COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
Contract No. N62474-94-D-7609
Contract Task Order No. 385

Prepared For

U.S. DEPARTMENT OF THE NAVY
Greg Lorton, Remedial Project Manager
Engineering Field Division, Southwest
Naval Facilities Engineering Command
San Diego, California

ADDENDUM B
FINAL FIELD SAMPLING PLAN
SUPPLEMENTAL REMEDIAL INVESTIGATION
DATA GAP SAMPLING FOR
OPERABLE UNITS 1 AND 2

ALAMEDA POINT
ALAMEDA, CALIFORNIA

DS.0385.17345
August 27, 2001

Prepared By

TETRA TECH EM INC.
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for Neal Hutchison, Project Manager

DEPARTMENT OF THE NAVY
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August 29, 2001

Ms. Anna-Marie Cook
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75 Hawthorne Street, (SFD-8-2)
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Dear Ms. Cook:

Subj: ALAMEDA POINT OU-1 AND OU-2 DATA GAP SAMPLING ADDENDUM

Enclosed is a copy of Addendum B, Field Sampling Plan, Supplemental Remedial Investigation, Data Gap Sampling for Operable Units 1 and 2.

Please call me at (619) 532-0953, if you have any questions.

Sincerely,

GREGORY A. LORTON, P.E., R.E.A.
Remedial Project Manager

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DOCUMENT TITLE AND DATE:

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Supplemental Remedial Investigation Data Gap Sampling For Operable Units 1 and 2
August 27, 2001

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ADDENDUM B
FINAL FIELD SAMPLING PLAN
SUPPLEMENTAL REMEDIAL INVESTIGATION
DATA GAP SAMPLING FOR
OPERABLE UNITS 1 AND 2

ALAMEDA POINT
ALAMEDA, CALIFORNIA

Prepared for
U.S. DEPARTMENT OF THE NAVY

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DRAFT FINAL
FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN
SUPPLEMENTAL REMEDIAL INVESTIGATION DATA GAP SAMPLING

DATED 14 MAY 2001

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ADDENDUM B, QUALITY ASSURANCE PROJECT PLAN, SUPPLEMENTAL REMEDIAL INVESTIGATION, DATA GAP SAMPLING FOR OPERABLE UNITS 1 AND 2, ALAMEDA POINT, ALAMEDA, CALIFORNIA

FIGURES

FIGURES (Continued)

TABLES *(No Changes)*

TABLES (Continued) ***(No Changes)***

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

2,4-D	-	2,4-Dichlorophenoxyacetic acid
Army	-	U.S. Department of the Army
AST	-	Aboveground storage tank
ASTM	-	America Society for Testing and Materials
AVGAS	-	Aviation gasoline
BCT	-	Base Realignment and Closure Cleanup Team
BCP	-	Base Realignment and Closure Plan
BERC	-	Berkeley Environmental Restoration Center
bgs	-	Below ground surface
BRAC	-	Base Realignment and Closure
BSU	-	Bay Sediments Unit
BTEX	-	Benzene, toluene, ethylbenzene, and total xylenes
° C	-	Degrees Celsius
CA LUFT	-	California Leaking Underground Storage Tank Program
CANS	-	Container Storage Area
CAP	-	Corrective action plan
CBU	-	Construction Battalion Unit
CERCLA	-	**Comprehensive Environmental Response, Compensation, and Liability Act**
CES	-	Canonie Environmental Services
CLEAN	-	**Comprehensive Long-term Environmental Action Navy**
CLP	-	Contract Laboratory Program
cm^2	-	Square centimeters
COC	-	Chain of custody
CPT	-	Cone penetrometer test
Cr (VI)	-	Hexavalent chromium
Cr (III)	-	Trivalent chromium
CSM	-	Conceptual site model
CTO	-	Contract task order
DCA	-	Dichloroethane
DCE	-	Dichloroethene
DDT	-	Dichlorodiphenyltrichloroethane
DNAPL	-	Dense, nonaqueous-phase liquid
DQO	-	Data quality objective
DTSC	-	California Department of Toxic Substances Control
E&E	-	Ecology and Environment Inc.
EBMUD	-	East Bay Municipal Utilities District
EBS	-	Environmental baseline survey
EE/CA	-	Engineering evaluation/cost analysis
EPA	-	U.S. Environmental Protection Agency
ERV	-	Ecological reference value
FS	-	Feasibility study
FSP	-	Field sampling plan

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (Continued)

FTA	-	Fire Training Area
FTL	-	Field team leader
FWBZ	-	**First water-bearing zone**
GAP	-	Generation accumulation point
GPS	-	Global positioning system
HCl	-	Hydrochloric acid
HNO_3	-	Nitric acid
HHRA	-	Human health risk assessment
IAS	-	Initial assessment study
ID	-	Identification
IDW	-	Investigation-derived waste
IR	-	Installation restoration
IT	-	International Technology Corporation
IWTP	-	Industrial waste treatment plant
JMM	-	James M. Montgomery
L	-	Liter
LDPE	-	Low-density polyethylene
MCL	-	Maximum contaminant level
mg/kg	-	Milligrams per kilogram
mg/L	-	Milligram per liter
MLLW	-	Mean lowest low water
MNA	-	Monitored natural attenuation
MTBE	-	Methyl tertiary butyl ether
MW	-	Montgomery Watson Consulting Engineers
NAD	-	North American Datum
NaOH	-	Sodium hydroxide
NAPL	-	Nonaqueous-phase liquid
NAS	-	Naval Air Station
NACIP	-	Naval Assessment and Control of Installation Pollutants
Navy	-	U.S. Department of the Navy
NGVD	-	National Geodetic Vertical Datum
OD	-	Outer diameter
OU	-	Operable unit
PAH	-	Polynuclear aromatic hydrocarbon
PCB	-	Polychlorinated biphenyl
PCE	-	Tetrachloroethene
PDB	-	Passive diffusion bag
PID	-	Photoionization detector
PPE	-	Personal protective equipment

