynuclear aromatic hydrocarbon

Table J-11

Background Terrestrial Wildlife Receptor-Specific Refined Hazard Quotients (Refined HQ-Low)

COPEC	Background Refined Exposure Point Concentration[a] (mg/kg)	Deer Mouse	California Ground Squirrel	Alameda Song Sparrow	American Robin	Red-tailed Hawk	Maximum
Metals							
antimony	3.08E+00	**3E+00**	4E-01	**4E+01**	**4E+01**	**2E+00**	**4E+01**
arsenic	4.23E+00	4E-01	9E-02	4E-02	3E-02	4E-05	4E-01
barium	5.81E+01	3E-01	1E-01	1E-01	8E-02	1E-03	3E-01
beryllium	5.94E-01	1E-02	3E-03	3E-01	2E-01	7E-02	3E-01
cadmium	6.92E-01	**8E+00**	1E+00	**9E+00**	**8E+00**	2E-02	**9E+00**
chromium	3.67E+01	4E-01	9E-02	**2E+00**	**2E+00**	3E-02	**2E+00**
cobalt	1.04E+01	2E-01	4E-02	**2E+00**	1E+00	8E-03	**2E+00**
copper	1.57E+01	4E-01	8E-02	7E-01	5E-01	1E-02	7E-01
iron	1.33E+04	NA	NA	NA	NA	NA	NA
lead	2.50E+01	9E-01	2E-01	**1E+02**	**9E+01**	**2E+00**	**1E+02**
mercury	3.59E-01	3E-01	7E-02	**3E+00**	**2E+00**	4E-03	**3E+00**
molybdenum	ND	NA	NA	NA	NA	NA	NA
nickel	3.51E+01	**3E+01**	**4E+00**	**4E+00**	**4E+00**	5E-02	**3E+01**
selenium	ND	NA	NA	NA	NA	NA	NA
thallium	ND	NA	NA	NA	NA	NA	NA
vanadium	2.47E+01	1E+00	4E-01	6E-02	4E-02	3E-04	1E+00
zinc	4.36E+01	1E+00	3E-01	1E+00	1E+00	2E-02	1E+00

Note:
[a] refined exposure point concentration, smaller value of the 95 percent UCL and maximum detected concentration
* bold font indicates hazard quotient greater than 1

Acronyms/Abbreviations:
COPEC - chemical of potential ecological concern
HQ - hazard quotient
mg/kg - milligrams per kilogram
NA - not available
ND - no background concentrations reported greater than detection limits

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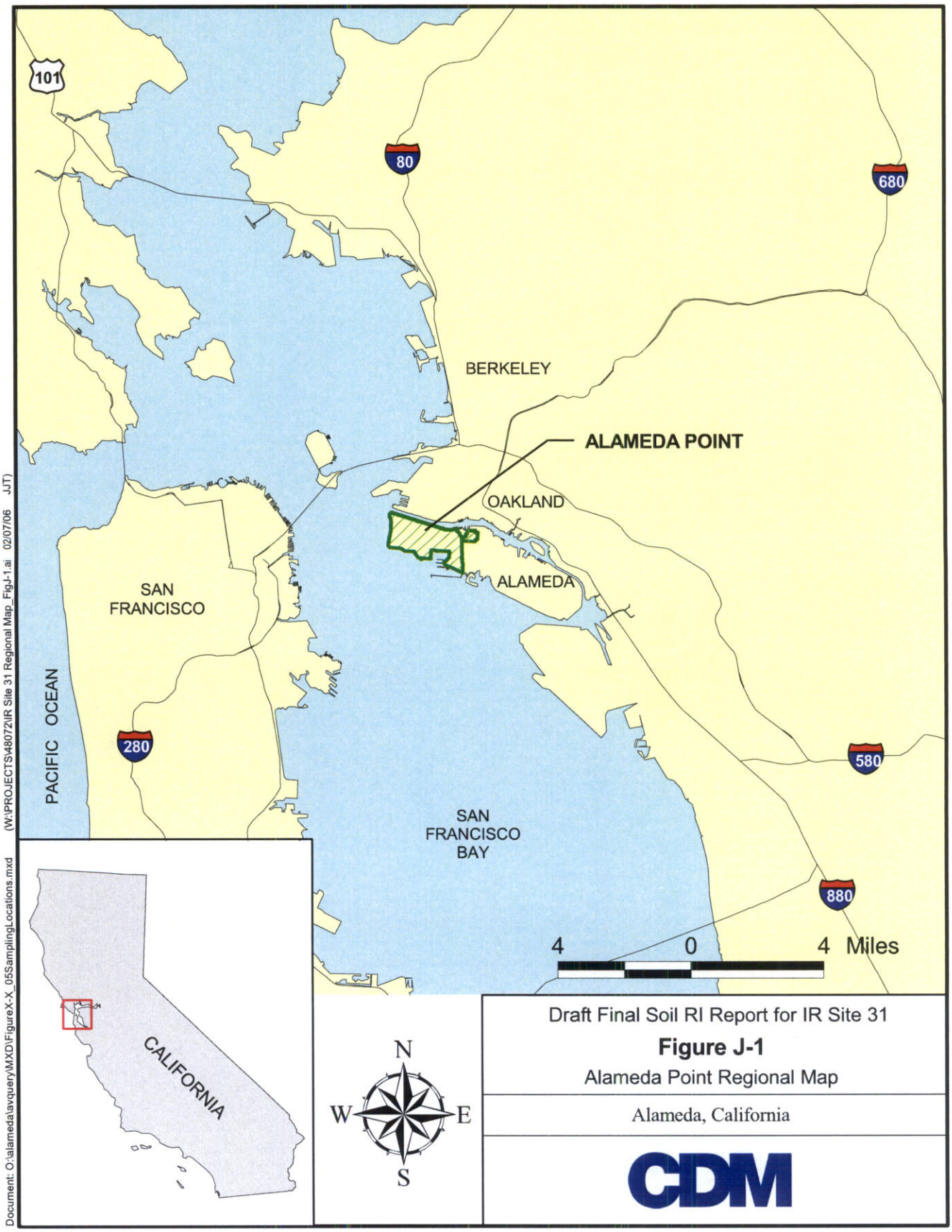

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Figure J-1

Alameda Point Regional Map

Alameda, California

CDM

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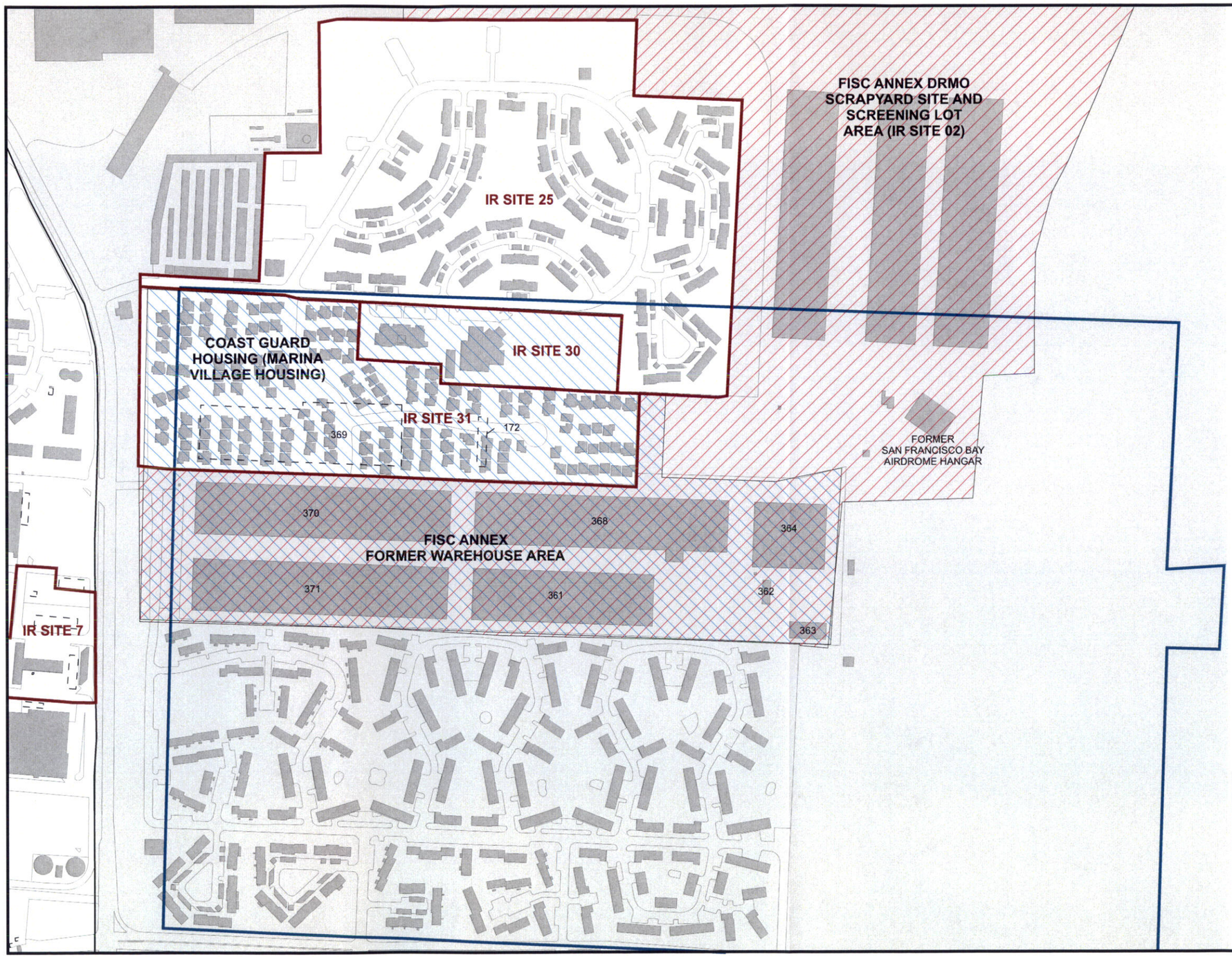

Legend

- IR Site Boundary
- Road or Paved Area
- Non-Navy Property
- Building or Structure
- Building or Structure (Former)
- FISC Annex
- Former Werehouse and Scrapyard Area
- Former San Francisco Bay Airdrome

Notes:

DRMO - Defense Reutilization and Marketing Office

FISC Annex - Former Fleet Industrial Supply Center, Oakland Alameda Annes and Alameda Facility

IR - Installation Restoration (Program)

N
W E
S

400 0 400 feet

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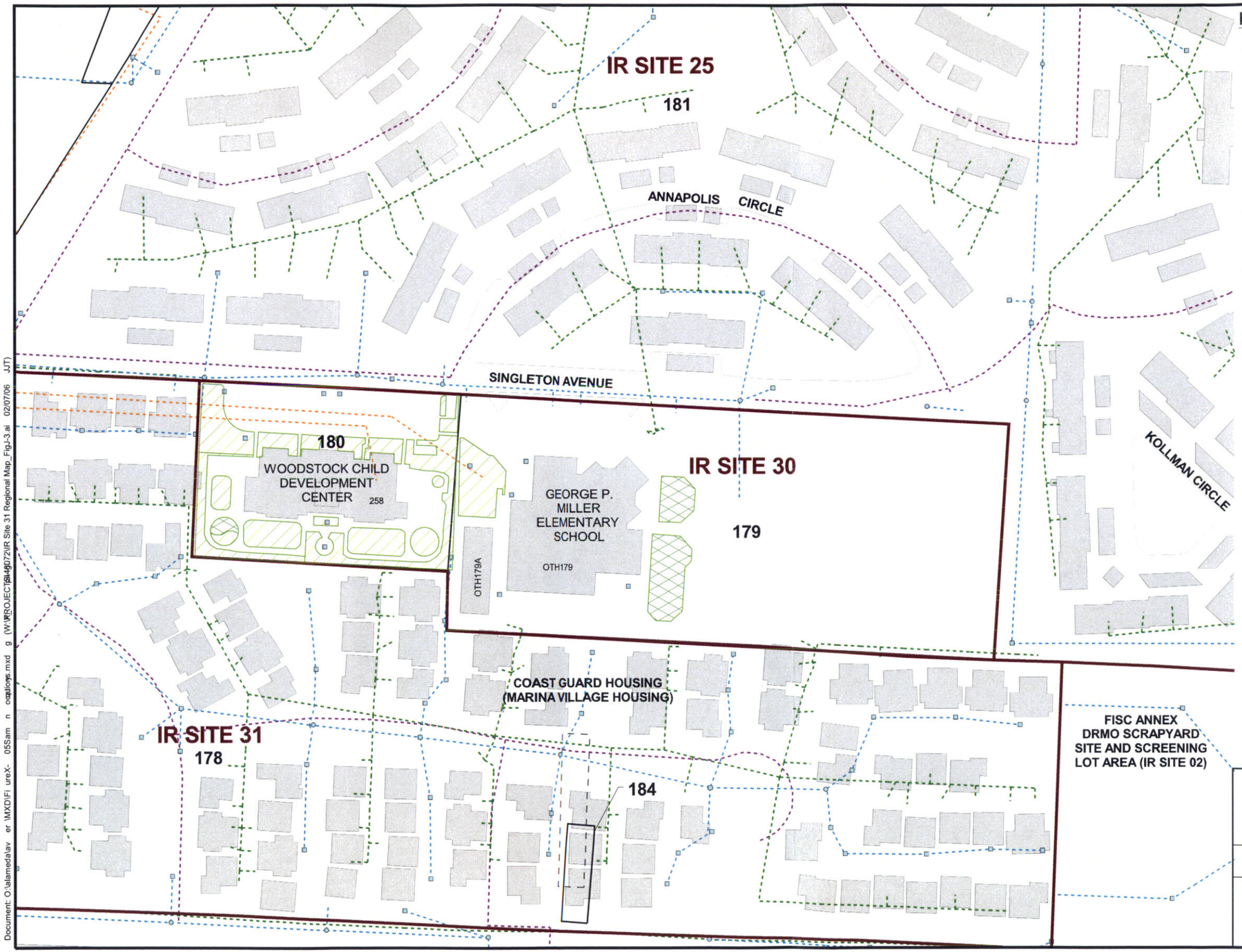
Figure J-2

Site Vicinity Map

Alameda, California

CDM



LEGEND

- IR SITE BOUNDARY
- 178 EBS PARCEL BOUNDARY WITH PARCEL NUMBER
- ROAD OR PAVED AREA
- BUILDING OR STRUCTURE
- BUILDING OR STRUCTURE (FORMER)
- UNPAVED LANDSCAPED OR PLAY AREA (CURRENT CONDITIONS)
- AREA PAVED FOR 2004 TCRA (UNPAVED DURING RI SAMPLING)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER LINE
- COMMUNICATION LINE
- GAS LINE

N W E S

NOTES:

DRMO – DEFENSE REUTILIZATION AND MARKETING OFFICE

EBS – ENVIRONMENTAL BASELINE SURVEY

FISC ANNEX – FORMER FLEET INDUSTRIAL SUPPLY CENTER, OAKLAND ALAMEDA ANNEX AND ALAMEDA FACILITY

IR – INSTALLATION RESTORATION (PROGRAM)

OTH179A – BUILDING NUMBER / IDENTIFIER

RI – REMEDIAL INVESTIGATION

TCRA – TIME-CRITICAL REMOVAL ACTION

130 0 130 Feet

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Figure J-3

Site Features Map

Alameda, California

CDM

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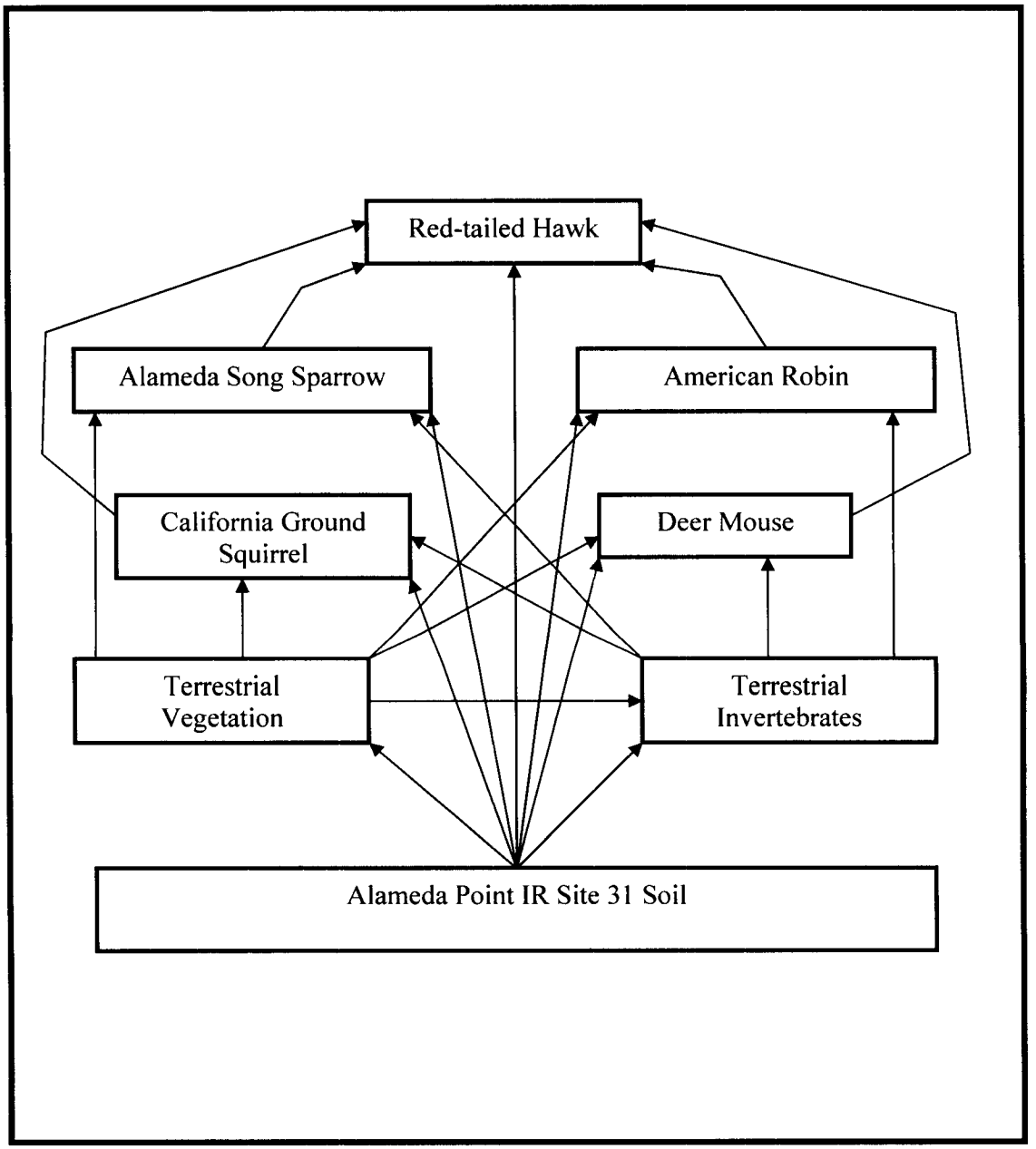


Figure J-4
Conceptual Site Model and Representative Ecological Receptors

APPENDIX J

Attachment J1

Backup Calculations

Table J1-1. Hazard Qoutient - Low Calculations for Deer Mouse

Food Ingestion Rate, kg food/day 4.35E-3 Site Use Factor (SUF, percent) 1.00E+0
Body Weight, kg 1.09E-2

Compound	COPC	Soil Maximum Detection (mg/kg)	Dietary Fraction - Soil Ingestion (kg soil/ kg food)	Soil-Plant BAF (kg soil/ kg_plant)	Dietary Fraction - Plant Ingestion (kg plant/ kg food)	Soil-Invertebrate BAF (kg soil/ kg_Invert)	Dietary Fraction - Invertebrate Ingestion (kg invert/ kg food)	Soil-Mammal BAF (kg soil/ kg_mammal)	Dietary Fraction - Small Mammal Ingestion (kg mamml/ kg food)	Total Exposure Dose (mg/kg-day)	Toxicity Reference Value - Lab Species Chronic NOAEL (mg/kg-day)	Toxicity Reference Value - Lab Species Body Weight (kg)	Toxicity Reference Value - Receptor (mg/kg-day)	HQ-Low
benzene	Yes	3.00E-3	5.00E-2	2.27E+0	5.00E-1	3.97E+0	5.00E-1	1.07E+0	0.0	3.80E-3	2.64E+1	3.00E-2	2.64E+1	1E-4
methylene chloride	Yes	2.00E-3	5.00E-2	7.34E+0	5.00E-1	7.55E-1	5.00E-1	1.07E+0	0.0	3.27E-3	5.85E+0	3.50E-1	5.85E+0	6E-4
xylenes, total	Yes	3.00E-3	5.00E-2	6.09E-1	5.00E-1	2.57E+1	5.00E-1	1.07E+0	0.0	1.58E-2	2.10E+0	3.00E-2	2.10E+0	8E-3
phenol	Yes	3.00E-1	5.00E-2	5.55E+0	5.00E-1	1.10E+1	5.00E-1	1.07E+0	0.0	9.98E-1	6.00E+1	3.50E-1	6.00E+1	2E-2
acenaphthene	Yes	2.90E+0	5.00E-2	2.10E-1	5.00E-1	3.00E-1	5.00E-1	1.07E+0	0.0	3.53E-1	5.00E+1	2.77E-1	5.00E+1	7E-3
acenaphthylene	Yes	1.20E+0	5.00E-2	2.04E-1	5.00E-1	2.20E-1	5.00E-1	1.07E+0	0.0	1.26E-1	5.00E+1	2.77E-1	5.00E+1	3E-3
anthracene	Yes	5.00E+0	5.00E-2	1.04E-1	5.00E-1	3.20E-1	5.00E-1	1.07E+0	0.0	5.23E-1	5.00E+1	2.77E-1	5.00E+1	1E-2
benzo(a)anthracene	Yes	1.50E+1	5.00E-2	1.81E-2	5.00E-1	2.70E-1	5.00E-1	1.07E+0	0.0	1.16E+0	1.31E+0	3.05E-2	1.31E+0	9E-1
benzo(b)fluoranthene	Yes	1.20E+1	5.00E-2	1.77E-2	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	7.85E-1	1.31E+0	3.05E-2	1.31E+0	6E-1
benzo(k)fluoranthene	Yes	1.30E+1	5.00E-2	1.14E-2	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	8.35E-1	1.31E+0	3.05E-2	1.31E+0	6E-1
benzo(g,h,i)perylene	Yes	1.30E+1	5.00E-2	5.70E-3	5.00E-1	1.50E-1	5.00E-1	1.07E+0	0.0	6.64E-1	1.31E+0	3.05E-2	1.31E+0	5E-1
benzo(a)pyrene	Yes	2.10E+1	5.00E-2	1.11E-2	5.00E-1	3.40E-1	5.00E-1	1.07E+0	0.0	1.89E+0	1.31E+0	3.05E-2	1.31E+0	1E+0
chrysene	Yes	1.80E+1	5.00E-2	1.70E-2	5.00E-1	4.40E-1	5.00E-1	1.07E+0	0.0	2.00E+0	1.31E+0	3.05E-2	1.31E+0	**2E+0**
dibenz(a,h)anthracene	Yes	1.70E+0	5.00E-2	4.86E-3	5.00E-1	4.90E-1	5.00E-1	1.07E+0	0.0	2.02E-1	1.31E+0	3.05E-2	1.31E+0	2E-1
fluoranthene	Yes	3.50E+1	5.00E-2	4.03E-2	5.00E-1	3.70E-1	5.00E-1	1.07E+0	0.0	3.57E+0	1.31E+0	3.05E-2	1.31E+0	**3E+0**
fluorene	Yes	1.80E-1	5.00E-2	1.49E-1	5.00E-1	2.00E-1	5.00E-1	1.07E+0	0.0	1.61E-2	5.00E+1	2.77E-1	5.00E+1	3E-4
indeno(1,2,3-c,d)pyrene	Yes	1.40E+1	5.00E-2	5.19E-3	5.00E-1	4.10E-1	5.00E-1	1.07E+0	0.0	1.44E+0	1.31E+0	3.05E-2	1.31E+0	1E+0
2-methylnaphthalene	Yes	2.60E-1	5.00E-2	2.27E-1	5.00E-1	2.00E-1	5.00E-1	1.07E+0	0.0	2.74E-2	5.00E+1	2.77E-1	5.00E+1	5E-4
naphthalene	Yes	1.60E+0	5.00E-2	4.79E-1	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	2.52E-1	5.00E+1	2.77E-1	5.00E+1	5E-3
phenanthrene	Yes	2.40E+1	5.00E-2	1.02E-1	5.00E-1	2.80E-1	5.00E-1	1.07E+0	0.0	2.31E+0	5.00E+1	2.77E-1	5.00E+1	5E-2
pyrene	Yes	4.70E+1	5.00E-2	5.85E-2	5.00E-1	3.90E-1	5.00E-1	1.07E+0	0.0	5.15E+0	1.31E+0	3.05E-2	1.31E+0	**4E+0**
4,4'-DDD	Yes	5.00E-3	5.00E-2	1.28E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	6.77E-3	8.00E-1	3.20E-1	8.00E-1	8E-3
4,4'-DDE	Yes	3.00E-2	5.00E-2	6.69E-3	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	4.06E-2	8.00E-1	3.20E-1	8.00E-1	5E-2
4,4'-DDT	Yes	2.60E-3	5.00E-2	3.93E-3	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	3.52E-3	8.00E-1	3.20E-1	8.00E-1	4E-3
dieldrin	Yes	5.00E-4	5.00E-2	2.93E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	6.79E-4	2.00E-2	3.50E-1	2.00E-2	3E-2
endosulfan sulfate	Yes	4.00E-3	5.00E-2	2.97E-1	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	5.64E-3	1.50E-1	3.50E-1	1.50E-1	4E-2
heptachlor	Yes	5.00E-4	5.00E-2	2.67E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	6.78E-4	1.29E-1	1.00E-1	1.29E-1	5E-3
Aroclor 1016	Yes	4.70E-2	5.00E-2	2.19E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	6.37E-2	3.60E-1	2.06E-2	3.60E-1	2E-1
Aroclor 1260	Yes	2.00E-2	5.00E-2	6.43E-4	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	2.70E-2	3.60E-1	2.06E-2	3.60E-1	8E-2
antimony	Yes	3.20E+0	5.00E-2	1.02E-2	5.00E-1	1.30E+0	5.00E-1	1.00E+0	0.0	9.01E-1	1.25E-1	3.00E-2	1.25E-1	**7E+0**
arsenic	Yes	4.24E+1	5.00E-2	3.80E-2	5.00E-1	2.20E-1	5.00E-1	2.50E-3	0.0	3.03E+0	3.20E-1	3.32E-1	3.20E-1	**9E+0**
barium	Yes	4.76E+2	5.00E-2	1.56E-1	5.00E-1	9.10E-2	5.00E-1	5.66E-2	0.0	3.30E+1	5.10E+0	4.35E-1	5.10E+0	**6E+0**
beryllium	Yes	6.60E-1	5.00E-2	1.00E-2	5.00E-1	4.50E-2	5.00E-1	1.00E+0	0.0	2.04E-2	6.60E-1	3.50E-1	6.60E-1	3E-2
cadmium	Yes	1.50E+0	5.00E-2	5.90E-1	5.00E-1	7.71E+0	5.00E-1	3.33E-1	0.0	2.52E+0	6.00E-2	3.22E-2	6.00E-2	**4E+1**
chromium	Yes	1.97E+2	5.00E-2	4.10E-2	5.00E-1	3.10E-1	5.00E-1	8.46E-2	0.0	1.77E+1	3.28E+0	3.50E-1	3.28E+0	**5E+0**
cobalt	Yes	2.86E+1	5.00E-2	7.45E-3	5.00E-1	1.22E-1	5.00E-1	2.05E-2	0.0	1.31E+0	1.20E+0	2.75E-1	1.20E+0	1E+0
copper	Yes	1.18E+2	5.00E-2	1.20E-1	5.00E-1	5.20E-1	5.00E-1	1.96E-1	0.0	1.74E+1	2.67E+0	3.00E-2	2.67E+0	**7E+0**
iron	Yes	6.70E+4	5.00E-2	4.25E-3	5.00E-1	3.60E-2	5.00E-1	1.24E-2	0.0	1.88E+3	NA	0.0	NA	NA
lead	Yes	1.68E+2	5.00E-2	3.90E-2	5.00E-1	2.70E-1	5.00E-1	1.05E-1	0.0	1.37E+1	1.00E+0	5.51E-1	1.00E+0	**1E+1**
mercury	Yes	2.40E+0	5.00E-2	6.50E-1	5.00E-1	1.69E+0	5.00E-1	5.43E-2	0.0	1.17E+0	2.50E-1	1.88E-1	2.50E-1	**5E+0**
molybdenum	Yes	2.50E+0	5.00E-2	2.50E-1	5.00E-1	9.53E-1	5.00E-1	1.00E+0	0.0	6.51E-1	2.60E-1	3.00E-2	2.60E-1	**3E+0**
nickel	Yes	4.74E+2	5.00E-2	1.80E-2	5.00E-1	1.06E+0	5.00E-1	2.49E-1	0.0	1.11E+2	1.33E-1	2.49E-1	1.33E-1	**8E+2**
selenium	Yes	3.10E+0	5.00E-2	6.70E-1	5.00E-1	9.90E-1	5.00E-1	1.62E-1	0.0	1.09E+0	5.00E-2	1.87E-1	5.00E-2	**2E+1**
thallium	Yes	3.70E+0	5.00E-2	4.00E-3	5.00E-1	1.30E+0	5.00E-1	1.12E-1	0.0	1.04E+0	4.80E-1	6.50E-2	4.80E-1	**2E+0**
vanadium	Yes	1.04E+2	5.00E-2	4.85E-3	5.00E-1	4.20E-2	5.00E-1	1.23E-2	0.0	3.05E+0	2.10E-1	2.60E-1	2.10E-1	**1E+1**
zinc	Yes	9.01E+2	5.00E-2	3.70E-1	5.00E-1	3.20E+0	5.00E-1	7.72E-1	0.0	6.61E+2	9.60E+0	2.55E-2	9.60E+0	**7E+1**

HQ = [(Soil-Conc*IR-Food*Dietary-Soil-Ingest)
+(Soil-Conc*Soil-Plant-BAF*IR-Food*Dietary-Plant-Ingest)
+(Soil-Conc*Soil-Invert-BAF*IR-Food*Dietary-Invert-Ingest)
+(Soil-Conc*Soil-Mammal-BAF*IR-Food*Dietary-Mammal-Ingest)]
*SUF/(Body Weight*TRV-Receptor)

Table J1-2. Hazard Qoutient - Low Calculations for Ground Squirrel

Food Ingestion Rate, kg food/day: 4.70E-2
Body Weight, kg: 3.21E-1
Site Use Factor (SUF, percent): 1.00E+0

