Appendix A
Part A Data Gaps Investigation Program

Final Report

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,

PG&E Topock Compressor Station, Needles, California

Prepared for

California Environmental Protection Agency, Department of Toxic Substances Control and United States Department of the Interior

On Behalf of

Pacific Gas and Electric Company

September 2012

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Soil Investigation Part A Phase 1 Data Gaps Evaluation Report

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May 2011September 2012

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Acronyms and Abbreviations

95%UCL	95 percent upper confidence limit of the mean
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
bss	below sediment surface
BTV	background threshold value
CERCLA	Comprehensive Environmental Response, Compensation, Liability Act of 1980
CHHSL	California human health screening level
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CMS/FS	corrective measures study/feasibility study
CSM	conceptual site model
DOI	United States Department of the Interior
DQO	data quality objective
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
ECV	ecological comparison value
EPC	exposure point concentration
HERD	Human Ecological Risk Department
mg/kg	milligrams per kilogram
Navy	United States Department of the Navy
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
RAWP	risk assessment work plan
RCRA	Resource Conservation and Recovery Act of 1976
RFI/RI	RCRA facility investigation/remedial investigation

RSL	regional screening level
SSL	soil screening level
STLC	soluble threshold limit concentrations
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCL	Target Compound List
TCLP	toxicity characteristic leaching procedure
TEC	threshold effects concentration
TEQ	toxicity equivalence quotient
TPH	total petroleum hydrocarbons
TTLC	total threshold limit concentration
UA	unidentified area
USEPA	United States Environmental Protection Agency
Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
XRF	x-ray fluorescence

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is conducting investigative and remedial activities at the Topock Compressor Station in Needles, California. The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California, as shown in Figure 1-1. Investigative and remedial activities at the Topock site are being performed under the Resource Conservation and Recovery Act of 1976 (RCRA), as well as the Comprehensive Environmental Response, Compensation, Liability Act of 1980 (CERCLA), pursuant to agreements with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and United States Department of the Interior (DOI), respectively.

Two draft work plans, Soil Part A Work Plan and Soil Part B Work Plan, were initially prepared initially to address supplemental soil characterization activities at the Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and other undesignated areas (UAs) identified in the *Revised Final RCRA Facility Investigation/Remedial Investigation Report, Volume 1 – Site Background and History* (referred to as the RFI/RI Volume 1) (CH2M HILL, 2007a). Investigation areas outside the compressor station fence line were addressed in the *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles California* (CH2M HILL, 2006), (referred to as the Soil Part A Work Plan). Investigation areas within the compressor station fence line were addressed in the Draft *RCRA Facility Investigation/Remedial Investigation* Soil *Investigation* Work Plan*, Part B, PG&E Topock Compressor Station, Needles, California* (Draft Soil Part B Work Plan) (CH2M HILL, 2007b).DTSC and DOI conditionally approved the Soil Part A Work Plan on August 10, 2007 (DTSC, 2007) and June 4, 2008 (DOI, 2008a), respectively. Clarification of DTSC's conditional approval was documented in an email containing the table titled "Clarification to Responses to PG&E Topock Compressor Station Soil Investigation Part A Work Plan August 10, 2007 Conditional Approval Letter" (CH2M HILL, 2007c).

To minimize the number of samples and disturbances to sensitive resources, the Part A supplemental soil investigation program is being conducted in two phases. Phase 1 was conducted in 2008. Phase 2 will be conducted to fill data gaps identified in the Phase 1 data. Phase 2 sampling is only necessary where data gaps were identified after evaluation of the combined soil data set (existing data and supplemental Phase 1 data) for the identified SWMUs, AOCs, and UAs. The results of the Phase 1 investigation and the proposed Phase 2 sampling locations are presented in Subappendices C1 through C12.

DTSC's conditional approval letter specifically rejected the data quality objectives (DQOs) and associated data gaps evaluation process presented in the Soil Part A Work Plan (Sections 3.0 and 4.0 of the work plan) while directing PG&E to implement the first phase of soil sampling (Phase 1). Between June 2008 and February 2010, DTSC, DOI, and PG&E convened a series of meetings to draft the Soil Part A DQOs Steps 1 through 5. These first five DQO steps are used to evaluate the combined soil data (Phase 1 data and data collected prior to 2008 [referred to as existing data in this document]) and to identify sampling needs for Phase 2. The Soil Part A DQO Steps 1 through 5 are presented in the technical memorandum *Data Quality Objectives – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M HILL, 2010a) (referred to as the Soil Part A DQO Tech Memo). The Soil Part A DQO Tech Memo is included as Appendix A to this report. Appendix B of this report describes investigation procedures, field methodology, and white powder/debris-mapping results as a result of the Part A soil investigation.

Step 6 of the DQOs was drafted during a meeting with DTSC, DOI, and PG&E on August 30 and 31, 2010. PG&E provided Step 7, proposed Phase 2 sampling locations in the September 2010 *Draft Topock Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Data Gaps Evaluation Report) (CH2M HILL, 2010b). The Phase 1 data gaps and the proposed Phase 2 sampling plan were presented at two meetings with DOI, DTSC, and the Tribes held at the Topock Compressor Station on October 6 and 7, 2010 and November 2 and 3, 2010. During the meeting, soil data were reviewed with stakeholders, each AOC was visited, and preliminary data gaps evaluations were discussed. A subsequent meeting was held on December 7, 2010 between DOI, DTSC, and the Tribes to discuss UA-1/UA-1 alternate and sampling at the mouth of Bat Cave Wash.

On December 13, 2010, DTSC issued direction to PG&E on UA-1 and UA-1A alternate location (DTSC, 2010). On December 15, 2010, DOI issued direction to PG&E on sampling at the mouth of Bat Cave wash (DOI, 2010). On January 13, 2011, a meeting was held to discuss Tribes' comments on the preliminary data gaps evaluation.

In response to concerns raised by the Tribes through letters provided by the Fort Mohave Indian Tribe consultant (Hargis + Associates, November 22, 2010) and the Hualapai Department of Cultural Resources (December 3, 2010), and as a result of meetings with the Tribes held December 7, 2010, and January 13, 2011, DOI and DTSC evaluated the possibility of reducing the number of Phase 2 samples. The number of samples and disturbances to sensitive cultural resources, the agencies evaluated each sample location to determine which, if any, sample locations could be eliminated based on several criteria. DOI and DTSC issued in a joint letter dated February 25, 2011 (included in as Attachment 1) with a revised Phase 2 sampling plan removing approximately 50 sample locations as a result of input received from the Tribes. The resulting Phase 2 sample locations are presented in this document. The proposed Phase 2 sample locations presented in the September 2010 Draft Topock Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL, 2010b) were renumbered to reflect the changes made by DOI and DTSC. Table 1-1 is a "crosswalk" table showing how the proposed Phase 2 sample location numbering has changed since the 2010 Part A Phase 1 Data Gaps Evaluation Report.

AOC 4, the Debris Ravine, was not included in the September 2010 version of the Draft Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL, 2010b) because the AOC 4 time-critical removal action was being conducted during the preparation of the report, and AOC 4 soil data were not yet available. The AOC 4 time-critical removal action was completed in December 2010, and AOC 4 soil data representing current conditions have been included in this report and are provided Appendix C10.

A Draft Final Part A Phase 1Draft Final Data Gaps Evaluation Report was provided in Appendix A to the *Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* submitted to the DTSC and DOI in May 2011 (CH2M HILL, 2011a 2011b). This work plan is referred to as the 2011 Draft Soil RFI/RI Work Plan. Comments on the 2011 Draft Soil RFI/RI Work Plan were received from the following:

1. Karen Baker of DTSC Geological Services Unit, August 19, 2011
2. Pamela S. Innis of the Department of the Interior, August 16,2011
3. Leo S. Leonhart of Hargis + Associates, Inc on behalf of the Fort Mojave Indian Tribe, August 1, 2011
4. Loretta Jackson-Kelly of the Hualapai Department of Cultural Resources, July 21, 2011

A summary of the stakeholder comments and responses to these are presented in Appendix I of the Soil RFI/RI Work Plan, and have been incorporated into this revised Part A Phase 1 Data Gaps Evaluation Report and other portions of the Soil RFI/RI Work Plan. These comments led to the addition of five new AOCs outside the fence line (see, which are shown on Figure 1-2 and are discussed below):

- AOC 27 – MW-24 Bench
- AOC 28 – Pipeline Drip Legs
- AOC 29 – Interim Measures No. 3 Treatment Plant
- AOC 30 – MW-20 Bench
- AOC 31 – Former Teapot Dome Oil Pit

AOC 27 – MW-24 Bench and AOC 28 – Pipeline Drip Legs**:** These two sites have been incorporated into this revised Part A Phase 1 Data Gaps Evaluation Report in Appendix C,, see Appendix C, Subappendices C11 (MW-24 Bench) and C12 (AOC 28), respectively.

AOC 31 – Former Teapot Dome Oil Pit (AOC 31): The location of the former Teapot Dome oil pit (AOC 31) overlaps with the Perimeter Area investigation. To simplify review of the entire Soil RFI/RI Work Plan and planning of the investigation effort, investigation of AOC 31 will initially be conducted as part of the Perimeter Area investigation, as discussed in (see Appendix C).

AOC 29 – Interim Measures No 3 Treatment Plant and AOC 30 – MW-20 Bench: Sampling at AOC 29 - Interim Measures No 3 Treatment Plant and AOC 30 - MW-20 Bench is not proposed in this appendix. Investigation of these AOCs will be conducted as part of the decommissioning and removal activities for these areas, as proposed in the forthcoming Interim Measures No. 3 Decommissioning, Removal, and Restoration Work Plan and as part of the baseline sampling during the Topock groundwater remedy system installation, as proposed in the forthcoming Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan. A portion of AOC 30 – MW-20 Bench will be used for the groundwater remedy, so this AOC will not be fully investigated until the groundwater remedy decommissioning sampling is conducted.

The comments also resulted in the need to sample sediment and pore water near the mouth of East Ravine (AOC 10). The proposed sampling approach for this area is included in Appendix C, Subappendix C4.

1.1 Soil Part A Phase 1 Investigation (August – November 2008)

Field activities for the Soil Part A Phase 1 soil investigation were implemented between August and November 2008. The Part A Phase 1 soil investigation encompassed the following 10 investigation areas outside of the compressor station fence line:

- SWMU 1 – Former Percolation Bed
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 9 – Southeast Fence Line
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Areas
- AOC 12 – Fill Areas
- AOC 14 – Railroad Debris Area
- UA 1 – Pipeline Disposal Area
- UA 2 – Former 300B Pipeline Liquids Tank Area

These 10 areas are shown in Figure 1-2. Boundaries shown for the SWMUs, AOC, and UA are from the RFI/RI Volume 1.

Field activities included soil boring installation, embankment modifications at AOC 10, sample collection, white powder material and debris mapping, geophysical surveys, and trenching. A summary of these activities is included in Appendix B. Six hundred fifty-nine soil samples, seven white powder material samples, and four debris/wood samples were collected (sample counts do not include duplicate samples collected for quality control purposes). Two samples were also collected from one location in an area of Bat Cave Wash where soil is transitioning into sediment near the mouth of Bat Cave Wash. The DTSC also collected three soil samples of white powder at locations in AOC 10.

It is important to note that while geophysical investigation was conducted at UA 1, no intrusive sampling was performed. During field implementation of the Phase 1 investigation, DOI directed PG&E to stop planned investigation in this area (DOI, 2008b).

1.2 Newly Identified Debris, Historic Burn, and White Powder Areas (May 2009 to January 2010)

In 2009, at DTSC's direction, PG&E conducted additional interviews with current and former employees to collect new anecdotal information pertaining to historic compressor station practices. To confirm the new anecdotal information collected, additional site walks, including debris mapping, were conducted. The information gathered was provided in letters dated August 14, 2009 (PG&E, 2009a), October 15, 2009 (PG&E, 2009b), January 15, 2010 (PG&E, 2010a), and January 29, 2010 (PG&E, 2010b). In addition, a major storm event in January 2010 exposed new white powder areas on the hillsides above Bat Cave Wash, AOC 10, and AOC 11. The newly -identified area in Bat Cave Wash was shown to representatives of DTSC, DOI, Fort Mojave Indian Tribe, and the Hualapai Indian Tribe during a site visit on January 26, 2010. The new area in AOC 10 was discussed with the agencies in e-mails dated February 22, 2010 and February 24, 2010. The new area in AOC 11 was discovered during a site reconnaissance on February 10, 2010.

At the agencies' direction, these new areas were incorporated for evaluation in this data gaps evaluation effort. Available information regarding these new areas is provided in the Appendix C sub-appendices.

1.3 Purpose of Soil Part A Phase 1 Data Gaps Evaluation Report

This Soil Part A Phase 1 Data Gaps Evaluation Report was prepared to:

- Present the combined soil data collected to date for the identified SWMU, AOCs, and UAs outside of the compressor station fence line.
- Present the results of the data gaps evaluation using the decision and criteria described in the Soil Part A DQO Steps 1 through 5.
- Present Phase 2 sampling recommendations.

This document identifies proposed sample locations based on specific DQO rules as developed at the direction of DTSC and DOI, input from stakeholders during the October and November 2010 workshops, and the joint DTSC and DOI February 2011 direction letter. The Soil Part A Phase 2 proposed sample locations shown on figures and tables in Appendix C of this report are considered the Soil Part A Phase 2 sampling program for the Soil RFI/RI Work Plan. These additional data are needed to fill quantitative data gaps, meet agency requirements, and make further progress toward remedial decision-making.

1.4 Report Organization

This Soil Part A Phase 1 Data Gaps Evaluation Report is organized into eight sections and six appendices, as follows:

- **Section 1.0, Introduction**, contains background information, objectives, and report organization.
- **Section 2.0, Overview of Data Gaps Evaluation Process**, provides an overview of the data gaps evaluation process and the four DQO decisions applicable to the Soil Part A investigation.
- **Section 3.0, Decision 1 – Nature and Extent**, presents the inputs and process for evaluating nature and extent of contamination.

- **Section 4.0, Decision 2 – Data Sufficiency to Calculate Exposure Point Concentrations**, presents the inputs and process for the data sufficiency evaluation with regard to calculation of exposure point concentrations (EPCs) for use in the risk assessment.
- **Section 5.0, Decision 3 – Threat to Groundwater from Residual Soil Concentrations**, presents the inputs and process for assessing the potential for residual soil to impact groundwater.
- **Section 6.0, Decision 4 – Data Sufficiency to Support Corrective Measures Study/ Feasibility Study**, presents the inputs and process for the data sufficiency evaluation with regard to preparation of the corrective measures study/feasibility study (CMS/FS).
- **Section 7.0, Data Gaps Evaluation Summary**, provides a summary of the data gaps evaluation, including the proposed Phase 2 sampling.
- **Section 8, References,** presents a list of works cited when preparing this document.
- **Attachment 1**, DOI Direction Letter**,** presents the PG&E Topock Compressor Station Remediation Site – *Topock Soil Investigation Part A Phase 1 Data Gaps Evaluation Report – Proposed Sample Locations, PG&E Topock Compressor Station, Needles, California.*
- **Appendix A,** ***Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California*****,** contains the Soil Part A DQO Tech Memo.
- **Appendix B, Investigation Procedures, Field Methodology and White Powder/Debris Mapping Results**, summarizes field methodology, debris and white powder material mapping, trenching observations, and deviations from the Soil Part A Work Plan.
- **Appendix C, Part A Phase 1 Soil Investigation Data Gaps Evaluation Results**, presents the results of the data gaps evaluation and proposed Phase 2 sample locations.
- **Appendix D, Review of Analytical Data for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station**, presents the data quality evaluation of the analytical results from sampled collected as part of the 2006 Soil Part A Work Plan.
- **Appendix E, Additional Inorganic Compounds**, summarizes the data evaluation and calculation of representative background concentrations for detected inorganics.
- **Appendix F, Documentation of Compliance and Response to California Department of Toxic Substances Control and United States Department of the Interior Comments,** contains responses to DTSC's comments and conditional approval of the Draft Soil RFI/RI Part A Work Plan and DOI's directions on the Draft Soil RFI/RI Part A Work Plan (DOI, 2008a-b)

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
SWMU 1					
SWMU1-18	No Change	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1, #3, and #4 - Define lateral and vertical extents of contamination in southern part of AOC 1 and support CMS/FS	Hexavalent chromium, Title 22 metals, PCBs[b]; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the southern portion of the former percolation beds area. Move this location due east approximately 25 feet so that it is located within the boundaries of the white powder area. Significantly elevated chromium concentrations are detected in this former impoundment area and is noted more often in aerial photos than the “blue line” impoundment.
SWMU1-19	No Change	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gap #1, #3, and #4 - Define lateral and vertical extent of contamination in bottom of Bat Cave Wash and support CMS/FS.	Hexavalent chromium, Title 22 metals, PCBs[b]; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the central portion of the former percolation beds area.
SWMU1-20	No Change	14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1 and #3 - Define vertical extent of contamination at previous sample location SWU1-2	Hexavalent chromium, Title 22 metals, PCBs[b]	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the northern portion of the former percolation beds area.
SWMU1-21	No Change	14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1 and #3 - Define vertical extent of contamination at previous sample location SWMU1-1	Hexavalent chromium, Title 22 metals, PCBs[b]	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the northern portion of the former percolation beds area.
SWMU1-22	No Change	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white	Hexavalent chromium, Title 22 metals, PCBs[b], SPLP[c] and general chemistry	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			powder material and soil	analyses[c]	potential pathway for site-related contamination to have migrated to Bat Cave Wash.
SWMU1-23	No Change	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white powder material and soil	Hexavalent chromium, Title 22 metals, PCBs[b], SPLP[c] and general chemistry analyses[c]	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized potential pathway for site-related contamination to have migrated to Bat Cave Wash.
SWMU1-24	No Change	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white powder material and soil	Hexavalent chromium, Title 22 metals, PCBsb, SPLPc and general chemistry analyses[c]	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized potential pathway for site-related contamination to have migrated to Bat Cave Wash.
SWMU1-25	New sample location	0, 2, 5, and 9	To resolve Data Gap #5 – Assess potential contamination at the toe of the slope in Bat Cave Wash below a potential historical discharge pipe	Hexavalent chromium, Title 22 metals, PCBs[b]	Not applicable.
AOC 1					
~~AOC1-BCW7~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW2~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	Replaced with DOI-specified tamarisk area sampling grid approach testing for hexavalent chromium, Title 22 metals, and PCBs.
~~AOC1-BCW8~~	Deleted sample location[e]	~~0, 2, and 5~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW6~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	
~~AOC1-BCW9~~	Deleted sample location[e]	~~0, 2, and 5~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW6~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	
~~AOC1-BCW10~~	Deleted sample location[e]	~~0~~	~~To resolve Data Gaps #3- To confirm detections of certain metals at previous sample location AOC1-BCW6~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	
~~AOC1-BCW11~~	Deleted sample	~~0, 2, and 5~~	~~To resolve Data Gaps #3,and #5- Define lateral extent at AOC1-~~	~~Hexavalent chromium, PCBs[a]; soil physical parameters (Atterberg limits,~~	

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
	location[e]		~~BCW4 and support CMS/FS~~	~~relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – 3 samples from boring~~	
~~AOC1-BCW12~~	Deleted sample location[e]	~~0 and 2~~	~~To resolve Data Gaps #3- Define lateral and vertical extent at AOC1-BCW6~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	
~~AOC1-1~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-2~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-3~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, and 20~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-4~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, and 20~~	~~To resolve Data Gaps #1 and #3 - Define lateral extent in bottom of Bat Cave Wash and support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PCBsa ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-5~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral and vertical extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-6~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral and vertical extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination in wash east of SWMU 1.
~~AOC1-7~~	Deleted sample	~~0, 2, 5, 9, 14, 20,~~	~~To resolve Data Gap #1 - Define~~	~~Hexavalent chromium, Title 22 metals,~~	Existing data and streambed configuration

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
	location[e]	~~and 30~~	~~lateral extent in bottom of Bat Cave Wash~~	~~PAHs, pH, PCBsa~~	adequately define and constrain lateral extent of contamination in wash east of SWMU 1.
~~AOC1-8~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination in wash east of SWMU 1.
AOC1-9 ~~(contingent)~~[d]	AOC1-1	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent of contamination in bottom of Bat Cave Wash.	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[b]	These points are retained to characterize this uncharacterized slope area; contingent upon AOC1-10 and AOC1-13.
AOC1-10	AOC1-2	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent of contamination in bottom of Bat Cave Wash.	Hexavalent chromium, Title 22 metals[d], PCBs[b]	These points are retained to characterize this uncharacterized slope area.
~~AOC1-11~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
~~AOC1-12~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1.
AOC1-13	AOC1-3	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gap #1 - Define lateral extent of contamination in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[b]	These points are retained to characterize this uncharacterized slope area.
AOC1-14 ~~(contingent)~~[d]	AOC1-4	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent of contamination in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[b]	These points are retained to characterize this uncharacterized slope area; contingent upon AOC1-10 and AOC1-13.
~~AOC1-15~~	Deleted sample location[e]	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBs~~[a]	Existing data adequately define southern extent of contamination.
AOC1-T1e	No Change	0, 2, 5, 9, and 14	To resolve Data Gap #1 - Define lateral extent of contamination at	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[b]	This point is retained to characterize this uncharacterized flood area.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			AOC1-T1c		
~~AOC1-T1f~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent at AOC1-T1b and at AOC1-T1c.~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T1g	AOC1-T1f	0, 2, 5, 9, and 14	To resolve Data Gap #1 - Define lateral extent of contamination at AOC1-T1c	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[b]	This point is retained to characterize this uncharacterized flood area.
~~AOC1-T2f~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Title 22 metals, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T2g~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Molybdenum, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T2h~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Title 22 metals, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T2i	AOC1-T2f	0, 2	To resolve Data Gap #4 - Evaluate potential white powder	Title 22 metals, hexavalent chromium, pH, PCBs[b]	This point is retained to characterize this uncharacterized white powder area.
~~AOC1-T3d~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T3.~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T4d~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample~~	~~Hexavalent chromium, Title 22 metals, PCBs[a] PAHs~~	Existing data for this portion of wash are adequate for remedial action decision-

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			~~transect AOC1-T4.~~		making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T4e~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T4.~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T5d	No Change	0, 2, 5, 9, 14, and 20	To resolve Data Gaps #1 and #5 - Define lateral extent of contamination near sample transect AOC1-T5 and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs[b], soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	This location is retained to characterize this long-term terminal endpoint for sediment deposition.
~~AOC1-T5e~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T5.~~	~~Copper, PAHs, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision-making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
New Point	AOC1-T6d	0, 2, 5, 9, 14, and 20	To resolve Data Gaps #5 and #6- Assess potential impoundment area near railroad bridge culvert and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs[b], soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	This location is retained to characterize this potential long-term terminal endpoint for sediment deposition.
New Point	AOC1-BCW7	0, 2, 5, 9, 14, and 20	To resolve Data Gaps #5 and #6- Assess potential impoundment area near IM-3 road crossing and support CMS/FS.	Hexavalent chromium, Title 22 metals, PAHs, PCBs ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – 3 samples from boring	This location is retained to characterize this potential long-term terminal endpoint for sediment deposition.
AOC1-BCW8	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash.	Hexavalent chromium, Title 22 metals	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
AOC1-BCW9	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash.	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW10	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash.	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW11	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash.	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW12	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash.	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW13	New sample location	0, 2, 5, and 9	To resolve Data Gaps #3, and #6 - Evaluation of tamarisk area near the mouth of Bat Cave Wash and support the CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides, dioxins/ furans; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – 3 samples from boring	Not applicable.
AOC1-BCW14	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW15	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW16	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW17	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW18	New sample	0, 2, 5, and 9	To resolve Data Gap #3 -	Hexavalent chromium, Title 22 metals,	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
	location		Evaluation of tamarisk area near the mouth of Bat Cave Wash	PCBs, pesticides, dioxins/furans	
AOC1-BCW19	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW20	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW21	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW22	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW23	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW24	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW25	New sample location	0, 2, 5, and 9	To resolve Data Gaps #3, and #6 - Evaluation of tamarisk area near the mouth of Bat Cave Wash and support the CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides, dioxins/ furans, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Not applicable.
AOC1-BCW26	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC1-BCW27	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			the mouth of Bat Cave Wash		
AOC1-BCW28	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW29	New sample location	0, 2, 5, and 9	To resolve Data Gap #3 - Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs, pesticides, dioxins/furans	Not applicable.
AOC1-BCW30	New sample location	0, 2, 5, and 9	To resolve Data Gaps #3- Evaluation of tamarisk area near the mouth of Bat Cave Wash	Hexavalent chromium, Title 22 metals	Not applicable.
AOC 4					
AOC4-BCW1	No Change	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, and dioxins/furans at the mouth of the ravine near and in Bat Cave Wash	Title 22 metals, hexavalent chromium, PAHs[d], PCBs and dioxins/furans	This data point is necessary to address the downstream extent of contamination potentially migrating into Bat Cave Wash from the Debris Ravine.
~~AOC4-BCW2~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).~~	~~Title 22 metals, hexavalent chromium , PCBs and dioxins/furans~~	This data point is not critical to remedial action decision-making for this portion of the wash
AOC4-BCW3	AOC4-BCW2	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, and dioxins/furans at the mouth of the ravine near and in Bat Cave Wash	Title 22 metals, hexavalent chromium, PAHs[d], PCBs, and dioxins/furans	These data points are retained as two transects to assess the potential for contamination migrating into Bat Cave Wash from the Debris Ravine. The specific migration pathway of contaminants emanating from the Debris Ravine is unknown.
AOC4-BCW4	AOC4-BCW3	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, and dioxins/furans at the mouth of the ravine near and in Bat Cave Wash	Title 22 metals, hexavalent chromium, PAHs[d], PCBs, and dioxins/furans	
AOC4-BCW5	AOC4-BCW4	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, and	Title 22 metals, hexavalent chromium, PAHs[d], PCBs, and dioxins/furans	