ABBREVIATIONS, ACRONYMS, AND SYMBOLS (Continued)

PRC	-	PRC Environmental Management, Inc.
PRG	-	Preliminary remediation goal
PVC	-	Polyvinyl chloride
QA/QC	-	Quality assurance and quality control
QAPP	-	Quality assurance project plan
RAC	-	**Remedial Action Contract**
Radian	-	Radian International LLC
Redox	-	**Reduction/oxidation potential**
RCRA	-	Resource Conservation and Recovery Act
RI	-	Remedial investigation
RI/FS	-	Remedial investigation and feasibility study
RNS	-	Ribbon NAPL sampler
ROD	-	Record of decision
RPM	-	Remedial project manager
SOP	-	Standard operating procedure
SOW	-	Statement of work
SSO	-	Site safety officer
SVOC	-	Semivolatile organic compound
TCA	-	Trichloroethane
TCE	-	Trichloroethene
TCDD	-	2, 3, 7, 8-tetrachlorodibenzo-p-dioxin
TPH	-	Total petroleum hydrocarbons
TEPH	-	Total petroleum hydrocarbon-extractable
TOC	-	Top of casing
TPPH	-	Total petroleum hydrocarbon-purgeable
TtEMI	-	Tetra Tech EM Inc.
U&A	-	Uribe and Associates
USA	-	Underground Service Alert
USACE	-	U.S. Army Corps of Engineers
USCS	-	Unified Soil Classification System
UST	-	Underground storage tank
VOC	-	Volatile organic compound
WBZ	-	Water-bearing zone

1.0 INTRODUCTION

Addendum B to the Draft Final Sampling Plan (FSP), Supplemental Remedial Investigation, Data Gap Sampling For Operable Units (OU) 1 and 2, Alameda Point, Alameda, California (dated May 14, 2001), addresses additional data gap sampling at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sites 11 and 21. In order to complete the design of the groundwater removal action treatment system, additional soil and groundwater sampling needs to be conducted to further evaluate design options. Soil sampling will be conducted to evaluate the geotechnical parameters of a low-permeability layer that may prevent sparged chemical from reaching the vadose zone and being extracted. Groundwater sampling will be conducted to further evaluate the extent of the volatile organic (VOC) plume and to evaluate the potential effectiveness of chemical oxidation to remediate the VOC plume.

Tetra Tech EM Inc. (TtEMI) will perform this work under Contract Task Order (CTO) No. 385, as received from the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command, Engineering Field Division, Southwest under Comprehensive Long-term Environmental Action Navy (CLEAN) II Contract No. N62474-94-D-7609. Addendum B addresses the following additional sampling activities:

(1) Soil sampling from selected depths at 4 locations within CERCLA Sites 11 and 21 at Alameda Point (formerly Naval Air Station [NAS] Alameda) in Alameda, California

(2) Groundwater sampling from selected depths at 14 locations (including the 4 locations in (1) above) within CERCLA Sites 11 and 21

6.0 OPERABLE UNIT 2B

This section in the original FSP summarizes the data gap sampling associated with OU-2B, which consists of CERCLA Sites 3, 4, 11, and 21. Section 6.1 provides OU-2B background information, including site location and history, local geology and hydrogeology, and previous investigations. Section 6.2 summarizes the data quality objectives (DQO) process and presents sampling objectives, proposed sampling locations, and analytical parameters. Additional data gap sampling activities as part of Addendum B to the FSP are discussed under Sections 6.2.2, 6.2.2.3, 6.2.6, and 6.2.7.

6.2 SUMMARY OF DATA QUALITY OBJECTIVES PROCESS

Data gap sampling at OU-2B covers the data gap categories presented in Section 1.2 of the FSP. Additional data gap sampling at CERCLA Sites 11 and 21 includes collecting soil samples, groundwater samples, and field data to support remedial design evaluations by (1) further delineating contaminant plumes in groundwater, (2) characterizing subsurface soil geotechnical conditions, and (3) evaluating the potential effectiveness of chemical oxidation to remediate the VOC plume. Table A-5 of the associated Quality Assurance Project Plan (QAPP) and Tables A-10 and A-11, Addendum B to the QAPP (attached here as Attachment A) present the seven-step DQO process for the relevant data gap categories.

General hydrogeologic conditions at CERCLA Sites 11 and 21 will have an effect on step-out sampling locations and the interpretation of the analytical results from data gap sampling. Sporadic zones of low permeability are expected to be encountered that may influence groundwater depths and hydraulic gradients, as well as VOC plume edges and contaminant concentrations (step-out criteria for selection of additional sampling locations are discussed in Appendix B of the FSP). Therefore, water level measurements will be collected at all existing monitoring wells (see Table 6-3) prior to initiating the additional data gap sampling at CERCLA Sites 11 and 21.