Compound	COPC	Soil Maximum Detection (mg/kg)	Dietary Fraction - Soil Ingestion (kg soil/ kg food)	Soil-Plant BAF (kg soil/ kg_plant)	Dietary Fraction - Plant Ingestion (kg plant/ kg food)	Soil-Invertebrate BAF (kg soil/ kg_Invert)	Dietary Fraction - Invertebrate Ingestion (kg invert/ kg food)	Soil-Mammal BAF (kg soil/ kg_mammal)	Dietary Fraction - Small Mammal Ingestion (kg mamml/ kg food)	Total Exposure Dose (mg/kg-day)	Toxicity Reference Value - Lab Species Chronic NOAEL (mg/kg-day)	Toxicity Reference Value - Lab Species Body Weight (kg)	Toxicity Reference Value - Receptor (mg/kg-day)	HQ-Low
benzene	Yes	3.00E-3	5.00E-2	2.27E+0	8.00E-1	3.97E+0	2.00E-1	1.07E+0	0.0	1.17E-3	2.64E+1	3.00E-2	2.64E+1	4E-5
methylene chloride	Yes	2.00E-3	5.00E-2	7.34E+0	8.00E-1	7.55E-1	2.00E-1	1.07E+0	0.0	1.78E-3	5.85E+0	3.50E-1	5.85E+0	3E-4
xylenes, total	Yes	3.00E-3	5.00E-2	6.09E-1	8.00E-1	2.57E+1	2.00E-1	1.07E+0	0.0	2.49E-3	2.10E+0	3.00E-2	2.10E+0	1E-3
phenol	Yes	3.00E-1	5.00E-2	5.55E+0	8.00E-1	1.10E+1	2.00E-1	1.07E+0	0.0	2.94E-1	6.00E+1	3.50E-1	6.00E+1	5E-3
acenaphthene	Yes	2.90E+0	5.00E-2	2.10E-1	8.00E-1	3.00E-1	2.00E-1	1.07E+0	0.0	1.18E-1	5.00E+1	2.77E-1	5.00E+1	2E-3
acenaphthylene	Yes	1.20E+0	5.00E-2	2.04E-1	8.00E-1	2.20E-1	2.00E-1	1.07E+0	0.0	4.53E-2	5.00E+1	2.77E-1	5.00E+1	9E-4
anthracene	Yes	5.00E+0	5.00E-2	1.04E-1	8.00E-1	3.20E-1	2.00E-1	1.07E+0	0.0	1.44E-1	5.00E+1	2.77E-1	5.00E+1	3E-3
benzo(a)anthracene	Yes	1.50E+1	5.00E-2	1.81E-2	8.00E-1	2.70E-1	2.00E-1	1.07E+0	0.0	2.60E-1	1.31E+0	3.05E-2	1.31E+0	2E-1
benzo(b)fluoranthene	Yes	1.20E+1	5.00E-2	1.77E-2	8.00E-1	2.10E-1	2.00E-1	1.07E+0	0.0	1.86E-1	1.31E+0	3.05E-2	1.31E+0	1E-1
benzo(k)fluoranthene	Yes	1.30E+1	5.00E-2	1.14E-2	8.00E-1	2.10E-1	2.00E-1	1.07E+0	0.0	1.92E-1	1.31E+0	3.05E-2	1.31E+0	1E-1
benzo(g,h,i)perylene	Yes	1.30E+1	5.00E-2	5.70E-3	8.00E-1	1.50E-1	2.00E-1	1.07E+0	0.0	1.61E-1	1.31E+0	3.05E-2	1.31E+0	1E-1
benzo(a)pyrene	Yes	2.10E+1	5.00E-2	1.11E-2	8.00E-1	3.40E-1	2.00E-1	1.07E+0	0.0	3.90E-1	1.31E+0	3.05E-2	1.31E+0	3E-1
chrysene	Yes	1.80E+1	5.00E-2	1.70E-2	8.00E-1	4.40E-1	2.00E-1	1.07E+0	0.0	4.00E-1	1.31E+0	3.05E-2	1.31E+0	3E-1
dibenz(a,h)anthracene	Yes	1.70E+0	5.00E-2	4.86E-3	8.00E-1	4.90E-1	2.00E-1	1.07E+0	0.0	3.78E-2	1.31E+0	3.05E-2	1.31E+0	3E-2
fluoranthene	Yes	3.50E+1	5.00E-2	4.03E-2	8.00E-1	3.70E-1	2.00E-1	1.07E+0	0.0	8.01E-1	1.31E+0	3.05E-2	1.31E+0	6E-1
fluorene	Yes	1.80E-1	5.00E-2	1.49E-1	8.00E-1	2.00E-1	2.00E-1	1.07E+0	0.0	5.50E-3	5.00E+1	2.77E-1	5.00E+1	1E-4
indeno(1,2,3-c,d)pyrene	Yes	1.40E+1	5.00E-2	5.19E-3	8.00E-1	4.10E-1	2.00E-1	1.07E+0	0.0	2.79E-1	1.31E+0	3.05E-2	1.31E+0	2E-1
2-methylnaphthalene	Yes	2.60E-1	5.00E-2	2.27E-1	8.00E-1	2.00E-1	2.00E-1	1.07E+0	0.0	1.04E-2	5.00E+1	2.77E-1	5.00E+1	2E-4
naphthalene	Yes	1.60E+0	5.00E-2	4.79E-1	8.00E-1	2.10E-1	2.00E-1	1.07E+0	0.0	1.11E-1	5.00E+1	2.77E-1	5.00E+1	2E-3
phenanthrene	Yes	2.40E+1	5.00E-2	1.02E-1	8.00E-1	2.80E-1	2.00E-1	1.07E+0	0.0	6.60E-1	5.00E+1	2.77E-1	5.00E+1	1E-2
pyrene	Yes	4.70E+1	5.00E-2	5.85E-2	8.00E-1	3.90E-1	2.00E-1	1.07E+0	0.0	1.20E+0	1.31E+0	3.05E-2	1.31E+0	9E-1
4,4'-DDD	Yes	5.00E-3	5.00E-2	1.28E-2	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	1.02E-3	8.00E-1	3.20E-1	8.00E-1	1E-3
4,4'-DDE	Yes	3.00E-2	5.00E-2	6.69E-3	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	6.10E-3	8.00E-1	3.20E-1	8.00E-1	8E-3
4,4'-DDT	Yes	2.60E-3	5.00E-2	3.93E-3	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	5.28E-4	8.00E-1	3.20E-1	8.00E-1	7E-4
dieldrin	Yes	5.00E-4	5.00E-2	2.93E-2	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	1.03E-4	2.00E-2	3.50E-1	2.00E-2	5E-3
endosulfan sulfate	Yes	4.00E-3	5.00E-2	2.97E-1	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	9.49E-4	1.50E-1	3.50E-1	1.50E-1	6E-3
heptachlor	Yes	5.00E-4	5.00E-2	2.67E-2	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	1.03E-4	1.29E-1	1.00E-1	1.29E-1	8E-4
Aroclor 1016	Yes	4.70E-2	5.00E-2	2.19E-2	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	9.64E-3	3.60E-1	2.06E-2	3.60E-1	3E-2
Aroclor 1260	Yes	2.00E-2	5.00E-2	6.43E-4	8.00E-1	6.67E+0	2.00E-1	1.07E+0	0.0	4.05E-3	3.60E-1	2.06E-2	3.60E-1	1E-2
antimony	Yes	3.20E+0	5.00E-2	1.02E-2	8.00E-1	1.30E+0	2.00E-1	1.00E+0	0.0	1.49E-1	1.25E-1	3.00E-2	1.25E-1	1E+0
arsenic	Yes	4.24E+1	5.00E-2	3.80E-2	8.00E-1	2.20E-1	2.00E-1	2.50E-3	0.0	7.72E-1	3.20E-1	3.32E-1	3.20E-1	**2E+0**
barium	Yes	4.76E+2	5.00E-2	1.56E-1	8.00E-1	9.10E-2	2.00E-1	5.66E-2	0.0	1.35E+1	5.10E+0	4.35E-1	5.10E+0	**3E+0**
beryllium	Yes	6.60E-1	5.00E-2	1.00E-2	8.00E-1	4.50E-2	2.00E-1	1.00E+0	0.0	6.47E-3	6.60E-1	3.50E-1	6.60E-1	1E-2
cadmium	Yes	1.50E+0	5.00E-2	5.90E-1	8.00E-1	7.71E+0	2.00E-1	3.33E-1	0.0	4.53E-1	6.00E-2	3.22E-2	6.00E-2	**8E+0**
chromium	Yes	1.97E+2	5.00E-2	4.10E-2	8.00E-1	3.10E-1	2.00E-1	8.46E-2	0.0	4.18E+0	3.28E+0	3.50E-1	3.28E+0	1E+0
cobalt	Yes	2.86E+1	5.00E-2	7.45E-3	8.00E-1	1.22E-1	2.00E-1	2.05E-2	0.0	3.37E-1	1.20E+0	2.75E-1	1.20E+0	3E-1
copper	Yes	1.18E+2	5.00E-2	1.20E-1	8.00E-1	5.20E-1	2.00E-1	1.96E-1	0.0	4.32E+0	2.67E+0	3.00E-2	2.67E+0	**2E+0**
iron	Yes	6.70E+4	5.00E-2	4.25E-3	8.00E-1	3.60E-2	2.00E-1	1.24E-2	0.0	5.95E+2	NA	0.0	NA	NA
lead	Yes	1.68E+2	5.00E-2	3.90E-2	8.00E-1	2.70E-1	2.00E-1	1.05E-1	0.0	3.33E+0	1.00E+0	5.51E-1	1.00E+0	**3E+0**
mercury	Yes	2.40E+0	5.00E-2	6.50E-1	8.00E-1	1.69E+0	2.00E-1	5.43E-2	0.0	3.19E-1	2.50E-1	1.88E-1	2.50E-1	1E+0
molybdenum	Yes	2.50E+0	5.00E-2	2.50E-1	8.00E-1	9.53E-1	2.00E-1	1.00E+0	0.0	1.61E-1	2.60E-1	3.00E-2	2.60E-1	6E-1
nickel	Yes	4.74E+2	5.00E-2	1.80E-2	8.00E-1	1.06E+0	2.00E-1	2.49E-1	0.0	1.92E+1	1.33E-1	2.49E-1	1.33E-1	**1E+2**
selenium	Yes	3.10E+0	5.00E-2	6.70E-1	8.00E-1	9.90E-1	2.00E-1	1.62E-1	0.0	3.56E-1	5.00E-2	1.87E-1	5.00E-2	**7E+0**
thallium	Yes	3.70E+0	5.00E-2	4.00E-3	8.00E-1	1.30E+0	2.00E-1	1.12E-1	0.0	1.70E-1	4.80E-1	6.50E-2	4.80E-1	4E-1
vanadium	Yes	1.04E+2	5.00E-2	4.85E-3	8.00E-1	4.20E-2	2.00E-1	1.23E-2	0.0	9.48E-1	2.10E-1	2.60E-1	2.10E-1	**5E+0**
zinc	Yes	9.01E+2	5.00E-2	3.70E-1	8.00E-1	3.20E+0	2.00E-1	7.72E-1	0.0	1.30E+2	9.60E+0	2.55E-2	9.60E+0	**1E+1**

HQ = [(Soil-Conc*IR-Food*Dietary-Soil-Ingest)
+(Soil-Conc*Soil-Plant-BAF*IR-Food*Dietary-Plant-Ingest)
+(Soil-Conc*Soil-Invert-BAF*IR-Food*Dietary-Invert-Ingest)
+(Soil-Conc*Soil-Mammal-BAF*IR-Food*Dietary-Mammal-Ingest)]
*SUF/(Body Weight*TRV-Receptor)

Table J1-3. Hazard Qoutient - Low Calculations for Song Sparrow

Food Ingestion Rate, kg food/day: 5.87E-3
Body Weight, kg: 1.99E-2
Site Use Factor (SUF, percent): 1.00E+0

Compound	COPC	Soil Maximum Detection (mg/kg)	Dietary Fraction - Soil Ingestion (kg soil/ kg food)	Soil-Plant BAF (kg soil/ kg_plant)	Dietary Fraction - Plant Ingestion (kg plant/ kg food)	Soil-Invertebrate BAF (kg soil/ kg_Invert)	Dietary Fraction - Invertebrate Ingestion (kg invert/ kg food)	Soil-Mammal BAF (kg soil/ kg_mammal)	Dietary Fraction - Small Mammal Ingestion (kg mamml/ kg food)	Total Exposure Dose (mg/kg-day)	Toxicity Reference Value - Lab Species Chronic NOAEL (mg/kg-day)	Toxicity Reference Value - Lab Species Body Weight (kg)	Toxicity Reference Value - Receptor (mg/kg-day)	HQ-Low
benzene	Yes	3.00E-3	9.30E-2	2.27E+0	5.00E-1	3.97E+0	5.00E-1	1.07E+0	0.0	2.84E-3	2.64E+0	0.0	2.64E+0	1E-3
methylene chloride	Yes	2.00E-3	9.30E-2	7.34E+0	5.00E-1	7.55E-1	5.00E-1	1.07E+0	0.0	2.44E-3	5.85E-1	0.0	5.85E-1	4E-3
xylenes, total	Yes	3.00E-3	9.30E-2	6.09E-1	5.00E-1	2.57E+1	5.00E-1	1.07E+0	0.0	1.17E-2	2.10E-1	0.0	2.10E-1	6E-2
phenol	Yes	3.00E-1	9.30E-2	5.55E+0	5.00E-1	1.10E+1	5.00E-1	1.07E+0	0.0	7.41E-1	1.13E+0	7.40E-2	1.13E+0	7E-1
acenaphthene	Yes	2.90E+0	9.30E-2	2.10E-1	5.00E-1	3.00E-1	5.00E-1	1.07E+0	0.0	2.98E-1	1.01E+0	7.40E-2	1.01E+0	3E-1
acenaphthylene	Yes	1.20E+0	9.30E-2	2.04E-1	5.00E-1	2.20E-1	5.00E-1	1.07E+0	0.0	1.08E-1	1.01E+0	7.40E-2	1.01E+0	1E-1
anthracene	Yes	5.00E+0	9.30E-2	1.04E-1	5.00E-1	3.20E-1	5.00E-1	1.07E+0	0.0	4.50E-1	1.11E+0	7.40E-2	1.11E+0	4E-1
benzo(a)anthracene	Yes	1.50E+1	9.30E-2	1.81E-2	5.00E-1	2.70E-1	5.00E-1	1.07E+0	0.0	1.05E+0	1.01E+0	7.40E-2	1.01E+0	1E+0
benzo(b)fluoranthene	Yes	1.20E+1	9.30E-2	1.77E-2	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	7.32E-1	1.01E+0	7.40E-2	1.01E+0	7E-1
benzo(k)fluoranthene	Yes	1.30E+1	9.30E-2	1.14E-2	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	7.81E-1	1.01E+0	7.40E-2	1.01E+0	8E-1
benzo(g,h,i)perylene	Yes	1.30E+1	9.30E-2	5.70E-3	5.00E-1	1.50E-1	5.00E-1	1.07E+0	0.0	6.55E-1	1.01E+0	7.40E-2	1.01E+0	6E-1
benzo(a)pyrene	Yes	2.10E+1	9.30E-2	1.11E-2	5.00E-1	3.40E-1	5.00E-1	1.07E+0	0.0	1.66E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
chrysene	Yes	1.80E+1	9.30E-2	1.70E-2	5.00E-1	4.40E-1	5.00E-1	1.07E+0	0.0	1.71E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
dibenz(a,h)anthracene	Yes	1.70E+0	9.30E-2	4.86E-3	5.00E-1	4.90E-1	5.00E-1	1.07E+0	0.0	1.71E-1	1.01E+0	7.40E-2	1.01E+0	2E-1
fluoranthene	Yes	3.50E+1	9.30E-2	4.03E-2	5.00E-1	3.70E-1	5.00E-1	1.07E+0	0.0	3.08E+0	1.01E+0	7.40E-2	1.01E+0	**3E+0**
fluorene	Yes	1.80E-1	9.30E-2	1.49E-1	5.00E-1	2.00E-1	5.00E-1	1.07E+0	0.0	1.42E-2	1.01E+0	7.40E-2	1.01E+0	1E-2
indeno(1,2,3-c,d)pyrene	Yes	1.40E+1	9.30E-2	5.19E-3	5.00E-1	4.10E-1	5.00E-1	1.07E+0	0.0	1.24E+0	1.01E+0	7.40E-2	1.01E+0	1E+0
2-methylnaphthalene	Yes	2.60E-1	9.30E-2	2.27E-1	5.00E-1	2.00E-1	5.00E-1	1.07E+0	0.0	2.35E-2	1.01E+0	7.40E-2	1.01E+0	2E-2
naphthalene	Yes	1.60E+0	9.30E-2	4.79E-1	5.00E-1	2.10E-1	5.00E-1	1.07E+0	0.0	2.07E-1	1.01E+0	7.40E-2	1.01E+0	2E-1
phenanthrene	Yes	2.40E+1	9.30E-2	1.02E-1	5.00E-1	2.80E-1	5.00E-1	1.07E+0	0.0	2.01E+0	1.13E+0	7.40E-2	1.13E+0	**2E+0**
pyrene	Yes	4.70E+1	9.30E-2	5.85E-2	5.00E-1	3.90E-1	5.00E-1	1.07E+0	0.0	4.40E+0	1.01E+0	7.40E-2	1.01E+0	**4E+0**
4,4'-DDD	Yes	5.00E-3	9.30E-2	1.28E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	5.06E-3	9.00E-3	3.50E+0	3.20E-3	**2E+0**
4,4'-DDE	Yes	3.00E-2	9.30E-2	6.69E-3	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	3.03E-2	9.00E-3	3.50E+0	3.20E-3	**9E+0**
4,4'-DDT	Yes	2.60E-3	9.30E-2	3.93E-3	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	2.63E-3	9.00E-3	3.50E+0	3.20E-3	8E-1
dieldrin	Yes	5.00E-4	9.30E-2	2.93E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	5.07E-4	7.70E-2	4.66E-1	7.70E-2	7E-3
endosulfan sulfate	Yes	4.00E-3	9.30E-2	2.97E-1	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	4.22E-3	1.00E+1	4.00E-1	1.00E+1	4E-4
heptachlor	Yes	5.00E-4	9.30E-2	2.67E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	5.07E-4	2.14E+0	6.40E-2	2.14E+0	2E-4
Aroclor 1016	Yes	4.70E-2	9.30E-2	2.19E-2	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	4.77E-2	8.80E-2	8.00E-1	8.80E-2	5E-1
Aroclor 1260	Yes	2.00E-2	9.30E-2	6.43E-4	5.00E-1	6.67E+0	5.00E-1	1.07E+0	0.0	2.02E-2	8.80E-2	8.00E-1	8.80E-2	2E-1
antimony	Yes	3.20E+0	9.30E-2	1.02E-2	5.00E-1	1.30E+0	5.00E-1	1.00E+0	0.0	7.06E-1	1.25E-2	0.0	1.25E-2	**6E+1**
arsenic	Yes	4.24E+1	9.30E-2	3.80E-2	5.00E-1	2.20E-1	5.00E-1	2.50E-3	0.0	2.78E+0	5.50E+0	1.17E+0	5.50E+0	5E-1
barium	Yes	4.76E+2	9.30E-2	1.56E-1	5.00E-1	9.10E-2	5.00E-1	5.66E-2	0.0	3.04E+1	2.08E+1	1.21E-1	2.08E+1	1E+0
beryllium	Yes	6.60E-1	9.30E-2	1.00E-2	5.00E-1	4.50E-2	5.00E-1	1.00E+0	0.0	2.35E-2	6.60E-2	0.0	6.60E-2	4E-1
cadmium	Yes	1.50E+0	9.30E-2	5.90E-1	5.00E-1	7.71E+0	5.00E-1	3.33E-1	0.0	1.88E+0	7.80E-2	7.99E-1	7.80E-2	**2E+1**
chromium	Yes	1.97E+2	9.30E-2	4.10E-2	5.00E-1	3.10E-1	5.00E-1	8.46E-2	0.0	1.56E+1	1.00E+0	1.25E+0	1.00E+0	**2E+1**
cobalt	Yes	2.86E+1	9.30E-2	7.45E-3	5.00E-1	1.22E-1	5.00E-1	2.05E-2	0.0	1.33E+0	2.37E-1	1.53E-1	2.37E-1	**6E+0**
copper	Yes	1.18E+2	9.30E-2	1.20E-1	5.00E-1	5.20E-1	5.00E-1	1.96E-1	0.0	1.44E+1	2.30E+0	6.39E-1	2.30E+0	**6E+0**
iron	Yes	6.70E+4	9.30E-2	4.25E-3	5.00E-1	3.60E-2	5.00E-1	1.24E-2	0.0	2.24E+3	NA	0.0	NA	NA
lead	Yes	1.68E+2	9.30E-2	3.90E-2	5.00E-1	2.70E-1	5.00E-1	1.05E-1	0.0	1.23E+1	1.40E-2	9.35E-2	1.40E-2	**9E+2**
mercury	Yes	2.40E+0	9.30E-2	6.50E-1	5.00E-1	1.69E+0	5.00E-1	5.43E-2	0.0	8.95E-1	3.90E-2	1.00E+0	3.90E-2	**2E+1**
molybdenum	Yes	2.50E+0	9.30E-2	2.50E-1	5.00E-1	9.53E-1	5.00E-1	1.00E+0	0.0	5.12E-1	3.50E+0	1.50E+0	3.50E+0	1E-1
nickel	Yes	4.74E+2	9.30E-2	1.80E-2	5.00E-1	1.06E+0	5.00E-1	2.49E-1	0.0	8.83E+1	1.38E+0	6.14E-1	1.38E+0	**6E+1**
selenium	Yes	3.10E+0	9.30E-2	6.70E-1	5.00E-1	9.90E-1	5.00E-1	1.62E-1	0.0	8.44E-1	2.30E-1	1.11E+0	2.30E-1	**4E+0**
thallium	Yes	3.70E+0	9.30E-2	4.00E-3	5.00E-1	1.30E+0	5.00E-1	1.12E-1	0.0	8.13E-1	3.50E-1	7.40E-2	3.50E-1	**2E+0**
vanadium	Yes	1.04E+2	9.30E-2	4.85E-3	5.00E-1	4.20E-2	5.00E-1	1.23E-2	0.0	3.57E+0	1.14E+1	1.17E+0	1.14E+1	3E-1
zinc	Yes	9.01E+2	9.30E-2	3.70E-1	5.00E-1	3.20E+0	5.00E-1	7.72E-1	0.0	4.99E+2	1.72E+1	9.55E-1	1.72E+1	**3E+1**

HQ = [(Soil-Conc*IR-Food*Dietary-Soil-Ingest)
+(Soil-Conc*Soil-Plant-BAF*IR-Food*Dietary-Plant-Ingest)
+(Soil-Conc*Soil-Invert-BAF*IR-Food*Dietary-Invert-Ingest)
+(Soil-Conc*Soil-Mammal-BAF*IR-Food*Dietary-Mammal-Ingest)]
*SUF/(Body Weight*TRV-Receptor)

Table J1-4. Hazard Qoutient - Low Calculations for American Robin

		Food Ingestion Rate, kg food/day			1.49E-2		Site Use Factor (SUF, percent)		1.00E+0					
		Body Weight, kg			6.35E-2									
Compound	COPC	Soil Maximum Detection (mg/kg)	Dietary Fraction - Soil Ingestion (kg soil/ kg food)	Soil-Plant BAF (kg soil/ kg_plant)	Dietary Fraction - Plant Ingestion (kg plant/ kg food)	Soil-Invertebrate BAF (kg soil/ kg_Invert)	Dietary Fraction - Invertebrate Ingestion (kg invert/ kg food)	Soil-Mammal BAF (kg soil/ kg_mammal)	Dietary Fraction - Small Mammal Ingestion (kg mamml/ kg food)	Total Exposure Dose (mg/kg-day)	Toxicity Reference Value - Lab Species Chronic NOAEL (mg/kg-day)	Toxicity Reference Value - Lab Species Body Weight (kg)	Toxicity Reference Value - Receptor (mg/kg-day)	HQ-Low
benzene	Yes	3.00E-3	1.04E-1	2.27E+0	1.70E-1	3.97E+0	8.30E-1	1.07E+0	0.0	2.67E-3	2.64E+0	0.0	2.64E+0	1E-3
methylene chloride	Yes	2.00E-3	1.04E-1	7.34E+0	1.70E-1	7.55E-1	8.30E-1	1.07E+0	0.0	9.30E-4	5.85E-1	0.0	5.85E-1	2E-3
xylenes, total	Yes	3.00E-3	1.04E-1	6.09E-1	1.70E-1	2.57E+1	8.30E-1	1.07E+0	0.0	1.52E-2	2.10E-1	0.0	2.10E-1	7E-2
phenol	Yes	3.00E-1	1.04E-1	5.55E+0	1.70E-1	1.10E+1	8.30E-1	1.07E+0	0.0	7.19E-1	1.13E+0	7.40E-2	1.13E+0	6E-1
acenaphthene	Yes	2.90E+0	1.04E-1	2.10E-1	1.70E-1	3.00E-1	8.30E-1	1.07E+0	0.0	2.65E-1	1.01E+0	7.40E-2	1.01E+0	3E-1
acenaphthylene	Yes	1.20E+0	1.04E-1	2.04E-1	1.70E-1	2.20E-1	8.30E-1	1.07E+0	0.0	9.07E-2	1.01E+0	7.40E-2	1.01E+0	9E-2
anthracene	Yes	5.00E+0	1.04E-1	1.04E-1	1.70E-1	3.20E-1	8.30E-1	1.07E+0	0.0	4.55E-1	1.11E+0	7.40E-2	1.11E+0	4E-1
benzo(a)anthracene	Yes	1.50E+1	1.04E-1	1.81E-2	1.70E-1	2.70E-1	8.30E-1	1.07E+0	0.0	1.17E+0	1.01E+0	7.40E-2	1.01E+0	1E+0
benzo(b)fluoranthene	Yes	1.20E+1	1.04E-1	1.77E-2	1.70E-1	2.10E-1	8.30E-1	1.07E+0	0.0	7.94E-1	1.01E+0	7.40E-2	1.01E+0	8E-1
benzo(k)fluoranthene	Yes	1.30E+1	1.04E-1	1.14E-2	1.70E-1	2.10E-1	8.30E-1	1.07E+0	0.0	8.57E-1	1.01E+0	7.40E-2	1.01E+0	8E-1
benzo(g,h,i)perylene	Yes	1.30E+1	1.04E-1	5.70E-3	1.70E-1	1.50E-1	8.30E-1	1.07E+0	0.0	7.01E-1	1.01E+0	7.40E-2	1.01E+0	7E-1
benzo(a)pyrene	Yes	2.10E+1	1.04E-1	1.11E-2	1.70E-1	3.40E-1	8.30E-1	1.07E+0	0.0	1.92E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
chrysene	Yes	1.80E+1	1.04E-1	1.70E-2	1.70E-1	4.40E-1	8.30E-1	1.07E+0	0.0	2.00E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
dibenz(a,h)anthracene	Yes	1.70E+0	1.04E-1	4.86E-3	1.70E-1	4.90E-1	8.30E-1	1.07E+0	0.0	2.04E-1	1.01E+0	7.40E-2	1.01E+0	2E-1
fluoranthene	Yes	3.50E+1	1.04E-1	4.03E-2	1.70E-1	3.70E-1	8.30E-1	1.07E+0	0.0	3.44E+0	1.01E+0	7.40E-2	1.01E+0	**3E+0**
fluorene	Yes	1.80E-1	1.04E-1	1.49E-1	1.70E-1	2.00E-1	8.30E-1	1.07E+0	0.0	1.25E-2	1.01E+0	7.40E-2	1.01E+0	1E-2
indeno(1,2,3-c,d)pyrene	Yes	1.40E+1	1.04E-1	5.19E-3	1.70E-1	4.10E-1	8.30E-1	1.07E+0	0.0	1.47E+0	1.01E+0	7.40E-2	1.01E+0	1E+0
2-methylnaphthalene	Yes	2.60E-1	1.04E-1	2.27E-1	1.70E-1	2.00E-1	8.30E-1	1.07E+0	0.0	1.89E-2	1.01E+0	7.40E-2	1.01E+0	2E-2
naphthalene	Yes	1.60E+0	1.04E-1	4.79E-1	1.70E-1	2.10E-1	8.30E-1	1.07E+0	0.0	1.35E-1	1.01E+0	7.40E-2	1.01E+0	1E-1
phenanthrene	Yes	2.40E+1	1.04E-1	1.02E-1	1.70E-1	2.80E-1	8.30E-1	1.07E+0	0.0	2.00E+0	1.13E+0	7.40E-2	1.13E+0	**2E+0**
pyrene	Yes	4.70E+1	1.04E-1	5.85E-2	1.70E-1	3.90E-1	8.30E-1	1.07E+0	0.0	4.84E+0	1.01E+0	7.40E-2	1.01E+0	**5E+0**
4,4'-DDD	Yes	5.00E-3	1.04E-1	1.28E-2	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	6.63E-3	9.00E-3	3.50E+0	9.00E-3	7E-1
4,4'-DDE	Yes	3.00E-2	1.04E-1	6.69E-3	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	3.98E-2	9.00E-3	3.50E+0	9.00E-3	**4E+0**
4,4'-DDT	Yes	2.60E-3	1.04E-1	3.93E-3	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	3.45E-3	9.00E-3	3.50E+0	9.00E-3	4E-1
dieldrin	Yes	5.00E-4	1.04E-1	2.93E-2	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	6.63E-4	7.70E-2	4.66E-1	7.70E-2	9E-3
endosulfan sulfate	Yes	4.00E-3	1.04E-1	2.97E-1	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	5.35E-3	1.00E+1	4.00E-1	1.00E+1	5E-4
heptachlor	Yes	5.00E-4	1.04E-1	2.67E-2	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	6.63E-4	2.14E+0	6.40E-2	2.14E+0	3E-4
Aroclor 1016	Yes	4.70E-2	1.04E-1	2.19E-2	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	6.23E-2	8.80E-2	8.00E-1	8.80E-2	7E-1
Aroclor 1260	Yes	2.00E-2	1.04E-1	6.43E-4	1.70E-1	6.67E+0	8.30E-1	1.07E+0	0.0	2.65E-2	8.80E-2	8.00E-1	8.80E-2	3E-1
antimony	Yes	3.20E+0	1.04E-1	1.02E-2	1.70E-1	1.30E+0	8.30E-1	1.00E+0	0.0	8.91E-1	1.25E-2	0.0	1.25E-2	**7E+1**
arsenic	Yes	4.24E+1	1.04E-1	3.80E-2	1.70E-1	2.20E-1	8.30E-1	2.50E-3	0.0	2.92E+0	5.50E+0	1.17E+0	5.50E+0	5E-1
barium	Yes	4.76E+2	1.04E-1	1.56E-1	1.70E-1	9.10E-2	8.30E-1	5.66E-2	0.0	2.31E+1	2.08E+1	1.21E-1	2.08E+1	1E+0
beryllium	Yes	6.60E-1	1.04E-1	1.00E-2	1.70E-1	4.50E-2	8.30E-1	1.00E+0	0.0	2.22E-2	6.60E-2	0.0	6.60E-2	3E-1
cadmium	Yes	1.50E+0	1.04E-1	5.90E-1	1.70E-1	7.71E+0	8.30E-1	3.33E-1	0.0	2.33E+0	7.80E-2	7.99E-1	7.80E-2	**3E+1**
chromium	Yes	1.97E+2	1.04E-1	4.10E-2	1.70E-1	3.10E-1	8.30E-1	8.46E-2	0.0	1.71E+1	1.00E+0	1.25E+0	1.00E+0	**2E+1**
cobalt	Yes	2.86E+1	1.04E-1	7.45E-3	1.70E-1	1.22E-1	8.30E-1	2.05E-2	0.0	1.39E+0	2.37E-1	1.53E-1	2.37E-1	**6E+0**
copper	Yes	1.18E+2	1.04E-1	1.20E-1	1.70E-1	5.20E-1	8.30E-1	1.96E-1	0.0	1.54E+1	2.30E+0	6.39E-1	2.30E+0	**7E+0**
iron	Yes	6.70E+4	1.04E-1	4.25E-3	1.70E-1	3.60E-2	8.30E-1	1.24E-2	0.0	2.12E+3	NA	0.0	NA	NA
lead	Yes	1.68E+2	1.04E-1	3.90E-2	1.70E-1	2.70E-1	8.30E-1	1.05E-1	0.0	1.32E+1	1.40E-2	9.35E-2	1.40E-2	**9E+2**
mercury	Yes	2.40E+0	1.04E-1	6.50E-1	1.70E-1	1.69E+0	8.30E-1	5.43E-2	0.0	9.14E-1	3.90E-2	1.00E+0	3.90E-2	**2E+1**
molybdenum	Yes	2.50E+0	1.04E-1	2.50E-1	1.70E-1	9.53E-1	8.30E-1	1.00E+0	0.0	5.51E-1	3.50E+0	1.50E+0	3.50E+0	2E-1
nickel	Yes	4.74E+2	1.04E-1	1.80E-2	1.70E-1	1.06E+0	8.30E-1	2.49E-1	0.0	1.10E+2	1.38E+0	6.14E-1	1.38E+0	**8E+1**
selenium	Yes	3.10E+0	1.04E-1	6.70E-1	1.70E-1	9.90E-1	8.30E-1	1.62E-1	0.0	7.58E-1	2.30E-1	1.11E+0	2.30E-1	**3E+0**
thallium	Yes	3.70E+0	1.04E-1	4.00E-3	1.70E-1	1.30E+0	8.30E-1	1.12E-1	0.0	1.03E+0	3.50E-1	7.40E-2	3.50E-1	**3E+0**
vanadium	Yes	1.04E+2	1.04E-1	4.85E-3	1.70E-1	4.20E-2	8.30E-1	1.23E-2	0.0	3.42E+0	1.14E+1	1.17E+0	1.14E+1	3E-1
zinc	Yes	9.01E+2	1.04E-1	3.70E-1	1.70E-1	3.20E+0	8.30E-1	7.72E-1	0.0	5.98E+2	1.72E+1	9.55E-1	1.72E+1	**3E+1**

HQ = [(Soil-Conc*IR-Food*Dietary-Soil-Ingest)
+(Soil-Conc*Soil-Plant-BAF*IR-Food*Dietary-Plant-Ingest)
+(Soil-Conc*Soil-Invert-BAF*IR-Food*Dietary-Invert-Ingest)
+(Soil-Conc*Soil-Mammal-BAF*IR-Food*Dietary-Mammal-Ingest)]
*SUF/(Body Weight*TRV-Receptor)