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			dioxins/furans at the mouth of the ravine near and in Bat Cave Wash		
AOC4-BCW6	AOC4-BCW5	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, dioxins/furans, and asbestos at the mouth of the ravine near and in Bat Cave Wash	Title 22 metals, hexavalent chromium, PCBs, dioxins/furans, PAHs[d], asbestos (surface soil sample only)	
AOC4-BCW7	AOC4-BCW6	0, 2, 5, and 9	To resolve Data Gap #3[d] – Define lateral and vertical extents of metals, PAHs, PCBs, and dioxins/furans at the mouth of the ravine near and in Bat Cave Wash	Title 22 metals, hexavalent chromium, PAHs[d], PCBs, and dioxins/furans	This data point is retained to assess the influence of upstream conditions to distinguish Debris Ravine effects on soil in Bat Cave Wash.
AOC4-17	New sample location	2, 5, and 9	To resolve Data Gaps #2 – Define vertical extent of various metals, PCBs, and dioxin/furans across the AOC; however, given the shallow depth to bedrock additional sampling is limited to the northern portion of AOC, where bedrock is not near the surface	Title 22 metals, hexavalent chromium, PCBs, dioxins/furans	Not applicable.
AOC4-18	New sample location	2, 5, and 9	To resolve Data Gaps #2 and #5 – Define vertical extent of various metals, PCBs, and dioxin/furans across the AOC; however, given the shallow depth to bedrock additional sampling is limited to the northern portion of AOC, where bedrock is not near the surface, and soil physical property parameters to support the CMS/FS	Title 22 metals, hexavalent chromium PCBs, dioxins/furans, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	Not applicable.
AOC4-19	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans near south, southeastern corner of	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			the AOC		
AOC4-20	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans near south, southeastern corner of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-21	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Lateral extent of various metals, PAHs, PCBs, and dioxins/furans near south, southeastern corner of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-22	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Lateral extent of various metals, PAHs, PCBs, and dioxins/furans near south-southeastern corner of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-23	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans near south,-southeastern corner of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-24	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans along eastern edge of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-25	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans along eastern edge of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-26	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans along eastern edge of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
AOC4-27	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans along eastern edge of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-28	New sample location	0 and 2, if feasible	To resolve Data Gap #1 - Define lateral extent of various metals, PAHs, PCBs, and dioxins/furans along eastern edge of the AOC	Title 22 metals, PAHs, PCBs, dioxins/furans	Not applicable.
AOC4-29	New sample location	0, 2, 5, and 9, if feasible	To resolve Data Gap #4 - Define lateral and vertical extents of metals and dioxins/furans just inside the compressor station fence line, along the northern boundary of the AOC	Title 22 metals, hexavalent chromium, dioxins/furans	Not applicable.
AOC4-30	New sample location	0, 2, 5, and 9, if feasible	To resolve Data Gap #4 - Define lateral and vertical extents of metals and dioxins/furans just inside the compressor station fence line, along the northern boundary of the AOC	Title 22 metals, hexavalent chromium, dioxins/furans	Not applicable.
AOC4-31	New sample location	0, 2, 5, and 9, if feasible	To resolve Data Gap #4 - Define lateral and vertical extents of metals and dioxins/furans just inside the compressor station fence line, along the northern boundary of the AOC	Title 22 metals, hexavalent chromium, dioxins/furans	Not applicable.
AOC4-32	New sample location	0, 2, 5, and 9, if feasible	To resolve Data Gap #4 - Define lateral and vertical extents of metals and dioxins/furans just inside the compressor station fence line, along the northern boundary of the AOC	Title 22 metals, hexavalent chromium, dioxins/furans	Not applicable.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
AOC 9					
AOC10a-2	No Change	0, 2, 5 and 9	To resolve Data Gaps #3 and #4 - Define lateral and vertical extents of contamination downslope of AOC 9 and Subarea AOC 10a and support model refinement for Decision 3	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides	This data point is retained to assess the nature and extent of contamination within the surface drainage leading from the base of the slope at the primary pipe break release area.
AOC10a-3	No Change	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral and vertical extents of contamination downslope of AOC 9 and Subarea AOC 10a	Hexavalent chromium, Titl2 22, PAHs, PCBs, pesticides	This data point is retained to assess the downstream nature and extent of contamination within the surface drainage leading from AOC 9 and other surface discharges along the slope east of AOC 9.
AOC9-15	No Change	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral extent downslope of AOC 9	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides	This data point is retained to assess the nature and extent of contamination at a runoff pathway across the dirt road at the base of the slope beneath the primary pipe break release area.
AOC9-16	No Change	0, 2, 5 and 9	To resolve Data Gaps #3 and #5 - Define lateral extent of contamination and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination at the base of the slope at the primary pipe break release area.
AOC9-17	No Change	9 and 14	To resolve Data Gaps #1 and #4 - Define vertical extent of contamination at cluster of previous sample locations (#4 through #9 and AOC9-8) and support model refinement for Decision 3	Hexavalent chromium	This data point is retained to verify the efficacy of the previous removal action and assess the vertical extent of contamination at the primary pipe break release area.
AOC9-18	No Change	5, 9, and 14	To resolve Data Gaps # 2 and 4 - Define vertical extent of contamination at previous sample location AOC9-5, and support	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the vertical extent of contamination where the vertical extent was undefined based on previous sampling.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			model refinement for Decision 3		
~~AOC9-19~~	Deleted sample location[e]	~~5, 9, and 14~~	~~To resolve Data Gaps #3 and 4 - Define vertical extent at previous sample location AOC9-3 and support modeling for Decision 3~~	~~Lead, zinc~~	Lead and zinc are unlikely to result in groundwater contamination or to drive risk.
~~AOC9-20~~	Deleted sample location[e]	~~5, 9, and 14~~	~~To resolve Data Gaps #2 and 4 - Define vertical extent at previous sample location AOC9-10~~	~~Title 22 metals, PAHs~~	This location is in proximity to AOC 9-18, which is adequate to define the vertical extent of contamination.
AOC9-21	AOC9-19	0, 2, 5 and 9	To resolve Data Gaps #3 and #5 - Define lateral and vertical extents of contamination and support CMS/FS	Title 22 metals, PAHs, pesticides, PCBs, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination downslope of the primary pipe break release area.
AOC9-22	AOC9-20	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral extent of contamination associated with AOC9-13	Mercury, lead, PAHs, pesticides, PCBs	This data point is retained to assess the influence of upstream conditions to distinguish AOC 9 effects on soil in surface drainage.
AOC 10					
AOC10-9	No Change	0, 2, 5,and 9	To resolve Data Gap #2 – Assess nature and extent of contamination associated with runoff from station access road to the low point north of Subarea 10d	Hexavalent chromium, Title 22 metals, PAHs	This point is retained to assess the potential for contamination entering the East Ravine from runoff.
AOC10-10	No Change	0, 2, 5, and 9	To resolve Data Gap #1- Assess lateral extent of contamination associated with PS-21and nature and extent of potential impact from soil down slope from the outfall	Hexavalent chromium, Title 22 metals	This data point is retained to assess the potential for contaminated surface runoff entering the East Ravine from an outfall from the facility.
~~AOC10-11~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve data gap #3 -Assess lateral extent between Subareas 10c and 10d~~	~~Hexavalent chromium, Title 22 metals, PAHs~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision-making purposes.

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
~~AOC10-12~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve data gap #4 - Assess potential impact from debris on northern slope (may not be technically feasible to get to proposed depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs~~	This location is in proximity to AOC 10-20.
AOC10-13	AOC10-11	0, 2, 5, 9 ~~and 14~~	~~To resolve data gaps #1, 4, and 7~~ To resolve Data Gaps #4, and #8 -Assess potential impacts from debris on south slope and the lateral extent between Subareas 10b and 10c and support CMS/FS[d]	Hexavalent chromium, Title 22 metals, PAHs, pH, TPH, SVOCs, dioxins and furans (if burn material present), PCBs, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) - three samples from boring	Move this location to immediately adjacent to debris pile to assess potential impact from debris. This is an unknown debris site and should be tested for all potential contaminants. Existing data are adequate to define the lateral extent of contamination in the main part of the wash. May want to consider another location for soil physical parameter data sample.
AOC10-14	AOC10-12	0, 2, 5, and 9	To resolve Data Gap #4 - Assess potential impacts from debris on south slope (may not be technically feasible to get to proposed depth)	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contamination entering the East Ravine from a debris pile.
AOC10-15	AOC10-13	~~0, 2, 5, and 9~~ White Powder Only	To resolve Data Gap #4 - Assess white powder material on north slope ~~(may not be technically feasible to get to proposed depth)~~	Hexavalent chromium, PAHs, pH, Title 22 metals	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated.
AOC10-16	AOC10-14	~~0 and 2[a]~~ White Powder ~~Only~~ and discolored soil	To resolve Data Gap #4 -- Assess white powder material and discolored soil on north slope ~~(may not be technically feasible to get to proposed depth)~~	Hexavalent chromium, PAHs, pH, Title 22 metals	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated.
AOC10-17	AOC10-15	0, 2, 5, and 9	To resolve Data Gap #4 – Assess potential impact from debris (dirt pile with green-colored wood)	Hexavalent chromium, Title 22 metals, PAHs, pH, TPH, SVOCs, dioxins and furans[d] (if burn material present), PCBs	This data point is retained to assess potential contamination from the debris, including green-colored wood possibly indicative of chromium contamination.
AOC10-18	No Change	0 and 2	To resolve Data Gap #1 – Assess nature and extent of soil	Hexavalent chromium, Title 22 metals, PAHs, dioxins and furans	This data point is retained to assess the potential for contaminated surface runoff

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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			downslope from the potential outfall of the former trench drain and from surface runoff from compressor station to AOC 10[d]		entering the East Ravine from an outfall from the facility.
AOC10-19	AOC10-16	0, 2, 5, and 9	To resolve data gap #4 - Assess potential impacts from debris on north slope (may not be technically feasible to get to depth)[d]	Hexavalent chromium, Title 22 metals, PAHs, pH, TPH, SVOCs, dioxins and furans (if burn material present), PCBs	This is an unknown debris site and should be tested for all potential contaminants.
AOC10-20	AOC10-17	~~0, 2, 5, and 9~~ White powder and discolored soil	To resolve Data Gap #4 - Assess white powder material and discolored soil on north slope (may not be technically feasible to get to depth)	Hexavalent chromium, PAHs, pH, Title 22 metals	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated.
AOC10a-2	No Change	0, 2, 5, and 9	To resolve Data Gaps #1 and #6 - Assess vertical and lateral extents of contamination and collect data to assess current threat to groundwater	Hexavalent chromium, Title 22 metals, PAHs, PCBs[d], pesticides[d]	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and AOC 9.
AOC10a-3	No Change	0, 2, 5, and 9	To resolve Data Gap #1 -Assess lateral extent of contamination (down slope of AOC9 and Subarea 10a)	Hexavalent chromium, Title 22 metals, PAHs, PCBs[d], pesticides[d]	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and AOC 9.
~~AOC10b-5~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve data gap # 3 - Assess lateral extent up slope from AOC 10b-3~~	~~Hexavalent chromium, Title 22 metals~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision-making purposes.
AOC10c-6[f]	No Change	14 To Groundwater	To resolve data gaps # 3 and 6 - Assess vertical extent of contamination at previous sample location AOC10c-1 and assess current threat to groundwater	Hexavalent chromium, total chromium	Dropping this sample location is contingent on the sampling of East Ravine Well Site H.
~~AOC10c-7~~	Deleted sample location[e]	~~14~~	~~To resolve data gap #3 - Assess vertical extent at previous sample~~	~~Title 22 metals, PAHs~~	This data point is in proximity to MW-58BR, which adequately defined vertical extent of

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			~~location AOC10c-4~~		contamination.
AOC10d-9	No Change	0, 2, 5, and 9	To resolve Data Dap #2 - Assess lateral extent of contamination associated with AOC 10d-3 and L-3	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contaminated surface runoff into the East Ravine.
~~AOC10d-10~~	Deleted sample location[e]	~~0, 2, 5, 9 and 14~~	~~To resolve data gaps #3 and 7 - Assess lateral and vertical (Zinc only) extent collect soil parameter information to support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PAHs; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision-making purposes. May want to consider another location for soil physical parameter data sample.
Assorted debris locations			To resolve data gap #4 - Sampling of new debris area[d]	Asbestos-containing material, XRF screen	XRF screen to assess potential for contamination in debris areas.
AOC 11					
~~AOC11a-6~~	Deleted sample location[e]	~~9, 14, and 19~~	~~To resolve Data Gaps #1 and #6 - Define vertical extent at AOC11a-1. Recollect at 9 feet verifying hexavalent chromium concentration. Collect data to assess current threat to groundwater.~~	~~Hexavalent chromium, lead~~	Existing data are adequate for remedial action decision-making for this area.
~~AOC11a-7~~	Deleted sample location[e]	~~14 and 19~~	~~To resolve Data Gap #1 - Define vertical extent at AOC11a-5.~~	~~Title 22 metals~~	Existing data are adequate for remedial action decision-making for this area.
AOC11c-3	No Change	~~14, 19~~ 14, 19, 29, 39, 49, 59, and 69 (to groundwater)	~~To resolve Data Gaps #2 and #6 - Define vertical extent at previous saple location AOC11c-SS2.~~ To resolve Data Gaps #6, and #7 - Collect data to assess current threat to groundwater and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs[d], PCBs, pesticides[d], soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) - three samples from boring[d]	This data point is retained to assess the vertical extent of contamination at this location.
~~AOC11c-4~~	Deleted sample location[e]	~~0, 2, 5, 9 and 14, 19~~	~~To resolve Data Gaps # 2 and #7 - Define lateral and vertical extent in AOC11c and support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs; soil physical parameters (Atterberg limits, relative compaction,~~	This data point is in proximity to AOC 11c-5.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
				~~alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	
AOC11c-5	AOC11c-4	0, 2, 5, 9 and 14, 19	To resolve Data Gaps #2 and #6 - Define lateral and vertical extents of contamination in AOC11c. Collect data to assess current threat to groundwater	Hexavalent chromium, Title 22 metals, PAHs, PCB, pesticides[d]	This data point is retained to assess the vertical extent of contamination in this former retention basin.
AOC11e-3	No Change	0, 2, 5, 9, and 14	To resolve Data Gap #3 - Define lateral and vertical extents of contamination upslope of AOC 11e (may not be technically feasible to get to depth)	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides[d]	This data point is retained to assess potential for contamination associated with outfall.
~~AOC11e-4~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #3 - Define lateral and vertical extent upslope of AOC 11e (may not be technically feasible to get to depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs~~	Data to be collected at AOC 11e5 will be adequate to assess this pathway for remedial action decision-making purposes.
AOC11e-5	AOC11e-4	0, 2, 5, 9, and 14	To resolve Data Gaps #3 and #7- Define lateral and vertical extents of contamination upslope of AOC 11e (may not be technically feasible to get to depth) and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides[d]; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination in this former retention basin Move in field if location fails depth.
AOC11e-6	AOC11e-5	14, 19, 29, 39, 49, 59, and 69 (to groundwater)	To resolve Data Gap #4 and #6 - Define vertical extent of contamination in AOC 11e; refine vadose zone leaching model.	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides[d]	This boring must extend to the water table, if technically feasible, to achieve objective of supporting vadose zone leaching model.
~~AOC11e-7~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #3 - Define lateral and vertical extent upslope of AOC 11c (may not be technically feasible to get to depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision-making purposes.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
AOC11e-8	AOC11e-6	0	To resolve Data Gaps #5 and #8 - Assess white powder material in newly identified white powder area	Title 22 metals, hexavalent chromium, general chemistry, pH	This data point is retained to assess the nature of the white powder.
AOC11-1	No Change	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station .
~~AOC11-2~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 - Assess newly identified area (burn area)~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans~~	Data to be collected at AOC 11-1 and AOC 11-3 will be adequate to characterize this area.
AOC11-3	AOC11-2	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans, PCBs	PCBs could be associated with waste-oil burning.
AOC11-4	AOC11-3	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs , dioxins and furans, PCBs	PCBs could be associated with waste-oil burning.
~~AOC11-5~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 - Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Data to be collected upstream and downstream at other locations and configuration of drainage will adequately define lateral extent of contamination for remedial action decision-making purposes.
AOC11-6	AOC11-4	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and fire training area.
~~AOC11-7~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 - Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Data to be collected upstream and downstream at other locations and configuration of drainage will adequately define lateral extent of contamination for remedial action decision-making purposes.
AOC11-8	AOC11-5	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans	This data point is retained to assess the potential for contaminated surface runoff in the terminal deposition area of the surface

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
					drainage leading from the compressor station and fire training area.
~~AOC11-9~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 – Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Extraneous location?
~~AOC11-10~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 – Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	This location is dropped based on collocation with AOC 11-8. PG&E shall base the location of AOC 11-8 on accessibility to the lowest point.
~~AOC11-11~~	Deleted sample location[e]	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8 – Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	AOC 11-11 and AOC 11-12 are adequate for initial characterization of this area. These two locations should be located at the lowest points along the road. Two additional sample locations are to be located in the outfalls below the bench area contingent upon the results of AOC 11-11 and AOC 11-12.
AOC11-12 ~~(contingent)~~[d]	AOC11-8	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 – Assess downslope areas below Subarea 11g[d]	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, PCBs[d], TAL/TCL constituents[d]	
AOC11-13 ~~(contingent)~~[d]	AOC11-9	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 – Assess downslope areas below Subarea 11g[d]	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs , PCBs[d], TCL/TAL constituents[d]	
AOC11-14	AOC11-6	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	
AOC 11-15[d]	AOC11-7	0, 2, 5, and 9	To resolve Data Gaps #5 and #8 - Assess new subareas	Title 22 metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	
AOC 14					
~~AOC14-14~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #2 -Assess possible drainage from AOC14 (location may be relocated after field assessment) and the newly identified potential burn area west of AOC14~~	~~Dioxin and furans, hexavalent chromium, molybdenum, total chromium~~	AOC 1 data will be used to assess the bottom of the adjacent drainage.
~~AOC14-15~~[a]	Deleted sample location[e]	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (accessible area at bottom of slope)~~	~~Hexavalent chromium, Title 22 metals, asbestos~~	To be screened with XRF.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
~~AOC14-16~~[a]	Deleted sample location[e]	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (area adjacent to debris) east of AOC14~~	~~Hexavalent chromium, pesticides PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-17~~	Deleted sample location[e]	~~0 and 2~~	~~To resolve data gap #2 - Assess debris area (accessible area at bottom of slope)~~	~~Hexavalent chromium, pesticides, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-18~~	Deleted sample location[e]	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (area adjacent to debris) east of AOC14~~	~~Hexavalent chromium, pesticides, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-19~~	Deleted sample location[e]	~~0 and 2~~	~~Define lateral and vertical extent in debris area~~	~~Hexavalent chromium, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos~~	To be screened with XRF.
AOC14-20	AOC14-14	0, 2, 5, 9, and 14	To resolve Data Gap #2 - Assess the newly identified potential burn area west of AOC14	Dioxins and furans	This sample point is retained to assess potential contamination associated with a small pocket of burn waste debris observed at this location.
AOC14-21	AOC14-15	0, 2, 5, 9, and 14	To resolve Data Gaps #1, #2, and #5 - Define lateral and vertical extents of exceedances in southwestern corner and assess the newly identified potential burn area west of AOC 14 and collect additional parameters to support the CMS/FS	Dioxins and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Select locations are based on waste observations. Sample locations are 0 to 10 feet bgs.
AOC14-22	AOC14-16	0, 2, 5, 9, and 14	To resolve Data Gap #2 - Assess the newly identified potential burn area west of AOC14	Dioxins and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	
AOC14-23	AOC14-17	0, 2, 5, 9, and 14	To resolve Data Gap #2 - Assess the newly identified potential burn area west of AOC14	Dioxins and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
~~AOC14-24~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #4 - Assess lateral (for vadose zone model refinement) and vertical extent of hexavalent chromium in vicinity of existing boring S4-4~~	~~Hexavalent chromium, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Data collection at these locations will not significantly alter groundwater assessment (PG&E to verify).
~~AOC14-25~~	Deleted sample location[e]	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #4 - Assess lateral (for vadose zone model refinement) and vertical extent of hexavalent chromium in vicinity of existing boring S4-4 (accessible area at bottom of slope)~~	~~Hexavalent chromium~~	Data collection at these locations will not significantly alter groundwater assessment (PG&E to verify).
Assorted debris locations			To resolve Data Gap #2 – Sampling of new debris areas east of the AOC	XRF screen	XRF screen to assess potential for metals contamination in debris areas.
AOC 27d					
		Surface geophysical survey	To resolve Data Gap #3 - Obtain initial information	Not applicable	Sampling as discussed at the Technical Working Group meeting in Fall 2010.
AOC27-1	New sample location	Bottom of trench	To resolve Data Gaps #1, #2, and #4 – Nature and extent of contamination in the newly identified debris area in the MW-24 bench area; limited data exist for this area, and data are needed to define extent of debris and collect information to support the CMS/FS.	Dioxins and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH , soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Not applicable.
AOC27-2	New sample location	Bottom of trench	To resolve Data Gaps #1, #2, and #4 – Nature and extent of contamination in the newly identified debris area in the MW-24 bench area. Limited data exist for this area, and data are needed to define extent of debris	Pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	Not applicable.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
AOC27-3	New sample location	Bottom of trench	To resolve Data Gaps #1, #2, and #4 – Nature and extent of contamination in the newly identified debris area in the MW-24 bench area; limited data exist for this area, and data are needed to define extent of debris	Pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	Not applicable.
AOC27-4	New sample location	Bottom of trench	To resolve Data Gaps #1 through #4 – Nature and extent of contamination in the newly identified debris area in the MW-24 bench area; limited data exist for this area, and data are needed to define extent of debris and collect information to support the CMS/FS	Pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange capacity, and particle size distribution) – three samples from boring	Not applicable.
AOC27-5	New sample location	Bottom of trench	To resolve Data Gaps #1, #2, and #4 – Nature and extent of contamination in the newly identified debris area in the MW-24 bench area; limited data exist for this area, and data are needed to define extent of debris	Pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	Not applicable.
AOC27-6	New sample location	0	To resolve Data Gap #1 – Nature and extent of contamination in the debris area in the MW-24 bench area	Hexavalent chromium, PAHs, Title 22 metals, TPH, PCBs, dioxins and furans	Not applicable.
AOC27-7	New sample location	0	To resolve Data Gap #1 – Nature and extent of contamination in the debris area in the MW-24 bench area	Hexavalent chromium, PAHs, Title 22 metals, TPH, PCBs, dioxins and furans	Not applicable.
AOC27-8	New sample location	0	To resolve Data Gap #1 – Nature and extent of contamination in the debris area in the MW-24 bench area	Hexavalent chromium, PAHs, Title 22 metals, TPH, PCBs, dioxins and furans	Not applicable.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station Needles, California

Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
50 foot grid across AOC 27	New sample locations		To resolve Data Gap #1 – Nature and extent of contamination in the debris area in the MW-24 bench area	XRF screen	Not applicable.
AOC 28[d]					
AOC28a-01	New sample location	0.5 and 3, if feasible	To resolve Data Gap #1– Insufficient data have been collected in this AOC. Collect data to assess nature and extent of potential contamination. Sample will be collected between the drip leg and the pipeline road.	TPH, PAHs, and PCBs	Not applicable.
AOC28b-01	New sample location	0.5 and 3, if feasible	To resolve Data Gaps #1 and #2– Insufficient data have been collected in this AOC. Collect data to assess nature and extent of potential contamination and collect parameters to support the CMS/FS. Sample will be collected between the drip leg and the pipeline road.	TPH, PAHs, PCBs, and soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – both samples	Not applicable.
AOC28c-01	New sample location	0.5 and 3, if feasible	To resolve Data Gap #1– Insufficient data have been collected in this AOC. Collect data to assess nature and extent of potential contamination. Sample will be collected between the drip leg and the pipeline road.	TPH, PAHs, and PCBs	Not applicable.
AOC28d-01	New sample location	0.5, 3, and 5, if feasible	To resolve Data Gap #1– Insufficient data have been collected in this AOC. Collect data to assess nature and extent of potential contamination. Samples will be collected along the east side of the drip leg and a sample	TPH, PAHs, and PCBs	Not applicable.

TABLE 1-1
Soil Part A Data Gap Table with Crosswalk
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Original Location ID	Renumbered Sample ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments[a]
			will be collected at 5 feet bgs to account for scour.		

Notes:

Text in red indicates changes and other information provided by DOI and DTSC. Text in black is provided by PG&E, and includes updates subsequent to the February 25, 2011 direction letter.

[a] Rationale/Comments are from the DOI/DTSC February 25, 2011 direction letter (see Attachment 1). Specific sample locations identified in this column refer to the original Location ID shown in the left-most column.

[b] PCB analysis only on soil samples collected at 0 and 2 feet bgs.

[c] White powder samples only.

[d] Added, removed, or modified subsequent to the DOI/DTSC February 25, 2011 direction letter (see Attachment 1).

[e] Sample locations identified as “deleted” may have been deleted entirely or renumbered/relocated.

[f] This sample was inadvertently deleted from the crosswalk table provided in the February 25, 2011 direction letter, and has been added back into the sampling program at the direction of DTSC.