As part of Addendum B to the FSP, 14 additional data gap sampling locations at CERCLA Sites 11 and 21 will be placed based on the VOC plume delineation results of the current data gap sampling event. These data will provide current local conditions of groundwater depth, hydraulic gradient, and extent of the VOC plume beneath CERCLA Sites 11 and 21.

6.2.2 Delineation of Groundwater Contaminant Plumes

VOC plumes in groundwater are present in the first water-bearing zone (FWBZ) at CERCLA Sites 11 and 21 from solvent releases related to activity within CERCLA Sites 4 and 21. At some locations, the lateral and vertical extent of VOCs in groundwater has not been delineated to the maximum contaminant level (MCL). The objective of delineating VOC plumes is to identify locations for long-term groundwater monitoring wells and to approximate exposure areas for risk analysis purposes. VOC plumes will be delineated to the most stringent California MCL for the VOCs present. Additional groundwater sampling defined as part of Addendum B will further assist in delineation of the VOC plume.

As part of the original FSP, all appropriate monitoring wells within CERCLA Sites 11 and 21 boundaries are being sampled and analyzed for VOCs, total purgeable petroleum hydrocarbons (TPPH), total extractable petroleum hydrocarbons (TEPH), and semivolatile organic compounds (SVOC) to meet the objective of delineating contaminant plumes in groundwater. Under the current data gap sampling event, direct-push sampling locations will be advanced where plumes have not been completely defined. These sampling locations were based on the location of the most recent detection and a conservative estimate of the distance that the dissolved compound would have traveled.

Groundwater samples will be submitted to a mobile laboratory to generate screening-level data for field team leaders to decide whether step-out sampling is necessary. Fixed laboratory confirmation is being conducted for 10 percent of the samples. Further detailed description of the plume delineation and step-out criteria is presented in Appendix B of the original FSP. Proposed initial sampling locations were shown in Figure 6-3. Sample identification numbers, depth intervals, and analyses were presented in Appendix E. The procedure for delineating contaminant plumes at each investigation area is summarized in Sections 6.2.2.1 through 6.2.2.6 of the original FSP. Sampling conducted as part of Addendum B to the FSP will follow the same procedures from these sections.

The following added text to Section 6.2.2.3 outlines the rationale, proposed sampling locations, and analyses for additional data gap sampling in the CERCLA Sites 11 and 21 area. Additional sampling locations are shown in Figure 6-4. Laboratory identification numbers, field identifications, and analyses for the 14 additional data gap sampling points are presented in added Table A-3-9 in Appendix A3 of Addendum B to the QAPP (see Attachment A, this document).

6.2.2.3 Delineation of Volatile Organic Compound Plume at IR Site 21

A VOC plume has been identified at CERCLA Sites 11 and 21, resulting from activity associated with the former Clean Shop within Building 162. VOCs also have been detected in groundwater at the northern end of Building 398.

Sampling Design for VOC Plume West of Buildings 14 and 162. A VOC plume, primarily trichloroethene (TCE), has been identified in groundwater at CERCLA Sites 11 and 21, west of Buildings 14 and 162. The source appears to be related to activities conducted in Building 162, most likely the former Clean Shop and sumps located at the southwestern corner of the building. TCE was detected above MCLs from about 15 to 30 feet near the suspected source, but extended to 45 feet below ground

surface (bgs) in samples collected closer to the Seaplane Lagoon. The TCE plume is delineated north and south of the plume but not to the east and west.

Fourteen additional direct-push groundwater sampling locations (S11-DGS-DP101 through S11-DGS-DP109 and S21-DGS-DP101 through S21-DGS-DP105) will be completed around CERCLA Sites 11 and 21 to define the edges of the VOC plume. Figure 6-4 shows these sampling locations. The actual placement of each location will be decided based on the results of current data being collected under the original FSP.

Based on historical data, the direct-push borings will extend to a depth of 50 feet bgs. Groundwater samples will typically be collected at depths of 10, 25, and 50 feet bgs. Groundwater samples will be analyzed for VOCs using an on-site mobile laboratory. Confirmation sampling for VOCs will be sent to a fixed laboratory. Groundwater parameters to be analyzed are summarized in Appendix A3 of the Addendum B to the QAPP (Table A-3-9, in Attachment A).

6.2.6 Soil Sampling To Support Soil Vapor Extraction/Air Sparging Design Analysis

Previous remedial investigations at Sites 11 and 21 revealed the presence of a discontinuous, potentially semiconfining layer of sediments with lower permeabilities than the overlying fill sediments and underlying Merritt Sand equivalent. At Sites 11 and 21, the VOC plume is in the FWBZ, which includes fill materials, low-permeability sediments, and the Merritt Sand. To assist in the evaluation of a remedial design that uses soil vapor extraction(SVE)/air sparging, soil samples need to be collected from selected intervals, including the low-permeability sediments, and submitted for geotechnical analyses.