Table J1-5. Hazard Qoutient - Low Calculations for Red-tailed Hawk

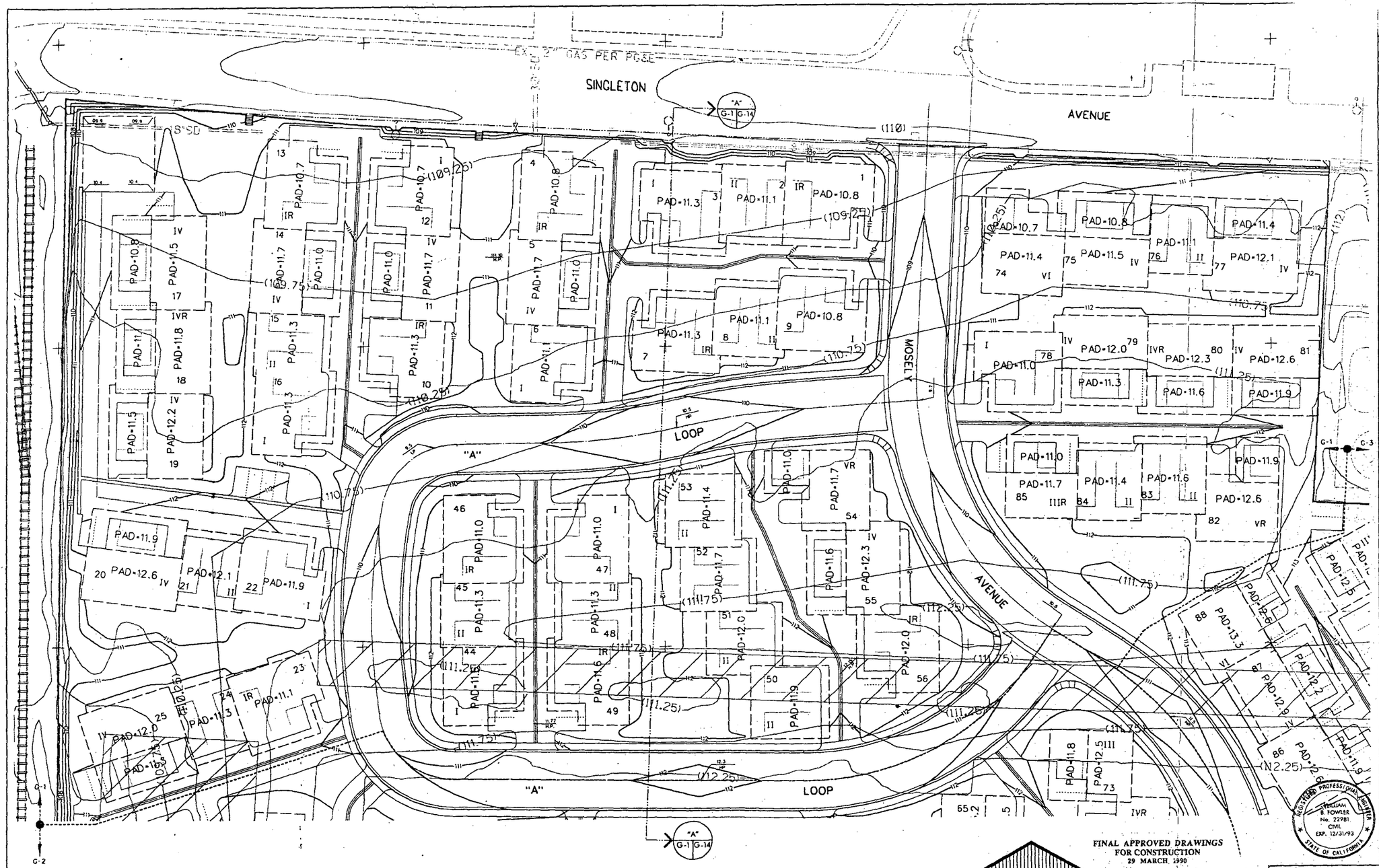
Food Ingestion Rate, kg food/day: 1.06E-1
Body Weight, kg: 9.57E-1
Site Use Factor (SUF, percent): 1.00E+0

Compound	COPC	Soil Maximum Detection (mg/kg)	Dietary Fraction - Soil Ingestion (kg soil/ kg food)	Soil-Plant BAF (kg soil/ kg_plant)	Dietary Fraction - Plant Ingestion (kg plant/ kg food)	Soil-Invertebrate BAF (kg soil/ kg_Invert)	Dietary Fraction - Invertebrate Ingestion (kg invert/ kg food)	Soil-Mammal BAF (kg soil/ kg_mammal)	Dietary Fraction - Small Mammal Ingestion (kg mamml/ kg food)	Total Exposure Dose (mg/kg-day)	Toxicity Reference Value - Lab Species Chronic NOAEL (mg/kg-day)	Toxicity Reference Value - Lab Species Body Weight (kg)	Toxicity Reference Value - Receptor (mg/kg-day)	HQ-Low
benzene	Yes	3.00E-3	3.50E-3	2.27E+0	0.0	3.97E+0	0.0	1.07E+0	1.00E+0	3.56E-4	2.64E+0	0.0	2.64E+0	1E-4
methylene chloride	Yes	2.00E-3	3.50E-3	7.34E+0	0.0	7.55E-1	0.0	1.07E+0	1.00E+0	2.37E-4	5.85E-1	0.0	5.85E-1	4E-4
xylenes, total	Yes	3.00E-3	3.50E-3	6.09E-1	0.0	2.57E+1	0.0	1.07E+0	1.00E+0	3.56E-4	2.10E-1	0.0	2.10E-1	2E-3
phenol	Yes	3.00E-1	3.50E-3	5.55E+0	0.0	1.10E+1	0.0	1.07E+0	1.00E+0	3.56E-2	1.13E+0	7.40E-2	1.13E+0	3E-2
acenaphthene	Yes	2.90E+0	3.50E-3	2.10E-1	0.0	3.00E-1	0.0	1.07E+0	1.00E+0	3.44E-1	1.01E+0	7.40E-2	1.01E+0	3E-1
acenaphthylene	Yes	1.20E+0	3.50E-3	2.04E-1	0.0	2.20E-1	0.0	1.07E+0	1.00E+0	1.42E-1	1.01E+0	7.40E-2	1.01E+0	1E-1
anthracene	Yes	5.00E+0	3.50E-3	1.04E-1	0.0	3.20E-1	0.0	1.07E+0	1.00E+0	5.93E-1	1.11E+0	7.40E-2	1.11E+0	5E-1
benzo(a)anthracene	Yes	1.50E+1	3.50E-3	1.81E-2	0.0	2.70E-1	0.0	1.07E+0	1.00E+0	1.78E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
benzo(b)fluoranthene	Yes	1.20E+1	3.50E-3	1.77E-2	0.0	2.10E-1	0.0	1.07E+0	1.00E+0	1.42E+0	1.01E+0	7.40E-2	1.01E+0	1E+0
benzo(k)fluoranthene	Yes	1.30E+1	3.50E-3	1.14E-2	0.0	2.10E-1	0.0	1.07E+0	1.00E+0	1.54E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
benzo(g,h,i)perylene	Yes	1.30E+1	3.50E-3	5.70E-3	0.0	1.50E-1	0.0	1.07E+0	1.00E+0	1.54E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
benzo(a)pyrene	Yes	2.10E+1	3.50E-3	1.11E-2	0.0	3.40E-1	0.0	1.07E+0	1.00E+0	2.49E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
chrysene	Yes	1.80E+1	3.50E-3	1.70E-2	0.0	4.40E-1	0.0	1.07E+0	1.00E+0	2.14E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
dibenz(a,h)anthracene	Yes	1.70E+0	3.50E-3	4.86E-3	0.0	4.90E-1	0.0	1.07E+0	1.00E+0	2.02E-1	1.01E+0	7.40E-2	1.01E+0	2E-1
fluoranthene	Yes	3.50E+1	3.50E-3	4.03E-2	0.0	3.70E-1	0.0	1.07E+0	1.00E+0	4.15E+0	1.01E+0	7.40E-2	1.01E+0	**4E+0**
fluorene	Yes	1.80E-1	3.50E-3	1.49E-1	0.0	2.00E-1	0.0	1.07E+0	1.00E+0	2.14E-2	1.01E+0	7.40E-2	1.01E+0	2E-2
indeno(1,2,3-c,d)pyrene	Yes	1.40E+1	3.50E-3	5.19E-3	0.0	4.10E-1	0.0	1.07E+0	1.00E+0	1.66E+0	1.01E+0	7.40E-2	1.01E+0	**2E+0**
2-methylnaphthalene	Yes	2.60E-1	3.50E-3	2.27E-1	0.0	2.00E-1	0.0	1.07E+0	1.00E+0	3.09E-2	1.01E+0	7.40E-2	1.01E+0	3E-2
naphthalene	Yes	1.60E+0	3.50E-3	4.79E-1	0.0	2.10E-1	0.0	1.07E+0	1.00E+0	1.90E-1	1.01E+0	7.40E-2	1.01E+0	2E-1
phenanthrene	Yes	2.40E+1	3.50E-3	1.02E-1	0.0	2.80E-1	0.0	1.07E+0	1.00E+0	2.85E+0	1.13E+0	7.40E-2	1.13E+0	**3E+0**
pyrene	Yes	4.70E+1	3.50E-3	5.85E-2	0.0	3.90E-1	0.0	1.07E+0	1.00E+0	5.58E+0	1.01E+0	7.40E-2	1.01E+0	**6E+0**
4,4'-DDD	Yes	5.00E-3	3.50E-3	1.28E-2	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	5.93E-4	9.00E-3	3.50E+0	9.00E-3	7E-2
4,4'-DDE	Yes	3.00E-2	3.50E-3	6.69E-3	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	3.56E-3	9.00E-3	3.50E+0	9.00E-3	4E-1
4,4'-DDT	Yes	2.60E-3	3.50E-3	3.93E-3	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	3.09E-4	9.00E-3	3.50E+0	9.00E-3	3E-2
dieldrin	Yes	5.00E-4	3.50E-3	2.93E-2	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	5.93E-5	7.70E-2	4.66E-1	7.70E-2	8E-4
endosulfan sulfate	Yes	4.00E-3	3.50E-3	2.97E-1	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	4.75E-4	1.00E+1	4.00E-1	1.00E+1	5E-5
heptachlor	Yes	5.00E-4	3.50E-3	2.67E-2	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	5.93E-5	2.14E+0	6.40E-2	2.14E+0	3E-5
Aroclor 1016	Yes	4.70E-2	3.50E-3	2.19E-2	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	5.58E-3	8.80E-2	8.00E-1	8.80E-2	6E-2
Aroclor 1260	Yes	2.00E-2	3.50E-3	6.43E-4	0.0	6.67E+0	0.0	1.07E+0	1.00E+0	2.37E-3	8.80E-2	8.00E-1	8.80E-2	3E-2
antimony	Yes	3.20E+0	3.50E-3	1.02E-2	0.0	1.30E+0	0.0	1.00E+0	1.00E+0	3.56E-1	1.25E-2	0.0	1.25E-2	**3E+1**
arsenic	Yes	4.24E+1	3.50E-3	3.80E-2	0.0	2.20E-1	0.0	2.50E-3	1.00E+0	2.82E-2	5.50E+0	1.17E+0	5.50E+0	5E-3
barium	Yes	4.76E+2	3.50E-3	1.56E-1	0.0	9.10E-2	0.0	5.66E-2	1.00E+0	3.17E+0	2.08E+1	1.21E-1	2.08E+1	2E-1
beryllium	Yes	6.60E-1	3.50E-3	1.00E-2	0.0	4.50E-2	0.0	1.00E+0	1.00E+0	7.35E-2	6.60E-2	0.0	6.60E-2	1E+0
cadmium	Yes	1.50E+0	3.50E-3	5.90E-1	0.0	7.71E+0	0.0	3.33E-1	1.00E+0	5.60E-2	7.80E-2	7.99E-1	7.80E-2	7E-1
chromium	Yes	1.97E+2	3.50E-3	4.10E-2	0.0	3.10E-1	0.0	8.46E-2	1.00E+0	1.92E+0	1.00E+0	1.25E+0	1.00E+0	**2E+0**
cobalt	Yes	2.86E+1	3.50E-3	7.45E-3	0.0	1.22E-1	0.0	2.05E-2	1.00E+0	7.61E-2	2.37E-1	1.53E-1	2.37E-1	3E-1
copper	Yes	1.18E+2	3.50E-3	1.20E-1	0.0	5.20E-1	0.0	1.96E-1	1.00E+0	2.61E+0	2.30E+0	6.39E-1	2.30E+0	1E+0
iron	Yes	6.70E+4	3.50E-3	4.25E-3	0.0	3.60E-2	0.0	1.24E-2	1.00E+0	1.18E+2	NA	0.0	NA	**NA**
lead	Yes	1.68E+2	3.50E-3	3.90E-2	0.0	2.70E-1	0.0	1.05E-1	1.00E+0	2.03E+0	1.40E-2	9.35E-2	1.40E-2	**1E+2**
mercury	Yes	2.40E+0	3.50E-3	6.50E-1	0.0	1.69E+0	0.0	5.43E-2	1.00E+0	1.54E-2	3.90E-2	1.00E+0	3.90E-2	4E-1
molybdenum	Yes	2.50E+0	3.50E-3	2.50E-1	0.0	9.53E-1	0.0	1.00E+0	1.00E+0	2.78E-1	3.50E+0	1.50E+0	3.50E+0	8E-2
nickel	Yes	4.74E+2	3.50E-3	1.80E-2	0.0	1.06E+0	0.0	2.49E-1	1.00E+0	1.33E+1	1.38E+0	6.14E-1	1.38E+0	**1E+1**
selenium	Yes	3.10E+0	3.50E-3	6.70E-1	0.0	9.90E-1	0.0	1.62E-1	1.00E+0	5.69E-2	2.30E-1	1.11E+0	2.30E-1	2E-1
thallium	Yes	3.70E+0	3.50E-3	4.00E-3	0.0	1.30E+0	0.0	1.12E-1	1.00E+0	4.76E-2	3.50E-1	7.40E-2	3.50E-1	1E-1
vanadium	Yes	1.04E+2	3.50E-3	4.85E-3	0.0	4.20E-2	0.0	1.23E-2	1.00E+0	1.82E-1	1.14E+1	1.17E+0	1.14E+1	2E-2
zinc	Yes	9.01E+2	3.50E-3	3.70E-1	0.0	3.20E+0	0.0	7.72E-1	1.00E+0	7.75E+1	1.72E+1	9.55E-1	1.72E+1	**5E+0**

HQ = [(Soil-Conc*IR-Food*Dietary-Soil-Ingest)
+(Soil-Conc*Soil-Plant-BAF*IR-Food*Dietary-Plant-Ingest)
+(Soil-Conc*Soil-Invert-BAF*IR-Food*Dietary-Invert-Ingest)
+(Soil-Conc*Soil-Mammal-BAF*IR-Food*Dietary-Mammal-Ingest)]
*SUF/(Body Weight*TRV-Receptor)

APPENDIX K

MARINA VILLAGE HOUSING
FINAL APPROVED DRAWINGS FOR CONSTRUCTION
SHEETS G-1, G-14, and S-12



NOTE: THIS PLAN REPRESENTS ELEVATIONS FOR ROUGH GRADING OF STREETS, ALLEYS, YARDS AND BUILDING PADS PRIOR TO IMPORTING 2 FEET OF FILL. THE EXISTING TOPOGRAPHY SHOWN HEREON REPRESENTS A LEVEL OF SOIL AFTER REMOVAL OF 3" OF ASPHALT AND 6" OF CONTAMINATED SOIL. NOTE THAT THE CROSSHATCHED AREAS REPRESENT LOCATIONS WHERE ASPHALT DID NOT EXIST ON THE SITE - THEREFORE ADD 3" TO EXISTING CONTOURS IN THESE AREAS.

SEE SHT. G-8 FOR NOTES
SEE SHT. G-4 FOR LEGEND

SYMBOL	DESCRIPTION	PREP. BY	DATE
	REVISIONS		

ROUGH GRADING PLAN — AREA 1

DSGN. WBF | DR. CAD | CHK. RJS | REVIEWED BY: | DATE

SUBMITTED BY: WILLIAM B. FOWLES, CIVIL ENGINEER, USN
DIM. & PLANS: J.P. | ENVIR. | CONTRACTS: | BR. HD.: | CDR. | CDR.
J. L. DRIZAR, LIEUTENANT COMMANDER, CEC, USN
FOR COMMANDER NAVFAC

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
WESTERN DIVISION
SAN BRUNO, CALIFORNIA

PUBLIC WORKS CENTER - SAN FRANCISCO
ALAMEDA ANNEX
FY 87 300 FAMILY HOUSING UNITS
BR HUNT BUILDING CORPORATION
P.O. BOX 9368 EL PASO, TEXAS 79984-0368 (915) 533-1122

SIZE D
IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY

CODE IDENT. NO.

PROJ. LOCATION
ALAMEDA ANNEX

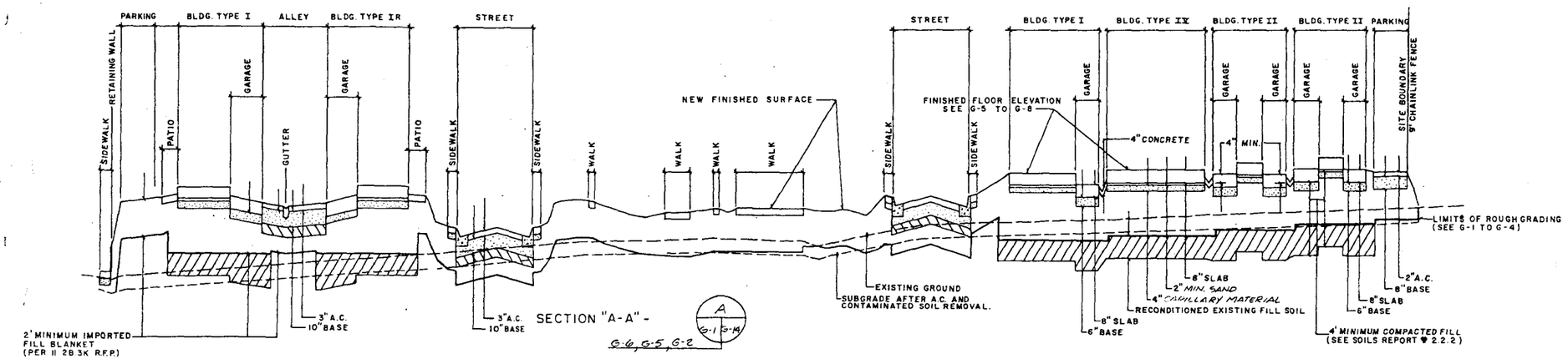
CONSTR. CONTR. NO.
N62474-87-C-7769

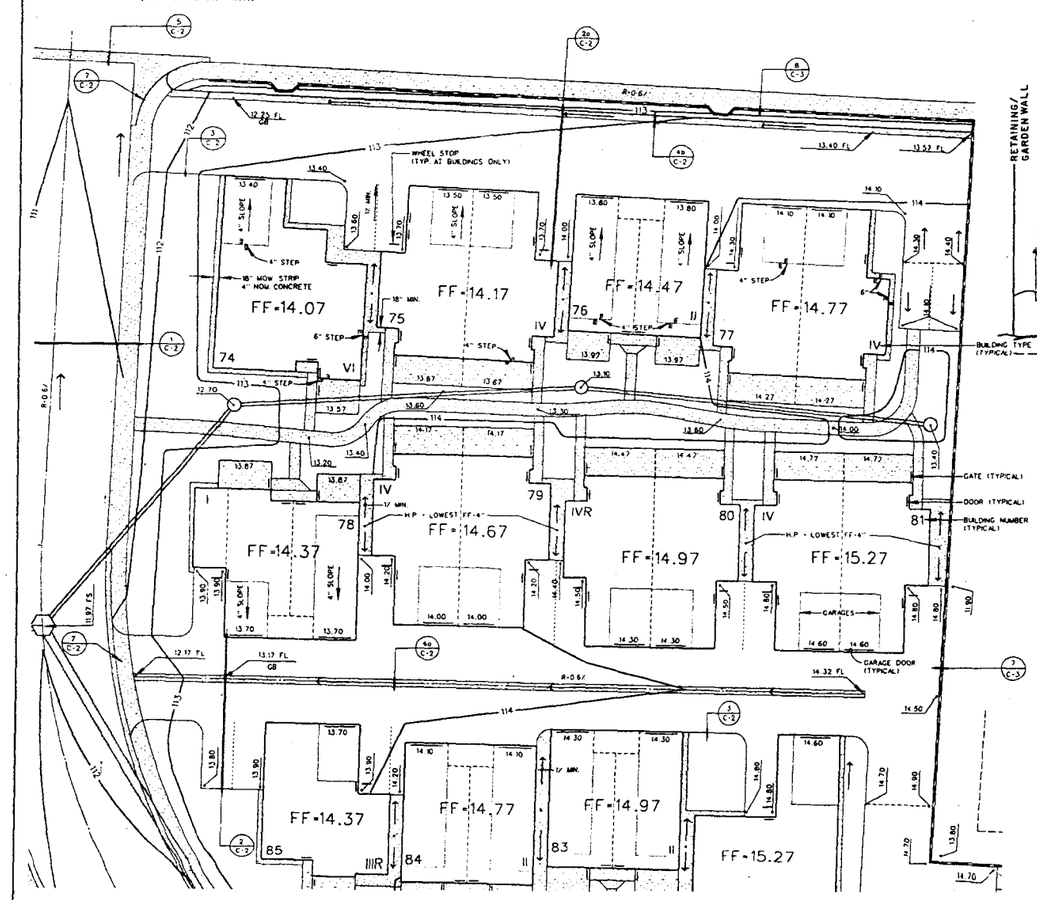
SPEC. 12-87-7769

NAVFAC DWG. NO.
6364361

SHEET 10 OF 132

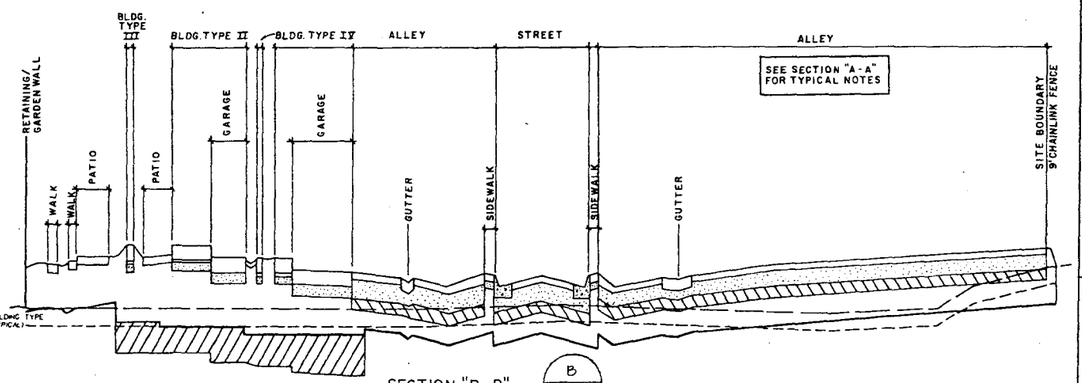
G-1





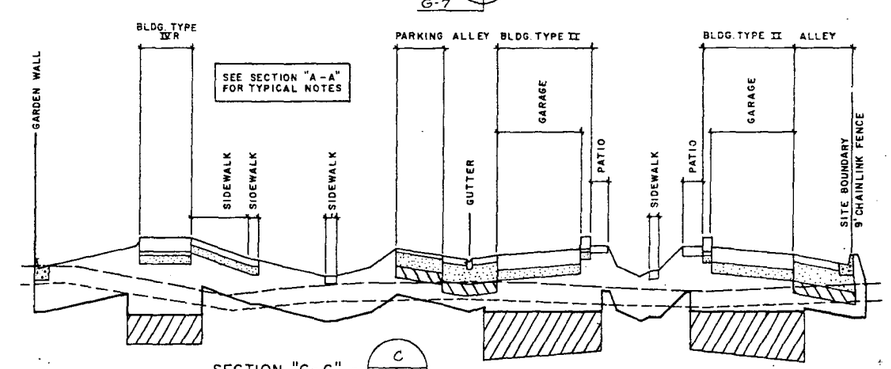
TYPICAL CLUSTER DETAIL

SCALE: 1"=20'



SECTION "B-B"- B G-3 G-14

G-7



SECTION "C-C" - C G-4 G-14

G-8

REGISTERED PROFESSIONAL ENGINEER WILLIAM B. FOWLER No. 72981 CIVIL EXP. 12/31/93 STATE OF CALIFORNIA

SCALE
VERT.: 1"=3'
HORIZ.: 1"=30'

FINAL APPROVED DRAWINGS FOR CONSTRUCTION 29 MARCH 1990

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(805) 526-6004 (818) 882-0950 FAX (805) 581-4189

SYMBOL	DESCRIPTION	PREP BY	DATE	APPROVED

REVISIONS

GRADING DETAILS

DESIGN WBF | DR. SK | CHK. RJS | REVIEWED BY | DATE

SUBMITTED BY: WILLIAM B. FOWLER CA RCE # 72981 | ENVIR. | DIR.

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
WESTERN DIVISION
SAN BRUNO, CALIFORNIA

PUBLIC WORKS CENTER - SAN FRANCISCO
ALAMEDA ANNEX
300 FAMILY HOUSING UNITS
FY 89

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CODE IDENT. NO.

PROJ. LOCATION
ALAMEDA ANNEX

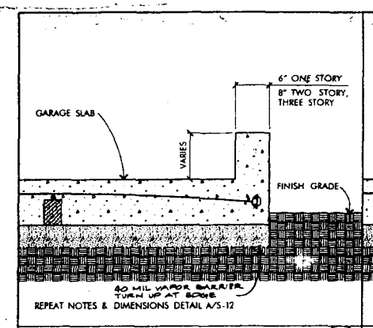
CONSTR. CONTR. NO.
N62474-87-C-7769

SPEC. 12-87-7769

NAVFAC DWG. NO.
6364374

SHEET 23 OF 132

G-14



CURB DETAIL (F)
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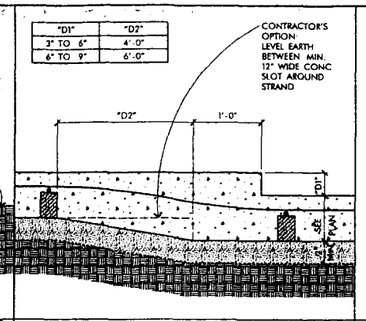
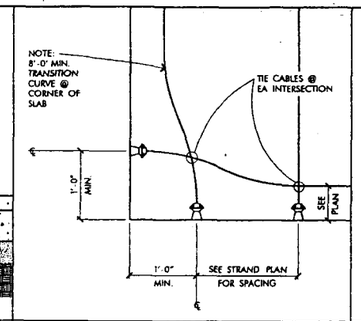
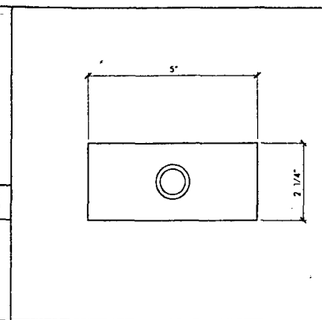


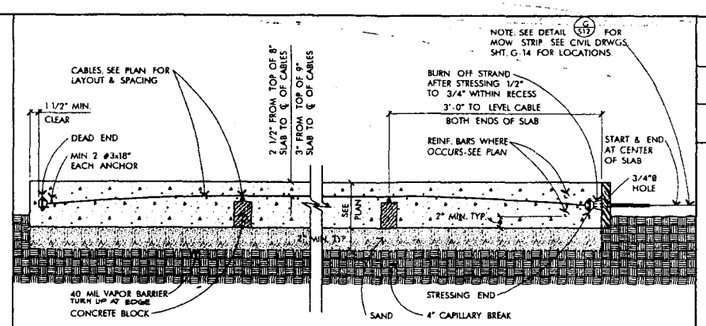
STEP DOWN DETAIL (E)
SCALE = 1"=1'-0"



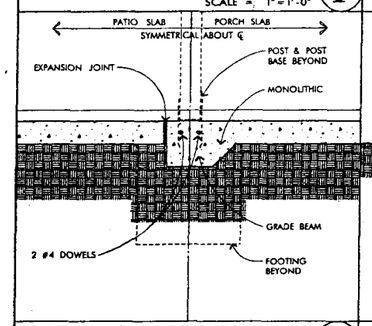
PLAN AT STESSED END & DEAD END (D)
SCALE = NONE



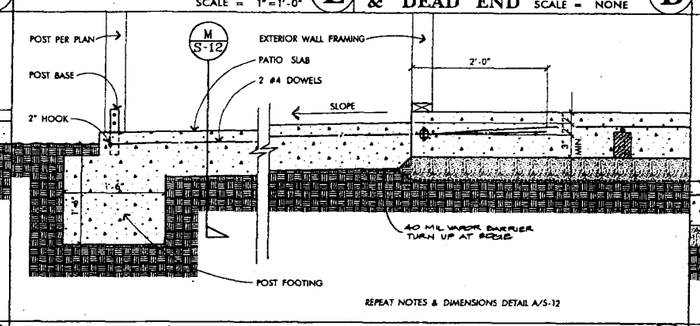
TYPICAL ANCHOR (C)
SCALE = HALF SIZE



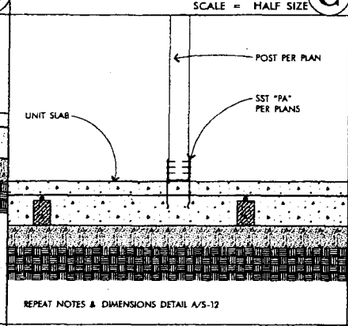
TYPICAL SLAB (A)
SCALE = 1"=1'-0"



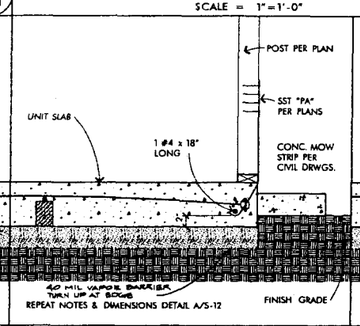
PATIO & PORCH FOOTING (M)
SCALE = 1"=1'-0"



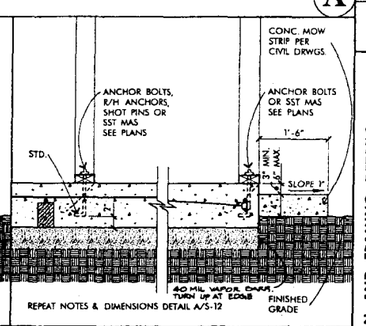
POST BASE @ PATIO SLAB (K)
SCALE = 1"=1'-0"



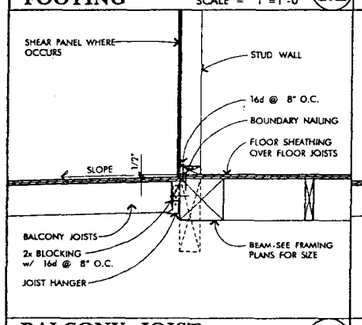
POST BASE DETAIL (J)
SCALE = 1"=1'-0"



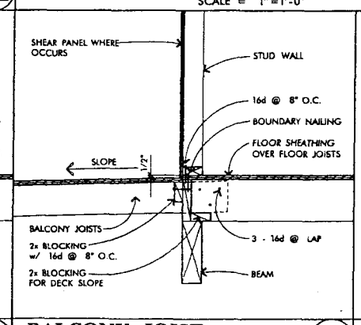
POST ANCHOR DETAIL (H)
SCALE = 1"=1'-0"



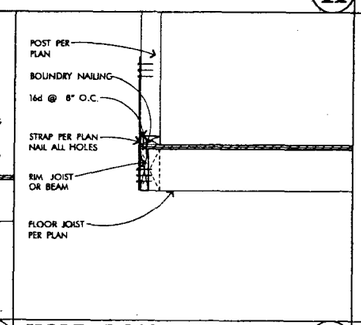
TYPICAL ANCHOR DETAILS (G)
SCALE = 1"=1'-0"



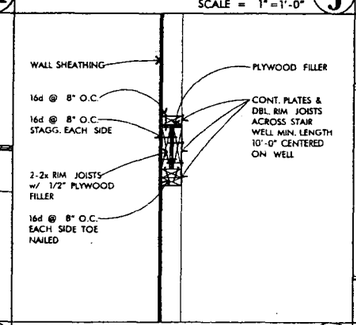
BALCONY JOIST CONNECTION (T)
SCALE = 1"=1'-0"



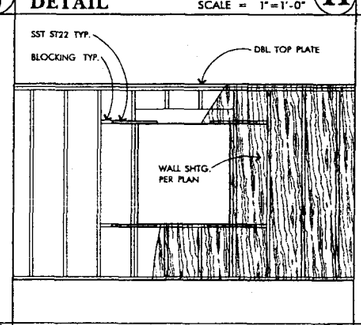
BALCONY JOIST CONNECTION (S)
SCALE = 1"=1'-0"



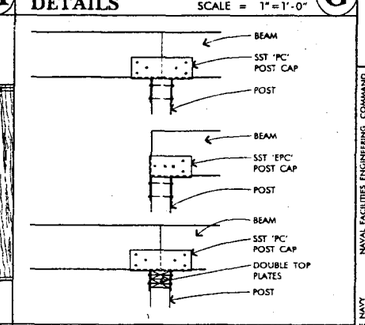
HOLD DOWN STRAP (R)
SCALE = 1"=1'-0"



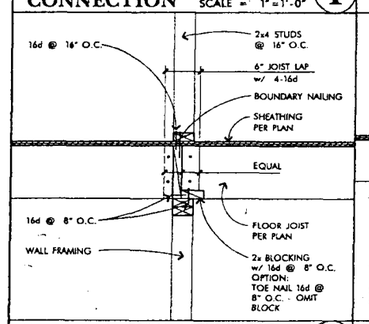
BOND BEAM AT EXT STAIR WALL (Q)
SCALE = 1"=1'-0"



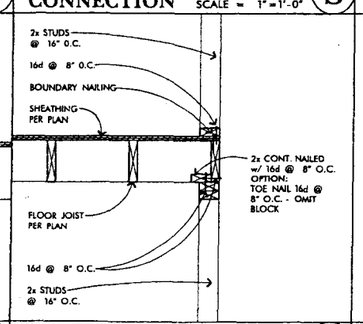
STRAP TIE TO HEADER (P)
SCALE = NONE



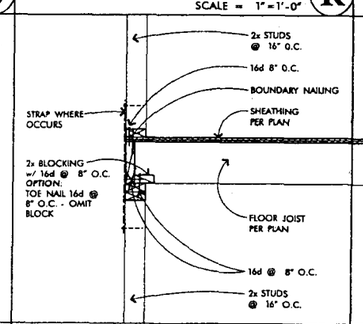
POST CAPS (N)
SCALE = 1"=1'-0"



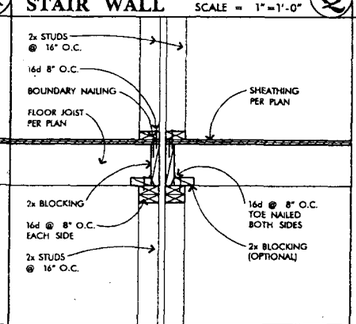
2nd FLR INT BEARING WALL (X)
SCALE = 1"=1'-0"



2nd FLR AT EXT WALL JOISTS PAR (W)
SCALE = 1"=1'-0"



2nd FLR AT EXT WALL JOISTS PERP (V)
SCALE = 1"=1'-0"



2nd FLOOR FRAMING AT PARTYWALL (U)
SCALE = 1"=1'-0"

REGISTERED PROFESSIONAL ENGINEER — FARZIN S. RAHBAR No.2833 STRUCTURAL EXP. 9.30.91 — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — WILLIAM B. FOWLER No. 22981 CIVIL EXP. 12/31/93 — STATE OF CALIFORNIA

FINAL APPROVED DRAWINGS FOR CONSTRUCTION
11 MARCH 1990

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(805) 526-8004 (818) 526-6860 FAX (805) 581-4108

SYMBOL	DESCRIPTION	DATE	APPROVED
		PREP. BY	

REVISIONS

FOUNDATION AND FRAMING DETAILS

DSGN. FR | DR. | CHK. FR | REVIEWED BY | DATE

SUBMITTED BY: WILLIAM B. FOWLER, CA RCE #22981 — DIR. ENGR.