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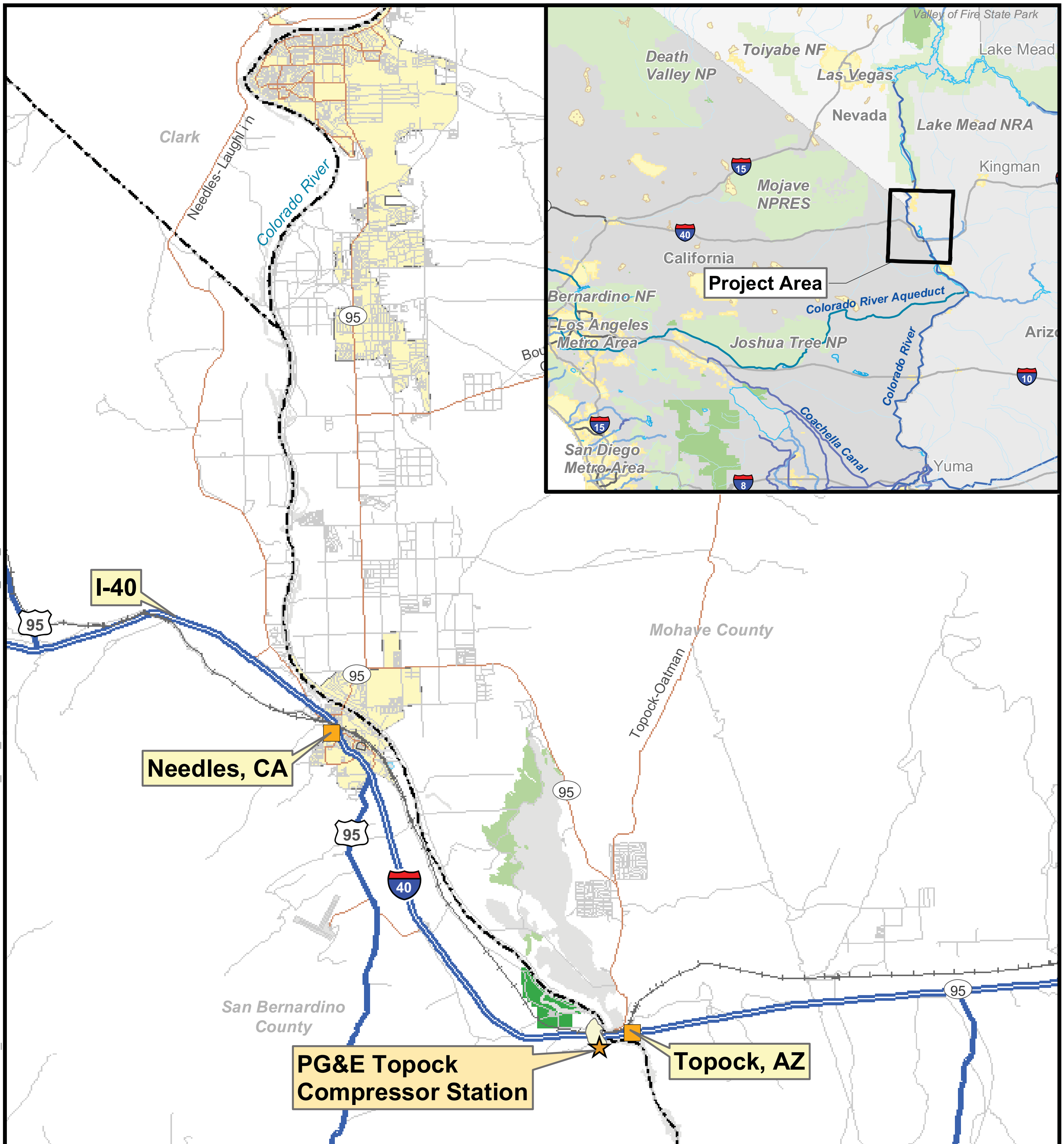
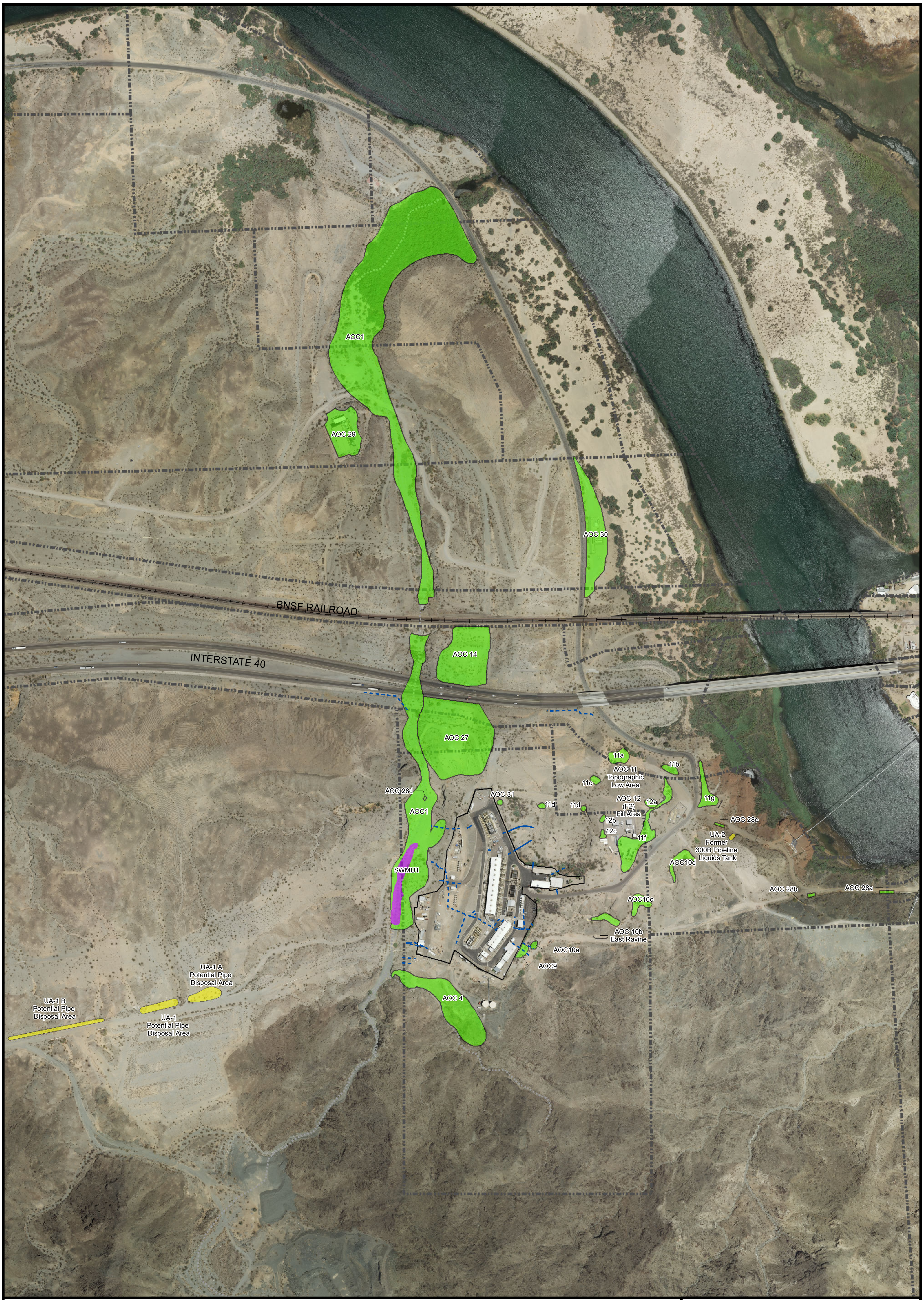


FIGURE 1-1
SITE LOCATION MAP

Soil Investigation Part A,
Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station
Needles, California

\\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS_NEW\MAPFILES\2009\AOC4\FINAL\LOCATION_MAP_PORTRAIT.MXD LOCATION_MAP_PORTRAIT.PDF BKAHLER 4/13/2010 14:35:25



LEGEND

- Site Fence Boundary
- Area of Concern (AOC)
- Solid Waste Management Unit (SWMU)
- Other Area
- Stormwater Piping Below Ground
- Stormwater Piping Above Ground

FIGURE 1-2
SOLID WASTE MANAGEMENT UNITS AREAS OF CONCERN, AND OTHER UNDESIGNATED AREAS TO BE INVESTIGATED UNDER PART A

SOIL INVESTIGATION PART A PHASE 1
DATA GAPS EVALUATION REPORT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CA

CH2MHILL

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2.0 Overview of Data Gaps Evaluation Process

The Part A supplemental soil investigation program employs the DQO process to ensure that data collected at each stage of the investigation process are of sufficient quantity and quality to enable the specified decisions to be made. The DQO process is a recognized procedure for defining project objectives and decisions and for optimizing sampling and other information-gathering programs to balance uncertainty, site disturbances, and cost in an acceptable manner. The United States Environmental Protection Agency (USEPA) has issued detailed guidance for the seven-step DQO process (USEPA, 2000, 2006a-b):

- Step 1 – State the Problem
- Step 2 – Identify the Decision(s)
- Step 3 – Identify the Inputs to the Decision
- Step 4 – Define the Study Boundaries
- Step 5 – Develop a Decision Rule
- Step 6 – Specify Tolerable Limits on Decision Errors
- Step 7 – Optimize the Design

Between June 2008 and February 2010, DTSC, DOI, and PG&E drafted Steps 1 through 5 of the Soil Part A DQOs, which are used in this report to evaluate combined soil data and identify data gaps. DQO Steps 6 and 7 are presented in this report and have been modified, as appropriate, based on stakeholder input. The Soil Part A DQO Steps 1 through 5 are summarized in the Soil Part A DQO Tech Memo (CH2M HILL, 2010a), which is included as Appendix A to this report. DQO Steps 6 and 7 are summarized in Section 7.0.

Below are the four Part A DQO decisions to be made using the combined soil data collected to date and the decision process results for each decision for each of the investigation areas:

- **Decision 1 (Nature and Extent).** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.

- **Decision 2 (Data Sufficiency Evaluation).** Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

- **Decision 3.** Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.

- **Decision 4 (Data Sufficiency Evaluation).** Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial action design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.

The following evaluations were completed for each of the four DQO decisions:

- **Decision 1**. The nature and extent of contamination at the Part A SWMU, AOCs, and UAs are described and evaluated to determine whether the nature and extent of contamination are adequately understood. The evaluation followed the Decision 1 rules outlined in the Part A DQO Tech Memo Figure 6, provided in Appendix A.
- **Decision 2**. A data sufficiency evaluation was conducted to determine if sufficient data exist for Part A SWMU, AOCs, and UAs to calculate representative EPCs for each applicable exposure interval for human health and ecological receptors. The evaluation followed the Decision 2 Rules outlined in the Part A DQO Tech Memo Figure 7, provided in Appendix A.
- **Decision 3**. Groundwater soil screening levels (SSLs) were calculated for any metal exceeding background concentrations at one or more locations within the Part A SWMU, AOCs, and UAs. For constituents where the detected concentrations exceeded the SSLs, vadose zone modeling was conducted to further evaluate the potential threat to groundwater. Vadose zone modeling was also conducted evaluate the potential threat to groundwater from all detected organic compounds, with the exception of polychlorinated biphenyls (PCBs) and dioxins/furans, which were evaluated based on a worst-case scenario where the lowest Kd was used in combination with the highest concentration observed at each depth interval. The evaluation followed the Decision 3 rules outlined in the Part A DQO Tech Memo Figure 8, provided in Appendix A.
- **Decision 4**. A data sufficiency evaluation was conducted to determine whether sufficient data exist at the Part A SWMU, AOCs, and UAs to support the CMS/FS (specifically, remedial technology feasibility assessment and estimation of soil and debris volumes potentially requiring remediation). The evaluation followed the Decision 4 rules outlined in the Part A DQO Tech Memo Figure 9, provided in Appendix A.

The following sections summarize the process used to evaluate the four DQO decisions. Results of the evaluation for the nine Part A units, including proposed Phase 2 sample locations if recommended, are provided in Appendix C.

3.0 Decision 1 – Nature and Extent

This section presents the inputs and process used to evaluate Decision 1 – Nature and Extent for the Part A SWMU, AOCs, and UAs. Results of the Decision 1 – Nature and Extent evaluation by SWMU/AOC/UA, including proposed Phase 2 sample locations, if recommended, are provided in Appendix C.

3.1 Inputs to Decision 1

The following three types of information are needed and considered when assessing whether the nature and extent of contamination at a site are adequately understood: (1) usable and appropriate chemicals of potential concern (COPCs) and chemicals of potential ecological concern (COPECs) concentration data, (2) potential fate and transport mechanisms, and (3) preliminary screening comparison values, as described in the Soil Part A DQO Tech Memo provided as Appendix A. The following subsections describe the inputs required to evaluate Decision 1 – Nature and Extent.

3.1.1 Data Usability

The data collected during the Part A Phase 1 soil investigation were validated as described in the *Draft PG&E Quality Assurance Project Plan* (CH2M HILL, 2008a) and the *Draft Soil Addendum for the Topock Compressor Station, RCRA Facility Investigation/Remedial Investigation (*CH2M HILL, 2008b*)*. Appendix D of this report presents the results of the data validation and data quality evaluation of Phase 1 data. The validated Part A Phase 1 data were combined with existing data. Existing data were evaluated in the *Final Soil and Sediment Data Usability Technical Memorandum, PG&E Topock Compressor Station, Needles, California* (CH2M HILL, 2008c). All data meeting Category 1 data quality standards were included in the combined data set.

The existing Category 1 data were also reviewed to assess whether they are still considered reliable due to changing site conditions. If site conditions had changed substantially (for example, as in Bat Cave Wash following 2006 and 2010 storm events with high runoff), the data were assessed to determine whether it is likely that the changes have altered the conditions at particular locations. This data assessment process was limited to surface and near-surface samples, as deeper samples would not be expected to be affected by storm event erosion and deposition.

The Soil Investigation Draft Part A Work Plan acknowledged that both deposition and erosion occurs in Bat Cave Wash after significant storm events; however, the precise nature of erosion and deposition patterns are difficult to assess. A significant storm event in 2006 resulted in erosion and deposition in many areas of SWMU 1 and, as such, the reliability of the shallow samples from pre-2006 data is suspect. Consequently, at the direction of DTSC, the Part A Phase 1 investigation included six sample transects, containing at least three sample locations each, across the wash perpendicular to the direction of flow to characterize the wash at the time of the Part A Phase 1 investigation. The Part A Phase 1 investigation conducted in 2008 provided data to develop an accurate assessment of conditions in the wash following the last major runoff event that occurred in 2006. Another significant storm event occurred in early January 2010. A site reconnaissance was performed on February 10 and 11, 2010 to evaluate whether the existing Part A Phase 1 data were still considered reliable. Based on the site reconnaissance, the Part A Phase 1 data are considered reliable. Deposition of large amounts of material occurred in the southern reaches of Bat Cave Wash near the confluence of AOC 4-debris ravine, but erosion and deposition appeared to be limited in SWMU 1 and AOC 1 as most sample location stakes were still present.

3.1.2 Potential Fate and Transport Mechanisms

Conceptual site models (CSMs) were developed for the *Human Health and Ecological Risk Assessment Work Plan* [RAWP], *Topock Compressor Station, Needles, California* (ARCADIS, 2008a) and RAWP Addendum (ARCADIS, 2009a) and were updated in the *Human and Ecological Risk Assessment of Groundwater Impacted by Activities at Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and SWMU 2, Topock Compressor Station, Needles, California* (ARCADIS, 2009c). The updated CSMs are shown in Figures 2 through 5 of the Soil Part A DQO Tech Memo in Appendix A. The CSMs were updated again to include the new investigation units, new primary sources, and exposure pathways, as necessary. The revised CSMs are shown in Figures 3-1 through 3-4. The CSMs focus on evaluation of potential exposure pathways to human and to human and ecological receptors. Site-specific CSMs, providing a more detailed assessment of contaminant fate and transport mechanisms at each unit, were also developed and are presented in Appendix C.

The CSMs rely on the detailed information on the physical characteristics and setting of each unit, including surface features, topography, meteorology, site geology, surface water hydrology, site hydrogeology, land use, cultural resources, and ecology. Potential transport mechanisms and fate of COPCs and COPECs potentially released into the environment outside the fence line of Topock Compressor Station are presented in the CSMs.

3.1.3 Comparison Values

Six types of comparison values identified for this evaluation include:

- Soil background threshold values (BTVs) for metals and inorganic compounds, which are discussed in the *Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M HILL, 2009a) and in Appendix E to this report.
- Ecological comparison values (ECVs), which are calculated to be protective of the species potentially present in the area outside the fence line (ARCADIS, 2008b, 2009a-b).
- Threshold effect concentrations (TECs) that were obtained from MacDonald, et al. (2000) for comparison with sediment results, in accordance with the approved RAWP (ARCADIS, 2008a).
- DTSC California human health screening levels (CHHSLs) for residential use (California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, 2005).

- USEPA regional screening levels (RSLs) for residential use for those compounds for which CHHSLs are unavailable or for which the existing CHHSLs are based on outdated toxicity factors (USEPA, 2009a). The USEPA RSLs were last updated in May 2012. Table 3-1 was updated with the current residential RSLs of 0.29 milligrams per kilogram (mg/kg) and 10 mg/kg for hexavalent chromium and elemental mercury, respectively(USEPA, 2012). RSLs for remaining analytes in Tables 3-1 through 3-8 will not change the screening levels used in the Part A, Phase 1 data gaps evaluation, which were either the Topock-specific background valueBTV or the ecological comparison valueECV. Therefore, incorporating the updated May 2012 USEPA RSLs into the Final Part A, Phase 1 Data Gaps Evaluation Report will not change the identified data gaps. The most current, applicable USEPA RSLs will be used to conduct the next data gaps evaluation after the collection of the Phase 2 samples.
- California Regional Water Quality Control Board, San Francisco Bay Region (Water Board, 2008) environmental screening levels for total petroleum hydrocarbons (TPH) in the gasoline, diesel, and motor- oil ranges for a residential exposure scenario for human health based on a hazard index of 1.0.
- Project-specific screening levels developed for COPCs/COPECs identified from Target Analyte List and Target Compound List (TAL/TCL) data, to be developed as needed.

The comparison values were used to assess the extent of contamination. The extent of contamination was defined to the lowest of the applicable comparison values, defined as the interim screening level. The soil interim screening level for most metals is equal to the corresponding BTV. Certain ECVs, USEPA RSLs, or DTSC CHHSLs for metals are lower than the BTV; in these cases, the BTV was used in lieu of the ECVs, USEPA RSLs, or DTSC CHHSLs when determining whether delineation is adequate. If a BTV is not available, then the interim screening value is usually the lesser of the DTSC CHHSLs or soil ECVs. As stated above, the USEPA RSL is used instead of the CHHSL in those instances where a CHHSL does not exist or where the toxicity values used in the CHHSL are outdated. The interim sediment screening level for most metals was the TEC. Where sediment TECs were not available for a given compound, the soil BTV was used as the interim screening level in a conservative estimate of sediment background values since background concentrations of metals in upland soil would be expected to be lower than background concentrations in sediment. The comparison values are shown in Tables 3-1 through 3-8.

Exceedance of any comparison values does not indicate the presence or absence of unacceptable risk (potential site-related risks will be evaluated in the baseline risk assessment). To assess dioxin/furan results, dioxin toxicity equivalence quotients (TEQs) were calculated and compared to the DTSC/Human Ecological Risk Department (HERD) dioxin TEQs remedial goals presented in *Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Site* (DTSC, 2009). The DTSC/Human Ecological Risk Department HERD guidance provides the following dioxin TEQ remedial goals for sites in California:

- **Fifty** nanograms per kilogram: residential exposure scenario (based on 10^{-6} risk level and adjusted by a factor of 10 to account for minimal contribution of soil and dust to dioxin body burden in a University of Michigan dioxin study).

- **Two hundred** to 1,000 nanograms per kilogram: commercial/industrial exposure scenario (a range is proposed from a concentration based on 10^{-6} cancer risk [adjusted by a factor of 10 as with the residential value] to a concentration based on a hazard index of 1).

For completeness, the data were also compared to commercial/industrial DTSC CHHSLs or USEPA RSLs. This comparison is for informational purposes only; the nature and extent delineation was not based on comparison to the commercial use values.

3.2 Nature and Extent Evaluation

As outlined in the decision process for Decision 1 in the Soil Part A DQO Tech Memo, the nature and extent evaluation consisted of:

- Identifying newly detected compounds (note that these constituents have not been formally designated as COPCs or COPECs).
- Conducting a point-by-point comparison of all detected compounds to the comparison values.
- Assessing lateral and vertical extent of detected compounds, as well as spatial concentration trends of detected compounds (that is, changes in concentration laterally and vertically).
- Conducting a central tendency comparison between site and background data sets.

These steps are discussed in more detail below.

3.2.1 Identification of Newly Detected Compounds

The full inorganic and organic suite analyses included in the CERCLA TAL/TCL includes compounds that have not typically been included in analytical suites for the areas outside the fence line. At the request of DOI, 10 percent of all samples collected during the Soil Part A Phase 1 investigation were analyzed for the full TAL/TCL suite. The Part A Phase 1 data and existing pre-2008 data were combined and reviewed to assess whether, as a result of the full TAL/TCL analysis, any new compounds that qualify as COPCs/COPECs have been identified in the areas outside the compressor station. An evaluation of detected Part A CERCLA TAL/TCL constituents is included in Appendix C of this report.

3.2.2 Point-by-point Comparison with Comparison Values

The initial comparison of COPCs/COPECs was conducted on a point-by-point basis for all depths (that is, a simultaneous lateral and vertical assessment). All data for a given area were compared to the comparison values described in Section 3.1.3. (Data tables by constituent group by individual unit are included in Appendix C.) Detected concentrations of a given chemical were flagged for each occurrence of a COPC/ or COPEC exceeding the interim screening level. The results from this point-by-point comparison were used in conjunction with the spatial trends analysis and central tendency comparison to assess whether a data gap existed at locations with one or more constituents exceeding the applicable BTV or risk-based comparison values. Other considerations included:

- The frequency and extent to which the lowest applicable comparison value was exceeded and, in the case of comparison to BTVs, the degree of exceedance of the lowest applicable risk-based comparison value (typically the ECV).
- The influence of topography on both the likely direction of COPC /or COPEC movement and the ability to collect additional samples.
- The proximity of other relevant sample locations to the sample location exceeding the interim screening level.

For example, at AOC 9, copper was detected in samples at concentrations exceeding the BTV. One of these samples is located at the perimeter of the sampling area. However, none of the detected concentrations exceeded ECV and residential or commercial/industrial CHHSLs (20.6 milligrams per kilogram [mg/kg], 3,000 mg/kg, and 38,000 mg/kg, respectively). Consequently, no further sampling for copper was recommended for AOC 9.

Statistical summary tables were also created for each area and are included in the Appendix C sub-appendices. The statistical summary tables present the frequency of detection for each COPC/ and COPEC detected in soil, the maximum detected concentration, and the number of exceedances of each comparison value described in Section 3.1.3. Soil sample counts presented in the statistical summary tables do not include duplicate (quality control) soil samples. At locations where duplicate samples were collected, the higher of the two values were included in the statistical summary tables. The number of exceedances is the number of detections that are equal to or exceed the respective screening/comparison values. For the BTV, exceedances are the number of detections exceeding the BTV (that is, if a detected concentration is equal to the BTV, it is considered to be within background).

Eight metals (antimony, beryllium, cadmium, mercury, molybdenum, silver, selenium, and thallium) were commonly not detected in Part A Phase 1 soil samples at concentrations above laboratory reporting limits; however, the respective reporting limits were higher than the respective ECVs and/or BTVs. The laboratory reporting limits are equal to the laboratory's practical quantitation levels—the minimum concentration at which a laboratory can accurately determine the concentration of a substance. For these eight metals, the practical quantitation levels are at or below the USEPA Superfund Analytical Services/ Contract Laboratory Program required quantitation limits, and are the lowest concentration the laboratory can accurately achieve.

The fact that reporting limits for these metals exceeded the respective ECVs and/or BTVs is not considered a data gap for the following reasons:

- Antimony was not detected in background samples; therefore, a BTV was not calculated for antimony. The reporting limits for background samples are similar to the reporting limits for Part A Phase 1. Although the reporting limits exceeded the ECV, the limits are well below the residential CHHSL of 30 mg/kg, and no known source of antimony exists at Topock Compressor Station.
- The reporting limits for beryllium exceeded the BTV but were well below the ECV and residential CHHSL. The reporting limits were generally only two to three times the BTV,

indicating that beryllium was not highly elevated above the BTV in any of the samples, and no known source of beryllium exists at Topock Compressor Station.

- The reporting limits for cadmium, silver, selenium, and thallium rarely exceeded ECVs and/or BTVs. The majority of the reporting limits for these metals were below or equal to the applicable comparison values.
- The reporting limits for mercury exceeded its ECV but were well below the residential CHHSL. Mercury was not detected in the background samples; therefore, a BTV was not calculated. The reporting limits for the background samples were similar to the reporting limits for the Part A Phase 1 soil investigation. The ECV for mercury is below the capability of laboratory instrumentation to detect mercury, which is a recognized common issue with mercury analyses in ecological risk assessment. Furthermore, the ECV developed for the Part A soil investigation is intentionally very conservative (that is, the lowest value). Ecological risk from mercury and the uncertainty associated with the reporting limits will be addressed during the ecological risk assessment.
- The reporting limits for molybdenum sometimes exceeded its BTV but rarely exceeded its ECV. All reporting limits were well below the residential CHHSL. The reporting limits were typically no more than two times the BTV, indicating that molybdenum was not highly elevated above the BTV in any of the samples.

3.2.3 Evaluation of Lateral and Vertical Extents and Spatial Trends

The lateral and vertical extents of each COPC/COPEC were evaluated by assessing whether constituent concentrations in the samples were below the applicable interim screening level toward the edge of the unit or affected area. Potential hot spots, if any, were identified through the presence of clusters of elevated concentrations of COPCs/COPECs.