Four of the 14 additional data gap sampling locations (S11-DGS-DP101, S11-DGS-DP103, S11-DGS-DP109, and S21-DGS-DP104) discussed in Section 6.2.2.3 will be sampled for soils at depths of 10, 12, 15, 25, 35, and 50 feet bgs. Selected soil samples will be analyzed for permeability to air, dry bulk density, grain density, grain size distribution, air porosity, moisture content, relative permeability, and pore pressure dissipation. Soil samples will be submitted to a geotechnical laboratory for analyses. Geotechnical parameters to be analyzed are summarized in Appendix A3 of Addendum B to the QAPP (see Attachment A, Table A-3-9). DQOs for the additional soil sampling at Sites 11 and 21 in support of the SVE/air sparing evaluation are found in Table A-9 of Addendum B to the QAPP (see Attachment A).

6.2.7 Groundwater Sampling to Support Chemical Oxidation Design Evaluation

As discussed in Section 6.2.2.3, groundwater samples will be collected from selected depths at each of the 14 data gap sampling locations proposed in this addendum. In addition to field screening and laboratory confirmation of VOCs, additional analyses will be run on groundwater samples collected. Another alternative remedial design being evaluated for possible remediation of the existing groundwater plume includes in situ chemical oxidation. To support this evaluation, groundwater samples will be collected at all 14 locations and will be sent to a fixed laboratory and analyzed for VOCs and SVOCs, iron (II), nitrate, sulfate, methane, ethane, ethene, phosphate, dissolved oxygen, organic carbon, particle size distribution, conductivity, reduction/oxidation potential (redox), and pH (Table A-3-9 depicts sample identifications, analyses, and sample depths). DQOs for the additional groundwater sampling at Sites 11 and 21 in support of the chemical oxidation evaluation are located in Table A-10 of Addendum B to the QAPP (see Attachment A).

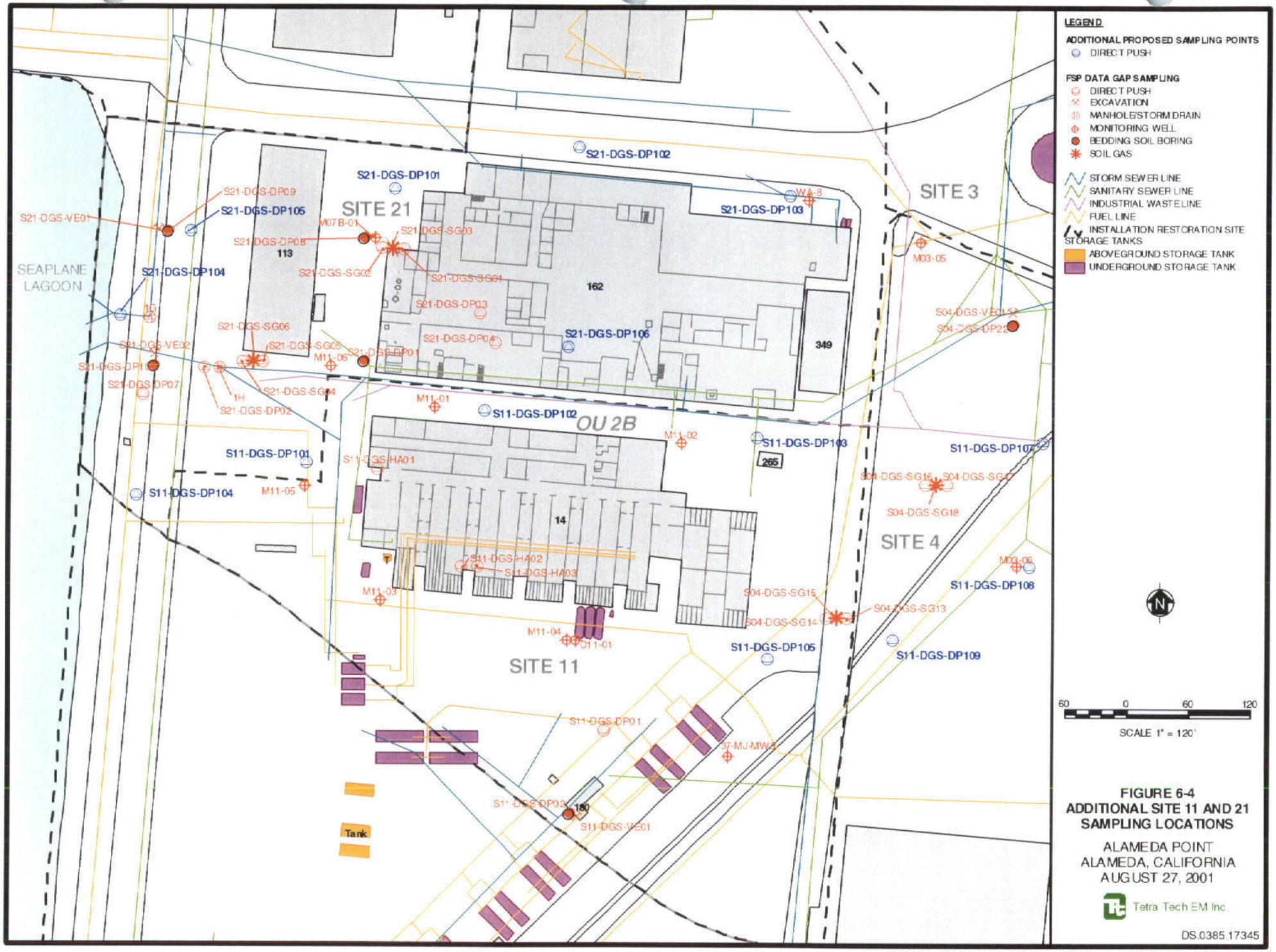

FIGURE 6-4
ADDITIONAL SITE 11 AND 21 SAMPLING LOCATIONS

ALAMEDA POINT
ALAMEDA, CALIFORNIA
AUGUST 27, 2001

Tetra Tech EM Inc.