BR HD

EFD FOR COMMANDER NAVFAC — DIR.

NAVAL FACILITIES ENGINEERING COMMAND
DEPARTMENT OF THE NAVY
WESTERN DIVISION
SAN BRUNO, CALIFORNIA

PUBLIC WORKS CENTER - SAN FRANCISCO
ALAMEDA ANNEX
FY 89 300 FAMILY HOUSING UNITS
BY: HUNT BUILDING CORPORATION
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SIZE D
IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT- SCALE REDUCED ACCORDINGLY

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PROJ. LOCATION
ALAMEDA ANNEX

CONSTR. CONTR. NO.
N62474-87-C-7769

SPEC. 12-87-7769

NAVFAC DWG. NO.
6364454

SHEET 103 OF 132

S-12

APPENDIX L

RESPONSE TO AGENCY COMMENTS (RTC)

Following are responses to comments provided by Dot Lofstrom and Michelle Dalrymple dated 18 January 2007 to Draft RI Report Dated 29 November 2006

#	Reference	Comments	Responses
General Review			
1.	Dot Lofstrom, P.G., Project Manager, Office of Military Facilities	The Department of Toxic Substances Control (DTSC) has reviewed the document referenced above, written by CDM Federal Programs Corporation, dated November 29, 2006 (Draft RI Report). Comments from the DTSC Human and Ecological Risk Division (HERD) and Geological Services Unit (GSU) are attached. The Draft RI Report was revised from the original Draft RI Report submitted in April 2006. The April 2006 Draft RI Report hypothesized that the source of the fill that created Site 31 was material derived from the Oakland Great Valley Group. The April 2006 Draft RI Report concluded that a data set based on the concentration of metals found in the Oakland Great Valley Group was therefore appropriate for use as a background data set for Site 31. In response to a shared regulator viewpoint that the Great Valley Group background data set is not an appropriate background data set for IR Site 31, a meeting was held on August 24, 2006. At this meeting, the Navy presented the argument that Sites 30, 31, East Housing, the College of Alameda, and portions of the Fleet and Industrial Supply Center Alameda (FISCA) sites were all emplaced during the same fill event, and could therefore be used together as an ambient data set. The regulatory agencies agreed to review the argument if presented in a report, with the provision that Site	There appears to be confusion on the technical assessment in the Draft RI Report-Revision I. The rationale for not needing a new ambient data set is presented below. Therefore, combining data with the IR Site 31 data as recommended in this comment is not necessary. The initial approach discussed in the meeting with the regulatory agencies on August 24, 2006, was to evaluate data from IR Site 25, College of Alameda, the FISCA property, and the East Housing Area as potential sources of background data for IR Sites 30 and 31 in lieu of the Alameda Point pink background data set. This evaluation of potential sources of background was conducted and presented in the Draft RI Report-Revision I issued in November 2006. During this evaluation, the statistical evaluation of data indicated that it is not necessary to identify a background data set because the arsenic data for IR Site 31 meet the DTSC criteria for ambient populations (DTSC 1997). Arsenic was selected for statistical evaluation following the DTSC policy methodology (DTSC 1997) because of the fill history, no background samples collected in this area, and because only arsenic is of potential concern at IR Site 31 based on the risk assessment. The USEPA and Cal/EPA arsenic risks and 95th UCL value at IR Site 31 are the same or lower than that of an Alameda Point background data set and a nearby historical housing area. Specifically, USEPA and Cal/EPA arsenic risks at IR Site 31 are the same as arsenic risks in the Alameda Point yellow background data set. There are over twice as many arsenic samples at IR Site 31 as in any of the Alameda Point background data sets, which gives a high level of confidence in the IR Site 31 risks. USEPA and Cal/EPA arsenic risks at IR Site 31 also are lower than arsenic risks at East Housing, where investigations have been completed and the property has been transferred and developed for housing and a school under DTSC oversight. Historical uses of

Following are responses to comments provided by Dot Lofstrom and Michelle Dalrymple dated 18 January 2007 to Draft RI Report Dated 29 November 2006

#	Reference	Comments	Responses
1. cont.		25 be included in the data set as well. The majority of the total risk estimate at Site 31 is due to arsenic in soil, which is elevated above the Alameda Point "pink" ambient arsenic concentration. The argument presented for using an ambient data set based on fill history is persuasive for arsenic. However, the argument that the soil types at Site 31 are not similar to soil types at Site 25 is not supported by grain size distribution analysis. Thus, data from Site 25 and the College of Alameda should not be excluded from the ambient data set.	East Housing were only for housing. The 95th UCL for arsenic at IR Site 31, 11.7 mg/kg, is lower than the 95th UCL for arsenic in the Alameda Point yellow background data set and the East Housing data set. When arsenic, which has been determined to be ambient, is removed from the IR Site 31 risk assessment, the residual risks do not warrant evaluating remedial alternatives in an FS. The purpose of the DTSC policy is to help risk assessors identify which metals in soil are related to site activities and which are present at ambient concentrations and not related to site activities. HERD, in its comments of April 6, 2007, agreed with the conclusion that the arsenic concentrations at IR Site 31 are ambient and that it is appropriate to exclude the risk for arsenic when making risk management decisions. There are other published papers on the use of probability plots for identification of ambient populations using methods that are similar to the DTSC policy (Cook, 1998; Fleischhauer and Korte, 1990; Sinclair, 1976; and Singh et al., 1994). The Draft RI Report-Revision I provided an evaluation of the fill history, chemistry, and lithology of IR Site 25, College of Alameda, the FISCA property, and the East Housing Area because this was discussed and requested by the regulatory agencies during the August 24, 2006 meeting and to support the following points. • The arsenic concentrations at IR Site 31 are not unique to this location. There are other areas (approximately 140 acres total) with similar arsenic concentrations. • Possible explanations for the differences in the arsenic concentrations between the 140-acre area and the Alameda Point pink background are differences in lithology and fill

Following are responses to comments provided by Dot Lofstrom and Michelle Dalrymple dated 18 January 2007 to Draft RI Report Dated 29 November 2006

#	Reference	Comments	Responses
1. cont.			history. The evaluation of the fill history, the chemistry, and lithology of adjacent sites is supplemental information and is not essential to evaluating whether a release of arsenic (or other metals) has occurred at IR Site 31. The DTSC (1997) evaluation determines whether arsenic is ambient. To avoid confusion, revisions were made in the Draft Final RI Report. Section 4.1.4.2 in the Draft Final RI Report and Section 2 in Appendix H2 was renamed "Other Metals at IR Site 31" rather than "Off-site Background Locations." The OU-5 (Site 25) RI Report also acknowledges the differences in fill history for the OU-5 area and the Alameda Point background data sets. The Final OU-5 RI Report states on pages 4-6 to 4-7, "Box plots comparing the range of site concentrations of arsenic, cadmium, chromium, copper, lead, and mercury to the range measured in background data are presented in Appendix B, Figures B-14 to B-9. These plots include metals from three Alameda ambient data sets ('pink', 'yellow', and 'blue') described in Summary of Background Concentrations in Soil and Groundwater, Alameda Point, Alameda, California, (TtEMI, 2001). Data from all three data sets was used because, although samples from the 'pink' data set were collected closest to OU-5, none of the three Alameda background data sets represent fill material deposited during the fill placement time period associated with the area presently occupied by the OU-5. The box plots suggest that five of the six metals (excluding cadmium) are elevated relative to the 'pink' data set. However, none of the six metals are present at concentrations or in patterns that clearly indicate a release to the environment. Concentrations of base metals such as aluminum, iron, and manganese were found to be significantly higher in the historical OU-5 data set compared to the three background data

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#	Reference	Comments	Responses
1. cont.			sets...." The Final OU-5 (Site 25) RI Report (Appendix B) further concludes that, "All three available background data sets representing Alameda Point soils are different enough from the OU-5 soils to make any conclusion based on comparisons to these data fairly uncertain." In conclusion, the OU-5 RI Report did not rely on direct comparisons between Site 25 soil metals concentrations and the Alameda Point pink data set, but determined that metals concentrations were not associated with a release.
General Comments			
2.	Michelle Dalrymple, PG, Engineering Geologist, Geologic Services Unit	**PROJECT SUMMARY** The RI was performed in accordance with the document entitled Final Work Plan for Remedial Investigation at IR Site 31, Alameda Point, alameda, California prepared by CDM dated September 2005. Revision 1 of the draft RI report (revised draft RI report) addresses input received from the regulatory agencies following review of the original draft RI report dated April 2006. Installation Restoration (IR) Site 31 is a 25-acre residential use property known as Marina Village Housing. IR Site 31 is located in the northwestern corner of the former San Francisco Bay Airdrome (SFBA). The SFBA, which was used primarily by private airplanes and business air fleets, was closed in 1941. In 1947, military housing was present across the northwestern portion of the site. In 1953, a warehouse was built on the southwestern portion of IR Site 31, beginning the	Comment noted.

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#	Reference	Comments	Responses
2. cont.		industrial use. Between 1953 and 1959, the military housing was demolished and additional warehouses were built. Between 1985 and 1993, the warehouse buildings were demolished and the Marina Village Coast Guard Housing was built on the site. The purpose of the RI is to: • Characterize the nature and extent of contaminants in soil that may have resulted from historical site operations • Assess human health and ecological risks associated with direct exposure to contaminated soil • Assess human health risk associated with potential indoor air contamination due to volatilization of contaminants from groundwater • Evaluate whether groundwater beneath the site has characteristics consistent with the known contaminants of the Operable Unit (OU)-5/IR-02 groundwater plume, or if the data indicate that a site-specific release of contaminants to groundwater has occurred.	
GENERAL COMMENTS AND RECOMMENDATIONS			
A.		The East Housing Area is not proposed as a background data set for IR Site 31, but it is proposed as a potential background location in the revised draft RI report. The revised draft RI report uses East Housing Area soil data to compare arsenic concentrations from IR Site 31 for the purpose of evaluating ambient levels. This	A different background location is not proposed and not needed because arsenic concentrations in soil at IR Site 31 meet the DTSC criteria for an ambient population. Dr. Polisini has agreed that the arsenic in soil at IR Site 31 represents an ambient population, as noted in his comments of April 6, 2007. The Draft Final RI Report text was revised in Section 4.1.4.3 to clarify that lithology and fill history is not needed to determine the nature of

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#	Reference	Comments	Responses
A. cont.		evaluation assumes that arsenic concentrations in soil in the East Housing Area are ambient, but there is no evaluation of how this determination was made. The arguments presented in Appendix H2 indicate that the East Housing Area was chosen over other neighboring areas for comparison based on lithology and fill history. IR Site 25 was excluded as a suitable background location because of reported dissimilar lithology and fill history. The argument that the soil types at IR Site 31 are dissimilar to the soil types at IR Site 25, however, is not fully supported. The grain size distribution analysis presented in Appendix H2 shows that the relative percentage of sand in the soil types between IR Sites 31 and 25 are similar (58 and 54 percent, respectively), with varying amounts of gravel and fines. The geotechnical analyses also do not provide compelling support for this argument, indicating sand, silty sand, and silt at Sites 31 and 25, and mostly clay at IR Site 30. The presence or absence of gravel recorded on boring logs should not be used as a basis for determining whether or not a data set is suitable for use as background (see Specific Comment 11a). Also, the fill history for all sites located east of Main Street that were evaluated for comparison is similar (i.e., within a decade). **Recommendation** **If the Navy proposes to use a data set other than**	metals on-site and was used as supplemental information to justify not using the Alameda Point pink background dataset. The information on soil type for locations surrounding IR Site 31 was provided partially in response to an agency request at a meeting in August 2006 when the East Housing Area was proposed as a background location for IR Site 31. The RI Report presents substantial evidence and evaluations of the arsenic concentrations and lithology of IR Site 25, College of Alameda, the FISCA property, and East Housing, along with the fill history, to support the following points. • Arsenic concentrations in soil at IR Site 31 are not unique to this IR site. There are other areas (approximately 140 acres total) with similar arsenic concentrations. • Possible explanations for the differences in the arsenic concentrations between the 140-acre area and the Alameda Point pink background data set are differences in lithology and fill history. The evaluation of the lithology provides qualitative support for the premise that the fill material used to create Alameda Point came from different sources and that the soil can therefore vary in physical and chemical properties.

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#	Reference	Comments	Responses
A. cont.		**the pink data set established for Alameda Point for comparison purposes, then all available data from nearby sites that do not have anthropogenic metals (specifically, IR Site 25 and the College of Alameda) should be included.**	
B.		GSU disagrees that there is sufficient evidence to support the conclusion that metals in soil do not represent releases from on-site sources. The RI report shows that 15 of 17 metals in soil are elevated above the Alameda Point pink background data set. However, the RI report has determined that this background data set is not appropriate for comparison with IR Site 31 data. The revised draft RI report does not propose an alternative background data set for IR Site 31, and there is no evaluation of metals in soil other than arsenic in the revised draft RI report. Therefore, the source of metals other than arsenic in soil at IR Site 31 cannot be determined. A review of the summary statistics shown included in Appendix H2 indicates that, in addition to arsenic, other metals in soil appear to be elevated relative to nearby sites (East Housing Area and IR Site 25) including nickel, chromium, and lead. Although the revised draft RI report did not find these metals to be risk-drivers, their presence is potentially related to past Navy activities, and this should be addressed in the RI report. The RI report should also discuss the adequacy of the investigation with respect to areas	The Draft Final RI Report was revised to include an evaluation of five additional metals, using statistical methods (DTSC 1997) to differentiate metals in soil that are related to site activities and metals that are present at ambient concentrations and not related to site activities. The five inorganics, cadmium, chromium, iron, lead, and vanadium, were selected for statistical evaluation based upon the following: Iron, lead, and vanadium are being evaluated because these inorganics are at concentrations greater than the residential PRG criteria. Cadmium is being evaluated because of its contribution to human health risk. Chromium is being evaluated because concentrations in groundwater samples collected during the IR Site 31 RI sampling event of November 2005, showed concentrations in groundwater greater than concentrations in historic groundwater data. The evaluation will be integrated into Appendix H and into the Section 4.1 nature and extent discussion. New tables and maps are not required in the Section 4 text. The inorganics exceeding residential PRG criteria are already mapped and a table of the statistical evaluation is not needed in the text of Section 4. Reference is made to the presentation of statistical evaluations that is contained within Appendix H.

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#	Reference	Comments	Responses
B. cont.		where elevated levels of metals were found. <u>Recommendation</u> **The sufficiency of the RI with respect to characterization of potentially site-related metals found in soil should be discussed in the RI report. Soil data should be evaluated in conjunction with groundwater data to determine whether additional soil and/or groundwater plume delineation is required (see General Comment C).**	
C.		The objective of the groundwater sampling performed during the RI was to determine whether the nature of groundwater contamination at IR Site 31 is consistent with the OU-5/IR-02 groundwater plume. In addition to VOCs, consistency with respect to metals in groundwater should be addressed in the RI report. Metals are potentially site-related contaminants, and impacts to groundwater from on-site sources may have occurred. For example, chromium, cadmium, and lead were all detected in groundwater collected from IR Site 31 at concentrations greater than 1) Alameda Point background values, 2) the maximum concentrations reported for the OU-5/IR-02 plume, and 3) their respective maximum contaminant levels (MCLs). Elevated lead and cadmium appear to be collocated in samples collected on the northwestern portion of the site where elevated levels of heavy metals were historically found in soil. GSU understands that	The objective of the RI for groundwater as stated in Section 1.1, is to evaluate whether groundwater beneath IR Site 31 has characteristics consistent with the known contaminants of the OU-5/IR-02 groundwater plume, or if the data indicate a site-specific release has occurred and has contributed unique contaminants to groundwater, which are specifically related to previous IR Site 31 activities. The Groundwater RI/FS (EERG 2004) concluded that inorganics in groundwater are not chemicals of potential concern for remedial decisions. The OU-5/IR-02 groundwater remedial process does not address inorganics as a groundwater contaminant. Inorganics are monitored regularly in the Site 25 Group of the Basewide Groundwater Monitoring program and are not mapped as a chemical of interest. Therefore, it appears unlikely that inorganics in soil from IR Site 31 have contributed to groundwater contamination. A statement regarding the conclusions of inorganics from the Groundwater RI/FS was incorporated into the Draft Final RI Report Section 4.2.4.3. Although inorganics are not a groundwater contaminant, the metals concentrations are subjected to a comparative evaluation in the Draft

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#	Reference	Comments	Responses
C. cont.		the RI was intended to address impacts to soil and not groundwater. However, if the site has impacted groundwater with contaminants that are not being addressed by the area-wide groundwater investigation (i.e., metals), then this should be addressed as part of the IR Site 31 RI. <u>Recommendation</u> **The RI report should evaluate the groundwater results for metals to determine whether or not metals in groundwater are attributable to on-site sources or are consistent with the area-wide groundwater plume.**	Final RI to determine if they may be related to an IR Site 31 source in soil. As stated by the reviewer, chromium, cadmium, and lead were detected in groundwater samples collected during the November 2005 IR Site 31 RI sampling event, at concentrations greater than the maximum concentrations reported for the OU-5/IR-02 plume. Specifically, the maximum inorganic concentrations are analytical results of samples collected from temporary wells installed through direct push methods. To address the comment that a release may have occurred to soil and impacted groundwater, cadmium, chromium, lead, are statistically evaluated in the Draft Final RI Report to identify if these metals in soil are related to site activities or are present at ambient concentrations and not related to site activities. The consistency of groundwater samples at IR Site 31 with the OU-5/IR-02 groundwater plume was revised in the Draft Final RI Report by updating Table 4-6 and Section 4.2.4.3 with results from the 2006 base-wide groundwater monitoring events (ITSI 2007a, b), and comparing the IR Site 31 groundwater data collected in the 2005 RI sampling with groundwater data collected prior to 2002 and reported in the Groundwater RI/FS (EERG 2004). This discussion shows that analytical results for inorganics collected from monitoring wells during the IR Site 31 Soil RI are consistent with analytical results for inorganics in groundwater for the OU-5/IR-02 plume. Revisions were made to Section 4.2.4.3 of the Draft Final RI Report to include a discussion of the discrepancies between analytical results for inorganics from the direct push sample locations and analytical results for inorganics from monitoring well samples collected during the IR Site 31 Soil RI. The discrepancy is related to the high turbidity of direct push samples compared to lower turbidity of the monitoring well samples.

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#	Reference	Comments	Responses
SPECIFIC COMMENTS AND RECOMMENDATIONS			
1.	Section 1.3.5.3 - Zone Evaluation Data Summary, Zone 16: Housing Zone.	This section incorrectly states that the soil samples collected during this investigation were analyzed for metals. The environmental Baseline Survey report (IT 2001) does not indicate that metals analyses were performed. Please correct this apparent error.	Revisions were made to Section 1.3.5.3, the Zone Evaluation Data Summary, discussion to remove metals from the list of analytes. The Environmental Baseline Survey report (IT 2001) documents that metals analyses were performed in initial phases of the EBS program. The details are presented in Section 4 page 4-2.
2.	Section 4.1 - Soil	The last sentence of this section states that in the case of previously collected data, all quality control samples were excluded from the assessment of nature and extent. However, for the recent RI analytical data, the higher value was used between the parent and duplicate soil samples for the evaluation of nature and extent. The same method that was used for the recent RI data should be used for the previously collected data. That is, the higher of the two detected values between the parent and the duplicate should be used. Please use the higher of the two values between the parent and the duplicate samples for all analytical data in this RI, including historical data, unless a valid reason for not doing so can be provided.	When the historical data are used for quantitative evaluations, the data reduction rules applied are the same. The human health risk assessment used the higher of the two values for all data. The nature and extent discussion does not use the historical data for quantitative evaluations.
3.	Section 4.1.1.3 - 2003 Polynuclear Aromatic Hydrocarbon Assessment	Although Section 4.1 states that all quality control samples were excluded from the assessment of nature and extent for previously collected soil data, it appears in this section (and in the table in Appendix B) that quality control samples were included to calculate frequency of detection. For example, this section indicates that 191 polynuclear aromatic hydrocarbon (PAH)	The descriptions in Section 4.1.1.3 and the frequency tables in the Appendix B were revised to explain that the duplicate samples were not included in the statistical summary.

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#	Reference	Comments	Responses
3. cont.		analyses were performed on 163 soil samples from the 0 to 0.5-foot depth-interval indicating that duplicate analyses were performed. Appendix B uses the larger number of analyses (191) to calculate frequency of detection. However, duplicate analyses should not be used to evaluate frequency of detection. Either the original or duplicate sample should be used based on the highest reported concentration. Please resolve this issue.	
4.	Section 4.1.2 – Soil Analytical Results	Please clarify that the project objectives include potential exposure of ecological receptors in addition to human receptors. Please provide references for the Regional Water Quality Control Board (RWQCB) vapor intrusion and Environmental Protection Agency (EPA) ecological soil screening levels.	The text of Section 4.1.2 was modified to include potential exposure of ecological receptors in addition to the human receptors. The following is the revised text. "The criteria were selected on the basis of project objectives: human health exposure to soil and indoor air and ecological exposure to soil." The references for the Regional Water Quality Board and EPA ecological soil screening levels were appropriately expanded in the text.
5.	Section 4.1.2.3 – Other Semi-Volatile Organic Compounds	It is stated that the combined RI and historical analytical results (ERM West 1994 and IT 2001) support the conclusion that semivolatile organic compounds (SVOCs), other than PAHs, are not generally present in soils at IR Site 31 in concentrations that exceed regulatory criteria. However, according to information in Section 1.3.5, the two referenced studies did not collect and analyze samples for SVOCs. Please resolve this discrepancy.	Revisions were made to this statement in section 4.1.2.3 and other sections as needed.

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#	Reference	Comments	Responses
6.	Section 4.1.2.5 - Metals	a. It is stated in section 4.1.2.5 that all 18 metals were detected in the soil samples analyzed. However, only 17 metals are listed on Table 4-1, and silver is not included on the list. Please clarify whether or not silver was detected in soil samples from IR Site 31 during the RI and correct this information. b. Please clarify why only metals that exceeded human-health regulatory criteria (i.e., preliminary remediation goals [PRGs]) are discussed, and not those that exceeded the ecological regulatory criteria specified in Section 4.1.2.	a. The text in Section 4.1.2.5 was revised to clarify that silver was not detected. IR Site 31 RI results for analytes detected above sample quantitation limits at least once in soil samples are summarized in Table 4-1. The presentation of information in Table 3-6, shows that silver has a non-detect value in 126 of 126 analyses. Therefore, the text in Section 4.1.2.5 was revised to state that 18 inorganics were analyzed and 17 were detected. Reference was made to Table 3-6 showing the number of non-detect results. b. Section 6.2 identifies and discusses the chemicals of potential ecological concern. Because IR Site 31 consists of barren and urban habitat with minimal ecological receptors, and no native or natural habitat occurs or is expected to occur at IR Site 31 due to human activities, mapping of chemicals that may have potential effects on potential receptors was considered not appropriate for the nature and extent discussion. If the screening level ecological risk assessment showed on-site receptors and significant threat to ecological receptors, the chemicals representing that threat would be mapped and discussed.
7.	Section 4.1.3 - Nature and Extent of Soil Contamination	GSU does not agree with the decision to eliminate the Zone 16 parcel evaluation samples in the nature and extent discussions. These samples are included in the risk assessment. All data carried through the risk assessment should be included in the nature and extent discussions. GSU requests that the Navy include the three soil samples collected from the Zone 16 parcel evaluation in the nature and extent discussion, for completeness. The addition of these data would not constitute a significant effort.	The data are not eliminated from the nature and extent discussion. Section 4.1.2.4 discusses the two analytical results, the locations are shown on Figure 4-1, and the two analytical results are tabulated in Appendix B. The historical information referenced in this comment is used to conclude that a data gap exists and mapping or detailed presentation of the information makes no impact on the nature and extent discussion for the IR Site 31 RI. The scope of the IR Site 31 RI nature and extent is to discuss and map the new data collected during this RI.

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#	Reference	Comments	Responses
8.	Section 4.1.3.3 – Evaluation of Background Metals	Please clarify why only metals that exceeded PRGs are discussed, and not those that exceeded the ecological regulatory criteria specified in Section 4.1.2.	Please see response to Comment 6b. Ecological information is presented in Section 6.2.
9.	Section 4.1.3.3 – Evaluation of Background Metals	The revised draft RI report states that there is strong evidence that the metals in soil at IR Site 31 are not the result of a release from Navy activities and are ambient concentrations. However, there is no support for this statement. The background analysis presented in Appendix H1 shows that 15 out of 17 metals were reported above the Alameda Point pink background data set. The RI report states that historical use of the site by the Navy does not indicate any activity that would have resulted in an increased concentration of 15 metals. However, the RI report also states that the Alameda Point pink background data set is not suitable for use at IR Site 31. If this is not a suitable data set, then the evaluation with respect to this data set does not provide useful information for the purpose of determining possible releases, and there is no background evaluation for metals other than arsenic in the revised draft RI report. Please revise this discussion (see General Comment B).	Additional statistics for selected metals have been included in the Draft Final RI Report, as described in the response to General Comment B.
10.	Section 4.1.4.1 – Arsenic at IR Sites 30 and 31	GSU defers to the DTSC Human and Ecological Risk Division as to the appropriate use and application of the referenced DTSC policy (1997) for evaluation arsenic in soil as described in this section and in Appendix H2.	Comment noted.

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#	Reference	Comments	Responses
11.	Section 4.1.4.3 – Fill History and Lithology	a. The conclusion that East Housing Area soil has a high gravel content similar to IR Sites 30 and 31 is not fully supported. This interpretation is based solely on qualitative statements made on boring logs about the "presence" of gravel. Appendix H2 indicates that descriptions on boring logs for the East Housing Area did not follow the Unified Soil Classification System or American Society for Testing and Materials standards. Further support for this conclusion should be provided, or it should be removed from the report. b. GSU questions whether there are lithologic data available from the FISCA Warehouse Area between IR Site 31 and the East Housing Area. Based on the fill history, it is expected that data from this area would also show the presence of "gravel-laden" fill material. Please clarify whether lithologic data from the FISCA Warehouse Area are available and if so, include them in the analysis.	As discussed in the response to General Comment A, the lithological evaluation has been provided as qualitative information on possible differences in the sources of the fill material at IR Sites 30 and 31. This evaluation is not crucial to the evidence that the concentrations of arsenic at IR Site 31 meet the criteria for an ambient population or that no release has occurred. However, the following information has been included to address the requests in this comment: a.) The boring logs for the East Housing Area have been included in the Draft Final RI Report in Attachment C to Appendix H2. In addition, as part of this response to comments, the logs were provided to EPA and DTSC electronically via FTP site. The discussion in regarding "high gravel content" has been deleted from the document. b.) The available boring logs for the FISCA Warehouse Area have been included in the Draft Final RI Report in Attachment C to Appendix H2. The available boring logs for the FISCA Warehouse Area were reviewed as part of the qualitative evaluation presented in the Draft RI Report – Revision I. Additionally, geotechnical information from soil samples collected in the FISCA Warehouse Area was presented in Table 2 of Appendix H2 in the Draft RI Report – Revision I. An extensive search to locate a boring log for every borehole advanced in the FISCA Warehouse Area was not conducted. However, additional references have been reviewed and any additional available boring logs have been included in Attachment C and discussed in Appendix H2 of the Draft Final RI Report.
12. 12.	Section 4.1.4.4 – Arsenic Concentrations East of Main Street	The revised draft RI report implies that arsenic levels in soil east of Main street are ambient by stating that arsenic concentrations higher than those in the Alameda Point pink background data	The Navy does not state that the concentrations of arsenic are ambient at any location east of Main Street other than at IR Sites 30 and 31. The text has been clarified in Section 4.1.4 regarding arsenic concentrations at IR Site 31 and adjacent locations.

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#	Reference	Comments	Responses
cont.		set can be found at ambient levels in fill soil east of Main Street. Without a comparison of common rock-forming elements such as iron and manganese, or other lines of evidence, this statement is not supportable and should be removed from the report.	
13.	Section 4.2.3.2 - Inorganic Analytes	The maximum concentrations for cadmium and lead shown on Table 4-6 are inconsistent with the maximum concentrations for these metals shown on Table 4-4. Please resolve this discrepancy.	Table 4-4 presents results for analytes detected at least once in groundwater samples collected for the IR Site 31 RI sampling event of November 2005. Table 4-6 presents groundwater sample results collected for the RI during the IR Site 31 November 2005 sampling event from monitoring wells and temporary wells with sample depths that correlated to monitoring well sample depths and compared to analytical results from monitoring wells reported in the spring 2005 annual groundwater sampling report (ITSI 2005). The tables are presenting different data hence the differences in sample results. There is no discrepancy in the tables. The text in Section 4 has been clarified to describe these tables in more detail. The information in Table 4-6 will be updated to include the 2006 basewide groundwater monitoring data in addition to the November 2005 RI data for the Draft Final RI Report.
14.	Section 4.2.4.3 - Comparison of IR Site 31 Data to Plume	Please discuss the groundwater results for metals in greater detail per General Comment C.	Please see response to comment C.