In addition, spatial trends were evaluated for those COPCs/COPECs identified by the point-by-point comparison as having concentrations exceeding the interim screening level. Figures with posted concentrations were created for those COPCs/COPECs that were detected four or more times above respective interim screening levels to assist with the evaluation of lateral and vertical extents and spatial trends. These figures are presented for each unit in the Appendix C sub-appendices.

Spatial trends were evaluated both laterally and vertically. For lateral delineation, concentration trends toward the perimeter of each area were reviewed to ensure that concentrations are generally decreasing toward the perimeter. Vertical concentration trends were also reviewed for each boring showing concentrations of COPCs/ COPECs. Evaluation of spatial trends included:

- Lateral concentration trends toward the edge of a unit or affected area (that is, potential hot spot) within a unit.
- Vertical concentration trends in each boring and throughout a given unit or area.
- Distribution of detections and non-detections of each constituent within a unit.
- Where applicable, concentrations trends at an upstream/upslope unit or area.

The specific areas where COPC/COPEC lateral or vertical boundaries are not adequately defined or where concentration trends are not decreasing were identified as locations where data gaps exist. The identified data gaps provided the basis for further sampling recommendations for Decision 1. If additional data collection was feasible (that is, no structures, topography, or cultural resources preventing step-out sampling or deeper sampling vertically), then additional sampling locations, depths, and/or analytical suites were proposed for Phase 2 soil based on Step 7 of the DQO process. The additional sampling recommendations for each unit are included in the Appendix C sub-appendices.

3.2.4 Central Tendency Comparison

A population (central tendency) comparison was conducted for those metals detected in soil at concentrations exceeding the respective BTVs. The central tendency comparison assesses whether there is an overall shift of concentrations between the site data versus the background data (that is, if the site concentrations are higher relative to the background concentrations than random variability could explain). The comparison helps to determine whether an overall shift exists between the background and the combined soil data set for each area.

The comparison was conducted using the approved *Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California Technical Memorandum* (CH2M HILL, 2009a). Because comparison to the BTV offers information only on the upper tail of the site concentration distribution, in cases where single- point exceedances of the BTV exist, the central tendency comparison offers an opportunity to statistically address whether there is an overall shift of site concentrations relative to background concentrations. This overall shift may be identified as a data gap, and additional sampling may be proposed, if appropriate.

The Gehan test and Wilcoxon Rank Sum test are commonly used to conduct central tendency comparisons. These central tendency tests are discussed both in USEPA and United States Department of the Navy (Navy) literature (USEPA, 2009b; Navy, 2002). These central tendency tests provide a calculated probability, which was compared to a significance level of 0.05. If the probability was below 0.05, it was concluded that a significant exceedance over background is present.

Both tests are nonparametric approaches based upon the ranks of the data; however, they handle ties in these ranks differently. For that reason, the Gehan test is recommended when the percent of nondetects is greater than 40 percent or when multiple detection limits exist for a given metal, both of which were frequently the case. These joint reasons led to the use of the Gehan test for all cases. (Using these rules, the Wilcoxon Rank Sum test could have been performed for one case, but the calculated probability only differed by a single thousandth between the two tests, thus not impacting the conclusion of the test and allowing use of the Gehan test to be a more consistent approach.)

The central tendency test was not performed if a metal was infrequently detected (less than five detects) in either the unit data or background data set or had a limited number of results (less than eight). Using these rules, a central tendency comparison for hexavalent chromium could not be conducted at any unit because there were insufficient detections of hexavalent chromium in the background data set.

Central tendency comparison box-and-whisker and scatter plots are shown in Figure 3-5, and results for each area are discussed in detail in the Appendix C sub-appendices.

TABLE 3-1
Soil Analyte Comparison Table - Metals and Cyanide
Soil Investigation Part A, Phase 1 Data Gaps Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (mg/kg)	DTSC CHHSL Residential (mg/kg)	DTSC CHHSL Commercial (mg/kg)	EPA Regional SL (December 2009) Residential (mg/kg)	EPA Regional SL (December 2009) Commercial (mg/kg)	Background Levels (mg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (mg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (mg/kg)	Does RL Exceed Screening Level?
x	Aluminum	7429-90-5	10	NE	NE	77,000	990,000	16,400	NC	---	16,400	No
	Antimony	7440-36-0	2	30	380	31	410	---	0.285	Yes	0.285	Yes
	Arsenic	7440-38-2	0.5	0.07	0.24	0.062 *	0.25 *	11	11.4	No	11	No
	Barium	7440-39-3	1	5,200	63,000	15,000	190,000	410	330	No	410	No
	Beryllium	7440-41-7	0.5	16	190	160	2,000	0.672	23.3	No	0.672	No
	Cadmium	7440-43-9	0.5	39	500	70	800	1.1	0.0151	Yes	1.1	No
x	Calcium	7440-70-2	100	NE	NE	NE	NE	66,500	NC	---	66,500	No
5	Chromium, Hexavalent	18540-29-9	0.4	17	37	0.29	1,400	0.83	139.6	No	0.83	No
2	Chromium, total	7440-47-3	1	NE	NE	280	1,400	39.8	36.3	No	39.8	No
	Cobalt	7440-48-4	1	660	3,200	23	300	12.7	13	No	12.7	No
	Copper	7440-50-8	1	3,000	38,000	3,100	41,000	16.8	20.6	No	16.8	No
x	Cyanide	57-12-5	0.25	NE	NE	1,600	20,000	---	0.9	No	0.9	No
x	Iron	7439-89-6	10	NE	NE	55,000	720,000	---	NC	---	55,000	No
	Lead	7439-92-1	1	80	320	150	800	8.39	0.0166	Yes	8.39	No
x	Magnesium	7439-95-4	100	NE	NE	NE	NE	12,100	NC	---	12,100	No
x	Manganese	7439-96-5	1	NE	NE	1,800	23,000	402	220	No	402	No
3	Mercury	NA	0.1	18	180	10	310	---	0.0125	Yes	0.0125	Yes
	Molybdenum	7439-98-7	1	380	4,800	390	5,100	1.37	2.25	No	1.37	No
	Nickel	7440-02-0	1	1,600	16,000	1,500	20,000	27.3	0.607	Yes	27.3	No
x	Potassium	7440-09-7	100	NE	NE	NE	NE	4,400	NC	---	4,400	No
	Selenium	7782-49-2	1	380	4,800	390	5,100	1.47	0.177	Yes	1.47	No
	Silver	7440-22-4	1	380	4,800	390	5,100	---	5.15	No	5.15	No
x	Sodium	7440-23-5	100	NE	NE	NE	NE	2,070	NC	---	2,070	No
6	Thallium	7440-28-0	2	5.0	63	5.1	66	---	2.32	No	2.32	No
4	Vanadium	NA	1	530	6,700	390	5,200	52.2	13.9	No	52.2	No
	Zinc	7440-66-6	2	23,000	100,000	23,000	310,000	58	0.164	Yes	58	No

TABLE 3-2
Sediment Analyte Comparison Table - Metals and Detected Organics
Soil Investigation Part A, Phase 1 Data Summary Report, PG&E Topock Compressor Station, Needles, California

Analyte	CAS	QAPP RL (mg/kg)	Soil Background Levels (mg/kg)	Consensus-based Concentration Threshold (mg/kg)	Consensus-based Concentration Probable (mg/kg)	Interim Screening Level [1] (mg/kg)	Does RL Exceed Screening Level?
Metals							
Aluminum	7429-90-5	10	16400	NE	NE	NE	---
Antimony	7440-36-0	2	---	NE	NE	NE	---
Arsenic	7440-38-2	0.5	11	9.79	33	9.79	No
Barium	7440-39-3	1	410	NE	NE	410	No
Beryllium	7440-41-7	0.5	0.672	NE	NE	0.672	No
Cadmium	7440-43-9	0.5	1.1	0.99	4.98	0.99	No
Calcium	7440-70-2	100	66500	NE	NE	NE	---
Chromium, Hexavalent	18540-29-9	0.4	0.83	NE	NE	0.83	No
Chromium, total	7440-47-3	1	39.8	43.4	111	43.4	No
Cobalt	7440-48-4	1	12.7	NE	NE	12.7	No
Copper	7440-50-8	1	16.8	31.6	149	31.6	No
Iron	7439-89-6	10	---	NE	NE	NE	---
Lead	7439-92-1	1	8.39	35.8	128	35.8	No
Magnesium	7439-95-4	100	12100	NE	NE	NE	---
Manganese	7439-96-5	1	402	NE	NE	NE	---
[2] Mercury	NA	0.1	---	0.18	1.06	0.18	No
Molybdenum	7439-98-7	1	1.37	NE	NE	1.37	No
Nickel	7440-02-0	1	27.3	22.7	48.6	22.7	No
Potassium	7440-09-7	100	4400	NE	NE	NE	---
Selenium	7782-49-2	1	1.47	NE	NE	1.47	No
Silver	7440-22-4	1	---	NE	NE	NE	---
Sodium	7440-23-5	100	2070	NE	NE	NE	---
[3] Thallium	7440-28-0	2	---	NE	NE	NE	---
[4] Vanadium	NA	1	52.2	NE	NE	52.2	No
Zinc	7440-66-6	2	58	121	459	121	No
Organics							
B(a)P Equivalent	50-32-8E	5	---	NE	NE	NE	---
Benzo (b) fluoranthene	205-99-2	5	---	NE	NE	NE	---
Benzo (b) fluoranthene	205-99-2	330 [5]	---	NE	NE	NE	---
Chrysene	218-01-9	5	---	0.166	1.29	NE	---
Chrysene	218-01-9	330 [5]	---	0.166	1.29	NE	---
Fluoranthene	206-44-0	5	---	0.423	2.23	NE	---
Fluoranthene	206-44-0	330 [5]	---	0.423	2.23	NE	---
Phenanthrene	85-01-8	5	---	0.204	1.17	NE	---
Phenanthrene	85-01-8	330 [5]	---	0.204	1.17	NE	---
Pyrene	129-00-0	5	---	0.195	1.52	NE	---
Pyrene	129-00-0	330 [5]	---	0.195	1.52	NE	---

TABLE 3-3

Soil Analyte Comparison Table - Polycyclic Aromatic Hydrocarbon (PAH) - SW8270SIM

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

				DTSC CHHSL		EPA Regional SL (December 2009)						
	Analyte	CAS	QAPP RL (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)	Background Levels (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
	1-Methyl naphthalene	90-12-0	5	NE	NE	22,000	99,000	---	NE	No	22,000	No
	2-Methyl naphthalene	91-57-6	5	NE	NE	310,000	4,100,000 (sat)	---	NE	No	310,000	No
s	Acena phthylene	208-96-8	5	NE	NE	1,700,000	17,000,000	---	NE	No	1,700,000	No
	Acenaphthene	83-32-9	5	NE	NE	3,400,000	33,000,000	---	NE	No	3,400,000	No
	Anthracene	120-12-7	5	NE	NE	17,000,000	170,000,000	---	NE	No	17,000,000	No
2	Benzo (a) anthracene	56-55-3	5	NE	NE	380	1,300	---	NE	No	380	No
	Benzo (a) pyrene	50-32-8	5	38	130	15	210	---	NE	No	38	No
2	Benzo (b) fluoranthene	205-99-2	5	NE	NE	380	1,300	---	NE	No	380	No
s	Benzo (ghi) perylene	191-24-2	5	NE	NE	1,700,000	17,000,000	---	NE	No	1,700,000	No
	Benzo (k) fluoranthene	207-08-9	5	NE	NE	380 *	1,300 *	---	NE	No	380	No
	Chrysene	218-01-9	5	NE	NE	3,800 *	13,000 *	---	NE	No	3,800	No
2	Dibenzo (a,h) anthracene	53-70-3	5	NE	NE	110	380	---	NE	No	110	No
	Fluoranthene	206-44-0	5	NE	NE	2,300,000	22,000,000	---	NE	No	2,300,000	No
	Fluorene	86-73-7	5	NE	NE	2,300,000	22,000,000	---	NE	No	2,300,000	No
2	Indeno (1,2,3-cd) pyrene	193-39-5	5	NE	NE	380	1,300	---	NE	No	380	No
	Naphthalene	91-20-3	5	NE	NE	3,600	18,000	---	NE	No	3,600	No
s	Phenanthrene	85-01-8	5	NE	NE	1,700,000	17,000,000	---	NE	No	1,700,000	No
	Pyrene	129-00-0	5	NE	NE	1,700,000	17,000,000	---	NE	No	1,700,000	No
	PAH Low molecular weight	NA	5	NE	NE	NE	NE	---	10,000	No	10,000	No
	PAH High molecular weight	NA	5	NE	NE	NE	NE	---	1,160	No	1,160	No
	B(a)P Equivalent	50-32-8	5	38	130	15	210	---	NE	No	38	No

Notes:

[1] Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

2 Calculated using California toxicity values. The EPA Regional SL for Benzo(a)anthracene, Benzo(b)fluoranthene and Indeno (1,2,3-c,d)pyrene residential is 150 µg/kg, commercial is 2100 µg/kg; Dibenzo(a,h)anthracene residential is 15 µg/kg, commercial is 210 µg/kg.

[S] Pyrene is used as a surrogate

QAPP RL = quality assurance procedures plan reporting limit

DTSC CHHSL = California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)

SL = USEPA regional screening level, (USEPA, December 2009)

µg/kg = micrograms per kilogram

NE = regulatory standard not established

--- = background concentration could not be established because all background samples were non-detect for this constituent

(sat) = concentration may exceed saturation value

* = California modified preliminary remediation goal (USEPA 2004)

NA = not available

USEPA = United States Environmental Protection Agency

TABLE 3-4

Soil Analyte Comparison Table - Semivolatile Organic Compounds - SW8270C

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL Residential (µg/kg)	DTSC CHHSL Commercial (µg/kg)	EPA Regional SL (December 2009) Residential (µg/kg)	EPA Regional SL (December 2009) Commercial (µg/kg)	Background Levels (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
x	1,1´-Biphenyl	92-52-4	700	NE	NE	3,900,000 (sat)	51,000,000 (sat)	---	See note 2	No	3,900,000	No
x	1,2,4,5-Tetrachlorobenzene	95-94-3	700	NE	NE	18,000	180,000	---	See note 2	No	18,000	No
	1,2,4-Trichlorobenzene	120-82-1	330	NE	NE	22,000	99,000	---	See note 2	No	22,000	No
	1,2-Dichlorobenzene	95-50-1	330	NE	NE	1,900,000 (sat)	9,800,000 (sat)	---	See note 2	No	1,900,000	No
	1,3-Dichlorobenzene	541-73-1	330	NE	NE	530,000 ^	600,000 ^	---	See note 2	No	530,000	No
	1,4-Dichlorobenzene	106-46-7	330	NE	NE	2,400	12,000	---	See note 2	No	2,400	No
x	1,4-Dioxane	123-91-1	500	18,000	64,000	44,000	160,000	---	See note 2	No	18,000	No
x	2,3,4,6-Tetrachlorophenol	58-90-2	700	NE	NE	1,800,000	18,000,000	---	See note 2	No	1,800,000	No
	2,4,5-Trichlorophenol	95-95-4	700	NE	NE	6,100,000	62,000,000	---	See note 2	No	6,100,000	No
	2,4,6-Trichlorophenol	88-06-2	330	NE	NE	6,900 *	25,000 *	---	See note 2	No	6,900	No
	2,4-Dichlorophenol	120-83-2	330	NE	NE	180,000	1,800,000	---	See note 2	No	180,000	No
	2,4-Dimethylphenol	105-67-9	330	NE	NE	1,200,000	12,000,000	---	See note 2	No	1,200,000	No
	2,4-Dinitrophenol	51-28-5	330	NE	NE	120,000	1,200,000	---	See note 2	No	120,000	No
	2,4-Dinitrotoluene	121-14-2	330	NE	NE	1,600	5,500	---	See note 2	No	1,600	No
	2,6-Dinitrotoluene	606-20-2	330	NE	NE	61,000	620,000	---	See note 2	No	61,000	No
	2-Chloro naphthalene	91-58-7	330	NE	NE	6,300,000 (sat)	82,000,000 (sat)	---	See note 2	No	6,300,000	No
	2-Chlorophenol	95-57-8	330	NE	NE	63,000 ^	240,000 ^	---	See note 2	No	63,000	No
	2-Methyl naphthalene	91-57-6	330 [3]	NE	NE	310,000	4,100,000 (sat)	---	See note 2	No	310,000	No
	2-Methylphenol	95-48-7	330	NE	NE	3,100,000	31,000,000	---	See note 2	No	3,100,000	No
	2-Nitroaniline	88-74-4	700	NE	NE	180,000 ^	1,800,000 ^	---	See note 2	No	180,000	No
	2-Nitrophenol	88-75-5	700	NE	NE	NE	NE	---	See note 2	No	NE	---
	3,3-Dichlorobenzidene	91-94-1	1,300	NE	NE	1,100	3,800	---	See note 2	No	1,100	Yes
	3-Nitroaniline	99-09-2	700	NE	NE	18,000 ^	82,000 ^	---	See note 2	No	18,000	No
	4,6-Dinitro-2-methylphenol	534-52-1	1,600	NE	NE	6,100	62,000	---	See note 2	No	6,100	No
	4-Bromophenyl phenyl ether	101-55-3	330	NE	NE	NE	NE	---	See note 2	No	NE	---
	4-Chloro-3-methylphenol	59-50-7	600	NE	NE	6,100,000	62,000,000	---	See note 2	No	6,100,000	No
	4-Chloroaniline	106-47-8	700	NE	NE	2,400	8,600	---	See note 2	No	2,400	No
	4-Chlorophenyl phenyl ether	7005-72-3	330	NE	NE	NE	NE	---	See note 2	No	NE	---
	4-Methylphenol	106-44-5	330	NE	NE	310,000	3,100,000	---	500	No	500	No
	4-Nitroaniline	100-01-6	700	NE	NE	24,000	86,000	---	See note 2	No	24,000	No
	4-Nitrophenol	100-02-7	700	NE	NE	NE	NE	---	See note 2	No	NE	---
s1	Acena phthylene	208-96-8	330 [3]	NE	NE	1,700,000	17,000,000	---	See note 2	No	1,700,000	No

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL Residential (µg/kg)	DTSC CHHSL Commercial (µg/kg)	EPA Regional SL (December 2009) Residential (µg/kg)	EPA Regional SL (December 2009) Commercial (µg/kg)	Background Levels (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level 1 (µg/kg)	Does RL Exceed Screening Level?
	Acenaphthene	83-32-9	330 3	NE	NE	3,400,000	33,000,000	---	See note 2	No	3,400,000	No
x	Acetophenone	98-86-2	700	NE	NE	7,800,000 (sat)	100,000,000 (sat)	---	See note 2	No	7,800,000	No
	Anthracene	120-12-7	330 3	NE	NE	17,000,000	170,000,000	---	See note 2	No	17,000,000	No
x	Atrazine	1912-24-9	700	NE	NE	2,100	7,500	---	See note 2	No	2,100	No
x	Benzaldehyde	100-52-7	700	NE	NE	7,800,000 (sat)	100,000,000 (sat)	---	See note 2	No	7,800,000	No
4	Benzo (a) anthracene	56-55-3	330 3	NE	NE	380	1,300	---	See note 2	No	380	No
	Benzo (a) pyrene	50-32-8	330 3	38	130	15	210	---	See note 2	No	38	Yes
4	Benzo (b) fluoranthene	205-99-2	330 3	NE	NE	380	1,300	---	See note 2	No	380	No
s1	Benzo (ghi) perylene	191-24-2	330 3	NE	NE	1,700,000	17,000,000	---	See note 2	No	1,700,000	No
	Benzo (k) fluoranthene	207-08-9	330 3	NE	NE	380 *	1,300 *	---	See note 2	No	380	No
	Benzoic acid	65-85-0	5,000	NE	NE	240,000,000	2,500,000,000	---	See note 2	No	240,000,000	No
	Benzyl alcohol	100516	600	NE	NE	6,100,000	62,000,000	---	See note 2	No	6,100,000	No
	Bis (2-chloroethoxy) methane	111-91-1	330	NE	NE	180,000	1,800,000	---	See note 2	No	180,000	No
	Bis (2-chloroethyl) ether	111-44-4	330	NE	NE	210	1,000	---	See note 2	No	210	Yes
	Bis (2-chloroisopropyl) ether	108-60-1	330	NE	NE	4,600	22,000	---	See note 2	No	4,600	No
	Bis (2-ethylhexyl) phthalate	117-81-7	700	NE	NE	35,000	120,000	---	2900	No	2,900	No
	Butyl benzyl phthalate	85-68-7	1,000	NE	NE	260,000	910,000	---	See note 2	No	260,000	No
x	Caprolactam	105-60-2	700	NE	NE	31,000,000	310,000,000	---	See note 2	No	31,000,000	No
x	Carbazole	86-74-8	700	NE	NE	24,000 ^	86,000 ^	---	2800000	No	24,000	No
	Chrysene	218-01-9	330 3	NE	NE	3,800 *	13,000 *	---	See note 2	No	3,800	No
4	Dibenzo (a,h) anthracene	53-70-3	330 3	NE	NE	110	380	---	See note 2	No	110	Yes
	Dibenzofuran	132-64-9	330	NE	NE	150,000 ^	1,600,000 ^	---	See note 2	No	150,000	No
	Diethyl phthalate	84-66-2	330	NE	NE	49,000,000	490,000,000	---	See note 2	No	49,000,000	No
	Dimethyl phthalate	131-11-3	330	NE	NE	100,000,000 ^(max)	100,000,000 ^(max)	---	See note 2	No	100,000,000	No
	Di-N-butyl phthalate	84-74-2	330	NE	NE	6,100,000	62,000,000	---	47	Yes	47	Yes
	Di-N-octyl phthalate	117-84-0	1,000	NE	NE	2,400,000 ^	25,000,000 ^	---	See note 2	No	2,400,000	No
	Fluoranthene	206-44-0	330 3	NE	NE	2,300,000	22,000,000	---	See note 2	No	2,300,000	No
	Fluorene	86-73-7	330 3	NE	NE	2,300,000	22,000,000	---	See note 2	No	2,300,000	No
	Hexachlorobenzene	118-74-1	330	NE	NE	300	1,100	---	See note 2	No	300	Yes
	Hexachlorobutadiene	87-68-3	330	NE	NE	6,200	22,000	---	See note 2	No	6,200	No
x	Hexachlorocyclopentadiene	77-47-4	700	NE	NE	370,000	3,700,000	---	See note 2	No	370,000	No
	Hexachloroethane	67-72-1	330	NE	NE	35,000	120,000	---	See note 2	No	35,000	No

TABLE 3-4

Soil Analyte Comparison Table - Semivolatile Organic Compounds - SW8270C

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL		EPA Regional SL (December 2009)		Background Levels (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level 1 (µg/kg)	Does RL Exceed Screening Level?
				Residential (µg/kg)	Commercial (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)					
4	Indeno (1,2,3-cd) pyrene	193-39-5	330 3	NE	NE	380	1,300	---	See note 2	No	380	No
	Isophorone	78-59-1	330	NE	NE	510,000	1,800,000	---	See note 2	No	510,000	No
	Naphthalene	91-20-3	330	NE	NE	3,600	18,000	---	See note 2	No	3,600	No
	Nitrobenzene	98-95-3	330	NE	NE	4,800	24,000	---	See note 2	No	4,800	No
	N-Nitroso-di-n-propylamine	621-64-7	330	NE	NE	69	250	---	See note 2	No	69	Yes
	N-nitrosodiphenylamine	86-30-6	330	NE	NE	99,000	350,000	---	See note 2	No	99,000	No
	Pentachloro phenol	87-86-5	700	4,400	13,000	3,000	9,000	---	2500	No	2,500	No
s1	Phenanthrene	85-01-8	330 3	NE	NE	1,700,000	17,000,000	---	See note 2	No	1,700,000	No
	Phenol	108-95-2	330	NE	NE	18,000,000	180,000,000	---	See note 2	No	18,000,000	No
	Pyrene	129-00-0	330 3	NE	NE	1,700,000	17,000,000	---	See note 2	No	1,700,000	No

Notes:

All soil sample results will be reported in dry weight unless otherwise specified in the SAP.

1 Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

2 ECVs were calculated as needed for constituents detected during the Part A Phase 1 sampling.

3 Analytes were analyzed by SW8270SIM to achieve a lower reporting limit.

4 Calculated using California toxicity values. The EPA Regional SL for Benzo(a)anthracene, Benzo(b)fluoranthene and Indeno (1,2,3-c,d)pyrene residential is 150 µg/kg, commercial is 2100 µg/kg; Dibenzo(a,h)anthracene residential is 15 µg/kg, commercial is 210 µg/kg.

QAPP RL = quality assurance procedures plan reporting limit

DTSC CHHSL = California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)

µg/kg = micrograms per kilogram

SL = USEPA regional screening level, (USEPA, December 2009)

NE = regulatory standard not established

(sat) = concentration may exceed saturation value

s1 = pyrene is used as a surrogate.