DS.0385.17345

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ATTACHMENT A

ADDENDUM B
FINAL
QUALITY ASSURANCE PROJECT PLAN

SUPPLEMENTAL REMEDIAL INVESTIGATION
DATA GAP SAMPLING FOR
OPERABLE UNITS 1 AND 2

ALAMEDA POINT
ALAMEDA, CALIFORNIA

A1 APPROVAL PAGE

ADDENDUM B
FINAL
QUALITY ASSURANCE PROJECT PLAN

SUPPLEMENTAL REMEDIAL INVESTIGATION
DATA GAP SAMPLING FOR
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ALAMEDA POINT
ALAMEDA, CALIFORNIA

Prepared for
U.S. DEPARTMENT OF THE NAVY

REVIEWS AND APPROVALS

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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
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U.S. DEPARTMENT OF THE NAVY
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Naval Facilities Engineering Command
San Diego, California

ATTACHMENT A

ADDENDUM B
FINAL
QUALITY ASSURANCE PROJECT PLAN

SUPPLEMENTAL REMEDIAL INVESTIGATION
DATA GAP SAMPLING FOR
OPERABLE UNITS 1 AND 2

ALAMEDA POINT
ALAMEDA, CALIFORNIA

August 27, 2001

Prepared by

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Chris Jennessy
for Neal Hutchison, Project Manager

A2 CONTENTS

Appendix

FIGURES *(No Changes)*

TABLES

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TABLES (Continued)

A3 ABBREVIATIONS AND ACRONYMS

°C	Degrees Celsius
%D	Percent difference
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
BCT	Base Realignment and Closure Cleanup Team
BFB	Bromofluorobenzene
BRAC	Base Realignment and Closure
Cal-EPA	California Environmental Protection Agency
CCV	Continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Calibration factor
CLEAN II	Comprehensive Long-term Environmental Action Navy Contract N62474-94-D-7609
CLP	Contract Laboratory Program
COC	Chain of custody
CPR	Cardiopulmonary resuscitation
CPT	Cone penetrometer test
CSM	Conceptual site model
CTO	Contract task order
CVAA	Cold vapor atomic absorption
DCA	1,2-dichloroethane
DCE	cis-1,2-dichloroethene
DNAPL	Dense, nonaqueous-phase liquid
DOT	U.S. Department of Transportation
DQO	Data quality objective
DTSC	California Department of Toxic Substances Control
EBS	Environmental baseline survey
EE/CA	Engineering evaluation and cost analysis
EDD	Electronic data deliverable
EFD	Engineering Field Division
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
ERV	Ecological risk value
EWI	Environmental Work Instruction
FS	Feasibility study
FTL	Field team leader
FSP	Field sampling plan
FWBZ	First water-bearing zone

ABBREVIATIONS AND ACRONYMS (Continued)

GC/MS	Gas chromatography/mass spectrometry
GFAA	Graphite furnace atomic absorption
GIS	Geographic information system
HHRA	Human health risk assessment
HSP	Health and safety plan
HSPM	Health and Safety Program Manager
IC	Installation Coordinator
ICP	Inductively coupled plasma
ICV	Initial calibration verification
IDL	Instrument detection limit
IR	Installation restoration
IS	Internal standard
IT	International Technologies Corporation
LCS	Laboratory control sample
LIMS	Laboratory information management system
LNAPL	Light, nonaqueous-phase liquid
LUFT	Leaking underground fuel tank
MCL	Maximum contaminant level
MCCAW	Methods for Chemical Analysis of Water and Wastes
MDL	Method detection limit
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MS/MSD	Matrix spike and matrix spike duplicate
NAS	Naval Air Station
NEDTS	Navy Environmental Data Transfer Standards
OU	Operable unit
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PCB	Polychlorinated biphenyl
PDF	Portable document format
PPE	Personal protective equipment
PQL	Practical quantitation limit
PRC	Preliminary remediation criterion
QA	Quality assurance
QC	Quality control
QAPP	Quality assurance project plan
QAO	Quality Assurance Officer
QCSR	Quality control summary report
QMP	Quality management plan

ABBREVIATIONS AND ACRONYMS (Continued)

RAC	**Remedial Action Contract**
Redox	**Reduction/oxidation potential**
RF	Response factor
RI	Remedial investigation
RPD	Relative percent difference
RPM	Remedial Project Manager
RSD	Relative standard deviation
RWQCB	California Regional Water Quality Control Board
SOP	Standard operating procedures
SS	Surrogate standard
SSO	Site Safety Officer
SWDIV	U.S. Navy Southwest Division
SWRCB	California State Water Resources Control Board
SVE	**Soil vapor extraction**
SVOC	Semivolatile organic compound
TAL	Target analyte list
TCL	Target compound list
TDS	Total dissolved solids
TEPH	Total extractable petroleum hydrocarbons
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
TPPH	Total purgeable petroleum hydrocarbons
TtEMI	Tetra Tech EM Inc.
TTPH	Total TPH
UST	Underground storage tank
VOC	Volatile organic compound
WBZ	Water-bearing zone

A6 PROBLEM STATEMENT AND BACKGROUND

The following sections discuss additional modifications to the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). Modifications include providing background information regarding additional data gaps, additional data quality objectives (DQO) tables, and an update to the sample identification table.