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#	Reference	Comments	Responses
15.	Section 5.1.2 - Distribution of Contaminants, Soil	a. The statement that the surficial fill materials at IR Site 31 are yellowish-brown, clayey gravel is not supported by the lithologic information presented on boring logs in Appendix D, geotechnical analyses in Appendix E, or the grain-size distribution analysis in Appendix H2. These data indicate that the surficial materials are predominantly sands with varying amounts of fines and gravel. Please revise the interpreted lithology to reflect site-reflect site-specific data as supported by the appendices. b. The statement that there are multiple lines of evidence to suggest that the levels of metals in soil are ambient is not supported (see Specific Comment 19). Please revise or remove this statement.	a. The revised Appendix H2 Sections 3.2, 3.3 and 3.4 provide supporting data. In addition, a review of the IR Site boring logs in Appendix D shows that a description of yellow brown, olive brown, brown, and the presence of gravel are described in all but a very few logs. Appendix H2 Figure 6 shows the gravel content from grain-size analyses at 26 to 30 percent and 12 to 16 percent fines (clay/silt). The significant conclusions are that the gravel content in surficial soil at IR Sites 30 and 31 varies from 43 to 30 percent, whereas IR Site 25 has only 7 percent gravel. If needed, the description could be revised to indicate that the surficial fill soil type varies from yellow-brown, gravely-clayey sand to a yellowish-brown, clayey gravel. b. The statements regarding multiple lines of evidence that support the conclusion that metals concentrations in soil are ambient have been revised. These statements now draw conclusions about only the selected metals for which an evaluation of the DTSC criteria for an ambient population has been conducted.
16.	Section 7.1 - Conclusions	The revised draft RI report does not explain the presence of elevated levels of chromium, lead, and nickel in soil, nor does it discuss the elevated chromium, lead, and cadmium in groundwater (see General Comments B and C). Therefore, GSU does not agree that the revised draft RI report presents sufficient evidence to support the conclusion that there have been no releases from past Navy activities at IR Site 31. Please provide additional support for the conclusions regarding past releases with respect to these and possibly other metals.	The Draft Final RI Report Section 4.1.4 and elsewhere clearly identify that residential soil PRGs were exceeded by arsenic, iron, lead, and vanadium. All other inorganics in soil are below the criteria and cannot be considered "elevated." For lead, only two of the 126 detected results exceeded the criteria. These two of 126 results cannot be considered as representing "elevated" concentrations of lead at IR Site 31. The concentrations of inorganics, the distribution of detections, and results of the risk assessment, support the conclusions that the presence of inorganics is not related to a release of hazardous substances. The risk assessment results included these inorganics and show that (excluding arsenic) the presence of these inorganics in soil has residual risk that does not warrant evaluating remedial

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#	Reference	Comments	Responses
16. cont.			alternatives in an FS. To further substantiate that inorganics have not been released at IR Site 31, and in response to other review comments, revisions were made. The Draft Final RI Report includes an evaluation of five additional metals by statistical methods (DTSC 1997) to differentiate between concentrations of metals in soil that are related to site activities and metals that are present at ambient concentrations and not related to site activities. The five inorganics, cadmium, chromium, iron, lead, and vanadium, were selected for statistical evaluation based upon the following: Iron, lead, and vanadium are being evaluated because these inorganics are at concentrations greater than the residential PRG criteria. Cadmium is being evaluated because of its contribution to human health risk. Chromium is being evaluated because concentrations in groundwater samples collected during the IR Site 31 RI sampling event of November 2005, showed concentrations greater than concentrations in historic groundwater data. See response to General Comments B and C.
17.	Section 7.1.2 - Groundwater	The conclusion that the groundwater contamination beneath IR Site 31 is consistent with the OU-5/IR-02 groundwater plume does not appear to be true for metals. In particular, lead, cadmium, and chromium were found in groundwater beneath IR Site 31 at concentrations greater than Alameda Point background values, the area-wide plume values, and their respective MCLs. The RI report should provide further evaluation of metals in groundwater to determine whether or not these metals are the result of on-site sources.	Revisions to the RI report have been made. Please see response to General Comment C for a discussion of inorganics in groundwater at IR Site 31. Metals are present throughout the OU-5/IR-02 groundwater plume at various concentrations and are not identified as chemical contaminants that are targeted for remediation, and therefore, were not the focus of the comparisons to impacted groundwater.

Following are responses to comments provided by Dot Lofstrom and Michelle Dalrymple dated 18 January 2007 to Draft RI Report Dated 29 November 2006

#	Reference	Comments	Responses
18.	Section 7.2 - Recommendations	GSU cannot concur with the recommendation of no further action without further supporting information for metals in soil and groundwater, as requested (see general Comments B and C).	Revisions were made to address this comment. See response to General Comments B and C.

References cited:

- Cook, P.D. 1998. Estimating Background Concentrations of Inorganic Analytes from On-Site Soil Sample Data. Superfund Risk Assessment in Soil Contamination Studies: Third Volume, ASTM STP 1338, K.B. Hoddinott, Ed., American Society for Testing and Materials.
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- Fleischhauer, H.L., and N. Korte. 1990. Formation of Cleanup Standards for Trace Elements with Probability Plots. Environmental Management (Vol. 14, No. 1), Springer-Verlag, New York, NY, pp. 95-105.
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Response to Comments – DTSC - HERD
Draft Soil Remedial Investigation Report Revision I IR Site 31, Soil Former NAS Alameda Point, Alameda, California

Following are responses to comments provided by James Polisini dated 9 April 2007 to Draft RI Report Revision I Dated 29 November 2006

#	Reference	Comments	Responses
General Review			
1.	James M. Polisini, Ph.D., Staff Toxicologist, HERD	HERD reviewed the document titled *Draft Soil Remedial Investigation Report – Revision I for IR Site 31 Marina Village Housing, Alameda Point, Alameda, California,* dated November, 2006. This document was prepared by CDM Federal Programs Corporation, of San Diego, California. HERD reviewed the previous version of this document titled *Draft Soil Remedial Investigation Report for IR Site 31 Marina Village Housing, Alameda Point, Alameda, California,* dated April, 2006 in a HERD memorandum dated June 26, 2006 and met with the Navy and Navy consultants on August 24, 2006 to discuss those comments. Installation Restoration (IR) Site 31 was designated an IR site because groundwater beneath the site is impacted by an area-wide Volatile Organic Compound (VOC) plume containing benzene, naphthalene and chlorinated VOCs beneath IR Site 31 and surrounding areas, some of which are also IR sites. Area-wide human health impacts associated with the VOC groundwater plume were addressed in the IR Site 25 HHRA. IR Site 31, now called Marina Village Housing, was historically used for storage and warehousing on portions of the site from 1950 to 1990. There is no documented spill or release at IR Site 31, however previous investigations report that IR Site 31 soil may be impacted by polycyclic aromatic hydrocarbons (PAHs). In 1930, the U.S. Army acquired the original base property from the City of Alameda and began	Comment noted.
1.			

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#	Reference	Comments	Responses
cont.		construction activities in 1930. In 1936, the Navy acquired title to the land from the Army and began building an air station. Construction of the Base included filling tidelands, marshlands, and sloughs with dredge materials from the San Francisco Bay. Naval Air Station Alameda (NASA) was an active naval facility from 1940 to 1997. Base operations included aircraft, engine, gun and avionics maintenance; engine overhaul and repair; fueling activities; and metal plating, stripping and painting activities.	
General Comments			
1.		A detailed presentation of arsenic concentrations in soil at sites east of Main Street is provided in support of at least two new ambient data sets for sites east of Main Street. Fill history records are cited as demonstrating that fill material was placed during the same period for the East Housing Area, IR Sites 30 and 31, a portion of the College of Alameda campus adjoining the East Housing Area, and a portion of Fleet Industrial Supply Center Alameda (FISCA) between IR Site 31 and the East Housing Area, and the FISCA Warehouse Area. The notation 'gravel-laden' in the boring logs, soil type classification, soil color and fill history is also provided as supporting the common soil type in these areas. The discussion of 'ambient' concentrations, particularly for soil arsenic, is persuasive but refers to IR Site 30 and 31 soils in the text to the exclusion of the other areas listed as having similar 'gravel-laden' soils. Please carefully define the data set which is compared to the 'pink' ambient as: 1) only IR 30 and IR 31 soil samples; or	The initial approach discussed in the meeting with the regulatory agencies on August 24, 2006, was to evaluate data from IR Site 25, College of Alameda, the FISCA property, and the East Housing Area as potential sources of background data for IR Sites 30 and 31 in lieu of the Alameda Point pink background data set. This evaluation of potential sources of background was conducted and presented in the Draft RI Report-Revision I issued in November 2006. During this evaluation, the statistical evaluation of data indicated that it is unnecessary to identify a new background data set for this area because the arsenic data for IR Site 31 meet the criteria for a single population (DTSC 1997). The East Housing area, or any other potential background location, is not needed and not proposed as a new background location. The Site 31 Draft RI Report - Revision I, provided an evaluation of the fill history, the chemistry and lithology of IR Site 25, IR Site 30, College of Alameda, the FISCA property, and the East Housing Area because this was discussed and requested by the regulatory agencies during the August 24, 2006 meeting and to demonstrate the following points. • The arsenic concentrations at IR Site 31 are not unique to this location. There are other areas (e.g., IR Site 30, the FISCA Warehouse Area, and the East Housing Area, totaling
1. cont.			

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#	Reference	Comments	Responses
1. cont.		define the data set which is compared to the 'pink' ambient as: 1) only IR 30 and IR 31 soil samples; or 2) soil samples from all the 'gravel-laden' locations listed above. If only IR 30 and 31 soils are compared please support excluding soil samples from the other areas with 'gravel-laden' soils east of Main Street. An analysis of all inorganic elements, particularly cadmium, should be provided in support of the proposal for two new NAS Alameda ambient data sets for the area east of Main Street described as from: 1) the placement of high-gravel content upland soils; and 2) the hydraulic fill, low gravel, areas. HERD accepts the conclusion of little or no terrestrial ecological hazard, given the habitat currently existing at IR Site 31. The detailed Human Health Risk Assessment (HHRA) calculations were reviewed in the previous version of the Draft IR Site 31 Soil Remedial Investigation (RI) Report. The CD-ROM containing the detailed HHRA calculations for Revision I (Appendix I) was unreadable on multiple drives on multiple computer workstations. Please provide a readable CD-ROM prior to completion of the Draft Final IR 31 Soil RI Report.	approximately 140 acres) with similar arsenic concentrations. • Possible explanations for the differences in the arsenic concentrations between the 140-acre area and the Alameda Point pink background are differences in lithology and fill history. The evaluation of the fill history, the chemistry, and lithology of adjacent sites is supplemental information and is not essential to evaluating whether a release of arsenic (or other metals) has occurred at IR Site 31. The DTSC (1997) evaluation determines whether arsenic is ambient. To avoid confusion, revisions were made in the Draft Final RI Report. Section 4.1.4.2 in the Draft Final RI Report and Section 2 in Appendix H2 was renamed "Other Metals at IR Site 31" rather than "Off-site Background Locations." As is typically done for an RI, in the Draft RI Report, the concentrations of each metal at IR Site 31 were statistically compared to the Alameda Point pink background data set using the protocol agreed upon with U.S. EPA as presented in Appendix H1 of the Draft RI Report - Revision I. Similar information is provided for metals at IR Site 30 in the IR Site 30 RI Report (BEI 2005). This analysis was not conducted for other adjacent locations having similar soil with the exception of an analysis of arsenic in the East Housing Area data set. Arsenic was selected for statistical evaluation following the DTSC policy methods (DTSC 1997) because of the different fill history in this area, no background samples collected in this area, and because only arsenic is of potential concern at IR Site 31 based on the risk assessment. When arsenic, which has been determined to be ambient, is removed from the IR Site 31 risk assessment, the residual risk does not warrant evaluating remedial alternatives in an FS. The concentrations of arsenic at IR Sites 30 and 31 were evaluated

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#	Reference	Comments	Responses
1. cont.			separately using the DTSC 1997 criteria to identify ambient populations. The purpose of the policy is to identify whether a release of metals has occurred at IR sites by identifying metals in soil that are related to site activities and metals that are present at ambient concentrations and not related to site activities. There are other published papers on the use of probability plots for identification of ambient populations using methods that are similar to the DTSC policy (Cook, 1998; Fleischhauer and Korte, 1990; Sinclair, 1976; and Singh et al., 1994). Revisions were made. The discussion of gravel content in soil is included to help explain the presence of a 140-acre area with arsenic concentrations that are different from those of the Alameda Point pink background data set. The differences in physical characteristics suggest that the soils may be from different sources. However, the presence of gravel is not considered sufficient justification for combining data from adjacent locations into a larger ambient data set. To combine data sets into a single ambient data set, there would need to be evidence that the soils were from the same source or that the chemical compositions were statistically similar. The sources of the fill soil in specific areas east and west of Main Street are not known. Analyses to determine whether the concentrations of metals at IR Site 31 were statistically similar to those at any adjacent location were not conducted. The physical characteristics of the soil, such as the absence or presence of gravel, may provide some indication that two soils came from a different source. However, the presence of gravel in two soils does not necessarily prove that the source of the fill soil is the same. The Draft Final RI Report includes revisions to perform the statistical evaluations (DTSC 1997) on concentrations of the three inorganics lead, iron, and vanadium that have concentrations greater than residential

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1. cont.			PRGs, plus cadmium and chromium. The purpose of the statistical evaluation is to differentiate between concentrations of metals in soil that are related to site activities and metals that are present at ambient concentrations and not related to site activities. Cadmium is being evaluated because of its contribution to human health risk. Chromium is being evaluated because concentrations in groundwater samples collected during the IR Site 31 RI sampling event of November 2005, showed concentrations greater than concentrations in historic groundwater data. A new CD, which was verified as usable, was sent to DTSC-HERD on May 15, 2007. Note that the information on this CD represents the HHRA which is the same as that included in the Draft RI Report - Revision I.
Specific Comments			
1.		U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) and California modified PRGs for arsenic, lead, iron and vanadium were checked and found to be arithmetically correct (Table 4-2).	No response needed.
2. 2.		The benzo(a)pyrene (BaP) soil concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) is generally higher in the western portion of IR Site 31 at depths greater than 2 feet (Section 4.1.3.2, page 4-9). The BaP equivalent 0-4 feet bgs soil concentration ranges from 1.4µg/kg to 4,200 µg/kg, while the 4-8 feet bgs soil BaP concentration ranges from 3.9 µg/kg to 71,000 µg/kg. HERD recommends OMF consider a deed restriction prohibiting potential future users from excavating below 4 feet bgs.	No response is needed however the Navy provides this information for DTSC's consideration. Exposure to semivolatile (PAH) compounds does not contribute significantly to human health risks. Other than benzo(a)pyrene, cancer risk from all other PAH compounds is less than 10^{-6}. As shown in Table 6-8, the Cal/EPA risk value from benzo(a)pyrene for the future residential scenario is 1×10^{-5} which includes all soil from 0 to 7 feet. The Cal/EPA risk value from benzo(a)pyrene (Table 6-5) for the current residential scenario is 3×10^{-6} which includes soil from 0 to2 feet. Risks from naphthalene, which is not discussed as a risk driver in Section 6, has a total cancer risk of 4×10^{-7} for all pathways. Risks from exposure to PAHs are within the acceptable risk management range.

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cont.			City of Alameda Ordinance No. 2824, Alameda Municipal Code Chapter XIII, Section 13-56 contains institutional controls enforced through out Alameda Point. These institutional controls restrict uncontrolled excavations and specify a depth of five feet as the threshold limits for excavation in the western one-third and specifically the northwest portion of IR Site 31. Excavation below a depth of 4 feet is already limited by the depth to groundwater at the site which is typically encountered between 4 and 5 feet below ground surface. Also the area of concern is small and below a depth of 4 feet. Exposure is based on an estimate of the average concentration. It is unlikely that anyone would be exposed to significant amounts of soil below 4 feet in the small area at the northwest portion of IR Site 31.
3.		The Cal-modified residential soil PRG for naphthalene (Section 4.1.3.2, page 4-10) is arithmetically correct. However, PRGs do not include the inhalation of outdoor or indoor air exposure pathway. The inhalation pathway for naphthalene and other Volatile Organic Compounds (VOCs) is adequately evaluated by other modeling and comparisons in addition to this PRG comparison. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.

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#	Reference	Comments	Responses
4.		The majority of the total risk estimate is due to arsenic in IR Site 31 soil. IR Site 31 soil arsenic is elevated above the NASA 'pink' ambient arsenic concentration. The proposal is made that the arsenic concentrations in IR Site 30 and IR Site 31 soil are naturally occurring and that the Alameda Point background concentrations are not applicable (Section 4.1.3.3, page 4-11). The argument presented for differing ambient data sets based on placement of upland fill in some areas and hydraulic fill in some other areas east of Main Street is persuasive for arsenic (Appendix H1 and H2). However, additional comparisons are required for the other inorganic elements. See HERD specific comments on Appendix H1 and H2 below. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
5.		A subset of the human health-based screening criteria and ecological screening criteria (Table 4-2) were checked and found to be arithmetically correct. The human health-based screening criterion for chromium is the U.S. EPA Region 9 Preliminary Remediation Goal (PRG) which assumes a 6:1 ratio of trivalent chromium (Cr^{+3}) to hexavalent chromium (Cr^{+6}). While no site-specific evidence is provided for the IR Site 31 ratio of Cr^{+3} to Cr^{+6}, this ratio should be health-protective given the history of IR Site 31 and IR Site 30 site-related activities. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.

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6.		Historic IR-05 groundwater sample results from within the IR Site 31 boundary are mapped (Figure 4-17) but not included in the evaluation of whether IR Site 31 groundwater contamination is associated with the IR 25 area groundwater plume (Section 4.2.2, page 4-21) even though these sample results do no represent the current plume conditions. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
7.		HERD defers to the DTSC GSU, or the DTSC Project Manager, for evaluation of the methodology used for comparison and the conclusion made of no significant difference between IR Site 31 groundwater concentrations and the IR Site 25 area wide groundwater concentrations (Section 4.2.4, page 4-23 through page 4-27).	No response needed.
8.		Please amend the text to ensure that reference to the NASA risk management criterion of 620 µg/kg BaP equivalents for carcinogenic PAHs always includes the indication of BaP equivalents rather than generic reference to PAH concentrations (e.g., Section 6.1.1, page 6-1).	The indication of BaP equivalents rather than a generic reference to PAH concentrations in the text has been amended where applicable.
9.		The vapor migration modeling (i.e., Johnson and Ettinger) for shallow groundwater to indoor air uses a hypothetical shallow groundwater sample which uses the maximum Volatile Organic Compound (VOC) concentration found in any groundwater sample (Section 6.1.3, page 6-4). This methodology is accepted as a protective estimate of exposure.	No response needed.

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10.		The proposed human health exposure pathways (Section 6.1.3, page 6-3 and 6-4) are sufficient to evaluate current and potential future human exposures. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
11.		A subset of the incremental cancer risk and non-cancer hazard values presented in the text (Section 6.1.5, page 6-5 through -10) were compared to the relevant tables (Table 6-2 through 6-11) and found to agree. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
12.		The report contains the statement that the 'Navy reserves the right to evaluate the legal and technical justification for the Cal/EPA toxicity values and accept or reject them before or at the time of cleanup decisions' (Section 6.1.4, page 6-5; Section 6.1.5.1.4, page 6-9). This statement of the Navy's options to re-evaluate, stronger than past similar statements, does not alter the fact that HERD is required to use the Cal/EPA toxicity values developed by the Office of Environmental Health Hazard Assessment (OEHHA) in human health risk assessments. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.

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#	Reference	Comments	Responses
13.		The statement that cadmium is most likely present at concentrations below NAS Alameda 'pink' ambient (Section 6.1.5.1.1, page 6-6) is not supported by either the conclusions (Appendix H1, Section H1.3, page H-4) or the summary tables for surface soils (Table H-9) or vadose zone soils (Table H-10). Please amend the text and carry cadmium risk forward in the HHRA.	The HHRA calculations were revised to include cadmium which has an EPA cancer risk less than 1×10^{-6} and a Cal/EPA cancer risk of 2×10^{-6} (see Appendix I tables). The statistical comparison of cadmium to Alameda Point pink background indicated that cadmium was above background based on inspection of dot plots. The cadmium data set for IR Site 31 is much larger than the cadmium Alameda Point background data set. The Alameda Point pink data set has 3 detected values for cadmium and the IR Site 31 has 46 detected values. Due to the difference in the size of the data set, it was judged that cadmium concentrations at IR Site 31 could be similar to the Alameda Point background concentrations. Therefore, the cancer risks without cadmium were discussed in the risk characterization section because it is likely that this metal is present at concentrations below background. However, as noted in the response to General Review Comment 1, additional statistics for cadmium in soil will be conducted and included in the Draft Final RI Report. The text in the Draft Final RI Report will be revised as necessary to reflect the outcome of these calculations.
14.		HERD provisionally considers the 'East of Main Street' upland fill arsenic data set as representative of IR Site 31 ambient arsenic (See HERD specific comment below). The HHRA statements made regarding IR Site 31-specific arsenic ambient concentrations (Section 6.1.5.1.4, page 6-8) should be considered valid. HERD does not agree that the ambient cadmium issue has been resolved. HERD recommends OMF consider only total risk and/or hazard estimates for cadmium until the issue of IR Site 31-specific cadmium ambient is resolved.	Although cadmium, with a maximum detected concentration of 1.5 mg/kg, is less than the residential PRGs of 37 mg/kg, because of its contribution to cancer risk (EPA cancer risk less than 1×10^{-6} and a Cal/EPA cancer risk of 2×10^{-6}), additional statistical analyses will be performed at the request of DTSC, to determine whether the cadmium data represent an ambient population.

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#	Reference	Comments	Responses
15.		The estimates of risk associated with domestic use of groundwater included in the future residential use scenario are taken, as calculated in 2004, from the Final Groundwater RI/FS for Site 25/IR-02 (Section 6.1.5.1.2, page 6-8). These calculations do not, apparently, consider naphthalene as a carcinogen (Section 6.1.7, page 6-13). However, as a site-specific exemption, given that: 1) naphthalene in shallow groundwater is evaluated as a carcinogen in the groundwater to indoor air exposure pathway; 2) domestic use of groundwater by potential future residents is extremely unlikely; and, 3) both benzene and naphthalene in groundwater will be remediated by the preferred alternative agreed to in the Draft Final Proposed Plan for OU 5/IR-02 Groundwater (CDM, 2005) this treatment is acceptable. This risk assessment methodology should not be implemented at other sites.	Comment noted.
16.		The results of the indoor air evaluation of nearby Parcel 181 Coast Guard housing (Section 6.1.6.3, page 6-11) would appear to offer evidence that indoor air intrusion, at least at for conditions similar to those at Parcel 181, may be less than modeled for IR Site 31 should be considered when evaluating remedial alternatives for IR Site 31. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.

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#	Reference	Comments	Responses
17.		Please revise the statement, for the child receptor, that 100 percent absorption is assumed (Section 6.1.6.4, page 6-12). The correct statement of the assumed arsenic absorption is that it is identical to the absorption in the toxicity experiment used as the basis to estimate the Cancer Slope Factor (CSF) and/or the Reference Dose (RfD).	The statement in Section 6.1.6.4 has been revised to read as follow: "This HHRA assumed that children (0-6 years of age) ingest 200 milligrams of soil daily and that the arsenic in the soil is 100 percent biologically available."
18.		The summary statements regarding arsenic concentrations at other sites which were finally determined to be 'acceptable' by either DTSC or EPA (Section 6.1.6.4, page 6-12) are risk management decisions. Site-specific risk management decisions, made after consideration of the nine 'balancing' criteria, are not directly indicative of the relative risk and/or hazard and not directly transferable to IR Site 31. Please remove this summary paragraph and present it in the IR Site 31 Feasibility Study (FS).	Because an FS for IR Site 31 is not required to support remedial decisions, it is appropriate to include the information in the Draft Final RI Report to support recommendations for making risk management decisions as noted in the comment. The information will remain in the Draft Final RI Report. The following information will also be added to Section 6.1.6.4: "Similar concentrations of arsenic are also found in other areas of Alameda Point. The exposure point concentration for arsenic at IR Site 31 of 11.7 mg/kg (0-8 feet bgs) is similar to the Alameda Point yellow background data set (which is remote from IR Site 31) at 11.9 mg/kg and lower than that for the adjacent East Housing Area of 16.3 mg/kg."
19.		The statement that cadmium may not be greater than the NAS Alameda 'pink' ambient concentration (Section 6.1.8, page 6-14), due to unbalanced data sets, is unsupported by, and not mentioned in, the detailed background analysis (Appendices H1 and H2). In fact, many inorganic elements had more detected concentrations than cadmium (e.g., chromium, copper and lead; Table 6-13). Either remove this statement or include the statistical detail necessary to support it.	Additional statistical analyses of the cadmium data set were performed, as explained in the response to General Review Comment 1 and Specific comment 14.

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#	Reference	Comments	Responses
20.		The Screening Level Ecological Risk Assessment (SLERA) Hazard Quotients (HQs) (Table 6-14) and Refined Ecological Risk Assessment (ERA) HQs (Table 6-15) are based on No Observable Adverse Effect Level (NOAEL) Toxicity Reference Values (TRVs). Consideration of a 10 percent Site Use Factor (SUF) (Section 6.3.2, page 6-23), which HERD considers protective for IR Site 31, leaves 2 Contaminants of Ecological Concern (COECs), lead and nickel, with terrestrial vertebrate NOAEL-based HQs greater than 1. Given the additional difference between the NOAEL TRVs used to calculate the vertebrate HQs and the Lowest Observable Adverse Effect Level (LOAEL), HERD considers the probability of adverse effects for vertebrate receptors minimal given the current landscaped habitat present at IR Site 31. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
21.		HERD and the Navy have yet to resolve some issues regarding potential outliers in the NAS Alameda 'pink' ambient data set. The comparison of IR Site 31 to background HQs (Table 6-16) should not be the basis of any risk management decisions regarding ecological hazard. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
22.		Given the current and potential future ecological habitat present at IR Site 31, HERD accepts the recommendation for no further investigation or assessment of ecological hazard (Section 6.3.3, page	Comment noted.

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#	Reference	Comments	Responses
22. cont.		6-24) based on the criteria outlined in Specific Comment number 20 above. Changes in future land use which lead to the establishment of more significant ecological habitat at IR Site 31 would require a more detailed ERA.	
23.		HERD recommends that consideration of the recommendations for IR Site 31 (Section 7) be delayed until the issue of 'East of Main Street' cadmium ambient is resolved. This issue can be addressed prior to addressing the upland fill and hydraulic fill components of the 'East of Main Street' ambient for all other inorganic elements.	Additional statistical analyses of the cadmium data set were performed, as discussed in response to General Review Comment 1.
24.	**Appendix H1 - Inorganics Background Comparison**	Box and whisker plots were prepared for all inorganic elements where the Wilcoxon Rank Sum (WRS) test was performed (Appendix H1, Section H1.2, page H-3). If the null hypothesis was accepted, the box plots were examined to assure that the upper tail of the site data did not exceed the upper tail of the 'pink' background data set (Appendix H1, Section H1.2, page H-4). This investigation step was discussed during the August 24, 2006 meeting with regulatory agencies. This comment is meant for the DTSC Project Manager and no response is required from the Navy or the Navy contractor.	No response needed.

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#	Reference	Comments	Responses
25.		The results of the WRS test of 'pink' ambient concentrations to IR Site 31 soil samples for both the surface soils (Table H-7) and the vadose zone soils (Table H-8) indicate that IR 31 soil concentrations exceed 'pink' background soils for all 11 elements compared with the exception of beryllium. This seems highly unlikely based solely on a difference in soil type for the imported soil, as later described (Appendix H2). While the detailed comparison for arsenic (Appendix H2) is persuasive, HERD defers to the DTSC Geological Services Unit (GSU) regarding the proposal that the IR Site 31 imported soil provides a sufficient explanation for the IR Site 31 soil concentrations elevated above 'pink' ambient for all elements evaluated except beryllium.	No response needed.
26.	**Appendix H2 - Preliminary Draft Site Specific Background IR Sites 30 and 31**	The proposal is presented that imported soils, with concentrations of inorganic elements in excess of NAS Alameda soil 'pink' ambient concentrations, are present at IR Site 30 and IR Site 31 (Appendix H2, page i). A detailed area-specific ambient assessment was prepared only for arsenic, as arsenic is the primary contributor to the risk estimate among the inorganic elements (Appendix H2, page i; Appendix H2, Section 1, page 2; Appendix H2, Attachment A). A similar detailed area-specific ambient assessment must be prepared for all inorganic elements.	Additional statistical analyses were conducted, as discussed in the response to General Review Comment 1. Appendix H2 of the Draft Final RI Report was revised to include an evaluation of five additional metals by statistical methods (DTSC 1997) to differentiate between concentrations of metals in soil that are related to site activities and metals that are present at ambient concentrations and not related to site activities. The five inorganics, cadmium, chromium, iron, lead, and vanadium, were selected for statistical evaluation based upon the following: Iron, lead, and vanadium are being evaluated because these inorganics are at concentrations greater than the residential PRG criteria (arsenic was already evaluated). Cadmium is being evaluated because of its contribution to human health risk. Chromium is being evaluated because concentrations in groundwater samples collected during the IR Site 31 RI sampling event of November 2005, showed concentrations greater than concentrations in historic groundwater data.

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#	Reference	Comments	Responses
27.		IR Site 30 and IR Site 31 soils are described as statistically 'higher' in iron and manganese concentrations than the 'pink' ambient data set (Appendix H2, page ii; Appendix H2, Section 2.1, second bulleted item). A box and whisker plot comparison of IR Site 30 and IR Site 31 soils to 'pink' ambient data set is provided only for iron. Please provide the basis for stating that manganese is also elevated in IR Site 30 and IR Site 31 soils.	The text in Appendix H2 Section 2.1 has been corrected to show that only manganese data at IR Site 30 were statistically compared to the Alameda Point pink data set. At IR Site 31, the approved work plan did not include manganese in the initial list of analytes. The unvalidated manganese data were summarized for comparison purposes in Table B5 of Attachment B to Appendix H2.
28.		Fill history records are cited as demonstrating that fill material was placed during the same period for the East Housing Area, IR Sites 30 and 31, a portion of the College of Alameda campus adjoining the East Housing Area, and a portion of Fleet Industrial Supply Center Alameda (FISCA) between IR Site 31 and the East Housing Area, and the FISCA Warehouse Area (Appendix H2, page ii; Appendix H2, Section 3.1, page 5). A more detailed inter-group comparison than similar boring logs indicating 'gravel-laden' material (Appendix H2, page iii; Appendix H2, Section 3.2, page 6), including box and whisker plots comparing the soil concentrations for each of these areas, must be presented in support of concluding that this single fill episode used similar fill material for all areas.	The text in Appendix H2 Section 2.1 has been revised to state that the discussion of gravel content is included to help explain the presence of a 140-acre area that had concentrations of arsenic different from those in the Alameda Point pink background data set. The explanation is that there may be more construction fill in this area than in the areas with lower arsenic concentrations, which are predominantly hydraulic fill. Appendix H2 does not conclude that the construction fill used in this 140-acre area is all from the same source.

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29.		The soil of IR Sites 30 and IR 31 are described as significantly higher in iron and manganese concentrations than 'pink' ambient data set (Appendix H2, Conclusions, page iv). In fact, East Housing Area samples are excluded from the proposed 'east of Main Street' ambient data set due to the lack of iron and manganese data. However, only a comparison of iron in the IR Site 30 and 31 data set to the 'pink' ambient data set is provided (Appendix H1). Please provide the manganese comparison between the IR Site 31 and 31 data set and the 'pink' ambient data set.	See response to Specific Comment 27 explaining that a statistical comparison of manganese concentrations in soil at IR Site 31 with the Alameda Point pink background data set was not performed.
30.		The bullet item in the summary, immediately following the exclusion of the East Housing Area data from the IR Site 30 and 31 ambient data set (Appendix H2, page v), states that East Housing Area and portions of FISCA Warehouse Area, between the East Housing Area and IR Site 31, compose an area with similar concentrations of arsenic. A much more detailed listing (Appendix H2, page ii) of 'gravel-laden' areas east of Main Street was previously provided as: a. The East Housing Area; b. IR Sites 30 and 31; c. A portion of the College of Alameda campus adjoining the East Housing Area; d. A portion of Fleet Industrial Supply Center Alameda (FISCA) between IR Site 31 and the East Housing Area; and, e. The FISCA Warehouse Area. Given that the East Housing Area is excluded	The sources for the surface soil and vadose-zone soil data sets are the separate data sets for IR Sites 30 and IR Site 31. Data from adjacent sites were not combined with data from IR Sites 30 or 31. See also response to General Review Comment 1. The text in Appendix H2 has been revised to explain that the data from adjacent locations are not included in the IR Site 30 or 31 statistical data analyses.

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#	Reference	Comments	Responses
30. cont.		for the data set described as IR Site 30 and IR Site 31 soils, please clearly define the source areas for the surface soil and vadose soil data sets described throughout this report as the IR Site 30 and 31 soils.	
31.		While IR Site 30 and IR 31, the East Housing Area, and portions of the FISCA Warehouse Area between the East Housing Area and IR Site 31 may represent a 'gravel-laden' area of elevated arsenic concentration (Appendix H2, page v), a similar detailed inter-group comparison of all inorganic elements, including box and whisker plots comparing the soil concentrations for each of these areas, must be presented in support of concluding that this proposed single fill episode used similar fill material for all areas.	As explained in the response to Specific Comment 28, the discussion in H2 does not propose that all the gravel-laden material or all the soil in the 140-acre area with different arsenic concentrations came from the same source. The possibility that these 140 acres were filled in the same time frame helps to explain why the soil concentrations could be similar. However, it does not necessarily follow that all the fill soils in this area are from the same source.
32.		In addition to the summary statistics, the discrete sample results for IR Site 25 must be located (Appendix H2, Section 2.2, page 4) if IR Site 25 is to be used as part of a 'hydraulic fill east of Main Street' ambient data set.	For the objectives of the IR Site 31 RI it is not necessary to create an ambient data set for hydraulic fill soil east of Main Street.
33.		HERD defers to the DTSC Geological Services Unit (GSU), or a DTSC geologist, for review of the representations and conclusions regarding groupings of 'gravel-laden' (Appendix H2, Section 3.2, page 6), 'soil type' classifications (Appendix H2, Section 3.3, page 8) and/or soil color (Appendix H2, Section 3.4, page 9).	Comment noted.