(max) = ceiling limit, not a risk-based value

^ = preliminary remediation goal, (USEPA, 2004)

--- = data not collected, available or applicable

x = indicates analytes from the Contract Laboratory Program Target Compound and Target Analyte Lists (TCL/TALs)

* = California modified preliminary remediation goal, (USEPA, 2004)

USEPA = United States Environmental Protection Agency

TABLE 3-5
Soil Analyte Comparison Table - Volatile Organic Compounds - SW8260B
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL Residential (µg/kg)	DTSC CHHSL Commercial (µg/kg)	EPA Regional SL (December 2009) Residential (µg/kg)	EPA Regional SL (December 2009) Commercial (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
	1,1,1,2-Tetrachloroethane	630-20-6	5	NE	NE	1,900	9,300	See note 2	No	1,900	No
	1,1,1-Trichloroethane	71-55-6	5	NE	NE	8,700,000 (sat)	38,000,000 (sat)	See note 2	No	8,700,000	No
	1,1,2,2-Tetrachloroethane	79-34-5	5	NE	NE	560	2,800	See note 2	No	560	No
	1,1,2-Trichloroethane	79-00-5	5	NE	NE	1,100	5,300	See note 2	No	1,100	No
	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	5	NE	NE	43,000,000 (sat)	180,000,000 (sat)	See note 2	No	43,000,000	No
	1,1-Dichloroethane	75-34-3	5	NE	NE	3,300	17,000	See note 2	No	3,300	No
	1,1-Dichloroethene	75-35-4	5	NE	NE	240,000	1,100,000	See note 2	No	240,000	No
s1	1,1-Dichloropropene	563-58-6	5	NE	NE	1,700	8,100	See note 2	No	1,700	No
	1,2,3-Trichlorobenzene	87-61-6	5	NE	NE	49,000	490,000 (sat)	See note 2	No	49,000	No
	1,2,3-Trichloropropane	96-18-4	5	NE	NE	5.0	95	See note 2	No	5.0	No
	1,2,4-Trichlorobenzene	120-82-1	5	NE	NE	22,000	99,000	See note 2	No	22,000	No
	1,2,4-Trimethylbenzene	95-63-6	6	NE	NE	62,000	260,000 (sat)	See note 2	No	62,000	No
	1,2-Dibromo-3-chloropropane	96-12-8	5	NE	NE	5.4	69	See note 2	No	5.4	No
	1,2-Dibromoethane	106-93-4	5	NE	NE	34	170	See note 2	No	34	No
	1,2-Dichlorobenzene	95-50-1	5	NE	NE	1,900,000 (sat)	9,800,000 (sat)	See note 2	No	1,900,000	No
	1,2-Dichloroethane	107-06-2	5	NE	NE	430	2,200	See note 2	No	430	No
	1,2-Dichloropropane	78-87-5	5	NE	NE	890	4,500	See note 2	No	890	No
	1,3,5-Trimethylbenzene	108-67-8	5	NE	NE	780,000 (sat)	10,000,000 (sat)	See note 2	No	780,000	No
	1,3-Dichlorobenzene	541-73-1	5	NE	NE	530,000 ^	600,000 ^	See note 2	No	530,000	No
	1,3-Dichloropropane	142-28-9	5	NE	NE	1,600,000	20,000,000 (sat)	See note 2	No	1,600,000	No
	1,4-Dichlorobenzene	106-46-7	5	NE	NE	2,400	12,000	See note 2	No	2,400	No
s2	2,2-Dichloropropane	594-20-7	5	NE	NE	890	4,500	See note 2	No	890	No
	2-Chlorotoluene	95-49-8	5	NE	NE	160,000 ^	560,000 ^	See note 2	No	160,000	No
x	2-Hexanone	591-78-6	10	NE	NE	210,000	1,400,000	See note 2	No	210,000	No
s3	4-Isopropyltoluene	99-87-6	6	NE	NE	2,100,000 (sat)	11,000,000 (sat)	See note 2	No	2,100,000	No
	Acetone	67-64-1	50	NE	NE	61,000,000	630,000,000 (sat)	See note 2	No	61,000,000	No
	Acrolein	107-02-8	100	NE	NE	150	650	See note 2	No	150	No
	Acrylonitrile	107-13-1	50	NE	NE	55 ^	120 ^	See note 2	No	55	No
	Benzene	71-43-2	5	NE	NE	1,100	5,400	See note 2	No	1,100	No
	Bromobenzene	108-86-1	5	NE	NE	300,000	1,800,000 (sat)	See note 2	No	300,000	No
s4	Bromochloromethane	74-97-5	5	NE	NE	270	1,400	See note 2	No	270	No
	Bromodichloromethane	75-27-4	5	NE	NE	270	1,400	See note 2	No	270	No
	Bromoform	75-25-2	5	NE	NE	61,000	220,000	See note 2	No	61,000	No
	Bromomethane	74-83-9	5	NE	NE	7,300	32,000	See note 2	No	7,300	No

TABLE 3-5

Soil Analyte Comparison Table - Volatile Organic Compounds - SW8260B

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

				DTSC CHHSL		EPA Regional SL (December 2009)		Soil Ecological Comparison Values (ECV)			
	Analyte	CAS	QAPP RL (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)	(ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
	Carbon disulfide	75-15-0	5	NE	NE	820,000 (sat)	3,700,000 (sat)	See note 2	No	820,000	No
	Carbon tetrachloride	56-23-5	5	NE	NE	250	1,200	See note 2	No	250	No
	Chloro benzene	108-90-7	5	NE	NE	290,000	1,400,000 (sat)	See note 2	No	290,000	No
	Chloroethane	75-00-3	5	NE	NE	15,000,000 (sat)	61,000,000 (sat)	See note 2	No	15,000,000	No
	Chloroform	67-66-3	5	NE	NE	290	1,500	See note 2	No	290	No
	Chloromethane	74-87-3	5	NE	NE	120,000	500,000	See note 2	No	120,000	No
	cis-1,2-Dichloro ethene	156-59-2	5	NE	NE	780,000	10,000,000 (sat)	See note 2	No	780,000	No
s1	cis-1,3-Dichloropropene	10061-01-5	5	NE	NE	1,700	8,100	See note 2	No	1,700	No
x	Cyclohexane	110-82-7	5	NE	NE	7,000,000 (sat)	29,000,000 (sat)	See note 2	No	7,000,000	No
	Dibromochloromethane	124-48-1	3	NE	NE	680	3,300	See note 2	No	680	No
	Dibromomethane	74-95-3	5	NE	NE	25,000	110,000	See note 2	No	25,000	No
	Dichlorodifluoromethane	75-71-8	5	NE	NE	180,000	780,000	See note 2	No	180,000	No
	Ethylbenzene	100-41-4	5	NE	NE	5,400	27,000	See note 2	No	5,400	No
	Hexachlorobutadiene	87-68-3	5	NE	NE	6,200	22,000	See note 2	No	6,200	No
	Isopropylbenzene	98-82-8	5	NE	NE	2,100,000 (sat)	11,000,000 (sat)	See note 2	No	2,100,000	No
s5	m+p-Xylenes	17261-72-7	10	NE	NE	3,400,000 (sat)	17,000,000 (sat)	See note 2	No	3,400,000	No
x	Methyl acetate	79-20-9	5	NE	NE	22,000,000 ^	92,000,000 ^	See note 2	No	22,000,000	No
	Methyl ethyl ketone	78-93-3	5	NE	NE	28,000,000 (sat)	200,000,000 (sat)	See note 2	No	28,000,000	No
	Methyl isobutyl ketone	108-10-1	50	NE	NE	5,300,000 (sat)	53,000,000 (sat)	See note 2	No	5,300,000	No
	Methyl tert-butyl ether (MTBE)	1634-04-4	20	NE	NE	43,000	220,000	See note 2	No	43,000	No
x	Methylcyclohexane	108-87-2	5	NE	NE	2,600,000 ^	8,700,000 ^	See note 2	No	2,600,000	No
	Methylene chloride	75-09-2	5	NE	NE	11,000	53,000	See note 2	No	11,000	No
	Naphthalene	91-20-3	5	NE	NE	3,600	18,000	See note 2	No	3,600	No
	N-Butylbenzene	104-51-8	5	NE	NE	240,000 ^(sat)	240,000 ^(sat)	See note 2	No	240,000	No
	N-Propylbenzene	103-65-1	5	NE	NE	240,000 ^(sat)	240,000 ^(sat)	See note 2	No	240,000	No
	o-Xylene	95-47-6	5	NE	NE	3,800,000 (sat)	19,000,000 (sat)	See note 2	No	3,800,000	No
	p-Chlorotoluene	106-43-4	5	NE	NE	5,500,000 (sat)	72,000,000 (sat)	See note 2	No	5,500,000	No
	sec-Butylbenzene	135-98-8	5	NE	NE	220,000 ^(sat)	220,000 ^(sat)	See note 2	No	220,000	No
	Styrene	100-42-5	5	NE	NE	6,300,000 (sat)	36,000,000 (sat)	See note 2	No	6,300,000	No
	tert-Butylbenzene	98-06-6	5	NE	NE	390,000 ^(sat)	390,000 ^(sat)	See note 2	No	390,000	No
	Tetrachloroethene	127-18-4	5	NE	NE	550	2,600	See note 2	No	550	No
	Toluene	108-88-3	5	NE	NE	5,000,000 (sat)	45,000,000 (sat)	See note 2	No	5,000,000	No
	trans-1,2-Dichloroethene	156-60-5	5	NE	NE	150,000	690,000	See note 2	No	150,000	No
s1	trans-1,3-Dichloropropene	10061-02-6	5	NE	NE	1,700	8,100	See note 2	No	1,700	No

TABLE 3-5

Soil Analyte Comparison Table - Volatile Organic Compounds - SW8260B

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

				DTSC CHHSL		EPA Regional SL (December 2009)		Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
	Analyte	CAS	QAPP RL (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)				
	Trichloroethene	79-01-6	5	NE	NE	2,800	14,000	See note 2	No	2,800	No
x	Trichlorofluoromethane (Freon 11)	75-69-4	5	NE	NE	790,000	3,400,000 (sat)	See note 2	No	790,000	No
	Vinyl chloride	75-01-4	5	NE	NE	60	1,700	See note 2	No	60	No
	Xylenes, total	1330-20-7	15	NE	NE	630,000 (sat)	2,700,000 (sat)	See note 2	No	630,000	No

Notes:

All soil samples are reported in dry weight unless otherwise specified.

[1] Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

[2] ECVs to be calculated as needed based on analytical results from Part A Phase 1 soil sampling.

QAPP RL = quality assurance procedures plan reporting limit

DTSC CHHSL = California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)

µg/kg = micrograms per kilogram

SL = USEPA regional screening level, (USEPA, December 2009)

s1 = 1,3-dichloropropene is used as a surrogate

s2 = 1,2-dichloropropane is used as a surrogate

s3 = isoproylbenzene is used as a surrogate

s4 = bromodichloromethane is used as a surrogate

s5 = m-xylene is used as a surrogate

* = California modified preliminary remediation goal (USEPA, 2004)

x = indicates analytes from the Contract Laboratory Program Target Compound and Target Analyte Lists (TCL/TALs)

NE = regulatory standard not established

(sat) = concentration may exceed saturated value

^(sat) = preliminary remediation goal, (UPEPA 2004); saturation concentration, not a risk based value

^ = preliminary remediation goal, (UPEPA 2004)

USEPA = United States Environmental Protection Agency

TABLE 3-6

Soil Analyte Comparison Table - Pesticides – SW8081A

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL Residential (µg/kg)	DTSC CHHSL Commercial (µg/kg)	EPA Regional SL (December 2009) Residential (µg/kg)	EPA Regional SL (December 2009) Commercial (µg/kg)	Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
	4,4-DDD	72-54-8	4	2,300	9,000	2,000	7,200	2.1	Yes	2.1	Yes
	4,4-DDE	72-55-9	4	1,600	6,300	1,400	5,100	2.1	Yes	2.1	Yes
	4,4-DDT	50-29-3	4	1,600	6,300	1,700	7,000	2.1	Yes	2.1	Yes
	Aldrin	309-00-2	4	33	130	29	100	See note 2	No	33	No
	alpha-BHC	319-84-6	4	NE	NE	77	270	See note 2	No	77	No
s1	alpha-Chlordane	5103-71-9	4	430	1,700	1,600	6,500	470	No	430	No
	beta-BHC	319-85-7	4	NE	NE	270	960	See note 2	No	270	No
	delta-BHC	319-84-8	4	NE	NE	77	270	See note 2	No	77	No
	Dieldrin	60-57-1	4	35	130	30	110	5	No	5.0	No
s3	Endo sulfan I	959-98-8	4	NE	NE	370,000	3,700,000	See note 2	No	370,000	No
s3	Endo sulfan II	33213-65-9	4	NE	NE	370,000	3,700,000	See note 2	No	370,000	No
s3	Endosulfan sulfate	1031-07-8	4	NE	NE	370,000	3,700,000	See note 2	No	370,000	No
	Endrin	72-20-8	4	21,000	230,000	18,000	180,000	See note 2	No	21,000	No
s4	Endrin aldehyde	7421-93-4	4	21,000	230,000	18,000	180,000	See note 2	No	21,000	No
x s4	Endrin ketone	53494-70-5	4	21,000	230,000	18,000	180,000	See note 2	No	21,000	No
	gamma-BHC	58-89-9	4	500	2,000	520	2,100	See note 2	No	500	No
s1	gamma-Chlordane	5103-74-2	4	430	1,700	1,600	6,500	470	No	430	No
	Heptachlor	76-44-8	4	130	520	110	380	See note 2	No	130	No
	Heptachlor Epoxide	1024-57-3	4	NE	NE	53	190	See note 2	No	53	No
	Methoxy chlor	72-43-5	20	340,000	3,800,000	310,000	3,100,000	See note 2	No	340,000	No
	Toxaphene	8001-35-2	100	460	1,800	440	1,600	See note 2	No	460	No

Notes:

[1] Interim screening level is DTSC residential CHHSL. If CHHSL is not available, the USEPA residential regional screening level is used. If an ecological comparison value has been calculated, then the lowest between the ecological comparison value or the CHHSL/regional screening level is used.

[2] ECVs were calculated as needed for constituents detected during the Part A Phase 1 sampling.

QAPP RL = quality assurance procedures plan reporting limit
DTSC CHHSL = California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)
SL = USEPA regional screening level, (USEPA, December 2009)
µg/kg = micrograms per kilogram
x = indicates analytes from the Contract Laboratory Program Target Compound and Target Analyte Lists (TCL/TALs)
s1 = chlordane is used as a surrogate
s2 = alpha BHC is used as a surrogate
s3 = endolsulfan is used as a surrogate
s4 = endrin is used as a surrogate
NE = regulatory standard not established
USEPA = United States Environmental Protection Agency

TABLE 3-7

Soil Analyte Comparison Table - Polychlorinated Biphenyls - SW8082

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

	Analyte	CAS	QAPP RL (µg/kg)	DTSC CHHSL		EPA Regional SL (December 2009)		Soil Ecological Comparison Values (ECV) (ARCADIS, 2008) (µg/kg)	Does RL Exceed ECV Level?	Interim Screening Level [1] (µg/kg)	Does RL Exceed Screening Level?
				Residential (µg/kg)	Commercial (µg/kg)	Residential (µg/kg)	Commercial (µg/kg)				
	Aroclor 1016	12674-11-2	50	89	300	3,900	21,000	See note 2	No	3900	No
	Aroclor 1221	11104-28-2	50	89	300	140	540	See note 2	No	140	No
	Aroclor 1232	11141-16-5	50	89	300	140	540	See note 2	No	140	No
	Aroclor 1242	53469-21-9	50	89	300	220	740	See note 2	No	220	No
	Aroclor 1248	12672-29-6	50	89	300	220	740	See note 2	No	220	No
	Aroclor 1254	11097-69-1	50	89	300	220	740	See note 2	No	220	No
	Aroclor 1260	11096-82-5	50	89	300	220	740	See note 2	No	220	No
x s	Aroclor 1262	37324-23-5	50	89	300	220	740	See note 2	No	220	No
x s	Aroclor 1268	11100-14-4	50	89	300	220	740	See note 2	No	220	No
	Total PCBs	PCBT	50	NE	NE	NE	NE	204	No	204	No

Notes:

[1] Interim screening level is the USEPA residential regional screening level.

[2] ECVs to be calculated as needed based on analytical results from Part A Phase 1 soil sampling.

QAPP RL = quality assurance procedures plan reporting limit

DTSC CHHSL = California Department of Toxic Substances Control; California human health screening levels (OEHHA, 2005)

SL = USEPA regional screening level, (USEPA, December 2009)

µg/kg = micrograms per kilogram

NE = not established

s = PCB 1260 is used as a surrogate

x = indicates analytes from the Contract Laboratory Program Target Compound and Target Analyte Lists (TCL/TALs)

TABLE 3-8

Soil Analyte Comparison Table - Total Petroleum Hydrocarbons - SW8015M

Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, PG&E Topock Compressor Station, Needles, California

Analyte	CAS	QAPP RL (mg/kg)	RWQCB ESL (mg/kg)	Interim Screening Level [1] (mg/kg)	Does RL Exceed Screening Level?
TPH as diesel	NA	10	540	540	No
TPH as gasoline	NA	1	540	540	No
TPH as motor oil	NA	10	1,800	1,800	No

Notes:

[1] Interim screening level is the Regional Water Quality Control Board environmental screening level.

QAPP RL = quality assurance procedures plan reporting limit

RWQCB ESL = "San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels, Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27, 2008

mg/kg = milligrams per kilogram

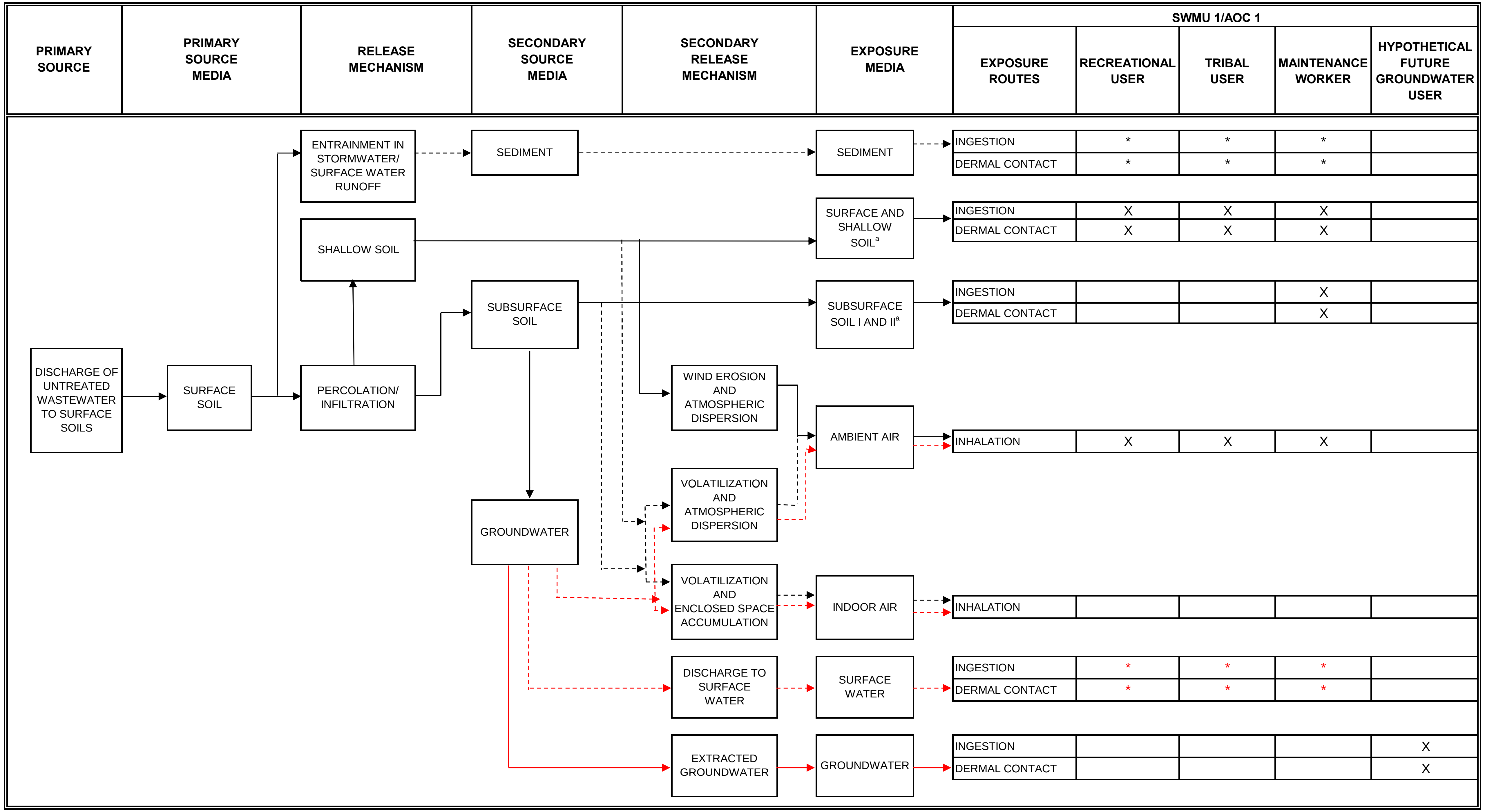
TPH = total petroleum hydrocarbons

FIGURE 3-1

UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR BAT CAVE WASH: RECREATIONAL, TRIBAL, AND WORKER USES

PACIFIC GAS AND ELECTRIC COMPANY

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009).

[a] For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).

(solid black arrow) Potentially complete transport pathway to be included in the quantitative soil risk assessment.

(dashed black arrow) Potentially complete transport pathway to be further evaluated in the soil risk assessment.

(solid red arrow) Quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a); Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

(dashed red arrow) Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a).

X Potentially complete exposure route to be included in the quantitative soil risk assessment; quantitative evaluation of groundwater exposure route completed in the GWRA (ARCADIS, 2009a).

* Potentially complete exposure route to be further evaluated in the soil risk assessment.

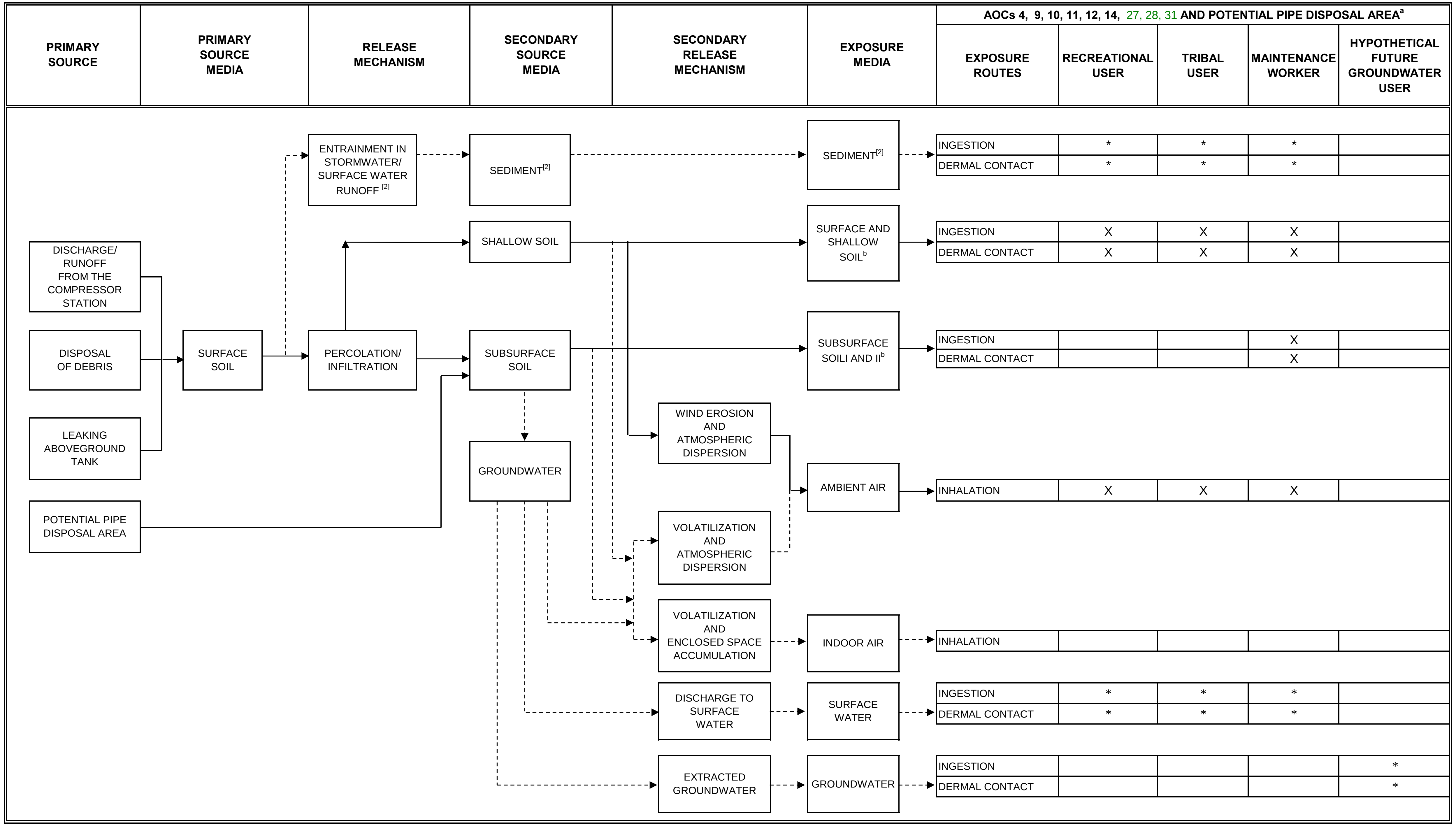
* (red) Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).

FIGURE 3-2

UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR AOCS 4, 9, 10, 11, 12, 14, 27, 28, 31and POTENTIAL PIPELINE DISPOSAL AREA (OUTSIDE THE COMPRESSOR STATION) [a]

PACIFIC GAS AND ELECTRIC COMPANY

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



EXPOSURE MEDIA	EXPOSURE ROUTES	RECREATIONAL USER	TRIBAL USER	MAINTENANCE WORKER	HYPOTHETICAL FUTURE GROUNDWATER USER
SEDIMENT[2]	INGESTION	*	*	*	
	DERMAL CONTACT	*	*	*	
SURFACE AND SHALLOW SOIL[b]	INGESTION	X	X	X	
	DERMAL CONTACT	X	X	X	
SUBSURFACE SOILI AND II[b]	INGESTION			X	
	DERMAL CONTACT			X	
AMBIENT AIR	INHALATION	X	X	X	
INDOOR AIR	INHALATION				
SURFACE WATER	INGESTION	*	*	*	
	DERMAL CONTACT	*	*	*	
GROUNDWATER	INGESTION				*
	DERMAL CONTACT				*

NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009a).