A6.1 INTRODUCTION

The Navy is conducting a remedial investigation (RI) and feasibility study (FS) in conformance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for 29 sites at Alameda Point, Alameda, California. Data gaps were identified during regulatory review of the draft FS report for Operable Unit (OU)-1, dated April 8, 1999 (Tetra Tech EM Inc. [TtEMI] 1999a) and the draft RI report for OU-2, dated June 29, 1999 (TtEMI 1999b). Subsequently, an FSP/QAPP was prepared and currently is being implemented at Alameda Point.

Since the start of the field sampling program, additional data gaps have been identified and are the subject of a recent addendum to the FSP and QAPP (Addendum A, submitted separately). Concurrently, the Navy's Remedial Action Contract (RAC) contractor has identified additional data gaps that, if filled, would assist them in evaluating design options for an appropriate groundwater treatment system (Addendum B to the FSP and QAPP).

The additional soil and groundwater sampling described in this addendum will address these data gaps and provide the necessary information and data to evaluate these sites and ultimately facilitate transfer of the land to the City of Alameda.

As a first step toward resolution of these data gaps, this addendum (Addendum B to the QAPP, Supplemental RI Data Gap Sampling for OU-1 and -2 [TtEMI, 2001]) has been prepared. Changes made to the QAPP are listed by the corresponding section number in the QAPP, starting with the changes to Section A6, as presented above. If no changes were required to a specific section of the QAPP, "No Changes" has been inserted into the table of contents.

A6.3 BACKGROUND FOR ADDITIONAL DATA GAPS

Concurrent with ongoing data gap sampling activities at various CERCLA sites at Alameda Point, the Navy has tasked its RAC contractor to evaluate existing data collected as part of earlier (and ongoing) environmental investigations in order to begin evaluating remedial action alternatives. At OU-2B (CERCLA Sites 3, 4, 11, and 21), remedial designs being evaluated include soil vapor extraction (SVE)/air sparging, and chemical oxidation techniques for remediating volatile organic chemicals (VOC) found in groundwater.

Additional data gap sampling identified at CERCLA Sites 11 and 21 includes further delineation of the lateral and vertical extent of the VOC plume in groundwater, collection of soil samples for geotechnical analyses from various intervals in the subsurface to assess their ability to support SVE/air sparging methods, and collection of groundwater samples for analyses that will aid in evaluating the potential to remediate VOCs using chemical oxidation. DQOs for delineating the groundwater plume are discussed in Table A-5. New DQOs have been included in Table A-10 for soil samples collected to aid in the SVE/air sparging design analyses and in Table A-11 for groundwater samples in support of a natural attenuation evaluation for in situ chemical oxidation design evaluation.

Fourteen additional data points are proposed in this addendum at CERCLA Sites 11 and 21. Soil samples will be collected at four of these locations and will be analyzed for permeability to air, dry bulk density, grain density, grain size distribution, air porosity, moisture content, relative permeability, and pore pressure dissipation. Groundwater samples will be collected in all 14 locations and analyzed for VOCs and semivolatile organic compounds (SVOC), iron (II), nitrate, sulfate, methane, ethane, ethene, phosphate, dissolved oxygen, organic carbon, particle size distribution, conductivity, reduction/oxidation potential (redox), and pH (Table A-3-9 depicts sample identifications, analyses, and sample depths). These 14 additional locations are proposed in this addendum to provide necessary information to allow the RAC contractor to complete their evaluation of the remedial design options for addressing remediation of the VOC plume.

TABLE A-10

DATA QUALITY OBJECTIVES FOR ADDITIONAL SOIL SAMPLES AT OPERABLE UNIT 2 SITES 11 AND 21
SUPPLEMENTAL REMEDIAL INVESTIGATION – DATA GAP SAMPLING
ALAMEDA POINT, ALAMEDA, CALIFORNIA

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	**Identify the Decisions**	**Identify the Inputs to the Decisions**	**Define Study Boundaries**	**Develop Decision Rules**	**Specify Tolerable Limits on Errors**	**Optimize Sampling Design**
Soil Data to Support Air Sparging/Soil Vapor Extraction Design Analysis: Existing data for subsurface soil samples show areas of low permeability beneath Sites 11 and 21 which may impact the use of air sparging/SVE technologies. Because these areas may act as confining layers, additional geotechnical data on these layers are required in order to accurately evaluate air sparging/SVE as a way to remediate VOCs in groundwater.	(1) Do new data indicate that the lower-permeability areas are too impermeable to allow sparged VOCs to reach the vadose zone for practical extraction?	(1) Existing data (validated and defensible) for soil samples collected during previous investigations Proposed analytical data (validated and defensible) for soil samples collected during data gap sampling Geological data	Vertical boundaries for the proposed sampling are from the shallow subsurface (about) 10 feet bgs to 50 feet bgs. Lateral boundaries will be based on site-specific cleanup goals and step-out sampling. The temporal boundary for field work is scheduled as a single sampling event. Additional time will be required for evaluation and reporting of analytical data.	(1) If additional data indicate that the low-permeability areas are impermeable, then two options are available: (a) step-out sampling to assess the lateral and vertical extent of the impermeable zone or (b) drop air sparging/SVE as an alternative. If additional data indicate that the low permeable layers are not too impermeable for air sparging/SVE, then a pilot well SVE test may be practical.	Measurement quality objectives specify criteria for the laboratory analysis of samples (see Section B4 of the Quality Assurance Project Plan for details). The number and location of samples are based on knowledge of site history, as well as existing analytical data.	New and existing analytical data will be evaluated to determine sampling locations.