Following are responses to comments provided by James Polisini dated 9 April 2007 to Draft RI Report Revision I Dated 29 November 2006

#	Reference	Comments	Responses
34.		The East Housing Area has high gravel content, but samples are missing iron and manganese data (Appendix H2, page iii). Measurements of East Housing Area inorganic elements particularly iron and manganese should be obtained to verify the proposal that East Area Housing soils are of the same fill history and soil type as IR Site 30 and IR Site 31 (Appendix H2, Section 4, page 11).	As discussed in the response to Specific Comment 31, the discussion in H2 does not propose that all the fill soils in the 140-acre area came from the same source.
35.		In addition to the cumulative frequency plots of soil arsenic concentrations in IR Site 30 and IR Site 31 (Appendix H2, Figure 2), box and whisker plots should be provided.	Box and whisker plots for arsenic were provided in the Draft RI Report – Revision I, in Appendix H1 Figure H-4.
36.		The proposal that the Great Valley Group (GVG) (LBNL, 2002; LBNL 2006) was the source of the fill for IR Site 30 and IR Site 31 fill material, contained in the previous version of the IR Site 31 Soil RI Report, was withdrawn after the August 24, 2006 meeting with regulatory agencies. The two 'Bay Area Background' values, associated with the GVG (Appendix H2, Figure 9) should be removed from the RI Report.	The Draft Final RI Report was revised as follows: The word "background" has been deleted from Figure 9 for the GVG. The text of Appendix H2 has been revised to explain that these values are included on the figure to explain that although the source of the fill material at IR Sites 30 and 31 is unknown, potential sources of fill soil with higher arsenic concentrations exist in the Bay area.
37.		The supplementary analysis summarized for arsenic (Appendix H2, Attachment A) includes the analysis required by HERD at the August 24, 2006 IR Site 30 and IR Site 31 meeting. This material is convincing in terms of arsenic alone. The proposal to consider two new NAS Alameda ambient data sets for: 1) upland fill; and, 2) hydraulic fill, east of Main Street, must be supported by a similar analysis for all inorganic elements.	There is no proposal for two new ambient data sets for upland fill and hydraulic fill. The Draft Final RI Report presents substantial evidence that the arsenic data at IR Sites 30 and 31 separately meet the criteria for ambient populations and therefore, there is no evidence of a release and no need for new ambient data sets for upland and hydraulic fill.

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#	Reference	Comments	Responses
38.	**Appendix I - Human Health Risk Assessment**	The results from six soil samples were delivered after the HHRA was prepared (Section I3.1, page I-4). The discussion of the inconsequential impact these sample results would have on the HHRA (Appendix I, Section I7.1, page I-18) are acceptable.	Comment noted.
39.		Carcinogenic risk and/or non-cancer hazard estimates differ between the current residential use scenario and the future residential use scenario because soil concentrations are based on surface to 2 feet below ground surface (bgs) while future soil concentrations are based on surface to 7 feet bgs (Appendix I, Section I4.1, page I-5) and minor differences in exposure pathways (Appendix I, Section I4.2, page I-6). This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
40.		The California Office of Environmental Health Hazard Assessment has determined that there is sufficient evidence to classify cadmium as a carcinogen (http://www.oehha.ca.gov/water/phg/pdf/122206cadmiummemo.pdf) (Section I5, page I-10). At this time HERD does not consider cadmium at relatively low soil concentrations, such as those occurring at IR Site 31, a carcinogen via the oral route of exposure.	Comment noted.

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41.		Cadmium is described as below NAS Alameda background (Appendix I, Section I6.4, page I-15) referring to Appendix H. Appendix H lists IR Site 31 cadmium as greater than background for the 0 to 2 feet bgs soils (Table H-9, page H-18) and 0 to 7 feet bgs soils (Table H-10, page H-19). In addition, later discussion of cadmium in the Conclusions (Appendix I, Section I8, page I-23) states that cadmium is greater than the NAS Alameda 'pink' ambient. Please amend any risk calculation errors in the event IR Site 31 cadmium was considered below NAS Alameda background. Otherwise, correct this typographic error.	The statement that cadmium is below Alameda Point pink background revised to state that cadmium is an ambient metal as defined by DTSC policy. Cadmium was included in risk calculations. Only Section I6.4 presents risk without arsenic or cadmium. Therefore, no changes to the calculations are required.
42.		The statement is made that the 'Navy reserves the right to evaluate the legal and technical justification for the Cal/EPA toxicity values and accept or reject them before or at the time of cleanup decisions' (Appendix I, Section I6.4, page I-16). This statement of the Navy's options to re-evaluate, stronger than past similar statements, does not alter the fact that HERD is required to use the Cal/EPA toxicity values developed by the Office of Environmental Health Hazard Assessment (OEHHA) in human health risk assessments. This comment is meant for the DTSC Project Manager and no response is required from the Navy or Navy contractor.	No response needed.
43.		Please revise the statement regarding the estimation of home-grown produce as a possible over-estimation (Appendix I, Section I7.2, page I-19) to indicate that the estimation may either over-estimate or under-estimate the home grown produce concentration.	The statement regarding homegrown produce in Appendix I has been revised to indicate that the risk may either be over or under-estimated.

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44.		Please revise the statement, for the child receptor, that 100 percent absorption is assumed (Appendix I, Section I7.5, page I-21). The correct statement of the assumed arsenic absorption is that it is identical to the absorption in the toxicity experiment used as the basis to estimate the Cancer Slope Factor (CSF) and/or the Reference Dose (RfD).	For the Draft Final RI Report the statement in Appendix I Section I7.5.1 has been revised to read as follow: "This HHRA assumed that children (0-6 years of age) ingest 200 milligrams of soil daily and that the arsenic in the soil is 100 percent biologically available."
45.		Please provide more detail for the hypothesis that cadmium was possibly determined to be greater than the NAS Alameda 'pink' ambient due to a large data set (Appendix I, Section I8, page I-23). This is the first indication of this hypothesis that HERD could locate in Appendix I.	The Draft Final RI Report will not have this statement. As detailed in responses to General Comment 1 and Specific comment 14, cadmium was carried through the risk assessment. In Appendix H2 of the Draft Final RI Report, cadmium was evaluated statistically (DTSC 1997) to identify if the concentrations represent a single population representing ambient conditions.

References cited:

- Cook, P.D. 1998. Estimating Background Concentrations of Inorganic Analytes from On-Site Soil Sample Data. Superfund Risk Assessment in Soil Contamination Studies: Third Volume, ASTM STP 1338, K.B. Hoddinott, Ed., American Society for Testing and Materials.
- Department of Toxic Substances Control (DTSC). 1997. Selecting Inorganic Constituents as Chemicals of Potential Concern for Risk Assessments at Hazardous Waste Sites and Permitted Facilities, Final Policy. Prepared by: Human and Ecological Risk Division, Department of Toxic Substances Control, California Environmental Protection Agency.
- Fleischhauer, H.L., and N. Korte. 1990. Formation of Cleanup Standards for Trace Elements with Probability Plots. Environmental Management (Vol. 14, No. 1), Springer-Verlag, New York, NY, pp. 95-105.
- Sinclair, A.J. 1976. Applications of Probability Graphs in Mineral Exploration. The Association of Exploration Geochemists, Special Volume No. 4, Richmond Printers Ltd., Richmond, B.C., Canada.

Singh, A., A. K. Singh, and G. Flatman. Estimation of Background Levels of Contaminants. Mathematical Geology. Vol. 26, No. 3, 1994

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	Reference	Comments	Responses
General Review			
1.		EPA has reviewed the above referenced report prepared by CDM Federal Programs Corporation and submitted by the Navy on November 29, 2006. This document is a revised Remedial Investigation Report intended to address regulatory agency concerns about the adequacy of the evaluation of nature and extent and risk assessment performed in the initial RI report. Among other things, EPA requested that the comparison between Site 31 soil data and data collected as part of a Lawrence Berkeley National Lab (LBNL) site study be eliminated due to lack of evidence that the two studies had any connection and that instead a background comparison be made with either the Alameda Point "pink" background data set or with the neighboring Site 25, College of Alameda and FISCA properties. During a telephone conference on August 24, 2006, the Navy agreed to eliminate the comparisons to the LBNL data and the regulators agreed to allow the Navy to use background data from Site 25, College of	There appears to be confusion on the technical assessment in the Draft RI Report-Revision I. The initial approach discussed in the meeting with the regulatory agencies on August 24, 2006, was to evaluate data from IR Site 25, College of Alameda, the FISCA property, and the East Housing Area as potential sources of background data for IR Sites 30 and 31 in lieu of the Alameda Point pink background data set. This evaluation of potential sources of background was conducted and presented in the Draft RI Report-Revision I issued in November 2006. During this evaluation, the statistical evaluation of data indicated that it is unnecessary to identify a new background data set for this area because the arsenic data for IR Site 31 meet the criteria for a single population (DTSC 1997). Arsenic was selected for statistical evaluation following the DTSC policy (DTSC 1997) because of the fill history, no background samples collected in this area, and because arsenic is a primary contributor to risk at IR Site 31 based on the risk assessment. The DTSC (1997) policy is an accepted procedure for evaluating whether metals are ambient, which yields definitive results, especially given the large number of samples at IR Site 31. The RI report Appendix H2 includes a rigorous outlier analysis as part of this evaluation although not required by the DTSC methods. The USEPA and Cal/EPA arsenic risks and 95th UCL value

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	Reference	Comments	Responses
		background data from Site 25, College of Alameda, FISCA property and the East Housing property, instead of the "pink" background data set. After the revised RI report was submitted, EPA reviewed the new background data submitted by the Navy for the neighboring sites. In summary, it appears that the Navy determined that 1) Site 31 did not qualify for comparison with the Alameda Point "pink" background data set because the fill history of Site 31 was different from that west of Main Street; 2) Site 25 did not qualify for comparison purposes because an "updated" fill history map showed that the fill event occurred for Site 25 in 1919 and for Site 31 in 1927; 3) the College of Alameda did not have any suitable background data that could be used for comparison purposes; 4) limited FISCA data could be used for comparison with Site 31; 5) East Housing data could be used for comparison with Site 31. EPA does not agree with the Navy's assessment of suitable comparison data for Site 31 based on the following: 1) according	The USEPA and Cal/EPA arsenic risks and 95th UCL value at IR Site 31 are the same or lower than that of an Alameda Point background data set and a nearby historical housing area. Specifically, USEPA and Cal/EPA arsenic risks at IR Site 31 are the same as arsenic risks in the Alameda Point yellow background data set. There are over twice as many arsenic samples at IR Site 31 as in any of the Alameda Point background data sets, which gives a high level of confidence in the IR Site 31 risks. USEPA and Cal/EPA arsenic risks at IR Site 31 also are lower than arsenic risks at East Housing, where investigations have been completed and the property has been transferred and developed for housing and a school under DTSC oversight. Historical uses of East Housing were only for housing. The 95th UCL for arsenic at IR Site 31, 11.7 mg/kg, is lower than the 95th UCL for arsenic in the Alameda Point yellow background data set and the East Housing data set. When arsenic, which has been determined to be ambient, is removed from the IR Site 31 risk assessment, the residual risks do not warrant assessment of remedial alternatives in a Feasibility Study. To more completely address your comment, additional information regarding the ambient/background evaluations follows. Please note that the Final OU-5 (Site 25) RI Report did not compare metals at Site 25 to the Alameda Point pink background data set for similar reasons as those presented in the Draft Site 31 RI Report.

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		to the fill history maps provided in the Site 25 Feasibility Study Report and compiled using USGS Quadrangle Maps and aerial photographs, Site 31 was filled at the same time as the West Housing Area which is west of Main Street. The West Housing Area displays no elevated concentrations of inorganics, falling consistently within the Alameda Point "pink" background data set; 2) portions of Site 25 were filled at the same time as Sites 30 and 31, yet no elevated inorganics were found during extensive soil investigations at Site 25; 3) College of Alameda data were used as a comparison for FISCA inorganic sample results to determine whether inorganics in FISCA soil were within background ranges. Therefore, data sets for the College of Alameda must be sufficiently extensive to be used for Site 31 as well; 4) the FISCA data submitted by the Navy appears to use inappropriately high detection limits; e.g. arsenic is set at 10 mg/kg and, in a few samples, at 20 mg/kg or even 40 mg/kg. As a result, the data set is not satisfactory for use as a background data set; 5) the East Housing data, likewise, uses	The purpose of the DTSC policy is to help risk assessors identify metals in soil that are related to site-activities and metals that are present at ambient concentrations and not related to site-activities. HERD, in its comments of April 6, 2007, agreed with the conclusion that the arsenic concentrations at IR Site 31 are ambient and that it is appropriate to exclude the risk for arsenic in making risk management decisions. Other metals also were evaluated using DTSC (1997) in the Draft Final RI Report. There are also a number of other published papers on the use of probability plots for identification of ambient populations using methods that are similar to the DTSC policy, including Cook (1998); Fleischhauer and Korte (1990); Sinclair (1976); and Singh et al. (1994). In summary, the East Housing area, or any other potential background location, is not needed and not proposed as a new background location. The Site 31 Draft RI Report - Revision I, provided an evaluation of the fill history, the chemistry and lithology of IR Site 25, IR Site 30, College of Alameda, the FISCA property, and the East Housing Area because this was discussed and requested by the regulatory agencies during the August 24, 2006 meeting and to demonstrate the following points. • The arsenic concentrations at IR Site 31 are not unique to this location. There are other areas

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	Reference	Comments	Responses
		inappropriately high detection limits with approximately half of the data yielding non-detects due to the high detection limits. The statistical analyses performed on the data set are not defensible. Additionally, iron and manganese sample results have not been included for the East Housing data set. In the absence of being able to supply the reviewers with suitable alternative data for comparison purposes, and given the fill history as presented in previous documents, EPA has compared the Site 31 data set to the Alameda Point "pink" background data set. It appears that arsenic is elevated at Site 31, along with less pervasive contamination of vanadium and iron. Although much of the soil at Site 31 is currently covered by houses and paving, the risk presented by soil if the houses and paving are removed is over the risk management range for State of California toxicity values, and at the high end of the risk management range for federal toxicity values. We have therefore concluded that a Feasibility Study to evaluate remedial action options is	(e.g., IR Site 30, the FISCA Warehouse Area, and the East Housing Area, totaling approximately 140 acres) with similar arsenic concentrations. • Possible explanations for the differences in the arsenic concentrations between the 140-acre area and the Alameda Point pink background are differences in lithology and fill history. The evaluation of the fill history, the chemistry, and lithology of adjacent sites is supplemental information and is not essential to evaluating whether a release of arsenic (or other metals) has occurred at IR Site 31. The DTSC (1997) evaluation determines whether arsenic is ambient. To avoid confusion, revisions were made in the Draft Final RI Report. Section 4.1.4.2 in the Draft Final RI Report and Section 2 in Appendix H2 was renamed "Other Metals at IR Site 31" rather than "Off-site Background Locations." This evidence substantially supports the conclusion that arsenic in soil at IR Site 31 is consistent with ambient concentrations and does not represent a release of a hazardous substance. Therefore, it is appropriate to exclude the risk for arsenic in making risk management decisions. Without arsenic, the residual risks do not warrant assessment of remedial alternatives in a Feasibility Study.

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	Reference	Comments	Responses
		warranted.	The fill history map (Figure 1-3) provided in the OU5 Soil Feasibility Study Report does not depict the fill history of most of the West Housing Area, which is located to the west of what is shown on the figure. Additionally, this fill history map indicates that only small portions of IR Site 31 and IR Site 30 (located south of the boundary of OU-5) may have been filled at the same time as IR Site 25. However, the fill history shown in Figure 1-3 of the Draft RI Report - Revision I was based on more detailed data in the 1915 USGS quadrangle map and a 1937 aerial photograph. As discussed in Section 2.1 of Appendix H2 of the IR Site 31 Draft RI Report - Revision I, the early fill history of Alameda Point has been refined in the vicinity of IR Sites 30 and 31 to include information presented in additional references (USCGS 1903, 1919, 1927, 1930, EC Sessions 1906, and a 1930 oblique aerial photo). As indicated in the inset on Figure 4 in Appendix H2, current interpretation of the fill history, based on the additional references and interpretation of soils described in boring logs, IR Sites 30 and 31 were not filled at the same time as IR Site 25 or the areas west of Main Street. Regarding comment item #2; "*...yet no elevated inorganics were found during extensive soil investigations at Site 25*"; the OU-5 RI Report (Neptune et al. 2002) for Site 25 soil, Section 4.1.2 with details in Appendix B of the OU-5 RI Report,

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	Reference	Comments	Responses
			discusses concentrations of inorganics that are "elevated" relative to the Alameda Point pink background data set. The OU-5 RI Report also acknowledges the differences in fill history for the OU-5 area and the Alameda Point background data sets. The Final OU-5 RI Report states on pages 4-6 to 4-7, "Box plots comparing the range of site concentrations of arsenic, cadmium, chromium, copper, lead, and mercury to the range measured in background data are presented in Appendix B, Figures B-14 to B-9. These plots include metals from three Alameda ambient data sets ('pink', 'yellow', and 'blue') described in Summary of Background Concentrations in Soil and Groundwater, Alameda Point, Alameda, California, (TtEMI, 2001). Data from all three data sets was used because, although samples from the 'pink' data set were collected closest to OU-5, none of the three Alameda background data sets represent fill material deposited during the fill placement time period associated with the area presently occupied by the OU-5. The box plots suggest that five of the six metals (excluding cadmium) are elevated relative to the 'pink' data set. However, none of the six metals are present at concentrations or in patterns that clearly indicate a release to the environment. ...Concentrations of base metals such as aluminum, iron, and manganese were found to be significantly higher in the

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			historical OU-5 data set compared to the three background data sets...." The Final OU-5 (Site 25) RI Report (Appendix B) further concludes that, "All three available background data sets representing Alameda Point soils are different enough from the OU-5 soils to make any conclusion based on comparisons to these data fairly uncertain." In conclusion, the OU-5 RI Report did not rely on direct comparisons between Site 25 soil metals concentrations and the Alameda Point pink data set, but determined that metals concentrations were not associated with a release.
General Comments			
1.		Arsenic has been detected in on-site soil (fill) at concentrations in excess of the Alameda Point background data set. Even though Appendix H2 presents information which describes arsenic concentrations in the most recent fill material as consistent with concentrations reported within the Alameda Point vicinity, the arguments	The substantial evidence that the Alameda Point pink background data are not applicable to IR Site 31 is supported by the finding that arsenic concentrations at IR Site 31 form an ambient population. As discussed in the response to the General Review Comment, the consistency of arsenic concentrations in soil at IR Site 31 with those in soil at adjacent sites is not an essential part of the evidence that a release of arsenic due

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	Reference	Comments	Responses
		presented to support this assertion are not substantiated. Site 31 appears to have higher levels of arsenic in the soil than in the neighboring sites and compared to other areas at Alameda Point, and EPA does not agree with the approach of leaving an "island of elevated concentrations in a sea of lower concentrations". We therefore request that Site 31 be taken forward to a Feasibility Study for evaluation for remedial action.	to Navy activities has not occurred at IR Site 31. However, this consistency with a substantial area of approximately 140 acres with similar concentrations of arsenic indicates that IR Site 31 is not an "island of elevated concentrations." Please see the previous response to the General Review Comment for additional details. This evidence substantially supports the conclusion that arsenic in soil at IR Site 31 is consistent with ambient concentrations and does not represent a release of a hazardous substance. Therefore, it is appropriate to exclude the risk for arsenic in making risk management decisions. Without arsenic, the residual risks do not warrant assessment of remedial alternatives in a Feasibility Study.
2.		In sections throughout the Draft Soil Remedial Investigation Report IR Site 31, Marina Village Housing (the Draft RI), Sites 30 and 31 are referenced together. It is understood that these two IR sites are adjacent to one another and therefore when describing locations and other general site characteristics the use of both sites is appropriate. However, when specific analytical concentrations are being discussed, then discussions should be	Revisions were made to minimize references to IR Site 30 in the Draft Final RI Report. However, the agencies in the August 24, 2006, meeting requested a detailed evaluation of the sites surrounding IR Site 31 and this includes IR Site 30. Therefore, not all references to IR Site 30 have been deleted.

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		limited to IR 31, exclusively, as this Draft RI is providing support for the decision to move forward to a Feasibility Study (FS) or not. Please see specific comments below.	
Specific Comments			
1.	**Executive Summary**	The language within the Executive Summary is confusing in regards to understanding the need and use of the screening level ecological risk assessment (SLERA). The second paragraph (page iii) indicates that strictly human health risk concerns were considered as suitable endpoints for the Site evaluation process. Then, the Executive Summary goes on to mention the SLERA, its methods and results. Please clearly and consistently describe the application of the SLERA to the Site closure process.	The second paragraph of the executive summary has been rewritten to reflect the following: The RI analytical results from 126 samples, plus historical data from 648 samples, provide the basis for the human health and Tier 1 screening-level ecological risk assessment conclusions that the current soil conditions at IR Site 31 are protective of human health for residential use, and there is no threat to ecological receptors.

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	Reference	Comments	Responses
2.	**Executive Summary, Human Health Risk Assessment, Page vi:**	It has not been demonstrated that off-site background values have been adequately compared to IR Site 31. Please delete the statement "arsenic at IR 30 and 31 represents ambient concentrations in the fill soil."	It was determined that the IR Site 31 data meet the DTSC policy criteria for an ambient population as discussed in the response to General Review Comment 1. It was not necessary to identify or compare off-site background values to IR Site 31.
3.	**Executive Summary, Nature and Extent of Potential Contaminants, Pages vii**	Sufficient substantiation has not been provided to conclude that the Alameda Point "pink" background data set is not applicable to IR Site 31 or that the lines of evidence are valid. Please see specific comments on Section 4.1.3.3, below and revise the Executive Summary as necessary.	The substantial evidence that the Alameda Point pink background data are not applicable to IR Site 31 is supported by the finding that arsenic concentrations at IR Site 31 form an ambient population.
4.	**Executive Summary, Conclusions, Pages vii through xi**	The recommendation for no further action based on "no evidence of a release of chemicals to soil due to a Navy release" is not substantiated. Please forward this site to a Feasibility Study.	There is no evidence of a release of arsenic, based on the finding that arsenic concentrations at IR Site 31 form an ambient population when statistically evaluated by methods in the DTSC 1997 policy. Therefore, it is appropriate to exclude the risk for arsenic in making risk management decisions. Without arsenic, the residual risks do not warrant assessment of remedial alternatives in a Feasibility Study. The Draft Final RI Report now includes an evaluation of

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			five additional metals by statistical methods (DTSC 1997) to differentiate between concentrations of metals in soil that are related to site-activities and metals that are present at ambient concentrations and not related to site-activities. The five inorganics, cadmium, chromium, iron, lead, and vanadium, were selected for statistical evaluation based upon the following: Iron, lead, and vanadium are being evaluated because these inorganics are at concentrations greater than the residential PRG criteria. Cadmium is being evaluated because of its contribution to human health risk. Chromium is being evaluated because concentrations in groundwater samples collected during the Site 31 RI sampling event of November 2005, showed concentrations greater than concentrations in historic groundwater data.
5.	**Figure 2-10, Top of Clay Elevation Map**	In general contour lines should be smooth, but some of the contours on this figure do not follow this convention. The 5 foot contour in the north central portion of the map centered on hydropunch location 3121 has an acute angle and the 6 and 7 foot contours in the same region have right angles. Also the four foot contour has an acute angle in the western area of the map, in the vicinity of hydropunch 3105. Please	Elevation contours will be revised to follow standard contour conventions. The closed contour around location 3134 will also be removed and the contour will be extended accordingly.

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		revise the elevation contours to follow standard contour conventions by eliminating acute angles and right or near-right angles. Also, it is unclear why there is a closed 6 foot contour around hydropunch location 3134 when there is a 6 foot contour adjacent and to the south that could be extended to include the area surrounding punch location 3134. Please remove the closed contour around this location and extend the southerly contour to include this sample location.	

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	Reference	Comments	Responses
6.	**Section 4, Nature and Extent of Contamination, Page 4-2**	The text states that PAH data collected in 2002 "was largely duplicated in a 2003 PAH assessment," but this statement implies that some data points were not duplicated. Also, comparison of data from nearby points may provide an indication of the variability in PAH concentrations in Site 31 soil, so the 2002 data should be included. Please revise the RI Report to include a presentation and discussion of the 2002 PAH data.	The initial response to this comment was provided in response to EPA's specific comment number 13 on the Draft RI Report and is presented in the Appendix L of the Draft RI Report – Revision 1 dated 29 November. In planning the 2003 PAH assessment, the EPA and DTSC agreed that specific to IR Site 31 (EDC-21) a sample density of 10 samples per acre of open land would represent the PAH at the site. Therefore, the approximate 17 acres of open area for Site 31, the 646 samples of the 2003 PAH investigation are representative of PAH in soil at IR Site 31. Because the 2003 PAH data are representative of the site, the Draft Final RI Report does not include the 2002 PAH data in the nature and extent discussion of the main text. However, the Draft Final RI Report includes in Appendix B, a map showing the locations and the BaP equivalent values for the PAH samples from the 2002 study. In the nature and extent discussion of the Draft Final RI Report, inclusion of the 2002 PAH data consisting of 12 locations and 46 analyses would have no impact on the outcome of the nature and extent discussion which is based upon 648 analyses from 163 locations. The details and conclusions of the 2002 PAH Study are available in the "Draft Technical Memorandum PAH Background Study for Alameda Point, Alameda California, August 2002 CTO-

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	Reference	Comments	Responses
			0032/0110. " The analytical results from the 46 samples from the 2002 PAH assessment were included with the analytical results from the 2003 PAH assessment for evaluating human health risk. The combined 2002 and 2003 analytical results comprise the data evaluated and used for the human health risk assessment., which concluded that exposure to semivolatile (PAH) compounds does not contribute significantly to human health risks. As shown in Table 6-8, the Cal/EPA risk value from Benzo(a)Pyrene for the future residential scenario is 1×10^{-5} which includes all soil from 0 to 7 feet. The Cal/EPA risk value from Benzo(a)Pyrene (Table 6-5) for the current residential scenario is 3×10^{-6} which includes soil from 0 to 2 feet.
7.	**Section 4.1.3.2, Polynuclear Aromatic Hydrocarbons, Page 4-9**	The text indicates that the arithmetic mean of the benzo(a)pyrene (BaP) equivalent values was calculated for the entire site, but it is not appropriate to calculate a single mean for an approximately 25 acre site. The site should be broken up into smaller units for consideration of the nature and extent of contamination. This approach, using smaller units, would then be consistent with the approach for Site 25	This comment was originally responded to in the Draft RI Report - Revision I, Appendix L Response to Agency Comments on the Draft RI Report, as response to EPA comment 14. The Draft RI Report - Revision I text presents and discusses the arithmetic mean of the benzo(a)pyrene (BaP) equivalent values by four depth intervals and for the entire site. The calculation of a mean value for the site is appropriate for the comparison being made in this RI. The

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		and the West Housing Area. In addition, an examination of the data indicates that there are just a few areas where there is significant contamination in the 0 to 4 foot depth interval (e.g., the northwest corner and borings along the western edge of Site 31; the western portion of the 12 housing units west of IR Site 30, etc. Further, a figure showing all of the BaP equivalent concentrations should be included. Please break up the site into smaller areas and revise the discussion of mean values to reflect these smaller areas. Also, please provide a figure that includes all of the BaP equivalent concentrations.	use of the mean value is to put the large amount of data into perspective. The mean values are also presented and discussed for each of four depth intervals. Unlike at IR Site 25, at IR Site 31, PAHs are not a primary risk driver. USEPA current and future residential risks for benzo(a)pyrene are 2×10^{-6} and 6×10^{-6} respectively. Cal/EPA current and future residential risks for benzo(a)pyrene are 3×10^{-6} and 1×10^{-5} respectively. Because the human health risk associated with PAHs is at or below 1×10^{-5}, the PAHs are not primary and/or significant contributors to the human health risk. Therefore, calculating the mean by sub areas and presenting discussions of nature and extent by sub areas is not needed to meet the RI objectives. The text of section 4.1.3.2 discusses the distribution of PAH and notes the overall distribution of PAHs in IR Site 31 soil which shows concentrations increase broadly westward and with depth. This suggests a distributed non-point source. The mean value for the BaP equivalent values is presented by four depth intervals because the variation in concentrations is primarily depth dependent. No changes will be made to the Section 4 discussion of PAH. However, for general information, Appendix B (Historic Data) was revised. The Draft Final RI Report now includes in Appendix B, estimates of the mean BaP

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			equivalent value for each of the 4 depth intervals for 3 equal-area portions of IR Site 31. The conclusions remain unchanged; the overall distribution of PAHs, based upon the mean BaP equivalent value in IR Site 31 soil, shows values increase westward and with depth.
8.	**Section 4.1.3.2, Polynuclear Aromatic Hydrocarbons, Page 4-9**	The second paragraph suggests that the high values of BaP equivalent values found in the soil represent biased PAH values due to the proximity of the soil samples to asphalt but justification has not been provided for this statement. Further, most of the locations with the highest concentrations of PAHs in shallow soil are located near IR Site 25 or in close proximity to Main Street. Since PAH contaminated fill was found in IR Site 25 and in the West Housing Area in EDC-5, please explain the rationale for assuming that asphalt is responsible for the higher hits found here. Furthermore, the assumption that the PAH concentrations were impacted by the presence of asphalt has serious implications for the sampling protocols used during the 2003 PAH investigation. It is inappropriate to dismiss the PAH values	This comment is repeated from the EPA comment #15 to the Draft RI Report. The complete response is provided in the Appendix L Response to Agency Review Comments in the Draft RI Report - Revision I. A summarized response is provided below. The results of these three analyses were not "dismissed". The statements qualify the information by presenting facts based upon documentation of the fieldwork notes, and a likely scenario for anomalous results. The three samples discussed have BaP equivalent concentrations that are an order of magnitude greater than the average value for that depth interval. The potential to have shallow soil samples that include asphalt particles when collected immediately beneath and or adjacent to asphalt paved surfaces is a likely scenario and does not present serious or negative implications for sampling protocols or sample integrity. The PAH investigation report (Bechtel 2004), Section 2.4.3 identifies such a scenario and the planned procedure to minimize the impact of asphalt particles. Because only 3 of the 648

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		for the three highest soil samples in the 0 to 2 foot range, when many of the soil samples throughout the entire site are beneath or adjacent to asphalt, the sampling protocols are called into question, and PAH-contaminated fill is known to have been used at adjacent and nearby sites. Please delete the statement that the three locations with the highest BaP equivalent values are "considered biased by the presence of asphalt and not representative of soil conditions."	samples are identified as having potentially anomalous results the mitigation plan was implemented relatively successfully. Borings C3S031B017 and C3S031B028, which were logged by the same geologist, specify asphalt and road base at the top of the logs.
9.	**Section 4.1.3.3 Metals, Page 4-11**	The conclusions drawn in this section are inconsistent with the analytical metal results for IR 31. This section contends that "there is strong evidence that metals in the soil of IR Site 31 are not the result of a release from Navy activities" and that an aerial photo review shows no evidence of a release, but a release of metals is not likely to be visible on aerial photographs. For example, arsenic was used in pesticides and rodenticides; and a release would not necessarily be visible on an aerial photo. Also the use of metals such as arsenic, copper, lead, mercury, and zinc,	The evaluations provided document that the arsenic concentrations meet the criteria for a single ambient population. The principle behind the DTSC policy is that the addition of contaminants to ambient concentrations results in two or more populations. The DTSC policy is designed to discriminate between contamination and ambient populations. The pink background data set was not considered applicable for adjacent Site 25 in the previous Final RI Report for Site 25 (Neptune et. al. 2002), and the Site 31 arsenic risks are the same as that for the Alameda Point yellow background data set and lower than arsenic risks at East Housing. Also, as noted earlier, DTSC HERD agrees that the arsenic probability plot represents a single

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		has been documented in anti-fouling paint and hot plastic (see for example, *Marine Fouling and Its Prevention*, which was prepared for the Navy in 1952). It is likely that this paint containing these metals was used in Alameda Point shipyards by the Navy and by Todd Shipyards and that wind-borne deposition or use of dredge containing these antifouling metals potentially contaminated soils at this site. Possible scenarios include, but are not limited to, deposition of airborne particulates from sandblasting a ship; releases from paint or antifouling additives stored at the DRMO; or use or release of arsenic as a pesticide or rodenticide in the Site 31 area. Regardless of the analysis of the likelihood of a release, it is not acceptable to leave an island of contamination surrounded by a sea of clean. Please retain the "pink" data set as background and evaluate accordingly the portions of IR 31 that are above background in the FS.	population and arsenic does not need to be included in the risk management decision. Please see the response to EPA General Review Comment 1 for additional information. Although the uses of arsenic described in the EPA comment are potential sources of arsenic, the Draft RI Report - Revision I presents substantial evidence that concentrations of arsenic in IR Site 31 soil are uniformly distributed, represent a single population, and are not from a release of hazardous substance. The Draft Final RI Report now includes an evaluation of five additional metals, using statistical methods (DTSC 1997) to differentiate metals in soil that are related to site-activities and metals that are present at ambient concentrations and not related to site-activities. In the Draft Final RI Report, the statements regarding releases of metals are limited to those metals with data that qualify as ambient populations.
10.	**Section 4.1.4, Area-Specific**	The conclusion that "concentrations of arsenic are present at ambient levels and do	See response to Comment 9.