[2] Applicable to AOC 10 only.

a The Former 300B Pipeline Liquids Tank Area outside the compressor station has already been closed (CH2M HILL, 2007), but DTSC has requested additional investigation (CalEPA, 2007). If complete pathways are identified based on the results, the Former 300B Pipeline Liquids Tank Area will also be included in the Human Health Risk Assessment (HHRA).

b For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).

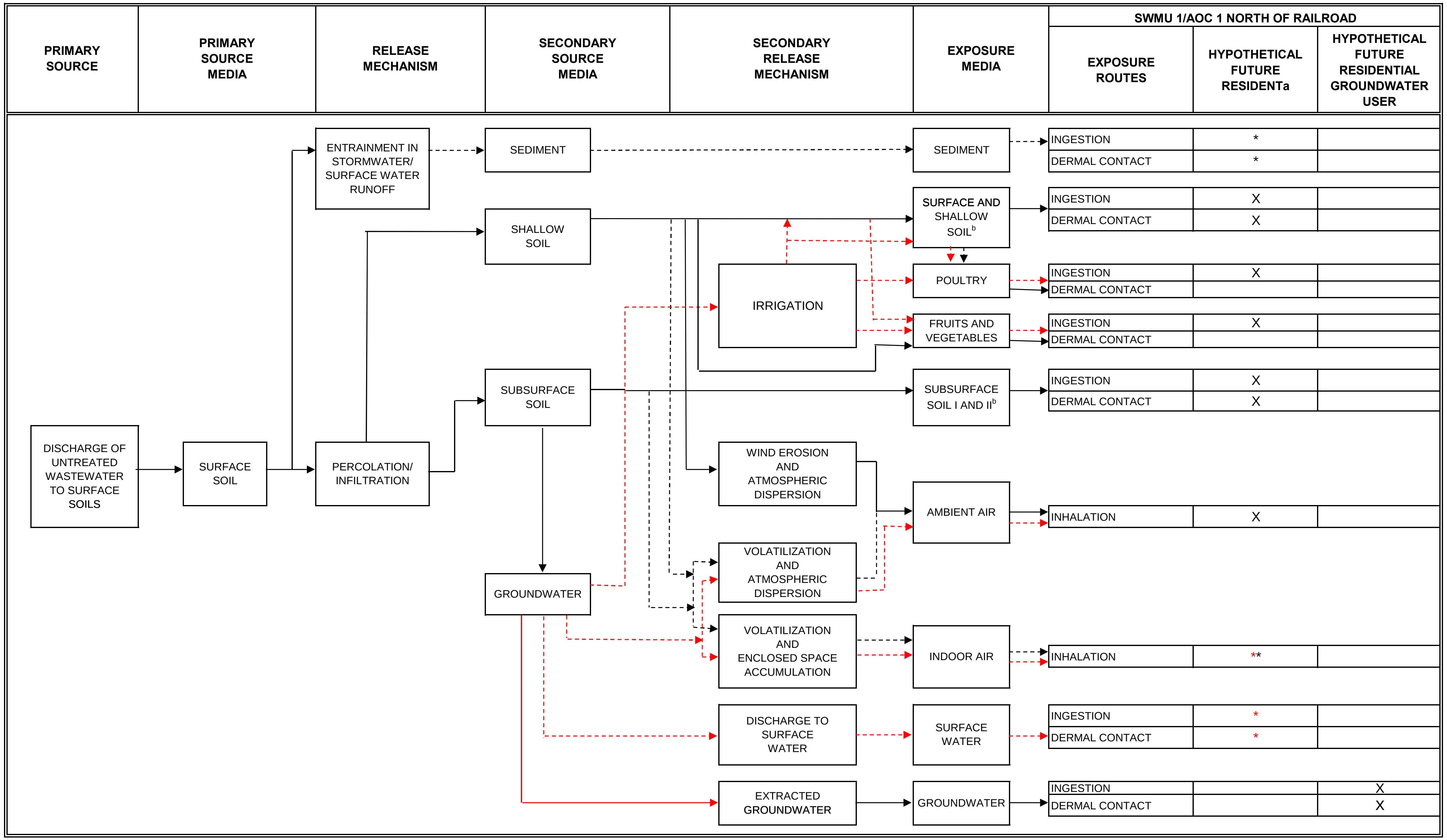
——▶ Potentially complete transport pathway to be included in the quantitative risk assessment.

- - - -▶ Potentially complete transport pathway to be further evaluated in the risk assessment; Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

X Potentially complete exposure route to be included in the quantitative risk assessment.

* Potentially complete exposure route to be further evaluated in the risk assessment.

FIGURE 3-3
UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR BAT CAVE WASH:
HYPOTHETICAL FUTURE RESIDENTIAL USE NORTH OF RAILROAD
PACIFIC GAS AND ELECTRIC COMPANY
HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN

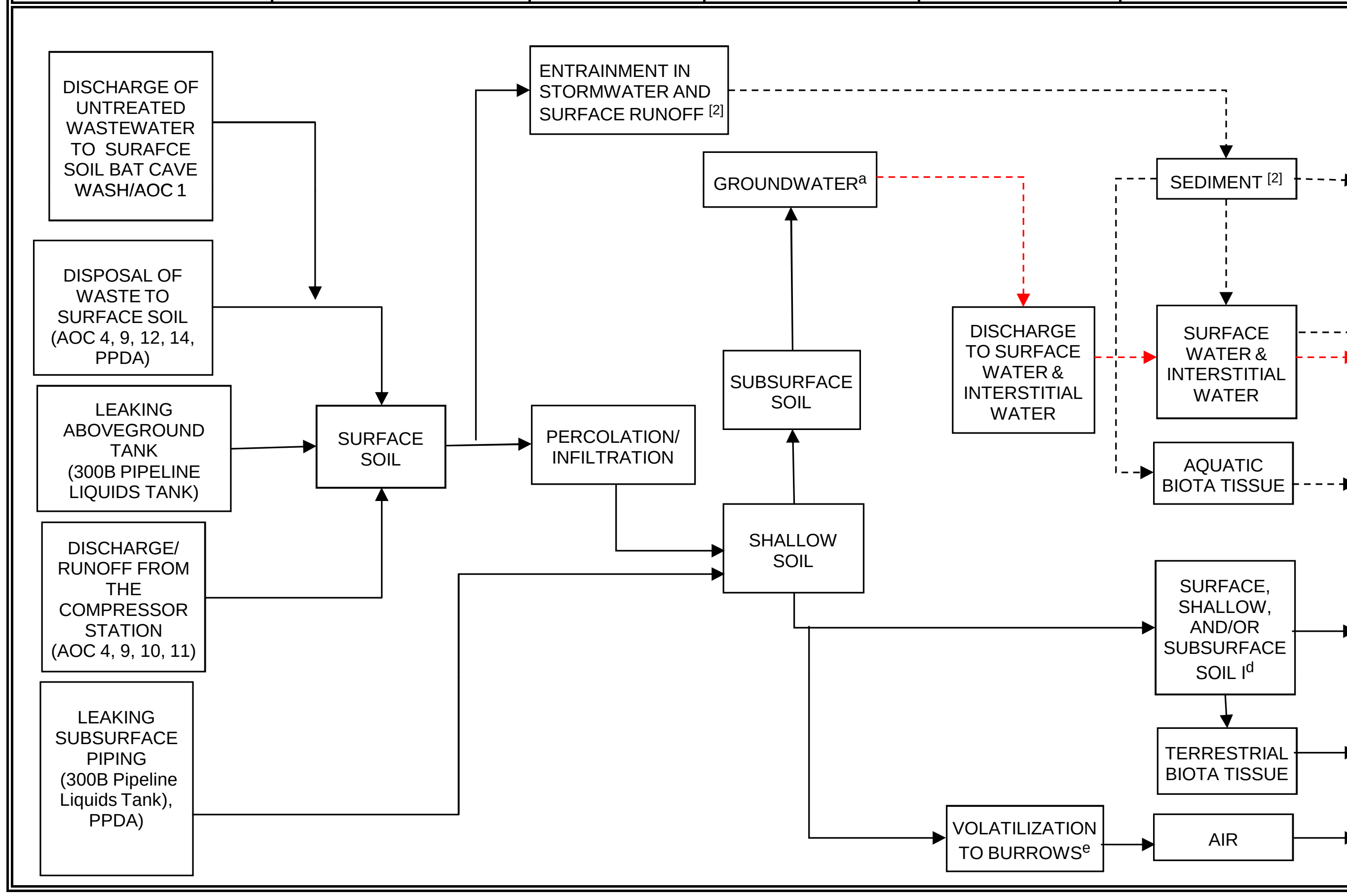


NOTES:

[1]	Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS,
a	As described in the text, the U.S. Bureau of Land Management (USBLM) has requested that the risk assessment assume future unrestricted use of their property. Accordingly, a future hypothetical residential scenario for contact with soils will be evaluated for property owned by USBLM.
b	For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).
——▶	Potentially complete transport pathway to be included in the quantitative soil risk assessment.
- - -▶	Potentially complete transport pathway to be evaluated qualitatively in the soil risk assessment.
——▶ (red)	Quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a); Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.
- - -▶ (red)	Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a).
X	Potentially complete exposure route to be included in the quantitative soil risk assessment; quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a).
*	Potentially complete exposure route to be further evaluated in the soil risk assessment.
* (red)	Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).

FIGURE 3-4
UPDATED[1] ECOLOGICAL CONCEPTUAL SITE MODEL
PACIFIC GAS AND ELECTRIC COMPANY
HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN

PRIMARY SOURCE	PRIMARY SOURCE MEDIA	RELEASE MECHANISM	SECONDARY SOURCE MEDIA	SECONDARY RELEASE MECHANISM	EXPOSURE MEDIA



EXPOSURE MEDIA	EXPOSURE ROUTES	AOCs 1, 4, 9, 10, 11, 12, 14, 27, 28, 31 AND POTENTIAL PIPE DISPOSAL AREA[a,b]					
		PLANTS	INVERTEBRATES	FISH	REPTILES/ AMPHIBIANS	BIRDS	MAMMALS
SEDIMENT [2]	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	*	*	*	*	*	*
	INGESTION		*	*	*	*	*
SURFACE WATER & INTERSTITIAL WATER	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	**	**	**	**	**	**
	INGESTION		**	**	**	**	**
AQUATIC BIOTA TISSUE	INGESTION			*	*	*	*
SURFACE, SHALLOW, AND/OR SUBSURFACE SOIL I[d]	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	X	X		O	O	O
	INGESTION		X		O	X	X
TERRESTRIAL BIOTA TISSUE	INGESTION				O	X	X
AIR	INHALATION				O[c]		O[c]

NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009a).

[2] Applicable to AOC 1 and AOC 10 only.

a As requested by California's Department of Toxic Substances Control (DTSC), the groundwater-to-phreatophytes pathway and consumption of phreatophytes by herbivores were evaluated in the GWRA (ARCADIS, 2009a) and exposure and risk were found to be insignificant.

→ (solid arrow) Potentially complete exposure pathway

→ (dashed arrow) Soil/sediment potential pathway under evaluation (separate assessment)

→ (red dashed arrow) Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a). Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

* Soil/sediment exposure route under evaluation (separate assessment)

* (red) Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).

X Potentially complete exposure route

O Potentially complete exposure route not significant or not directly assessed

AOC Area of concern

PPDA Potential Pipeline Disposal Area

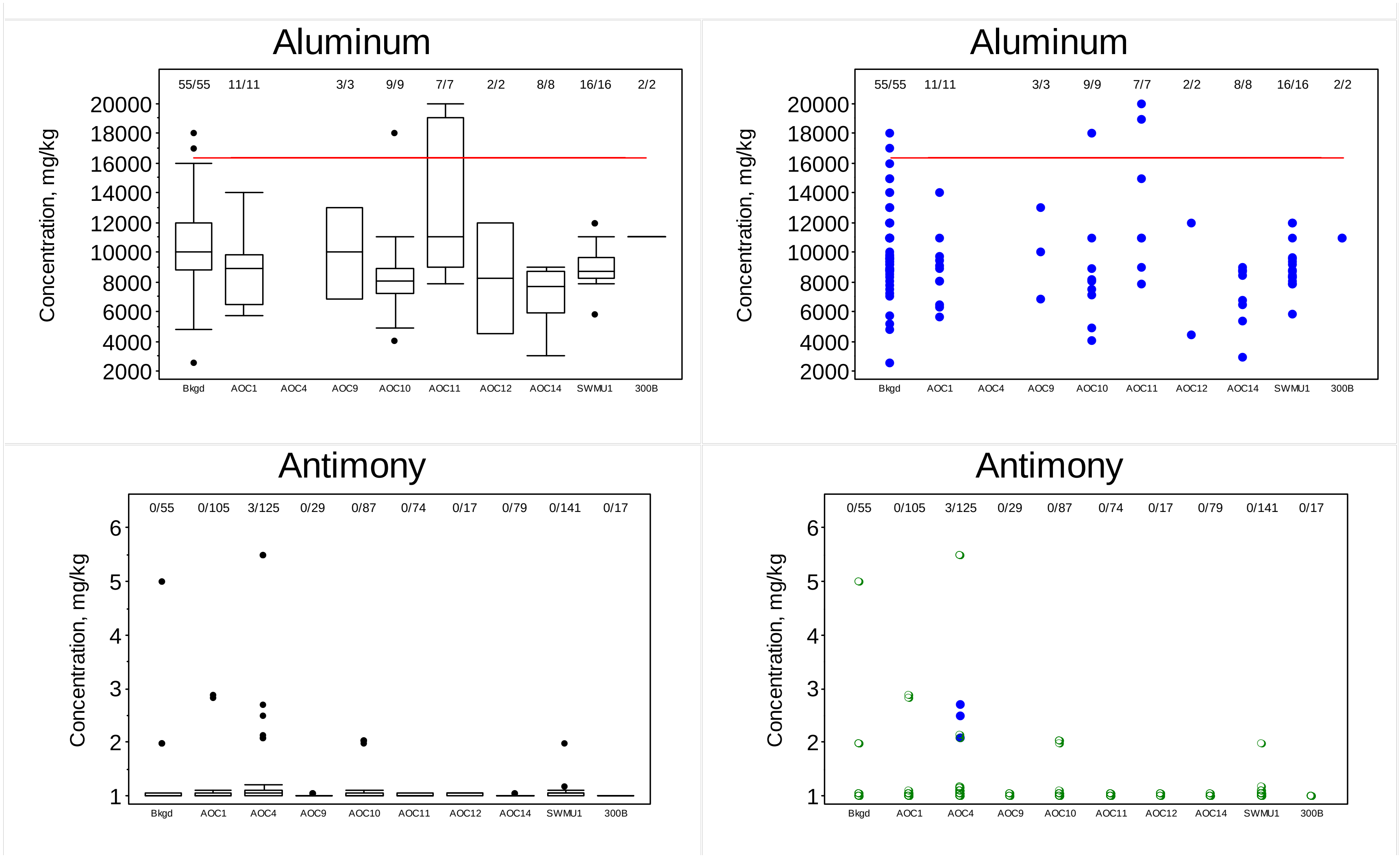
a. The Former 300B Pipeline Liquids Tank area has already been closed (CH2M HILL, 2007), but DTSC has requested additional investigation (CalEPA, 2007). If complete pathways are identified based on the results, the Former 300B Pipeline Liquids Tank area will be included in the Ecological Risk Assessment (ERA).

b. For the large home range ecological receptors, two exposure areas will be evaluated: (i) BCW (AOC 1) and AOC 4 and (ii) all other remaining AOCs outside the compressor station (AOCs 9, 10, 11, 12, 14, Potential Pipeline Disposal Area).
For small home range ecological receptors, the Potential Pipeline Disposal Area and each AOC outside the compressor station (AOCs 4, 9, 10, 11, 12, 14) will be evaluated as separate exposure areas (See Section 3 of the RAWP; ARCADIS, 2008).
All exposure pathways inside the compressor station are considered incomplete and will not be evaluated for ecological receptors.

c. Potential inhalation exposure in burrows was included for the Former 300B Pipeline Liquids Tank area only based on the potential presence of volatile organic compounds (VOCs).

d. For applicable soil exposure depth, please see Fig 3-1 in the RAWP Addendum (ARCADIS, 2009b).

e. Applicable soil depth is 0-6 feet below ground surface (bgs) for volatilization to burrow air.



LEGEND

AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

Detected value
Non-detected value
Identified outliers
Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

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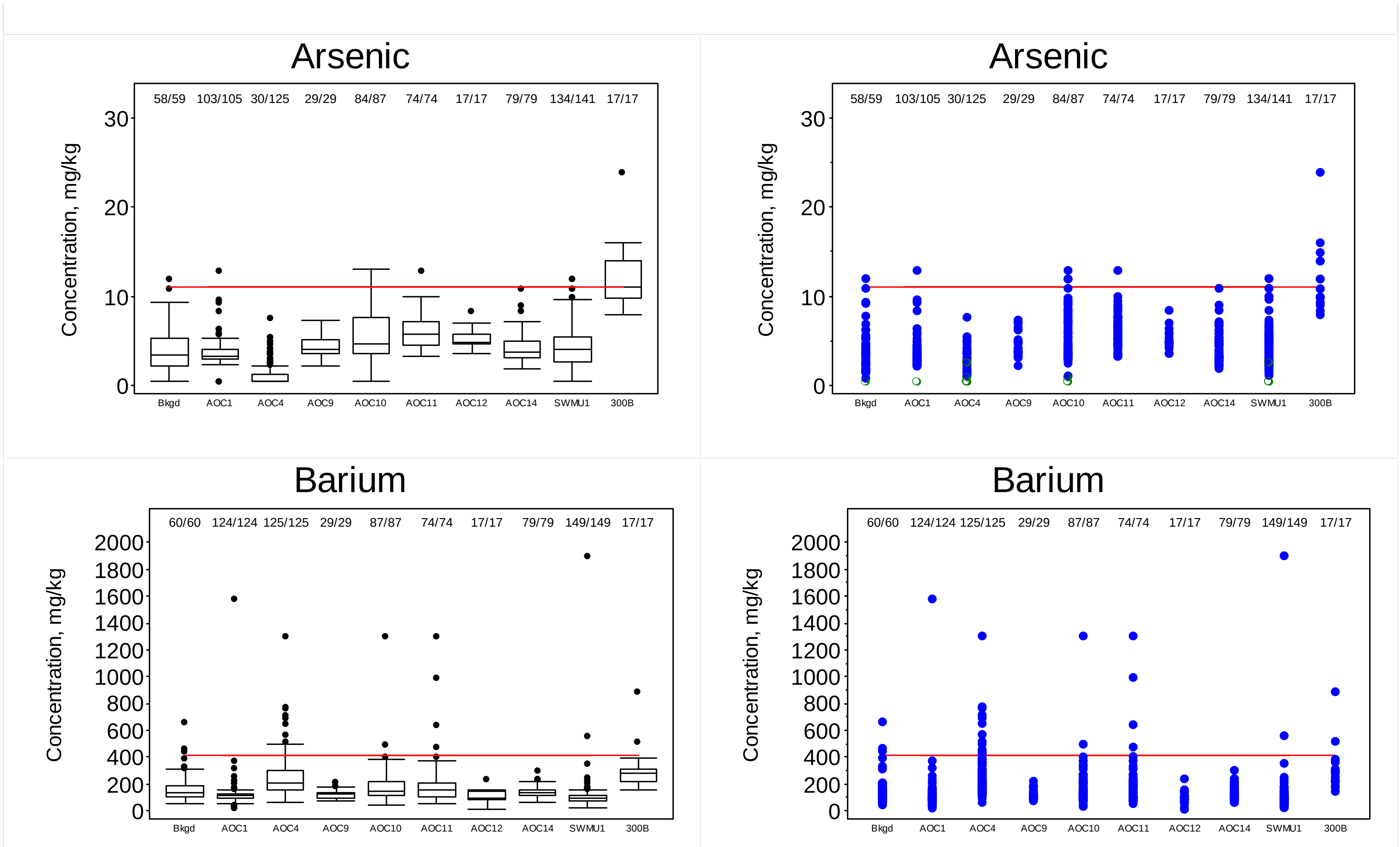


LEGEND

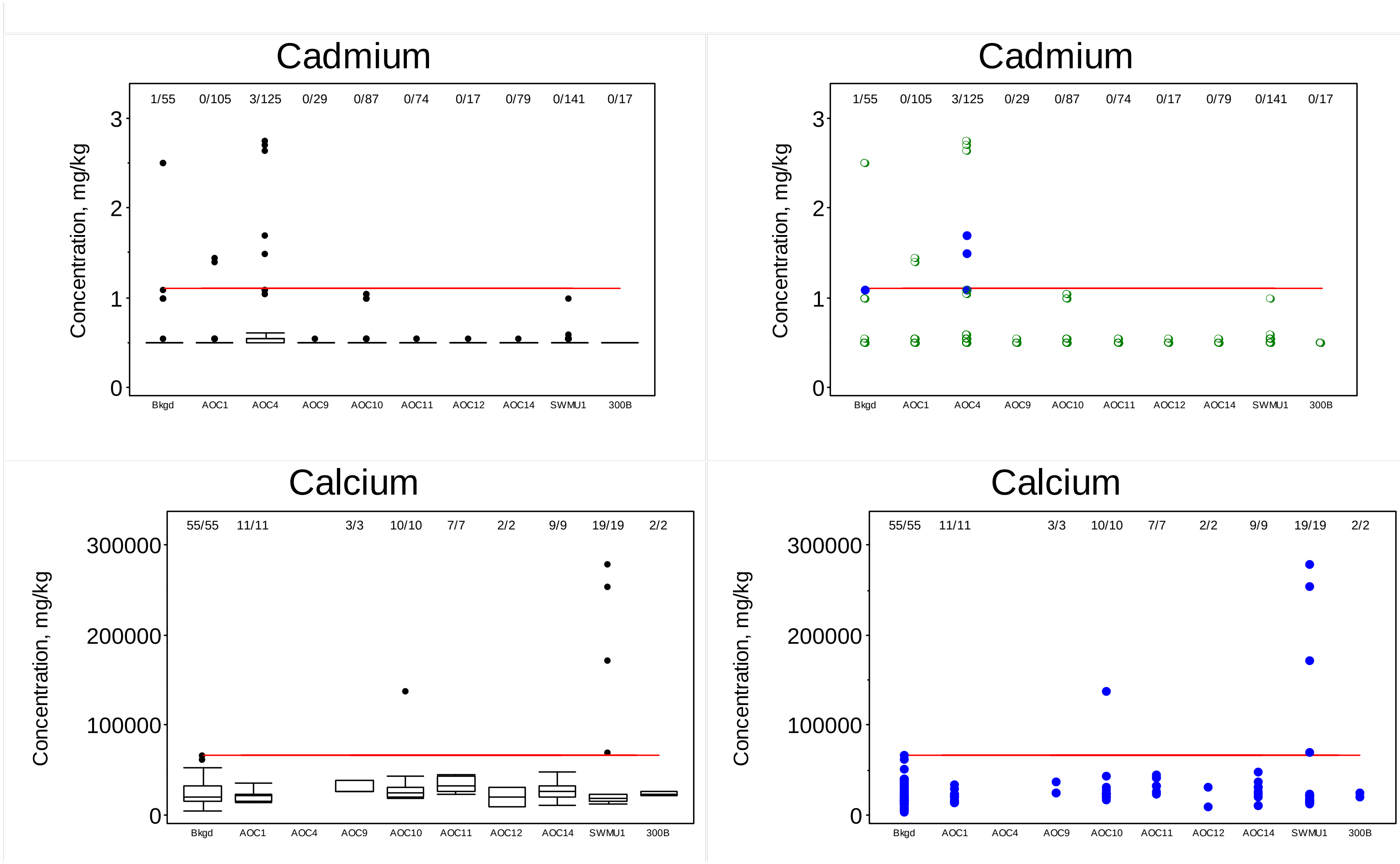
AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

- Detected value
- Non-detected value
- Identified outliers
- Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL.