Notes:

bgs Below ground surface
SVE Soil vapor extraction
VOC Volatile organic compound

TABLE A-11

DATA QUALITY OBJECTIVES FOR ADDITIONAL GROUNDWATER SAMPLING AT OPERABLE UNIT 2 SITES 11 AND 21
SUPPLEMENTAL REMEDIAL INVESTIGATION – DATA GAP SAMPLING
ALAMEDA POINT, ALAMEDA, CALIFORNIA

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
State the Problem	**Identify the Decisions**	**Identify the Inputs to the Decisions**	**Define Study Boundaries**	**Develop Decision Rules**	**Specify Tolerable Limits on Errors**	**Optimize Sampling Design**
Groundwater Data to Support Chemical Oxidation Design Evaluation: Existing analytical data indicate VOCs in groundwater; however, chemical analyses for parameters to assist in evaluating the feasibility of in situ chemical oxidation as a groundwater remediation method have yet to be collected. Without these parameters, in situ chemical oxidation cannot be evaluated.	(1) Will the chemical parameters measured show that in situ chemical oxidation is a possible design alternative for the treatment of VOCs in groundwater?	Existing analytical data for groundwater samples collected during previous investigations (both qualitative and quantitative data); validated and defensible data for risk assessment Proposed analytical data for groundwater samples collected during data-gap sampling (both qualitative and quantitative data) and validated and defensible data for risk assessment Geologic and hyrdrogeologic data for the site	For groundwater, the lateral and vertical extent includes the first water-bearing zone beneath Sites 11 and 21. The temporal boundary is scheduled as a single sampling event, to be conducted in 2001.	(1a) If the chemical analyses are within limits that support in situ chemical oxidation of VOCs in the groundwater, then evaluation of this remedial design will be completed and a pilot well study may be recommended, should this alternative be determined to be more reasonable than other evaluated remedial technologies (such as air sparging/soil vapor extraction). (1b) If the chemical analyses indicate that subsurface conditions do not support in situ chemical oxidation, then this approach will not be evaluated further.	Measurement quality objectives specify criteria for the laboratory analysis of samples (see Section B4 of the Quality Assurance Project Plan for details). The number and location of samples are based on knowledge of site history, as well as existing analytical data.	New and existing analytical data will be evaluated to determine sampling locations.

Note:

VOC Volatile organic compound

APPENDIX A3

SAMPLE IDENTIFICATION TABLE

(Table A-3-9 was added to address additional data gaps)