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	Background Evaluation, Page 4-15 and Appendix H2, Summary, Page i	not represent releases from on-site activities" does not take potential release mechanisms and sources into account. The historical use of arsenic as a pesticide and rodenticide suggests that arsenic could have been released from pesticides/rodenticides stored in the OU-5/FISCA/Site 31 area or that these materials could have been used for their intended purpose.	
11.	**Section 4.1.4.1, Arsenic at IR Sites 30 and 31, Page 4-16 and Appendix H2, Arsenic at IR Site 30 and 31, Page ii and 2**	The argument that the range between the maximum and minimum is less than 2 orders of magnitude is irrelevant because it does not preclude arsenic from being a contaminant. Also, it is unclear whether Figure 2 of Appendix H2 is the probability plot used to apply the Department of Toxic Substances Control (DTSC) guidance since this figure is not referenced in the text of Section 4.1.4.1. Please reference this plot within the main text of the document. Figure 2 appears to indicate that there may in fact be more than one population represented by	Establishing that the range is less than 2 orders of magnitude is one requirement for the DTSC policy, which states, "Typically, data drawn from just one population will display a range of detected values of no more than 2 orders of magnitude and a coefficient of variation no greater than 1." (Section 4.3, DTSC 1997). Figure 4-3 has been replaced with a probability plot for arsenic and a reference has been added to the first bullet in Section 4.1.4.1. As explained in Appendix H2, the pattern of the tails of the distribution deviating from the line is not uncommon in single populations and does not represent inflection points. Attached is an Excel file with five probability plots showing the arsenic data for IR Site 28, IR Site 26 and for

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	Reference	Comments	Responses
		this data, and this would mean that the data for IR 31 could not be considered ambient. The inflection points and curves as seen in the plot on Figure 2 of Appendix H2 imply the data represents two separate or two overlapping populations respectively. Please discuss the inflection points and curves in the region of a probability of 25 % and a concentration of 1.5 on the log scale and approximately 90% and log concentration 3.0.	the Alameda Point pink, blue, and yellow data. At IR Site 28, arsenic was found above background and included in the FS. The inflection point in the IR Site 28 plot is a clear demarcation where a second set of data points angle off on a line with a steeper slope. Probability plots are also included for Alameda Point pink, yellow, and blue background areas and IR Site 26. Arsenic concentrations at IR Site 26 were found to be consistent with Alameda Point pink and blue background values, respectively. These plots show various deviations from the line, and that occur at different points in the line. Therefore, some deviation from the line is not unusual in single populations. Also, as noted earlier, HERD agrees that the arsenic probability plot represents a single population and arsenic does not need to be included in the risk management decision.
12.	**Section 4.1.4.2, Off-site Background Locations, Page 4-17 and Appendix H2, Off-site Background**	It has not been demonstrated that arsenic data meet criteria for background, so the first sentence in these sections should be removed. Please delete the first sentence in these sections. Similarly, it has not been demonstrated that the iron and manganese concentrations at	These changes have not been made because arsenic meets the DTSC criteria for an ambient population. See response to General Review Comment 1. The text in the Draft Final RI Report has been corrected to remove the statement that manganese concentrations at IR Site 31 are statistically higher than those in the Alameda Point pink background data set and the conclusion that these manganese concentrations have not been impacted

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	Reference	Comments	Responses
	Locations, Pages ii and 4	Sites 30 and 31 have not been impacted by anthropogenic sources. Since iron and manganese (as well as vanadium, chromium, and other metals) are constituents of steel that would be released as fine particles from sandblasting operations, elevated iron and manganese concentrations may be indicative of a release. Iron and manganese data have not been provided so the argument in these sections cannot be verified. Please provide the iron and manganese data sets and discuss the analysis of this data. Finally, the lack of samples collected from the area east of Main Street alone is not sufficient to preclude the use of the "pink data set, so this bullet point should be deleted from this section. Please delete the third bullet point from these sections.	by anthropogenic sources. At IR Site 31, the approved work plan did not include manganese in the initial list of analytes and, therefore, only unvalidated manganese data are available. These data were summarized for comparison purposes in Table B5 of Attachment B to Appendix H2. The Draft Final RI Report now includes an evaluation of the inorganic concentrations in soil for iron, lead, and vanadium that are greater than the rPRGs at IR Site 31, similar to that conducted for arsenic. In addition, cadmium and chromium are evaluated by the statistical method as for the reasons discussed in response to comment 4. The fact that none of the Alameda Point pink background samples were collected in the vicinity of IR Site 31 is one of several points in the evidence that the Alameda Point pink background data set is not appropriate for IR Site 31. The information is relevant and therefore the bullet has not been deleted.
13.	**Section 4.1.4.3, Fill History and Lithology, Pages 4-17 and 4-18 and**	The text indicates that 400 borings were evaluated as potential background, however the boring logs have not been provided for the sites other than IR 31. Please provide the boring logs for the East	The boring logs for IR Site 25 (198 boring logs), IR Site 30 (78 boring logs), and the East Housing Area and FISCA (170 boring logs total, which included those from the College of Alameda) have been added to the Draft Final RI Report as Attachment C to Appendix H2. In addition, as

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	Appendix H, Fill History and Lithology, Page iii and Section 3.1, Lithology and Fill History, Page 6	Housing Area, Alameda College, and IR 25. Also it is unclear if each of these 400 borings was considered for comparison and/or if the entire length of the boring was evaluated for comparison. Please provide specific information one which borings were evaluated for comparison and which ones were excluded, if any.	part of this response to comments, the logs were provided to EPA and DTSC, electronically via FTP transfer site. Information from all of the boring logs available for IR Sites 25, 30, and 31 was included in the quantitative analysis of grain-size distribution. Information from the East Housing Area and FISCA boring logs was considered in the qualitative evaluation and the discussions in Section 4 and Appendix H2. None of the available boring logs were excluded from the evaluation, which focused on the upper 8 to 8.5 feet of soil at the site.
14.	**Section 4.1.4.3, Fill History and Lithology, Pages 4-17 and 4-18 and Appendix H2, Section 3.0, Soil Parameters, Page 5 through 7**	The analysis of gravel content at IR Sites 30 and 31 does not appear to take into account the potential that gravel was used as surface material in the former DRMO area, or that it was used for roads and building subbase materials. Many DRMO yards are on gravel so that materials are not placed directly on soil. Since Site 25 was not used for DRMO storage, and at least 2 feet of fill was placed on top of Site 31, it is likely that there would be significantly more gravel in the upper 4 feet of soil at Sites 30 and 31 than at Site 25. In addition, boring logs to substantiate the claims in these sections have not been provided. Further, the text	The text in the Draft Final RI Report has been revised to indicate that the gravel was most likely associated with construction fill material brought in at IR Sites 30, 31, and the East Housing Area. The construction fill material would likely have had a higher gravel content and could have different grain-size distribution and chemical characteristics than the hydraulic fill material used at other nearby sites. The text in Sections 4 and Appendix H2 has been revised to state that construction fill material may have been used at the site surface of the DRMO storage yard before it was paved. Boring logs for IR Sites 25 and 30 have been included in the Draft Final RI Report as Attachment C to Appendix H2. Table 1 of Appendix H2 has also been revised to indicate the percentage of locations where gravel content

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		in Section 3.2 states that the percentage of gravel was estimated using American Society for Testing and Materials (ASTM) standards for visual classification if the gravel percentage was not specified on boring logs, but Table 1 does not specify the percentage of locations where gravel content was estimated in this fashion. Please revise the text to state that gravel was likely used to cover the soil in the DRMO storage yard, provide the percentage of logs where gravel content was estimated, provide all boring logs, and revise or delete the argument about the percentage of gravel in the top 4 feet of soil at Sites 30 and 31.	was estimated using ASTM standards for visual classification when the percentage of gravel, sand, and fines was not noted on the boring log. At IR Site 25, the percentage of gravel, sand, and fines was estimated for 15 percent of the locations; at IR Site 30, the percentage of gravel, sand, and fines was estimated for 13 percent of the locations; and at IR Site 31, the percentage of gravel, sand, and fines was estimated for 50 percent of the locations.
15.	**Table 4-6, Groundwater Comparison:**	The entry for arsenic is incorrect; the first column indicates that arsenic was not detected and the remainder of the row is blank. Arsenic was detected in 3142 at 14.8 micrograms per liter (ug/L). Please revise the table to reflect the analytical data in Appendix G.	The table has been corrected and the correct arsenic value information has been added.
16.	**Section 6.1.3,**	This section outlines the complete exposure	As agreed upon with the agencies and consistent with the

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	Exposure Assessment, Page 6-3	pathways associated with (among others) future on-site residents. Although future residential exposure considers ingestion of groundwater as drinking water and inhalation of volatiles while showering as complete exposure pathways, dermal contact while bathing appears to be omitted from consideration. Please clarify this apparent oversight/discrepancy. This issue is ongoing throughout the remainder of the report and Appendix I. Additional comments related to this issue in other sections of the Draft RI have not been repeated pending response from the Navy.	approved RI at IR Site 30, the total cumulative risk including residential use of groundwater (ingestion and inhalation while showering) was calculated using the risk published in the Final Groundwater RI/FS for Site 25/IR-02, (ERRG 2004). This risk assessment did not evaluate dermal contact while showering.
17.	**Section 6.1.5.1.4 and Appendix I, Section I6.4, Cancer Risks - Ambient Concentrations of Arsenic, Pages 6-8 and I-15, Respectively**	It is inappropriate to consider the cancer risk without arsenic.	DTSC-HERD agrees that it is appropriate to consider the cancer risk without arsenic at IR Site 31 because arsenic data meet DTSC criteria for a single ambient population. Because arsenic concentrations are consistent with a single ambient population, the arsenic does not represent a release of hazardous substance, therefore, arsenic is not considered in risk-based decision making.
18.	**Section 7.1,**	Arsenic and several organic chemicals are	See response to Specific Comment 17 on arsenic risk. The

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	Conclusions, Page 7-1	present at concentrations that result in risk. Therefore, the decision to not proceed to the FS is inappropriate. We recommend a FS for Site 31. Also, please revise the conclusions to reflect changes made to the Draft RI Report in response to previous comments.	arsenic concentrations meet DTSC criteria for an ambient population; therefore, arsenic risk does not need to be considered in the risk management decision. Without arsenic, the cancer risks for organic chemicals are well within the risk management range. The other organic chemicals, PCBs, benzo(a)pyrene, and the pesticide dieldrin, were detected in 1 to 8 percent of samples. The Draft RI Report - Revision I shows that even though these chemicals have risk within the management range, the risks are overstated because, the risk assessment assumes that these organic chemicals are found throughout IR Site 31 when in fact, the chemicals were only found in a few samples. The conclusions are supported by substantial evidence and scientific evaluations therefore, it is not necessary to revise the conclusions.

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19.	**Section 7.1.1, Soil, Pages 7-2 and 7-3:**	Many conclusions drawn throughout this RI and reiterated in this section have not been adequately substantiated. This RI has failed to establish that the pink data set is not an appropriate background for IR 31, and has failed to supply satisfactory alternative background data for comparison purposes. Also it has not been adequately established that the IR 31 data set alone fits the DTSC guidance for representing a single ambient data set.	See response to General Review Comment 1. The evidence that arsenic data represent an ambient population and that a release has not occurred is sufficient to determine whether an FS is needed. Therefore, a background data set is unnecessary. HERD agrees that the IR Site 31 data set fits the DTSC guidance for a single ambient data set.
20.	**Section 7.2, Recommendations, Pages 7-6 and 7-7**	There is not enough evidence to support the recommendation for no further action. Please proceed with the development of remedial alternatives and evaluate them in a Feasibility Study for IR 31.	See response to General Review Comment 1 and Specific Comment 18. The Draft Final RI Report presents substantial evidence supporting the conclusion that there has been no release of hazardous substances. The evidence includes a determination that inorganics at concentrations greater than the residential PRG criteria in soil at IR Site 31 (arsenic, iron, and vanadium) are consistent with ambient concentrations and do not represent a release of a hazardous substance. The finding for lead is consistent with the multiple sources of lead in the environment, including historical use of leaded fuels. Therefore, it is appropriate to exclude the risk associated with arsenic from making risk management decisions. Without arsenic, the residual risks do not warrant

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			assessment of remedial alternatives in a Feasibility Study.
21.	**Appendix H, Inorganic Background Comparison**	Based on the results as presented in this appendix the median concentrations of most metals that have been analyzed for in IR 31 are statistically higher than the median of the same metals in the "pink" background data, therefore the assumption should be that the soil in IR 31 has been contaminated and should be evaluated as such. Please include this conclusion in the appendix and main text of the document.	Evaluation of the metals shows that arsenic and other metals above the r-PRG, with the exception of lead, are ambient. The evaluation of lead suggests multiple sources of lead in the environment, including historical use of leaded fuels. Please see the responses to General Review Comment 1 and Specific Comment 9.
22.	**Appendix H2, Site Specific Background Evaluation, Summary**	It is unclear how data was selected for the off site areas that were compared to IR 31. In reviewing the information on inorganic data sets for FISCA and East Housing, it is unclear why the 95 percent Upper Confidence Limit (95 UCL) has been calculated for metals where there were only 1, 2, or 4 detections within a data set of 18 or 21 total samples. The calculated UCL is meaningless with so few detections and the resulting value only represents the UCL of the detection limits used in the analytical process. The significance of	As discussed in the response to General Review Comment 1, data on the sites adjacent to IR Site 31 are provided for information purposes. The discussion of adjacent sites in the Draft Final RI Report has been revised to explain that the identification of a background location was unnecessary because arsenic data meet the DTSC criteria for an ambient population. For data sets with three or fewer reported values, the maximum concentration has been substituted for the 95th UCL and footnotes have been inserted to explain that there were too few samples to calculate a 95th UCL. (The limit of three reported values was recommended by a U.S. EPA toxicologist for risk assessment calculations.)

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		calculating a mean or median is similarly unclear, as the resulting calculations represent the mean or median of the detection limit. In addition, the detection limits for some metals are too high (e.g., 20 or 40 milligrams per kilogram [mg/kg] for arsenic) because they exceed the preliminary remediation goals (PRGs) and/or range of concentrations in the background data set. Finally, the East Housing data set appears to represent two separate populations for some metals, one population appears to have soil impacted by metals (e.g., from a spill or release, or from a different source area) and the other representing soil with lower (potentially background) concentrations of metals. For example, the data set for barium includes three locations (B-6, B-7, and B-8) with the highest concentrations of the data set (147 to 224 mg/kg). Since the highest concentration of mercury (9.36 mg/kg, an order of magnitude higher than other mercury detections) also was detected in a sample from one of these borings, there is further evidence that these borings	The purpose of the tables is to provide general statistical parameters. Only the data for the East Housing Area were used quantitatively. The detection limits for some of the East Housing Area data were elevated; however, the positive results demonstrated that the concentrations of arsenic at the East Housing Area were higher than those in the pink background data set. Because data from the East Housing Area is not proposed as an alternative background data set, a detailed statistical analysis of the data is not warranted.

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		represent a second and impacted population. In addition, data should be evaluated for presence of a second population before the 95 UCL is calculated. Please describe and provide all data available for the comparison sites. No comparison is provided for the iron and manganese between IR 31 data and the potential offsite background areas, even though the comparison of these metals is one of the significant rationales for the position that the pink data is inadequate for comparison with IR 31 analytical results. Please provide this comparison.	
23.	**Appendix H2, Summary, Page i and Section 2.2, Potential Off-Site Background Locations, Page 4**	The extent to which locations that have been selected as potential background are contaminated with other constituents is unclear, since the full analytical data set has not been provided. Samples with detections of VOCs, SVOCs, pesticides, or PCBs should be excluded from the potential background data set. Please exclude locations with organic contaminants, include a discussion of the	See response to General Review Comment 1 and Specific Comment 22. Use of an alternative background data set is not proposed and is not needed for the IR Site 31 Draft Final RI Report. Therefore, a detailed statistical analysis of the data is not warranted.

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		potential for the selected data sets to be contaminated, and include the full data set (all analytes) for all samples used in this analysis.	
24.	**Appendix H2, Summary, Page iii and Section 5, Conclusions**	The text indicates that metals concentration in the "pink" data set are statistically different from one another, however it is unclear why the conclusion is that they are entirely different populations when there is a likelihood that the IR 31 data may represent a contaminated subset of the "pink" data set. In order to more conclusively determine the statistical difference between the "pink" data set and the IR 31 data, comparisons should be provided for the two sets of data that include other chemical constituents and a comparison of lithology and grain sizes to establish the similarity or difference between the two populations. Please provide further comparison analysis of the pink and the IR 31 data sets.	See response to Specific Comment 9, which explains that the addition of chemical contaminants to ambient concentrations typically results in two or more populations. However, the arsenic data at IR Site 31 represent a single ambient population. In addition, physical characteristics of soil are more useful in showing that two soils with different physical characteristics are most likely from different sources. However, the fact that the two soils have similar physical characteristics is not evidence that the soils came from the same sources or have similar chemical characteristics. A detailed evaluation of physical soil properties at IR Site 31 and adjacent sites was performed as presented in Section 3 of Appendix H2. Geotechnical data collected at sites east and west of Main Street are presented in Table 2 (Appendix H2) and were discussed in Section 3.3 (Appendix H2). Figure 7 of Appendix H2 presents the grain size distribution curve for a representative soil sample collected at IR Site 35, within the pink background area west of Main Street, and for samples collected at IR

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			Sites 30 and 31, east of Main Street. As shown in Figure 7 (Appendix H2), the IR Site 35 soil samples have a narrow range of particle sizes (typically poorly graded sands with little or no gravel) compared to the wide range of particle sizes present in soil at IR Sites 30 and 31. The lithologic differences indicate separate fill events and different source materials.
25.	**Appendix H2, Section 2.1, PRC Pink Background Data Set, Page 3**	Historic maps and aerial photographs to validate information in this section have not been provided. Please provide this supporting evidence.	As described in Section 2.1 of Appendix H2, the fill history of Alameda Point has been refined since the PRC background study assigned areas of soil to one of three groups. Figure 4 of Appendix H2 was developed considering additional information that indicated the area west of Main Street was in place by 1927 (BEI 2002). As part of the background evaluation for IR Sites 30 and 31, the fill history presented in Figure 4 was further refined as shown in the inset. The latest refinement considered newly available 1903 United States Coast Geodetic Survey and 1906 E.C. Sessions maps which indicate that levees were aligned north-south along Main Street. The boundaries of fill events have also been refined by assessing lithologic characteristics in boring logs. The following maps and figures have been added to the Draft Final RI Report as Attachment D to Appendix H2, to provide supporting evidence for the discussion in Section 2.1 of Appendix H2:

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	Reference	Comments	Responses
			• USCGS 1903 Historical Map (Figure D-1) • E.C. Sessions 1906 Historical Map (Figure D-2) • USGS 1915 Quadrangle Map (Figure D-3) • USCGS 1919 Historical Map (Figure D-4) • USCGS 1927 Historical Map (Figure D-5) • USCGS 1930 Historical Map (Figure D-6) • 1930 oblique photo showing areas east and west of Main Street (Figure D-7)
26.	**Appendix H2, Section 2.1, PRC Pink Background Data Set, Page 3 and Figure 4, History of Artificial Fill**	The inset (updated fill history) and main map are inconsistent because the main map shows that most of IR Site 30 and a portion of IR Site 31 are in the "blue" area (i.e., fill in place by 1930) and that a portion of both sites were filled during the "olive" (i.e., filled before 1919) deposition period, but the inset shows that both areas are in the "light yellow" fill area (i.e., fill in place by 1927). Maps and aerial photographs to support this change have not been presented. Please provide supporting documentation to validate the information in the inset. If oblique aerial photographs were used, please discuss how the fill history was extrapolated, including points of reference that were used.	The inset on Figure 4 of Appendix H2 is not intended to be consistent with the information presented in the main body of the figure. Rather, the inset is intended to show the latest interpretation of the fill history in this area of Alameda Point. As described in Section 2.1 of Appendix H2, Figure 4 (prepared by BEI in 2002 and revised by BEI to include the inset showing the most recent interpretation of fill history) was refined based on the locations of levees and an assessment of the lithologic characteristics on boring logs advanced in IR site 31 and nearby locations. Copies of maps and a photo from 1930 and prior to 1930 that support the information in the inset on Figure 4 have been included in Attachment D to Appendix H2 as listed in response to Specific Comment 25. The location of Main Street has been indicated on the 1930 oblique aerial photo

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			(Figure D-7) as a point of reference. Regardless of the fill history of IR Site 31 and the similarities and differences in the soil composition between IR Site 31 and adjacent sites, the statistical analyses summarized in Section 1 of Appendix H2 indicate that the arsenic concentrations reported in soil at IR Site 31 are representative of a single population and meet the criteria outlined in DTSC policy (DTSC 1997) for an ambient data set. HERD supports the evaluation methods and the conclusion that arsenic concentrations in soil at IR Site 31 are ambient.
APPENDIX I, HUMAN HEALTH RISK ASSESSMENT **GENERAL COMMENTS**			
1.		One of the goals for conducting the baseline human health risk assessment (HHRA) was to "provide information for making decisions concerning the necessity for remedial action to reduce any potential exposure." Part of assessing exposure is understanding all possible routes for contaminant migration. Several constituents are present in soil at elevated levels. In addition, a viable drinking water aquifer underlies the site. However, it does	Please note that the discussion of the fate and transport of chemicals from soil to groundwater is typically included in Section 5, Fate and Transport Mechanisms, and not in the HHRA. There is no evidence of a source or a release of chemicals in soil that might leach to groundwater, and inorganics are not identified as contaminants in the OU-5/IR-02 groundwater remedy. The concentrations of organic compounds in groundwater at IR Site 31 are consistent with the area-wide plume, as discussed in Section 4.2.3.1

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	Reference	Comments	Responses
		not appear that an assessment of the potential for contaminants in soil to migrate to groundwater has been conducted. It is noted that the Draft RI Report indicates that while groundwater at Site 31 is impacted with volatile organic compounds (VOCs) and semi-VOCs (SVOCs), the source for the groundwater contamination is not likely associated with Site 31. However, the RI Report also does not appear to address whether contamination in soil at Site 31 could be a possible source for future contamination via migration of contamination in soil to groundwater. Typically a migration assessment is conducted to assess whether constituent concentrations in soil have the capacity to leach via downward migration and adversely impact underlying groundwater. This pathway is typically assessed using soil-to-groundwater Soil Screening Levels. This evaluation is also useful in determining areas that may require remediation. Please discuss why this evaluation was not conducted and if warranted, revise the RI Report to include a	Revisions were made. The Draft Final RI Report has discussion of specific inorganics in Section 4.2.3.2 to show that there is no evidence of impacts from metals in groundwater specific to IR Site 31. The use of "soil screening levels" for leaching and migration to groundwater is not practical because values for leaching of inorganics to groundwater have not been developed in the San Francisco Bay RWQCB Environmental Screening Level document (February 2005). The Draft Final RI Report includes evaluations of concentrations of cadmium, chromium, iron, lead, vanadium, by statistical methods (DTSC 1997) to identify if these metals in soil are related to site activities or are present at ambient concentrations and not related to site activities. The five inorganics, cadmium, chromium, iron, lead, and vanadium, were selected for statistical evaluation based upon the following: Iron, lead, and vanadium are being evaluated because these inorganics are at concentrations greater than the residential PRG criteria. Cadmium is being evaluated because of its contribution to human health risk. Chromium concentrations in soil are being evaluated because concentrations in groundwater samples collected during the IR Site 31 RI sampling event of November 2005, showed concentrations greater than concentrations in

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		comparison of site concentrations to the soil screening levels.	historic groundwater data. The consistency of groundwater samples at IR Site 31 with the OU-5/IR-02 groundwater plume will be addressed by updating Table 4-6 and Sections 4.2. The updated and revised information will use results from the 2006 base-wide groundwater monitoring events (ITSI 2007a, b), the OU-5/IR-02 RI/FS (Neptune et al. 2002), and also comparing data with groundwater data collect prior to 2002 and reported in the Groundwater RI/FS (EERG 2004). This discussion will show that monitoring well data collected during the IR Site 31 Soil RI are consistent with groundwater data for the OU-5/IR-02 plume and that remedial decisions for the OU-5/IR-02 do not include inorganics as chemicals of potential concern in groundwater. Discrepancies between direct push data and monitoring well data collected during the IR Site 31 Soil RI and related to the turbidity of direct push samples will also be addressed.
2.		The 1997 United States Environmental Protection Agency (EPA) Exposure Factors Handbook was used as a primary guidance for deriving exposure factors. Please note that for the evaluation of the child scenarios, exposure data should be	The 1997 EPA Exposure Factors Handbook was referenced for two of over a 100 RME exposure factors that required references. The primary reference is the EPA Region 9 Preliminary Remediation Goals (PRG) Table. The two references using the 1997 guidance are for ingestion of homegrown produce which were agreed upon for

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		obtained from EPA's Child-Specific Exposure Factors Handbook (2002) (ChEFH). Please ensure that the child exposure factors applied in the risk assessment are consistent with those in ChEFH.	Alameda risk assessments (TetraTech 2003).
3.		The most recent EPA guidance is not consistently used for this risk assessment. For example, EPA's 1996 Soil Screening Guidance is referenced while the 2002 update to this document, EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, December 2002 is not (e.g., referencing an assessment approach for construction worker exposures). Please revise the HHRA to cite the most recent relevant guidance documents.	The reference to EPA 1996 is on Page I-9 in connection with uptake values between soil and plants. The 2002 Supplemental Guidance does not address uptake between soil and plants; therefore, the current reference to the 1996 version is correct. As shown on Table I4-1, Exposure Assumptions Table, the reference for the construction worker exposure is the San Francisco Regional Water Quality Control Board Environmental Screening Levels, February, 2005. All citations are correct for the sources of the assumptions used in the HHRA.
4.		It is unclear whether 'chromium' concentrations represent the trivalent form (Cr3+) of this metal or total chromium, assuming a ratio of the hexavalent and trivalent forms ([Cr6+]+{Cr3+]). Please clarify whether 'chromium' concentrations	The risks for chromium were correctly incorporated for all pathways and receptors for cancer risk associated with hexavalent chromium as well as noncancer risk for trivalent chromium. Section I5.4 includes the following information in the third paragraph: "Total chromium samples were evaluated with a slope

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		represent trivalent form or total chromium, assuming a ratio of the hexavalent and trivalent forms ([Cr6+]+{Cr3+]). Table I5-2 indicates that hexavalent chromium (Cr6+) is used as a surrogate for Cr3+. The Navy has not considered risks associated with chromium in Table I6-1, suggesting that chromium concentrations are not based on total chromium (i.e., an assumed ratio of 1:6, Cr6+:Cr3+). Table I6-3 presents the oral reference dose (RfDo) for Cr6+ as the selected toxicity criterion for use in assessing hazard attributable to chromium. Please clarify which form(s) of chromium the data are representing.	factor modified in accordance with the EPA Region 9 PRGs to account for the presence of hexavalent chromium." Total chromium was included using the appropriate reference dose shown on Table I6-3.
SPECIFIC COMMENTS			
1.	**Appendix I, Section I4.2.2, Incomplete Exposure Pathways, Page I-7**	Dermal contact and incidental ingestion of groundwater by a construction worker are reasonable exposure scenarios; however, as the duration of these events is expected to be minimal, these pathways were deemed incomplete. Minimal duration does not address an incurred dose and is not sufficient justification for the exclusion of a	Section I4.2.2 explains that construction below the water table at Alameda Point requires the installation of sheet piling or a similar mechanism to stabilize the walls of the trench and dewatering to keep the trench dry. Consistent with the approved HHRAs at IR Sites 26, 27, 28 and 30, dermal exposure to groundwater is not considered a completed exposure pathway. The Draft Final RI Report has the following paragraph

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		pathway from the Risk Characterization. Please revise the risk assessment to include an expanded qualitative assessment (i.e., potential for substantive impact on overall expressions/quantitative point estimates of risk or hazard) or full quantitative assessment based on dermal contact with, and incidental ingestion of, groundwater for a construction worker population.	added to the end of Section I7.2: "The potential for a construction worker to be exposed to groundwater was considered negligible because of standard practices when constructing below the water table. However, it is possible, given that groundwater occurs as shallow as 7 feet depth, that construction workers could occasionally come into contact with groundwater. Shallow groundwater has lower concentrations of chemicals than deeper groundwater but this potential contact does add uncertainty to the calculations for construction workers. "
2.	**Appendix I, Section I4.3.2, Quantification of Daily Intake, Page I-8**	The exposure frequency (EF) considered for use in assessing exposures associated with ingestion of homegrown produce is equivalent to exposures occurring over approximately 20 percent of a given year. Please provide the decision criteria and supporting rationale to describe how this EF was derived.	The exposure frequency of 20 percent homegrown produce is an Alameda-specific assumption that was established early in the risk assessment process at Alameda (TetraTech, 2003).
3.	**Table I4-1, Selection of Exposure Pathways**	The HHRA does not appear to include the inhalation pathway. Inhalation of vapors while showering/ bathing is listed as a complete exposure pathway for future adult and child residents. Text in Section 6.1.2	The HHRA calculations for the IR Site 31 soil RI include inhalation of vapors from groundwater and soil to indoor air. As agreed upon with the agencies and consistent with the approved RI at IR Site 30, the total cumulative risk including residential use of groundwater (ingestion and

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		and Section I3.2 indicates that this pathway was evaluated quantitatively in the risk assessment using groundwater data from the Site 31 RI and the OU-5 RI (Neptune et al. 2002). However, the risk assessment does not appear to contain an analysis of this pathway. Rather, the results are cited in another report, the Final Groundwater RI/FS for Site 25/IR-02, but the extent to which the results are specific to Site 31 is unclear. Please clarify how this pathway was evaluated for Site 31. If this scenario was not addressed using site-specific data; please provide adequate justification for its exclusion or revise the risk assessment to include an evaluation of risks and hazards associated with inhalation and dermal contact with groundwater while showering.	inhalation while showering) was calculated using the risk published in the Final Groundwater RI/FS for IR Site 25/IR-02 (ERRG 2004). This risk assessment did not evaluate dermal contact while showering.
4.	**Table I4-1, Selection of Exposure Pathways**	The rationale provided in this table supporting exclusion of dermal contact with groundwater as a relevant pathway attributable to a future construction worker includes the argument that exposure would be transient and minimal. Section 2.4.2 indicates that depth to groundwater in the	See the response to Specific Comment 1 on the HHRA on dermal contact with groundwater for construction workers. The dermal exposure to groundwater is excluded because the construction below the water table at Alameda Point requires dewatering to stabilize the soils and keep the trench dry. Consistent with the approved HHRAs at IR

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		first water-bearing zone (FWBZ) is 3.8 to 7 ft bgs. Because shallow groundwater could be contacted during routine excavation activities, the risk assessment should be revised to include a quantitative or qualitative analysis of this pathway.	Sites 26, 27, 28 and 30, dermal exposure to groundwater is not considered a completed exposure pathway.
5.	**Table I4-5, Reasonable Maximum Exposure Values Used for Daily Intake**	This table fails to provide any parameters or equations used in assessing the inhalation of volatiles while showering. In addition, this table does not address ingestion of groundwater. Please revise Table I4-5 to include input parameters and equations for assessing the inhalation of vapors while showering and the ingestion of groundwater by a future child or adult resident.	As explained in the response to Specific Comment 3 on the HHRA, calculations of the risk associated with ingestion of groundwater and inhalation of volatiles while showering were not conducted as part of the soil RI HHRA but risks calculated in the Final Groundwater RI/FS for IR Site 25/IR-02 (ERRG 2004) were included. Therefore, it is not appropriate to include the input parameters and equations in Table I4-5 as they were not used in the risk assessment conducted for this report.
APPENDIX J, SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT **GENERAL COMMENTS**			
1.		The soil sampling intervals used for examining potential exposures to ecological receptors is unclear. The soil sampling intervals listed for soil appear to be	The state guidance of surface soil to a depth of 6 feet (Cal/EPA 1998) was used as the selection criterion for soil samples. The 0 to 8 ft below ground surface values represent the range of top-depth and bottom-depth for the

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		samples collected between 0 and 8 ft bgs. However, no justification is provided to clarify why this depth class is considered appropriate. Surface soil exposures for surface foraging receptors, typically 0 to 0.5 ft bgs, do not appear to have been examined separately from exposures to sub-surface foraging receptors, typically 0.5 to 4 ft bgs (or deeper, depending on the receptor of concern [ROCs]). The use of a sample collected from the 0 to 8 ft bgs sampling interval does not represent actual site-specific exposures for either receptors class. Please revise the RI Report to clarify and justify the depth classes used for examining exposures to ROCs, or include a clear, complete, and detailed discussion of this in the Uncertainties Section.	included soil samples. As noted in Section J1.3, the mean sample depth for all soil samples was less than or equal to 6 feet.
2.		It is stated throughout the RI Report that lower trophic level receptors, such as plants and invertebrates, are not expected to occur at IR Site 31, since current and expected future site conditions are not expected to include habitat areas for these receptors. However, it is also stated in the	The landscaped areas have non-native plants and are prepared with soil amendments and other yard management products. The landscaped areas represent a poor potential habitat for native plants and soil invertebrates. Therefore, plants and soil invertebrates are not included as assessment endpoints. The existing plants and invertebrates are a food base for wildlife in the area.