ES122008001BAO_topock_soil_ScatterPlots_MAY2011.indd_050311_lho



LEGEND

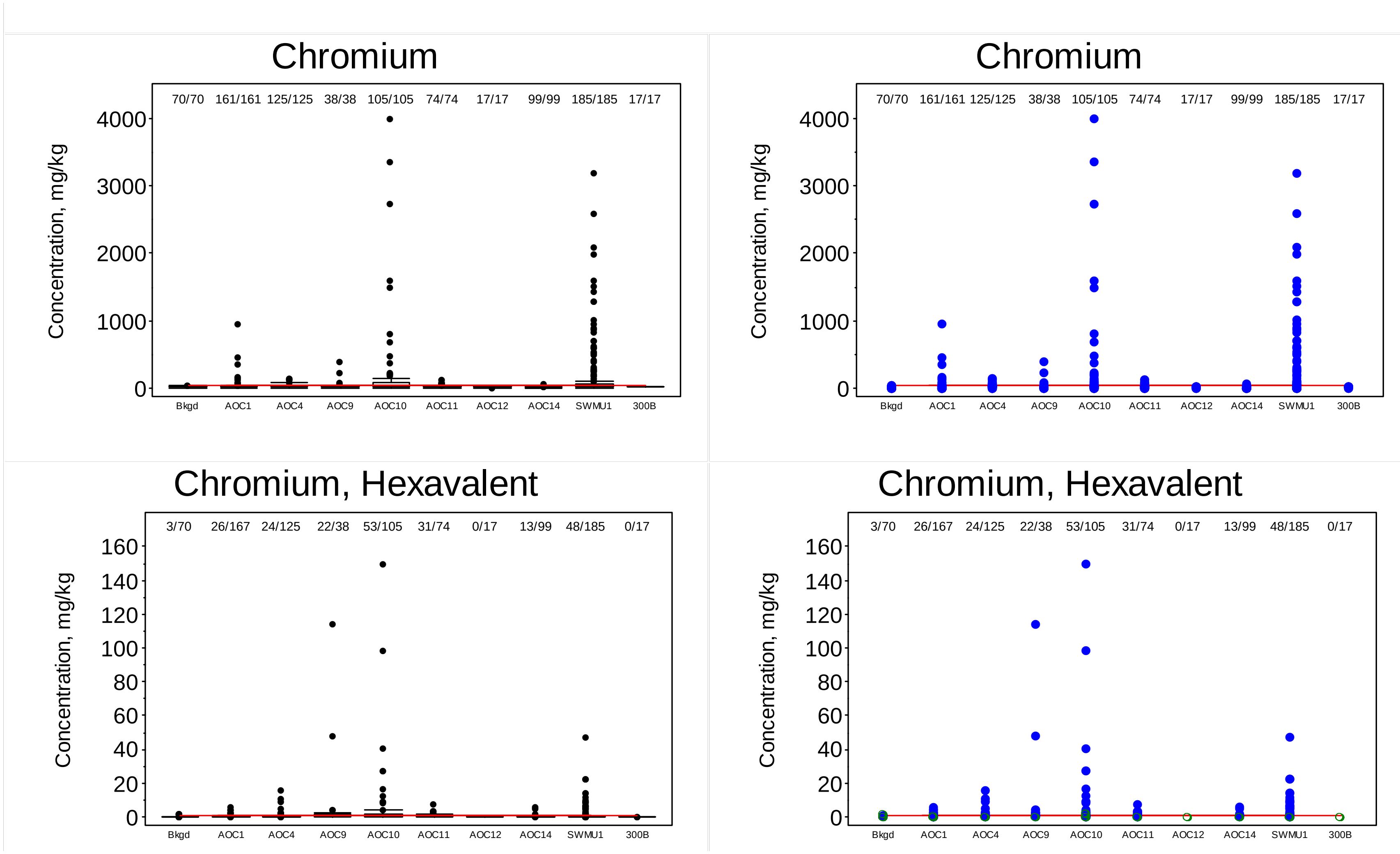
AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

Detected value
Non-detected value
Identified outliers
Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

ES122008001BAO_topock_soil_ScatterPlots_MAY2011.indd_050311_lho



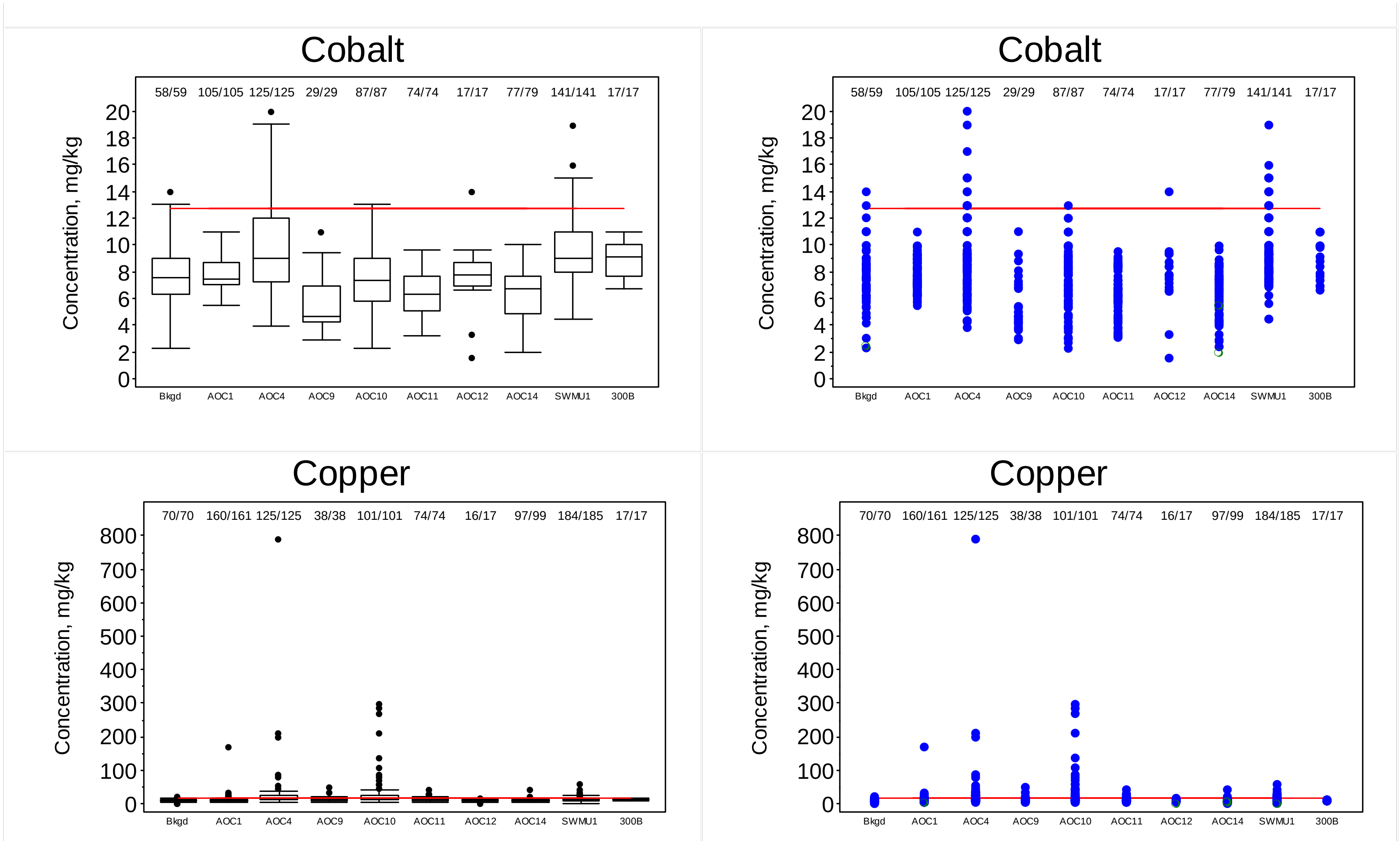
LEGEND

AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

Detected value
Non-detected value
Identified outliers
Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL



LEGEND

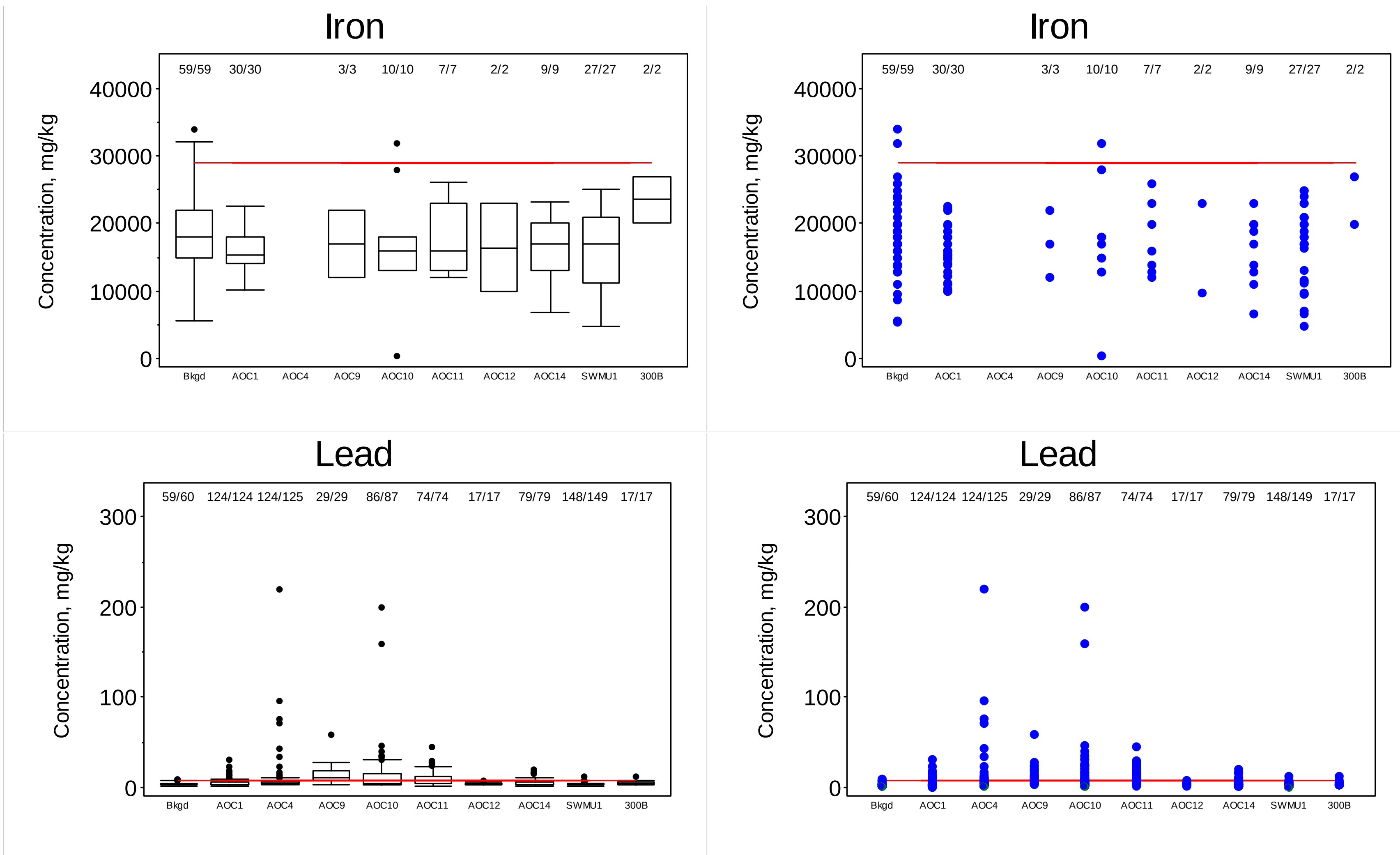
AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

- Detected value
- Non-detected value
- Identified outliers
- Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL®

ES122008001BAO_topock_soil_ScatterPlots_MAY2011.indd_050311_lho



LEGEND

AOC = Area of Concern
Bkgd = Background
SWMU = Solid Waste Management Unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram

Detected value
Non-detected value
Identified outliers
Background threshold value (when defined)

FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE
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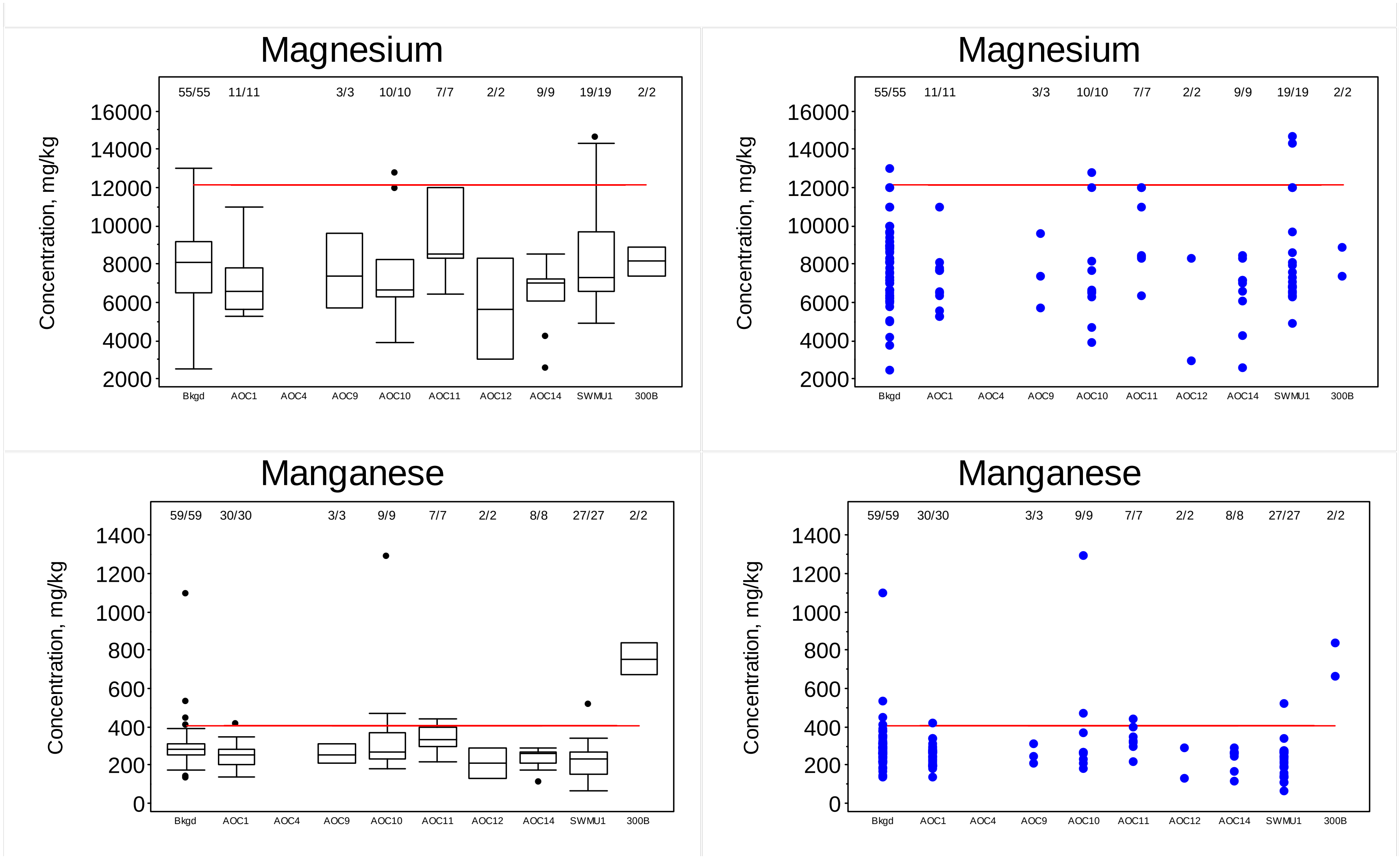
CH2MHILL.



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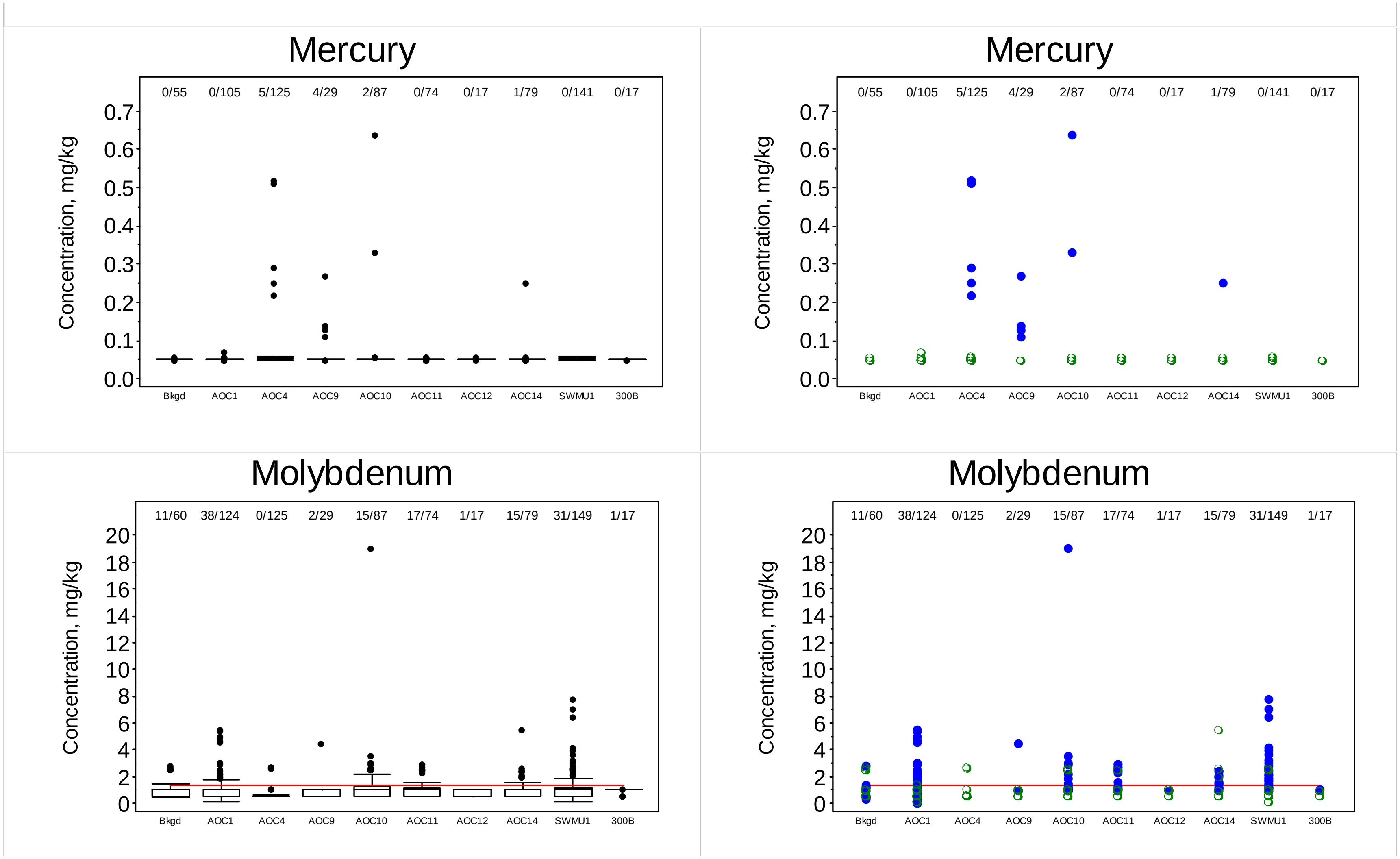

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FIGURE 3-5
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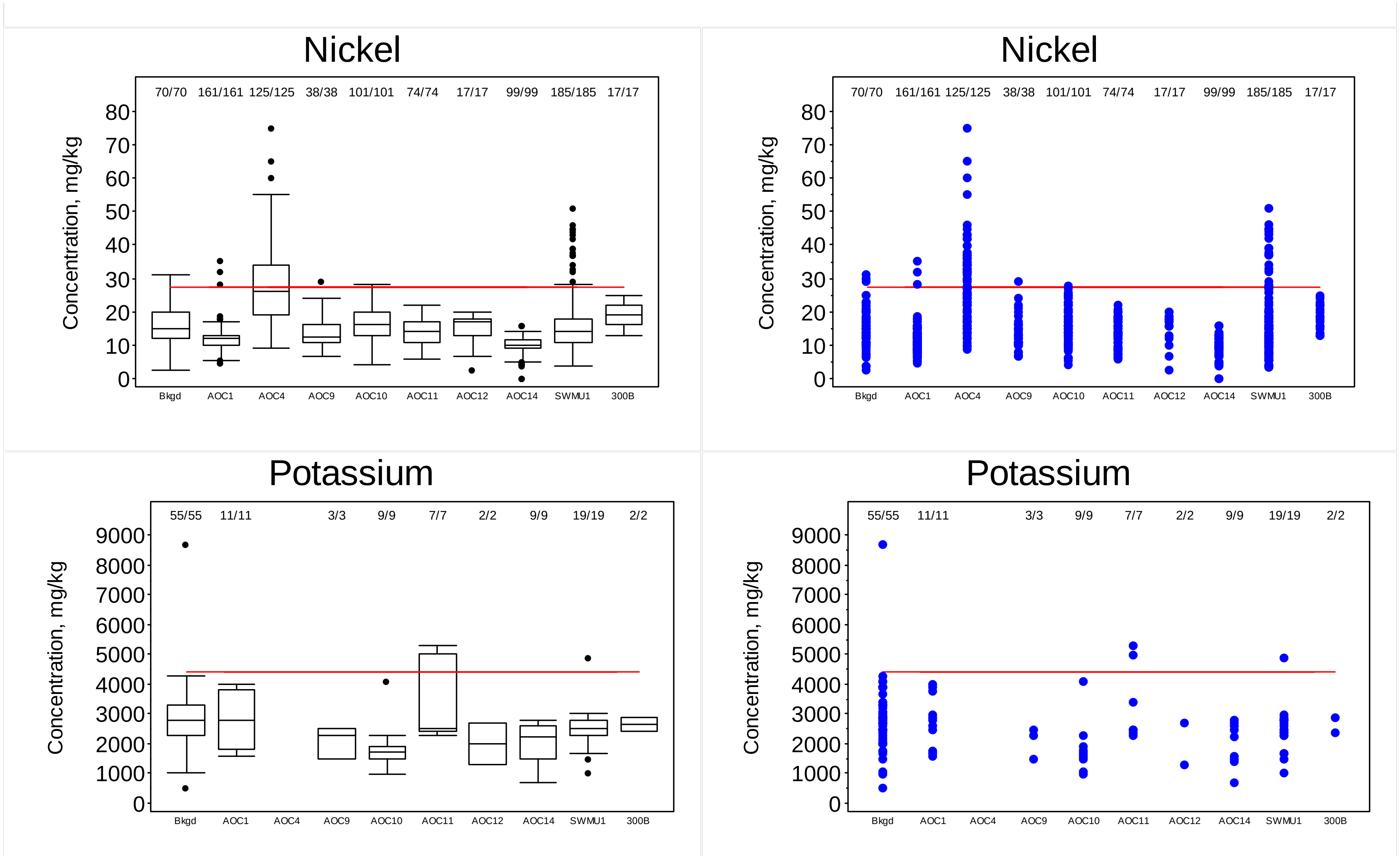

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FIGURE 3-5
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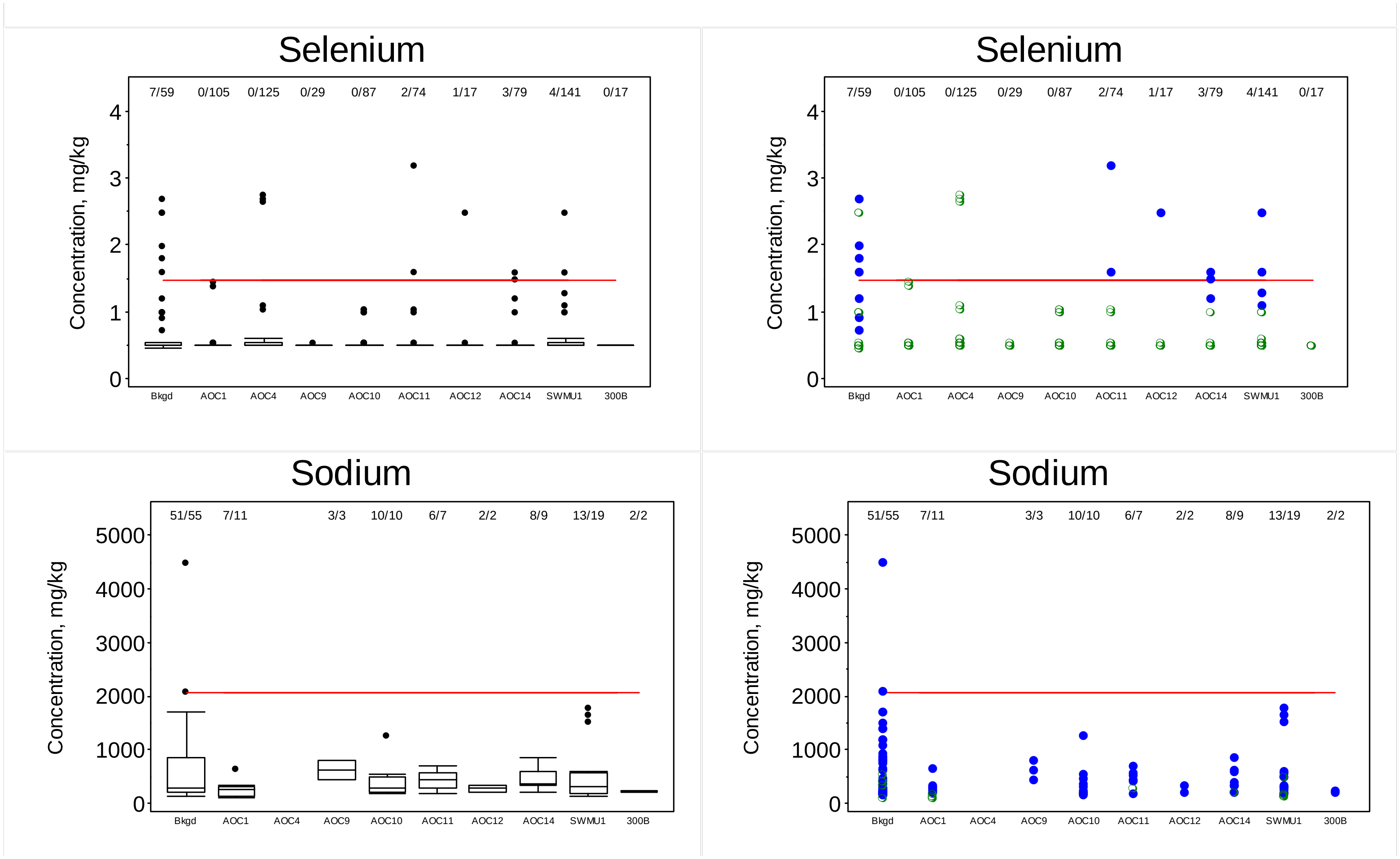