TABLE A-3-9

SAMPLE IDENTIFICATION NUMBERS
FOR SOIL AND GROUNDWATER SAMPLES
SITES 11 AND 21
ALAMEDA POINT, ALAMEDA, CALIFORNIA

				Soil - Geotechnical Parameters				Groundwater Parameters										
Laboratory Identification	Point Name	Field Identification	Matrix	Permeability to Air, Dry Bulk Density, Grain Density, Grain Size Distribution and Air Porosity (Geotechnical Laboratory API RP40)	Moisture Content (Geotechnical Laboratory ASTM D2216)	Relative Permeability	Pore Pressure Dissipation	Iron (II) (Hach Test Kit)	Conductivity	Redox	pH	Dissolved Oxygen	Volatile and Semivolatile Organic Compounds (SW 846 Methods 8260 and 8270)	Nitrate (SW 846 Method 9056)	Sulfate (SW 846 Method 9056)	Methane, Ethane, Ethene (RSK 175, EPA Draft Method)	Phosphate (EPA Method 300)	Fractional Organic Carbon
Installation Restoration Site 11																		
385-S11-101	S11-DGS-DP103	S11-DGS-DP103-SO-10	Soil				X											
385-S11-102		S11-DGS-DP103-GW-10	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-103		S11-DGS-DP103-SO-12	Soil	X	X	X	X											
385-S11-104		S11-DGS-DP103-SO-15	Soil	X	X	X	X											
385-S11-105		S11-DGS-DP103-SO-25	Soil	X		X	X											
385-S11-106		S11-DGS-DP103-GW-25	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-107		S11-DGS-DP103-SO-35	Soil	X		X	X											
385-S11-108		S11-DGS-DP103-SO-50	Soil				X											
385-S11-109		S11-DGS-DP103-GW-50	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-110	S11-DGS-DP102	S11-DGS-DP102-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-111		S11-DGS-DP102-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-112		S11-DGS-DP102-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-113	S11-DGS-DP104	S11-DGS-DP104-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-114		S11-DGS-DP104-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-115		S11-DGS-DP104-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-116	S11-DGS-DP109	S11-DGS-DP109-SO-10	Soil				X											
385-S11-117		S11-DGS-DP109-GW-10	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-118		S11-DGS-DP109-SO-12	Soil	X	X	X	X											
385-S11-119		S11-DGS-DP109-SO-15	Soil	X	X	X	X											
385-S11-120		S11-DGS-DP109-SO-25	Soil	X		X	X											
385-S11-121		S11-DGS-DP109-GW-25	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-122		S11-DGS-DP109-SO-35	Soil	X		X	X											
385-S11-123		S11-DGS-DP109-SO-50	Soil				X											
385-S11-124		S11-DGS-DP109-GW-50	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-125	S11-DGS-DP105	S11-DGS-DP105-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-126		S11-DGS-DP105-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-127		S11-DGS-DP105-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-128	S11-DGS-DP107	S11-DGS-DP107-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-129		S11-DGS-DP107-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-130		S11-DGS-DP107-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-131	S11-DGS-DP108	S11-DGS-DP108-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-132		S11-DGS-DP108-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-133		S11-DGS-DP108-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S11-134	S11-DGS-DP101	S11-DGS-DP101-SO-10	Soil				X											
385-S11-135		S11-DGS-DP101-GW-10	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-136		S11-DGS-DP101-SO-12	Soil	X	X	X	X											
385-S11-137		S11-DGS-DP101-SO-15	Soil	X	X	X	X											
385-S11-138		S11-DGS-DP101-SO-25	Soil	X		X	X											
385-S11-139		S11-DGS-DP101-GW-25	Water					X	X	X	X	X	X	X	X	X	X	X
385-S11-140		S11-DGS-DP101-SO-35	Soil	X		X	X											
385-S11-141		S11-DGS-DP101-SO-50	Soil				X											
385-S11-142		S11-DGS-DP101-GW-50	Water					X	X	X	X	X	X	X	X	X	X	X
		NUMBER OF SAMPLES >>		12	6	12	18	24	24	24	24	24	24	24	24	24	24	9

TABLE A-3-9

SAMPLE IDENTIFICATION NUMBERS
FOR SOIL AND GROUNDWATER SAMPLES
SITES 11 AND 21
ALAMEDA POINT, ALAMEDA, CALIFORNIA

				Soil - Geotechnical Parameters				Groundwater Parameters										
Laboratory Identification	Point Name	Field Identification	Matrix	Permeability to Air, Dry Bulk Density, Grain Density, Grain Size Distribution and Air Porosity (Geotechnical Laboratory API RP40)	Moisture Content (Geotechnical Laboratory ASTM D2216)	Relative Permeability	Pore Pressure Dissipation	Iron (II) (Hach Test Kit)	Conductivity	Redox	pH	Dissolved Oxygen	Volatile and Semivolatile Organic Compounds (SW 846 Methods 8260 and 8270)	Nitrate (SW 846 Method 9056)	Sulfate (SW 846 Method 9056)	Methane, Ethane, Ethene (RSK 175, EPA Draft Method)	Phosphate (EPA Method 300)	Fractional Organic Carbon
Installation Restoration Site 21																		
385-S21-101	S21-DGS-DP101	S21-DGS-DP101-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-102		S21-DGS-DP101-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-103		S21-DGS-DP101-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-104	S21-DGS-DP102	S21-DGS-DP102-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-105		S21-DGS-DP102-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-106		S21-DGS-DP102-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-107	S21-DGS-DP103	S21-DGS-DP103-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-108		S21-DGS-DP103-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-109		S21-DGS-DP103-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-110	S21-DGS-DP104	S21-DGS-DP104-SO-10	Soil				X											
385-S21-111		S21-DGS-DP104-GW-10	Water					X	X	X	X	X	X	X	X	X	X	X
385-S21-112		S21-DGS-DP104-SO-12	Soil	X	X	X	X											
385-S21-113		S21-DGS-DP104-SO-15	Soil	X	X	X	X											
385-S21-114		S21-DGS-DP104-SO-25	Soil	X		X	X											
385-S21-115		S21-DGS-DP104-GW-25	Water					X	X	X	X	X	X	X	X	X	X	X
385-S21-116		S21-DGS-DP104-SO-35	Soil	X		X	X											
385-S21-117		S21-DGS-DP104-SO-50	Soil				X											
385-S21-118		S21-DGS-DP104-GW-50	Water					X	X	X	X	X	X	X	X	X	X	X
385-S21-119	S21-DGS-DP105	S21-DGS-DP105-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-120		S21-DGS-DP105-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-121		S21-DGS-DP105-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-122	S21-DGS-DP106	S21-DGS-DP106-GW-10	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-123		S21-DGS-DP106-GW-25	Water					X	X	X	X	X	X	X	X	X	X	
385-S21-124		S21-DGS-DP106-GW-50	Water					X	X	X	X	X	X	X	X	X	X	
		NUMBER OF SAMPLES >>		4	2	4	6	18	18	18	18	18	18	18	18	18	18	3

Notes:

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
DGS	Data Gap Sample
DP	Direct-Push
EPA	U.S. Environmental Protection Agency
Redox	Reduction/oxidation potential