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		RI Report that landscape areas are present at IR Site 31, and therefore it can reasonably be assumed that invertebrates are present in these areas. In addition, although probably not native, plant species are also present, and both of these lower trophic level receptors can be assumed to provide a food base for upper level receptors. This is further supported by the fact that herbivorous, insectivorous, and omnivorous mammal and bird species have been selected as ROCs at the site. Please revise the RI Report to include plants and soil invertebrates as ROCs for the risk assessment.	This consideration is included in the assessment of the representative wildlife species.
3.		No information appears to be contained in the RI Report regarding assessment and measurement endpoints. It is important that the ecological resources in need of protection are clearly established for the site to ensure that the ecological risk assessment process is conducted in an appropriate manner. Please revise the RI Report to include this information.	Revisions were made. The Draft Final RI Report includes the following two sentences after the first sentence of the last paragraph of Section J1.6: "Assessment endpoints include growth and reproduction of omnivorous and herbivorous mammals, and omnivorous, invertebrate-feeding, and carnivorous birds. Exposure endpoints are hazard quotients for the following representative species."

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
4.		Appendix J (subsection J1.A) describes the complete and incomplete fate and transport pathways in regards to ecological exposure settings. The Appendix J subsection provides compelling evidence that brings important pathways to closure (groundwater to surface water, stormwater runoff to adjacent estuaries). These pathway descriptions need to be brought forward into the Risk Characterization descriptions within the Executive Summary (page xi) and Appendix J (subsection J9 page J-19) in order to address all ecological risk concerns.	Revisions were made. The Draft Final RI Report includes the following sentence after the first sentence of the first paragraph of Section J9: "The aquatic life at the nearby Oakland Inner Harbor is not expected to have unacceptable risk based on exposure to soil compounds since most of the site is paved and runoff and groundwater transport are considered incomplete pathways." The third sentence under "Ecological Risk Assessment" in the Executive Summary will be revised as follows: "Most of IR Site 31 is paved or covered by buildings and is continuously occupied as residential housing, exposure pathways to soil compounds by ecological receptors are not significant for current or expected future habitat."
SPECIFIC COMMENTS			
1.	**Section J1.2.2, Threatened, Endangered, and Of-Concern Species, Page J-4**	Numerous aquatic species are listed in this section. However, as indicated on page J-2, this ecological risk assessment does not focus on the potential groundwater to surface water transport/exposure pathway, and no aquatic resources are present onsite. Please revise the RI Report to clarify why these aquatic species are included in this section (e.g., transport of	Descriptions are provided for habitats occurring within 1 mile of the site, including the listing of occurring or potentially occurring threatened or endangered species (Cal/EPA 1996).

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
		precipitation driven run off and associated contaminated soils) or remove the aquatic species from this section and provide an abbreviated discussion regarding the information and results presented in the previous documents that deal with contaminated groundwater migrating to nearby aquatic habitats.	
2.	**Section J3.2.3, Soil-to-Small-Mammal Bioaccumulation Factors, Page J-12**	This section states that 2,3,7,8-tetrachlorodibenzo-p-dioxin was used to estimate bioaccumulation factors for organic COPECs. No justification or rationale has been provided for this approach, nor does the full citation from the 1998 paper by Sample appear to have been provided in the Reference Section. Please revise the RI Report to provide a complete, clear, technical justification for using 2,3,7,8- tetrachlorodibenzo-p-dioxin to estimate bioaccumulation factors (BAFs) for all organic compounds, along with the complete literature citation, or use the appropriate BAFs for these compound from proper open literature.	As noted in this comment and in Section J3.2.3 soil to small mammal bioaccumulation factors were estimated using the value for 2,3,7,8-tetrachlorodibenzo-p-dioxin (Sample et al 1998). This bioaccumulation factor has been routinely used at other screening-level ERAs at Alameda Point. No other organic compound soil to small mammal bioaccumulation factors are available in literature. The estimated value is not very different than a value of 1, which is often used as a default value when bioaccumulation factors are lacking. The full citation for Sample et al. (1998) is shown in the Draft Final RI Report.

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
3.	**Section J5.5, Exposure Estimates, Page J-15**	The third paragraph in this section states that the maximum detection of methylene chloride in the six "late" soil samples was approximately three times greater than detected in the previously established data set, but these data were not included as it would have no impact on risk characterization. However, no information is included to support this claim. Please revise the RI Report to provide information to verify this statement, or include this information from these six soil samples in the data set for examining potential ecological exposures at IR Site 31.	Revisions were made to clarify the point. The last two sentences of the third paragraph of Section J5.5 were replaced by these three sentences: "The methylene chloride maximum detected concentration reported for these six soil samples was greater by a factor of 3 than the maximum concentrations developed based on analysis of the initial data set.
4.	**Section J6.2, Exposure Factors, Page J-17**	Exposure factors (e.g., body weights and ingestion rates) for terrestrial wildlife were refined to more closely represent site-specific conditions. No information appears to be provided in the RI Report to describe the criteria used for this refinement process. Please revise the RI Report to include this information.	Revisions were made to include the missing table. The criterion used for the refined exposure factors was the mean value as noted in Section J6.2 and J8. Details of the refined exposure factors are shown on Table J-9 "Refined Exposure Factors for Representative Terrestrial Wildlife Receptors", which was omitted from the Draft RI Report - Revision I.

References cited:

Cook, P.D. 1998. Estimating Background Concentrations of Inorganic Analytes from On-Site Soil Sample Data. Superfund Risk

Following are responses to comments provided by Anna-Marie Cook dated 7 March 2007 to Draft RI Report Revision I Dated 29 November 2006

	Reference	Comments	Responses
Assessment in Soil Contamination Studies: Third Volume, ASTM STP 1338, K.B. Hoddinott, Ed., American Society for Testing and Materials. Department of Toxic Substances Control. 1997. Selecting Inorganic Constituents as Chemicals of Potential Concern for Risk Assessments at Hazardous Waste Sites and Permitted Facilities, Final Policy. Prepared by: Human and Ecological Risk Division, Department of Toxic Substances Control, California Environmental Protection Agency. Fleischhauer, H.L., and N. Korte. 1990. Formation of Cleanup Standards for Trace Elements with Probability Plots. Environmental Management (Vol. 14, No. 1), Springer-Verlag, New York, NY, pp. 95-105. Sinclair, A.J. 1976. Applications of Probability Graphs in Mineral Exploration. The Association of Exploration Geochemists, Special Volume No. 4, Richmond Printers Ltd., Richmond, B,C., Canada. Singh, A., A. K. Singh, and G. Flatman. Estimation of Background Levels of Contaminants. Mathematical Geology. Vol. 26, No. 3, 1994			

APPENDIX M

CITY OF ALAMEDA
MARSH CRUST EXCAVATION ORDINANCE
NUMBER 2824
FEBRUARY 16, 2000

I, the undersigned, hereby certify that the foregoing Ordinance was duly and regularly adopted and passed by the Council of the City of Alameda in regular meeting assembled on the 15th day of February, 2000, by the following vote to wit:

AYES:	Councilmembers Daysog, DeWitt, Johnson, Kerr and Mayor Appezzato - 5.
NOES:	None.
ABSENT:	None.
ABSTENTIONS:	None.

IN WITNESS, WHEREOF, I have hereunto set my hand and affixed the official seal of said City this 16th day of February, 2000.

Diane B Felsch

Diane Felsch, City Clerk
City of Alameda

March Crust
Ordinance

file

NOTICE OF EXEMPTION

To: __ Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

or _x_ County Clerk
County of Alameda
1225 Fallon Street
Oakland, CA 94612

From: City of Alameda
Planning Department
City Hall, Room 120
2263 Santa Clara Avenue
Alameda, CA 94501

RECEIVED
MAR 08 2000
CITY OF ALAMEDA

Project Title: Marsh Crust Excavation Ordinance No. 2824

Project Location - City: Alameda **Project Location - County:** Alameda

Description of Project: City Council adoption of Ordinance No. 2824 on February 16, 2000, providing environmental protection during excavation of potentially hazardous soils in the shoreline Marsh Crust area of Alameda along Oakland/Alameda Estuary. Project does not include individual construction activities within the Marsh Crust; projects will receive individual review under CEQA Guidelines.

Name of Public Agency Approving Project: Alameda City Council

Name of Person or Agency Carrying Out Project: Alameda City Public Works Department

Exempt Status: (check one)
Ministerial (Sec. 15268)
__Declared Emergency (Sec. 15269(a))
__Emergency Project (Sec. 15269(b)(c))
__Categorical Exemption. State type & section number.
XX Statutory Exemptions. State code number: S. 15308 ; also S. 15061(b)(3)

Reasons why project is exempt: The Ordinance is an "action by a regulatory agency for protection of the environment," a Class 8 exemption under Section 15308 of CEQA Guidelines, "to assure the maintenance, restoration, enhancement or protection of the environment." The Ordinance establishes standards for control of subsurface hydrocarbon and other deposits during future construction processes. Individual construction projects are to be evaluated by subsequent CEQA review, under standards of the Ordinance. In addition, Section 15061(b)(3) of the CEQA Guidelines provide, where it can be seen with certainty that a program will not involve activities which may have a significant effect on the environment, the project is exempt. Adoption of an Ordinance causes no physical activities and enhances regulation.

Lead Agency Contact Person: David Valeska, Planner III
Area Code/Telephone: (510) 748-4554

If filed by applicant:
1. Attach certified document of exemption finding.
2. Has a notice of exemption been filed by the public agency approving the project: __ Yes __ No

Signature: _____

Title: Development Review Manager

Date Received for Filing: _____
Date Posted: _____

SUPPLEMENT TO NOTICE OF EXEMPTION, MARSH CRUST EXCAVATION ORDINANCE

BACKGROUND

The City of Alameda borders the Oakland/Alameda Estuary, a waterway connecting to San Francisco Bay. The Estuary shoreline was at a lower elevation in the early 20th Century, when shipping and manufacturing left hydrocarbon deposits on these marsh areas. Later in the 20th Century, landfill raised the elevation of these shoreline areas above the tidal action line, covering the hydrocarbon-impacted tidal marshes. This process resulted in a buried layer of hydrocarbon-saturated soils known as Marsh Crust. Exposure of the Marsh Crust may result in hazardous conditions.

In recent years, construction along the north Alameda shoreline has involved excavation and installation of pilings to create foundations for new structures. Excavation below the surface of such properties may result in exposure of the Marsh Crust to the public.

Mitigated Negative Declarations adopted by the City in recent years for this area have included mitigations and conditions addressing excavation and pile driving in the Marsh Crust. The City has identified a need for establishment of standards for Marsh Crust excavation and pile driving, which resulted in adoption of the attached Ordinance.

ORDINANCE

The Ordinance provides for standards and procedures to be followed regarding excavation and pile driving in the Marsh Crust area. These regulations will minimize the risk of exposure of the public to subsurface hydrocarbon or other chemical deposits which have entered the Marsh Crust due to past chemical leakages. The regulations will protect Estuary wildlife by minimizing the risk of chemical spills into Estuary waters.

The Ordinance does not approve any individual construction projects. Each excavation or pile driving activity in the Marsh Crust will separately be evaluated under the California Environmental Quality Act as either requiring a Mitigated Negative Declaration, Categorical Exemption or other procedure.

CONCLUSION

The Ordinance is Categorically Exempt under Section 15308 of the CEQA Guidelines because it establishes regulatory standards for protection of the environment without approving any individual construction projects.

March 1, 2000 dv

NOTICE OF EXEMPTION

Appendix E

To: ☐ Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

☒ County Clerk
County of Alameda
1225 Fallon Street
Oakland, CA 94612

From: City of Alameda
Public Works Department
2263 Santa Clara Avenue
Alameda, CA 94501

Project Title: Excavation Ordinance

Project Location - Specific: Former Alameda Naval Air Station and Fleet Industrial Supply Center, Alameda Annex and Facility

Project Location - City: Alameda

Project Location - County: Alameda

Project Description: Adoption of an excavation ordinance to regulate excavation into the Marsh Crust at Fleet Industrial Supply Center and Alameda Naval Air Station, Alameda. The excavation ordinance will require testing and proper handling of soils which may be hazardous, protecting health and human safety.

Name of Public Agency Approving Project: City of Alameda

Name of Person or Agency Carrying Out Project:

Exempt Status: (check one)

- ☐ Ministerial (Sec. 21080(b)(1); 15268);
- ☐ Declared Emergency (Sec. 21080(b)(3); 15269(a));
- ☐ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
- ☒ Categorical Exemption. State type and section Number: 15061(b)(3)
- ☐ Statutory Exemptions. State code number:

Reasons why project is exempt: The project involves adoption of an excavation ordinance. There is no possibility that the adoption of this ordinance will have a significant impact on the environment. (See attachment)

Lead Agency Contact Person: Dina Tasini **Area Code/Telephone/Extension:** 510/749-5922

If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? ☐ Yes ☐ No

Signature: Dina Tasini Date: 2/18/00 Title: Environmental Mgr.

☐ Signed by Lead Agency Date received for filing at OPR:

☐ Signed by Applicant

CITY OF ALAMEDA ORDINANCE NO. 2824
New Series

AMENDING THE ALAMEDA MUNICIPAL CODE BY AMENDING CHAPTER XIII (BUILDING AND HOUSING) BY ADDING A NEW SECTION 13-56 (EXCAVATION INTO THE MARSH CRUST/SUBTIDAL ZONE AT THE FORMER NAVAL AIR STATION ALAMEDA AND FLEET INDUSTRIAL SUPPLY CENTER, ALAMEDA ANNEX AND FACILITY) TO ARTICLE XVII (PITS, WELLS AND EXCAVATIONS)

WHEREAS, the marshlands and near shore areas once located adjacent to the island of Alameda were filled with dredge material between approximately 1900 and 1940; and

WHEREAS, the marsh crust, and the subtidal zone extending from it, is a horizon that is identifiable in the subsurface (the interface at the bottom of the fill material) which contains remnants of grasses and other intertidal and subtidal features; and

WHEREAS, the marsh crust/subtidal zone also contains, at least locally, elevated levels of petroleum-related substances, such as semi-volatile organic compounds, which substances may pose an unacceptable risk to human health and the environment if excavated in marsh crust/subtidal zone materials, brought to the ground surface and handled in an uncontrolled manner; and

WHEREAS, proper handling, storage and disposal of materials excavated from the marsh crust/subtidal zone, pursuant to state and federal hazardous materials laws, will help eliminate unacceptable exposures and risks to human health and the environment; and

WHEREAS, the Draft Base-wide Focused Feasibility Study for the Former Subtidal Area and Marsh Crust and Ground Water (U.S. Navy, February 20, 1999) recommends implementation by the City of an institutional control, such as an excavation ordinance, as a remedial action related to the cleanup by the United States Navy of Naval Air Station Alameda and the Fleet Industrial Supply Center, Alameda Annex and Facility, which closed military installations are anticipated to be transferred to the City; and

WHEREAS, it can be seen with a certainty that adoption of a permitting program by the City that requires proper handling, storage and disposal, pursuant to existing state and federal hazardous materials laws, of materials excavated from the marsh crust/subtidal zone will not involve or require any physical activities other than optional testing of excavated materials and, therefore, is exempt from the California Environmental Quality Act pursuant to California Code of Regulations, title 14, section 15061(b)(3) because there is no possibility that the enactment of the ordinance may have a significant effect on the environment.

CITY ATTORNEY

NOW, THEREFORE, BE IT ORDAINED by the Council of the City of Alameda that:

Section 1. The Alameda Municipal Code is hereby amended by adding a new Section 13-56 (Excavation Into the Marsh Crust/Subtidal Zone at the Former Naval Air Station Alameda and Fleet Industrial Supply Center) to Article XVII (Pits, Wells and Excavations) of Chapter XIII (Building and Housing) thereof to read:

13-56 EXCAVATION INTO THE MARSH CRUST/SUBTIDAL ZONE AT THE FORMER NAVAL AIR STATION ALAMEDA AND FLEET INDUSTRIAL SUPPLY CENTER, ALAMEDA ANNEX AND FACILITY.

13-56.1 DEFINITIONS.

For purposes of this Section 13-56 the following definitions shall apply:

Bay shall mean San Francisco Bay, including the Oakland Estuary and the Oakland Inner Harbor.

DTSC shall mean the California Environmental Protection Agency, Department of Toxic Substances Control.

Earth material shall mean any rock, natural soil or fill or any combination thereof.

Excavation shall mean the mechanical removal of earth material.

Hazardous materials, as defined in California Health and Safety Code sections 25260(d) and 25501(k), shall mean any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste and any material which a handler or the administering agency has reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

Marsh crust shall mean the underground layer that is the remnant of the tidal marsh that existed along the shoreline of Alameda Island before filling to create additional dry land. In many places, this layer contains substances from former industrial discharges that were retained in the historic marsh before filling.

Subtidal zone shall mean the underground layer that is the pre-filling Bay floor extension of the historic marsh. Together, the marsh crust and the subtidal zone constitute a single, continuous, underground layer that extends Bayward of the original mean higher high tide line of Alameda Island, before filling, throughout the area that was filled.

Threshold depth shall mean the depth below which a permit is required by this Section 13-56. The threshold depth is conservatively identified with the elevation above which there is little likelihood that substances from the historic marsh or Bay floor would have mixed during filling, including a margin of safety above the elevation of the historic marsh surface or subtidal zone. In no event will the threshold depth be above mean higher high water.

13-56.2 Permit Required.

a. It shall be unlawful for any person, including utility companies and their employees and contractors, to excavate below a threshold depth above the marsh crust/subtidal zone within the area of the former Naval Air Station Alameda and Fleet and Industrial Supply Center, Alameda Annex and Facility, as depicted in Exhibit A, hereto, without first obtaining a permit in writing from the Chief Building Official.

b. All excavation below the threshold depth in the area subject to this Section 13-56 shall be performed solely in accordance with the permit as approved and issued by the City.

13-56.3 Depth of Excavation Subject to Permit Requirement.

The Chief Building Official shall establish a threshold depth, consistent with DTSC's remedial decision documents pertaining to the marsh crust/subtidal zone, below which a permit shall be required for excavation pursuant to this Section 13-56. The threshold depth may vary by location. The Chief Building Official shall publish a map depicting the parcels and threshold depths for which a permit is required under this Section 13-56. The Chief Building Official may update the map, consistent with DTSC's remedial decision documents pertaining to the marsh crust/subtidal zone, as necessary to incorporate any new information concerning the depth of the marsh crust/subtidal zone received by the City since the preparation of the initial map or last update.

13-56.4 Exception to Permit Requirement.

a. No permit shall be required under this Section 13-56 for pile driving or other penetration of the marsh crust/subtidal zone that involves neither (i) bringing materials from below the threshold depth to above the threshold depth; nor (ii) exposure of construction workers to soil excavated from below the threshold depth.

b. No permit shall be required under this Section 13-56 for excavation associated with emergency repair of public infrastructure facilities; provided, however, that soil excavated from below the threshold depth in the area of the marsh crust/subtidal zone, as depicted on Exhibit A, must be managed as though it were hazardous in accordance with Subsection 13-56.8b.

13-56.5 **Permit Application.**

Application for a permit shall be made in writing on forms available in or from the Building Services Office and shall be filed in the Building Services Office. Subsection 13-1.2 of Article I of Chapter XXIII regarding Appeals (Section 105.1), Appeal Fee (Section 105.2), Expiration (Section 106.4.4), Permit Fees (Section 107.2) and Plan Review Fees (Section 107.3) shall apply to all permits issued pursuant to this Section 13-56. The information required to be provided on the application shall be determined by the Chief Building Official and shall include at a minimum:

a. A description and map of the property that is to be excavated sufficient to locate the area of proposed excavation on Exhibit A.

b Detailed plans, prepared by a registered civil engineer licensed in the State of California, of the excavation work to be done, including a drawing with dimensions to scale of all proposed excavation activity.

c. A statement of the maximum depth of excavation.

d. All elevations in plans and application materials submitted to the City shall be referenced to City Datum and shall show depth below ground surface.

e. A cost estimate for purposes of determining the amount of the bond required to be obtained pursuant to Subsection 13-56.11.

13-56.6 **Certifications and Acknowledgments.**

a. The following certifications shall be required as part of the permit application:

1. The applicant shall sign a certification prepared by the Chief Building Official acknowledging receipt of notice that the property to be excavated may be in the area of the marsh crust/subtidal zone, and that hazardous materials may be encountered during excavation.

2. The applicant shall sign a certification prepared by the Chief Building Official acknowledging that federal and state hazardous materials laws and regulations will apply to storage, transportation and disposal of any materials excavated from the marsh crust/subtidal zone that are hazardous materials.

3. The applicant shall sign a certification prepared by the Chief Building Official acknowledging liability for disturbing and removing all materials from the marsh crust/subtidal zone in accordance with this Section 13-56 and the permit.

b. All building and excavation permits issued for construction or excavation within the area subject to this SubSection 13-56 shall contain the following written warning:

"Pursuant to Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code, excavation work in the area of the marsh crust/subtidal zone within the area of the former Naval Air Station Alameda and Fleet and Industrial Supply Center, Alameda Annex and Facility, as depicted in Exhibit A to Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code, may be subject to special materials handling requirements. The permittee acknowledges that he or she has been informed of the special materials handling requirements of Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code and that hazardous materials may be encountered during excavation."

13-56.7 Notification Prior to Start of Excavation.

a. After receipt of a permit and no less than two (2) business days (forty-eight (48) hours minimum) before commencement of any excavation activity in the area subject to this Section 13-56, the permittee shall notify the Chief Building Official of the planned start of excavation. Said notification shall include a schedule for any excavation work that will last for more than one day.

b. The permittee shall give adequate notice to Underground Service Alert prior to commencing any excavation activity subject to this Section 13-56.

13-56.8 Materials Handling.

The permittee shall elect to follow one or more of the courses of action set forth below before beginning any excavation activities in the area subject to this Section 13-56. Unless otherwise demonstrated by the permittee by means of reconnaissance investigation pursuant to Subsection 13-56.8a, or unless the permittee prepares site management plans pursuant to Subsection 13-56.8c, soil below the threshold depth in the area of the marsh crust/subtidal zone, as depicted on Exhibit A, must be managed as though it were hazardous pursuant to Subsection 13-56.8b. The permittee may elect to follow Subsection 13-56.8a, but must comply with Subsection 13-56.8b or 13-56.8c if testing demonstrates that the materials below the threshold depth are hazardous materials. Copies of all reconnaissance testing results and/or existing information used to satisfy the reconnaissance investigation requirements of Subsection 13-56.8a shall be reported to and filed with the City. All observations or encounters with the marsh crust/subtidal zone during excavation shall be reported to the City.

a. ***Reconnaissance Investigation to Rule Out the Presence of Hazardous Materials Below the Threshold Depth.***

The permittee may elect to use reconnaissance borings, pursuant to a plan prepared by a qualified registered engineer or registered geologist, licensed in the State of California, to rule out, to the satisfaction of the Chief Building Official, the presence of hazardous materials below the threshold depth in the area to be excavated. As part or all of the reconnaissance plan, the permittee may make use of existing information, where appropriate, if the existing information is directly relevant to the location and depth to be excavated and contains observations or results of analyses that assist in concluding whether hazardous materials are present. The reconnaissance report shall include a description of all observations from below the threshold depth evidencing the presence or absence of the marsh crust/subtidal zone.

1. If hazardous materials are found below the threshold depth within the area to be excavated at any time (during reconnaissance or during excavation), the permittee shall comply with either Subsection 13-56.8b or Subsection 13-56.8c, at his or her election.

2. If hazardous materials are not found below the threshold depth within the area to be excavated, no additional materials controls, except as otherwise may be required under applicable federal, state or local law, are required under this Section 13-56.

b. Handling Materials Excavated From Below the Threshold Depth as Hazardous Materials.

If the permittee has not ruled out the presence of hazardous materials pursuant to Subsection 13-56.8a, or elects not to prepare a site management plan and materials testing program pursuant to Subsection 13-56.8c, the permittee shall presume that materials excavated from below the threshold depth must be disposed at an appropriately permitted disposal facility. In addition, no excavated materials from below the threshold depth may be stockpiled prior to disposal or returned to the excavation.

c. Preparation of Construction Site Management Plan for Handling Materials Excavated From Below the Threshold Depth.

1. In lieu of handling materials excavated from below the threshold depth pursuant to the restrictions in Subsection 13-56.8b, the permittee may elect to hire a qualified registered engineer or registered geologist, licensed in the State of California, to develop a site-specific construction site management plan, including a materials testing program, to the satisfaction of the Chief Building Official. The construction site management plan shall include, at a minimum, provisions governing control of precipitation run on and run off from stockpiled soils, soil segregation, securing of stockpiled soils, duration of stockpiling, and contingency plans for handling materials excavated from below the threshold depth that prove to be hazardous materials.

2. The permittee shall hire a qualified registered engineer or registered geologist, licensed in the State of California, to oversee compliance with the approved construction site management plan, and shall transmit to the Chief Building Official upon completion of the project written certification of compliance with the construction site management plan. The certification report shall include a description of all observations from below the threshold depth evidencing the presence or absence of the marsh crust/subtidal zone.

13-56.9 Health and Safety Plan.

The applicant shall cause to be prepared by a certified industrial hygienist, and keep on the construction site at all times, a health and safety plan to protect workers at the excavation site and the general public to the satisfaction of the Chief Building Official. The Chief Building Official may prepare and provide to applicants a model health and safety plan which, if used by the applicant, shall be modified by the applicant's certified industrial hygienist to suit the specific requirements of the applicant's project.

13-56.10 Excavation Site Best Management Practices.

All excavation and materials handling activities permitted under this Section 13-56 shall be conducted in accordance with applicable Alameda Countywide Clean Water Program Best Management Practices and City of Alameda Storm Water Management and Discharge Control Program Ordinance requirements.

13-56.11 Bonds.

Upon a finding by the Chief Building Official that a permit should issue for excavation pursuant to this Section 13-56, a surety or performance bond conditioned upon the faithful performance and completion of the permitted excavation activity shall be filed with the City. Such bond shall be executed in favor of the City and shall be maintained in such form and amounts prescribed by the Risk Manager sufficient to ensure that the work, if not completed in accordance with the approved plans and specifications, will be corrected to eliminate hazardous conditions.

13-56.12 Nonassumption of Liability.

In undertaking to require applicants for certain excavation permits to comply with the requirements of this Section 13-56, the City of Alameda is assuming an undertaking only to promote the general welfare. The City is not assuming, nor is it imposing on itself or on its officers and employees, an obligation for breach of which it is liable in money damages to any person who claims that such breach proximately caused injury.

13-56.13 Construction on City Property.

a. The Chief Building Official shall prepare standard work procedures that comply with all the requirements of this Section 13-56 for all City

construction or improvement activities involving excavation below the threshold depth in the area subject to this Section 13-56. All departments, boards, commissions, bureaus and agencies of the City of Alameda that conduct construction or improvements on land under their jurisdiction involving excavation below the threshold depth in the area subject to this Section 13-56 shall follow such standard work procedures.

b. The City shall include in all contracts involving excavation below the threshold depth in the area subject to this Section 13-56 a provision requiring City contractors to comply with all the requirements of this Section 13-56. All contracts entered into by departments, boards, commissions, bureaus and agencies of the City of Alameda that authorize construction or improvements on land under their jurisdiction involving excavation below the threshold depth in the area subject to this Section 13-56 also shall contain such standard contract provision.

13-56.14 Severability.

If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Section 13-56 or any part thereof is for any reason held to be unconstitutional or invalid or ineffective by any court of competent jurisdiction, such decision shall not affect the validity or effectiveness of the remaining portions of this Section 13-56 or any part thereof. The City Council hereby declares that it would have passed each section, subsection, subdivision, paragraph, sentence, clause or phrase of this Section 13-56 irrespective of the fact that one or more sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases be declared unconstitutional or invalid or effective.

13-56.15 Permit Fee.

No permits for excavation in the marsh crust/subtidal zone shall be issued unless a fee has been paid. The fee shall be set by City Council resolution.

13-56.16 Penalties.

a. Any person, including utility companies and their employees and contractors, violating any of the provisions of this Section 13-56 shall be deemed guilty of a misdemeanor, and each person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any violation of any of the provisions of this Section 13-56 is committed, continued or permitted, and such violation may be prosecuted and punished as an infraction or misdemeanor pursuant to the provisions of Section 1-5.1 of the Alameda Municipal Code .

b. Any person, including utility companies and their employees and contractors, that commences any excavation without first obtaining the necessary permits therefor shall, if subsequently allowed to obtain a permit, pay an amount, in

addition to the ordinary permit fee required, quadruple the permit fee otherwise required.

13-56.17 Retention and Availability of Permit Files

The City shall maintain files pertaining to all permits issued under this Section 13-56, and shall make such files available to DTSC for inspection upon request during normal business hours.

13-56.18 Amendment of Section 13-56

This Section 13-56 shall not be repealed or amended without thirty (30) days prior written notice to the DTSC Deputy Director for Site Mitigation.

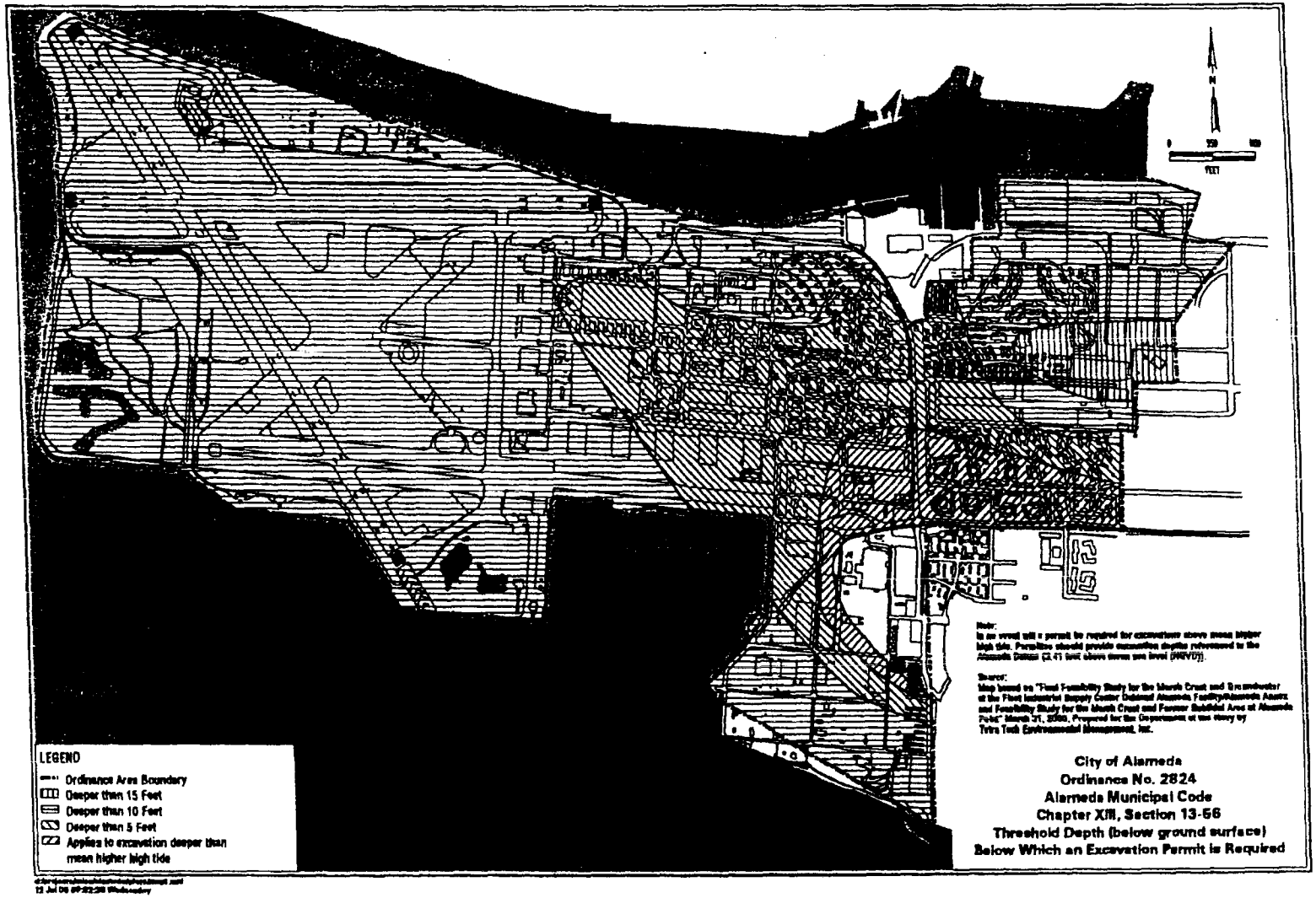
Section 2. This Ordinance shall be in full force and effect from and after the expiration of thirty (30) days from the date of its final passage.

Presiding Officer of the City Council

Attest:

City Clerk

* * * * * *



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