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FIGURE 3-5
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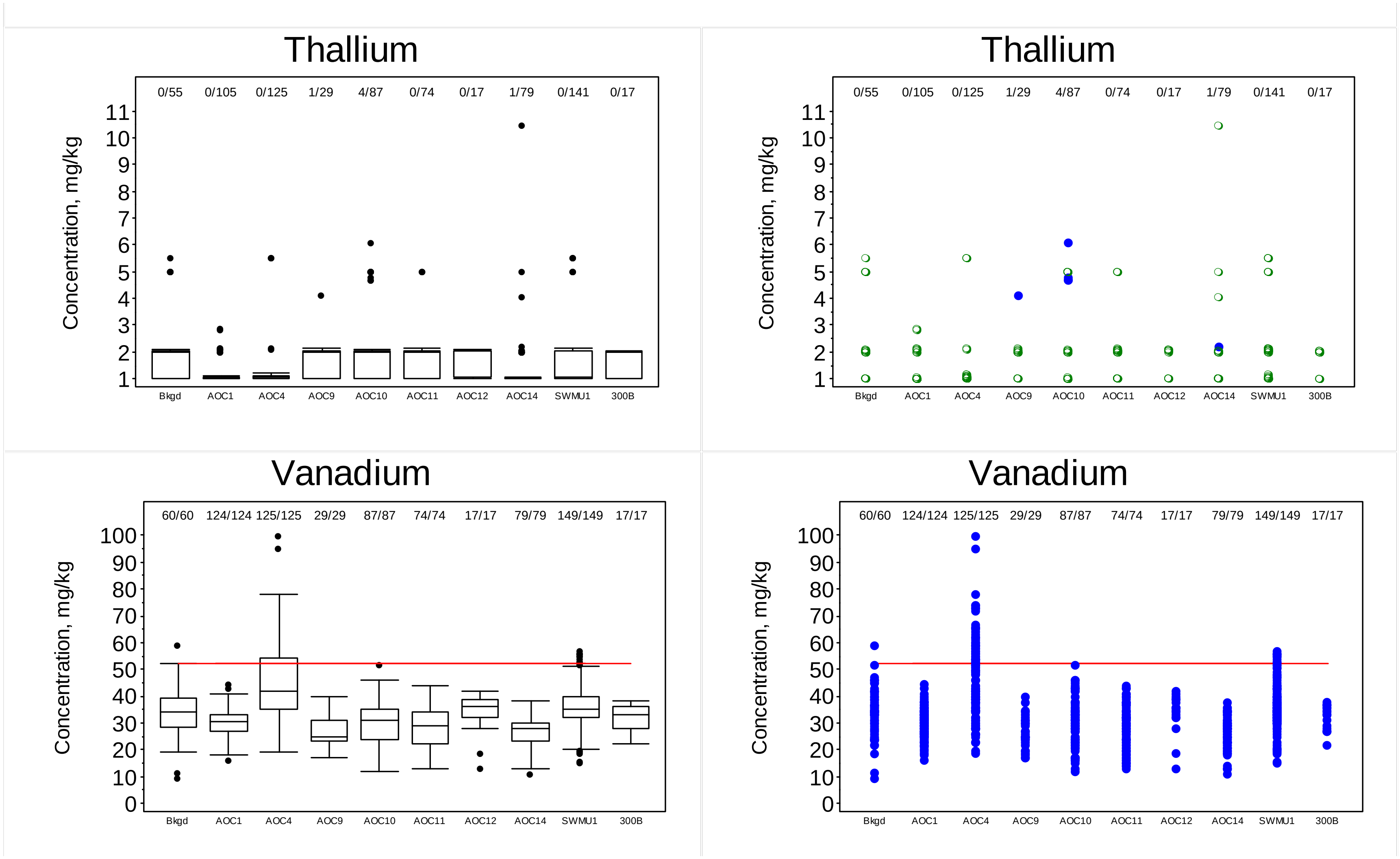

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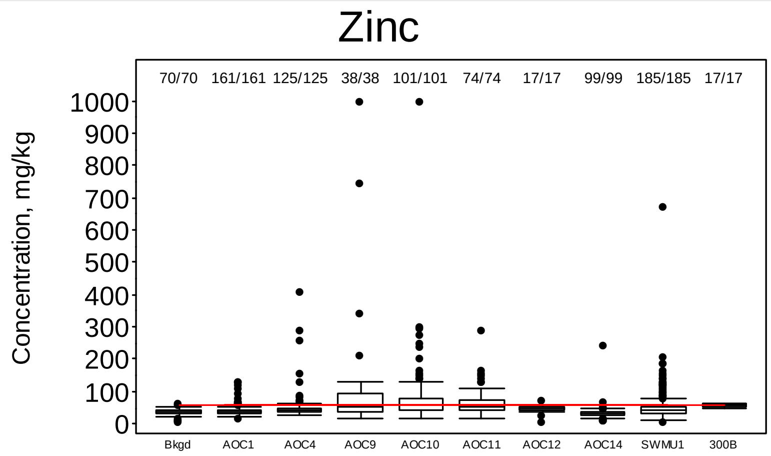
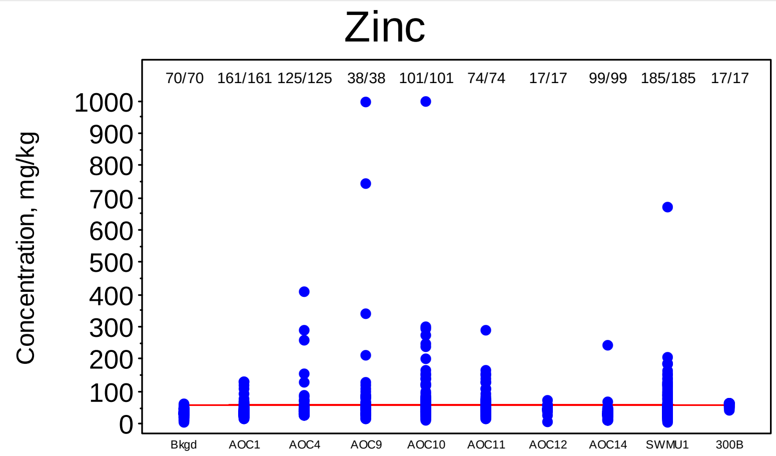
FIGURE 3-5
CENTRAL TENDENCY COMPARISON BOX AND WHISKER / SCATTER PLOTS BY SITE

SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
AT THE PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

ES122008001BAO_topock_soil_ScatterPlots_MAY2011.indd_050311_lho





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4.0 Decision 2 – Data Sufficiency to Estimate Representative Exposure Point Concentrations

This section presents the process used to evaluate Decision 2 – Data Sufficiency to Calculate Exposure Point Concentrations at the Part A SWMU, AOCs, and UAs. Results of the Decision 2 – Data Sufficiency to Calculate Exposure Point Concentrations by individual unit, including proposed Phase 2 sample locations, if recommended, are provided in the Appendix C sub-appendices.

4.1 Inputs to Decision 2

The inputs required for Decision 2 include COPC/ and COPEC concentrations in soil within the exposure areas and depth categories defined in the RAWP (ARCADIS, 2008a). In addition, COPEC concentrations in sediment were evaluated using the following preliminary ecological exposure intervals: 0 to 0.5 foot below sediment surface (bss), 0 to 2 feet bss, and 0 to 3 feet bss. Only COPC and COPEC data meeting data quality Category 1 standards will be used for the risk assessment. A Data Usability Matrix for Soil Risk Assessment was developed to aid in evaluating data usability and adequacy for risk assessment purposes and was used as a Decision 2 input tool (the matrix is provided in the Soil Part A DQO Tech Memo Appendix A, Table A-1). The matrix lists the total number of existing and newly collected samples per AOC and sub-AOC areas, identifying horizontal and vertical coverage, exposure depths as defined in the RAWP, analytical suites, data quality, representativeness, and comparability. The inputs to Decision 2 also include comparison values described in Section 3.1.3.

The data summarized in this Table are the minimum number of samples anticipated to be available if Phase 2 sampling proceeds as planned. Decision 2 was evaluated using the data tally summarized here. Additional data not currently included in this tally are also being collected. Those locations are not associated with a particular AOC, or the samples are isolated and spread out. Data from these special sample categories will be evaluated for inclusion in the risk assessment, and association with appropriate exposure areas for both human and ecological receptors. Categories for special sample locations include: Perimeter Samples, Storm Drain Samples, East Ravine porewater and sediment samples, AOC 28 (4 isolated locations), and AOC 31(a single location also along the fence line perimeter).

AOC 27 is a new area included in this Data Usability Matrix (Table 4-1, formerly A-1 in the Soil Part A DQO Tech Memo). The planned sampling as initially proposed has only 8 sampling locations for each exposure interval. Therefore, the data are identified as not adequate for estimating EPCs. However, the plan for this AOC is to also collect additional sampling from additional exploratory locations that are not yet identified. Once these additional samples are collected, it is likely that the data will include at least 10 samples for each exposure interval, and will therefore be adequate for estimating EPCs.

The Tamarisk Thicket north of the railroad near the mouth of BCW is also a new sampling area. This group of samples is a sub area of AOC 1- Upland BCW. These data are described as a separate area for now, since part of the sampling objective is to determine if this area has served as a sediment sink, and may comprise a hot spot. In the event the data do not appear to be a hot spot, these data will likely be incorporated into either the Riparian area, or the hypothetical residential area as appropriate for their location and the soil/sediment conditions.

The data usability matrix will be updated again in the risk assessment after the completion of Phase 2 sampling and analysis. The spatial coverage of the sampling over an entire exposure unit can be reviewed, and any biases (for example, more intensive sampling of certain AOCs) can be noted in the risk assessment along with an explanation of why that is the case and the implications it has for the risk estimates. Frequency of detection can also be used in the selection process for COPCs// chemicals of potential ecological concern (COPECs). The selection process for COPCs/COPECs and estimates for EPCs will also consider uncertainties associated with the variability in analytes for different sample locations in the data set, and spatial coverage for those analytes. PG&E acknowledges that DOI, DTSC, and stakeholders will need to work through a process on the grouping of data, data comparability, and representativeness for the risk assessment. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda.

Additionally, the RAWP (ARCADIS, 2008a) and RAWP Addendum (ARCADIS, 2009a) provide examples of how hot spot evaluations can be conducted for the site. A thorough description of the Thiessen polygon spatial weighting technique, along with literature references, was provided to the agencies as an attachment to the November 6, 2008 meeting notes and is also included, along with discussion of other spatial assessment techniques, as Attachment 2 to this appendix of this revised Soil RFI/RI Work Plan.

4.2 Data Sufficiency to Estimate Representative Exposure Point Concentrations Evaluation

Existing soil and sediment data were evaluated for sufficiency to estimate a representative EPC by:

- Detected compound
- SWMU, AOCs, or UA
- Exposure depth interval

The evaluation assumes the existing data adequately represent the nature and extent of contamination; this assumption will be verified after Phase 2 data have been collected. Additional sampling was recommended if data were insufficient estimate a representative EPC for any constituent in any defined exposure interval at each unit. The technical approach used to evaluate the data to address Decision 2 is described below.

All soil Category 1 data were evaluated for each of the exposure intervals defined in the RAWP (ARCADIS, 2008a) and RAWP Addendum (ARCADIS, 2009a) for potential contact by both human populations and ecological receptors. In addition, as stated above, Category 1 data from sediment were evaluated using the following preliminary ecological exposure intervals: 0 to 0.5 foot bss, 0 to 2 feet bss, and 0 to 3 feet bss. The sediment exposure area defined for this evaluation extends from the east margin of the Tamarisk thicket near the mouth of Bat Cave Wash to the easternmost end of the wash. Samples from both the west and east side of National Trails Highway at the mouth of Bat Cave Wash were included. Data for each detected compound in each AOC-specific exposure interval were evaluated for:

- Frequency of detection.
- Maximum result.
- Number of detections above comparison values.
- Human health comparison values—residential criteria or background, whichever is higher.
- Soil ECVs previously submitted in technical memoranda (ARCADIS, 2008b, 2009a-b) or background, whichever is higher.
- Sediment TECs from MacDonald, et. al. (2000) or soil background (as a conservative estimate of sediment background) if sediment TECs are not available.

Frequency of detections and maximum results were evaluated to understand whether the minimum data necessary are available to calculate a representative EPC to be used in the human and ecological risk assessment. A representative EPC could be either: (1) a 95 percent upper confidence limit of the mean (95%UCL), where at least eight results were reported with a minimum of five detections, or (2) the maximum concentration reported, if data were not adequate for a 95%UCL and the following criteria were met:

- The maximum was less than or equal to approximately two times the comparison value for human health or ecological risk screening, and/or
- Additional data collection appeared unlikely to yield additional detections to support the calculation of a 95%UCL.

The Appendix C sub-appendices present data tables that summarize key information for each detected COPC/COPEC in each unit. For each detected COPC/COPEC, the tables in Appendix C indicate, for each relevant exposure depth interval, the total number of samples collected, the number of detections, the maximum detected value, and whether there is sufficient information to calculate a representative EPC for that particular COPC/COPEC at that particular unit.

The data that are available at this time, as represented by the sample counts presented in the data usability matrix, are the analytic data that were specifically used in the data gaps evaluation process to assess Decision 2. As described in detail in Appendix C, in general, the soil and sediment data for each COPC/COPEC detected at the individual units available at this time are adequate to support the calculation of an EPC for use in the human health and ecological risk assessment. Thus, the additional data to be collected during Phase 2 will only help bolster the estimation of EPCs. The data usability matrix will be updated again in the risk assessment after the completion of Phase 2 sampling and analysis. BAs mentioned in

Section 4.1, based on the discussions at the meeting on October 27, 2011 with DOI and subsequent discussion on August 15, 2012 with DOI, PG&E, DOI, DTSC, and stakeholders will work through a process on the grouping of data and assessing data comparability and representativeness. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda. As discussed, the goal is to initiate a meeting sooner rather than later, using the existing data for one or two chemicals, for one AOC, as a beta-test for how the data evaluation/grouping and quantitative EPC estimation process will work.

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Upland BCW for Current Conditions	HHRA and ERA: COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	102	35 locations completed previously 51 locations completed in Phase I sampling 16 locations proposed for Phase 2 sampling (includes SWMU 1 locations)	0 to 0.5 foot bgs: 87	23 samples collected previously 50 samples collected in Phase I sampling 14 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 87	23 samples collected previously 50 samples collected in Phase I sampling 14 samples proposed for Phase 2 sampling	Full suite at most locations except surface interval (0 to 0.5 feet bgs), which did not include VOCs or TPH- purgeable Phase 2 – hexavalent chromium, Title 22 metals, PCBs all locations; 6 locations with PAHs	Category 1 Data (excluded Category 3 data from 8 locations [DS-1 through DS-4 and PB-1 through PB-4]) Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Current and planned data appear sufficient to calculate EPCs for each exposure interval and each analyte.** The Phase I samples include sampling locations north of the railroad (BCW1 through BCW5), locations south of railroad, and locations from Banks and White Powdery areas. Phase 1 samples were not collected from 7 to 8 feet bgs at 7 locations and from 9 to 10 feet bgs at 4 locations because of refusal. The proposed Phase I sampling in the Part A Work Plan (CH2M HILL, 2006a) for 0.5 or 1 feet bgs sample was collected at 0 to 0.5 feet bgs at the start of native material when feasible. Vertical coverage of the samples previously collected assumes samples collected from the Banks were at the 0 to 0.5 feet bgs depth interval. If sampling depth interval was not specified in the Work Plan (CH2M HILL, 2006a), that sample was not included in the vertical coverage for any depth. Data for SWMU 1 are included in this exposure area for both Phase 1 and Phase 2. Phase 2 sampling planned to fill data gaps.
					0.5 to 3 feet bgs: 75	15 samples collected previously 50 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	0 to 3 feet bgs:162	38 samples collected previously 100 samples collected in Phase I sampling 24 samples proposed for Phase 2 sampling					
					>3 to 6 feet bgs: 73	14 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 235	52 samples collected previously 150 samples collected in Phase I sampling 33 samples proposed for Phase 2 sampling					
					>6 to 10 feet bgs: 77	18 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 312	70 samples collected previously 200 samples collected in Phase I sampling 42 samples proposed for Phase 2 sampling					
AOC-1: Upland BCW for the 2 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	82	19 locations completed previously 51 locations completed in Phase I sampling 12 locations proposed for Phase 2 sampling	Current 2 to 3 feet bgs: 75	15 samples collected previously 50 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	0 to 1 feet bgs post scour (current 2 to 3 feet bgs): 75	15 samples collected previously 50 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	Full suite	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Current and planned data appear to be sufficient to calculate EPCs for each exposure interval and each analyte.** This scenario assumes scouring of top 2 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. The Phase I samples include sampling locations north of the railroad (BCW1 through BCW5) and White Powdery areas. Data for SWMU 1 are included in this exposure area for both Phase 1 and Phase 2. Phase 2 sampling planned to fill data gaps.
					Current >3 to 6 feet bgs: 73	14 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 148	29 samples collected previously 100 samples collected in Phase I sampling 19 samples proposed for Phase 2 sampling					

TABLE 4-1
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					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1 (continued): Upland BCW for the 2 feet Scouring Scenario					Current >6 to 10 feet bgs: 77	18 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 225	47 samples collected previously 150 samples collected in Phase I sampling 28 samples proposed for Phase 2 sampling					
					HHRA scenario only. Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling 0 samples proposed for Phase 2 sampling	HHRA scenario only 0 to 10 feet bgs post scour (current > 2 to 12 feet bgs): 225	47 samples collected previously 150 samples collected in Phase I sampling 28 samples proposed for Phase 2 sampling					
AOC-1: Upland BCW for the 5 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	82	20 locations completed previously 51 locations completed in Phase I sampling 11 locations proposed for Phase 2 sampling	Current 5 to 6 feet bgs: 71	12 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 1 foot bgs post scour (current 5 to 6 feet bgs): 71	12 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	Full suite	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Current and planned data appear to be sufficient to calculate EPCs for each exposure interval and each analyte.** This scenario assumes scouring of top 5 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. The Phase I samples included sampling locations north of the railroad (BCW1 through BCW5) and White Powdery areas. Data for SWMU 1 are included in this exposure area for both Phase 1 and Phase 2. Phase 2 sampling planned to fill data gaps.
					Current > 6 to 10 feet bgs: 77	8 samples collected previously 50 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 148	30 samples collected previously 100 samples collected in Phase I sampling 18 samples proposed for Phase 2 sampling					
					Current >10 to 15 feet bgs: 19	2 samples collected previously 6 samples collected in Phase I sampling 11 samples proposed for Phase 2 sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 167	32 samples collected previously 106 samples collected in Phase I sampling 29 samples proposed for Phase 2 sampling					

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					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Riparian BCW	**HHRA and ERA:** Screening Pathway Analysis	Sediment	10	9 locations completed previously (SED 5 through 12 and SS-1) 1 location (BCW-6) completed in Phase I sampling; this sample was collected in a transitional environment between soil and sediment 0 proposed locations for Phase 2 sampling	0 to 0.5 foot bss: 2	1 sample collected previously 1 sample collected in Phase I sampling	0 to 0.5 foot bss: 2	1 sample collected previously 1 sample collected in Phase I sampling	Hexavalent chromium and Title 22 metals for all samples; limited samples with full suite analysis	Category 1 Data Meets requirements of the QAPP Background concentrations not available Data Validation: at least 10%	Data are limited for a predictive ecological risk assessment, but adequate for screening purposes for ERA and HHRA. Deep vertical coverage is good. All locations extend to at least 10 feet bss. Shallow horizontal coverage is limited; two samples from 0 to 0.5 foot bss.	Yes	**Data gaps evaluation determined data to be sufficient for risk assessment, no additional Phase 2 data recommended. Several metals and inorganics were infrequently detected, so additional data will not alter or improve the quality of the current data set.** It is not yet known how much of the area will be soil or if inundated sediment will also be present.
					0.5 to 3 feet bss: 9	8 samples collected previously 1 sample collected in Phase I sampling	0 to 3 feet bss: 11	9 samples collected previously 2 samples collected in Phase I sampling					
					3 to 6 feet bss: 0	0 samples collected previously 0 samples collected in Phase I sampling due to refusal	0 to 6 ft bss: 11	9 samples collected previously 2 samples collected in Phase I sampling					
					6 to 10 feet bss: 0	0 samples collected previously 0 samples proposed in Phase I sampling	0 to 10 feet bgs: 11	9 samples collected previously 2 samples collected in Phase I sampling					
Tamarisk Thicket Riparian area borders the north end of the thicket	**HHRA and ERA:** COPC Selection EPC calculations Pathway Analysis Hot Spot Analysis	Soil	23	0 locations completed previously 0 locations in Phase 1 23 proposed locations for Phase 2 sampling	0 to 0.5 foot bss: 23	0 samples collected previously 0 samples collected in Phase I sampling 23 samples proposed for Phase 2 sampling	0 to 0.5 foot bss: 23	0 samples collected previously 0 samples collected in Phase I sampling 23 samples proposed for Phase 2 sampling	Hexavalent chromium, Title 22 metals, and PAHs for all samples; 13 with PCBs, and 11 with pesticides and dioxins/furans	Category 1 Data Meets requirements of the QAPP Background concentrations not available Data Validation: at least 10%	Yes	Yes	**Planned data appear sufficient to estimate EPCs for each exposure interval and all analytes.** It is not yet known how much of the area will be soil or if inundated sediment will also be present.
					0.5 to 3 feet bss: 23	0 samples collected previously 0 samples collected in Phase I sampling 23 samples proposed for Phase 2 sampling	0 to 3 feet bss: 46	0 samples collected previously 0 samples collected in Phase I sampling 46 samples proposed for Phase 2 sampling					

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					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
Tamarisk Thicket (continued) Riparian area borders the north end of the thicket					3 to 6 feet bss: 23	0 samples collected previously 0 samples collected in Phase I sampling 23 samples proposed for Phase 2 sampling	0 to 6 ft bss: 69	0 samples collected previously 0 samples collected in Phase I sampling 69 samples proposed for Phase 2 sampling					
					6 to 10 feet bss: 23	0 samples collected previously 0 samples proposed in Phase I sampling 23 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 92	0 samples collected previously 0 samples collected in Phase I sampling 92 samples proposed for Phase 2 sampling					
North of AOC 1: USBLM Land north of the railroad Current conditions	**HHRA (residential):** COPC Selection EPC Calculations	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables	15	8 locations completed previously (SS-2, SS-7, SS-8, SSB-8, SSB-9, DS-3, DS-4, and MW-13) 5 locations completed in Phase I sampling (BCW-1 through BCW-5) 2 locations proposed for Phase 2 sampling (AOC1-T6d, AOC1-BCW7)	0 to 0.5 foot bgs: 12	5 samples collected previously 5 samples collected in Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 12	5 samples collected previously 5 samples collected in Phase I sampling 2 samples proposed for Phase 2 sampling	Full suite at most locations except surface interval (0 to 0.5 foot bgs), which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • Data Validation: at least 10%.	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for each exposure interval. Several metals and inorganics were infrequently detected, so additional data will not alter or improve the quality of the current data set. Shallow characterization is assumed to represent deeper characterization.** This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs in indoor air pathway. Did not collect Phase 1 samples from 5 to 6 feet bgs at two locations and from 9 to 10 feet bgs samples at two locations because of refusal. Phase 2 sampling planned to fill data gaps.
					0.5 to 3 feet bgs: 12	5 samples collected previously 5 samples collected in Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 24	10 samples collected previously 10 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling					
					3 to 6 feet bgs: 7	2 samples collected previously 3 samples collected in Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 31	12 samples collected previously 13 samples collected in Phase I sampling 6 samples proposed for Phase 2 sampling					
					6 to 10 feet bgs: 8	3 samples collected previously 3 samples collected in Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 39	15 samples collected previously 16 samples collected in Phase I sampling 8 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples	Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
North of AOC 1: USBLM Land north of the railroad for the 2 feet Scouring Scenario	**HHRA (residential):** COPC Selection EPC Calculations	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables	10	3 locations completed previously (SSB-8, SSB-9 and MW-13) 5 locations completed in the Phase I sampling (BCW-1 through BCW-5) 2 locations proposed for Phase 2 sampling (AOC1-T6d, AOC1-BCW7)	Current 2 to 3 feet bgs: 9	2 samples collected previously 5 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 1 foot bgs post scour (current 2 to 3 feet bgs): 9	2 samples collected previously 5 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	Full suite at most locations except surface interval (0 to 0.5 foot bgs), which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes Data Validation: at least 10%.	Yes for deeper soils but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Data gaps evaluation determined only two additional sampling locations required due to infrequently detected compounds. Data for shallow depths are considered representative of deeper soil.** This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs n indoor air pathway. Did not collect Phase 1 samples from 5 to 6 feet bgs at two locations and from 9 to 10 feet bgs samples at two locations because of refusal.
					Current >3 to 6 feet bgs: 8	2 samples collected previously 4 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 17	4 samples collected previously 9 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling					
					Current >6 to 10 feet bgs: 9	3 samples collected previously 4 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 26	7 samples collected previously 13 samples collected in the Phase I sampling 6 samples proposed for Phase 2 sampling					
					Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in the Phase I sampling 0 samples proposed for Phase 2 sampling	0 to 10 feet bgs post scour (current > 2 to 12 feet bgs): 26	7 samples collected previously 13 samples collected in the Phase I sampling 6 samples proposed for Phase 2 sampling					
North of AOC 1: USBLM Land north of the railroad for the 5 feet Scouring Scenario	**HHRA (residential):** COPC Selection EPC Calculations	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables	10	3 locations completed previously (SSB-8, SSB-9, and MW-13) 5 locations completed in the Phase I sampling (BCW-1 through BCW-5) 2 locations proposed for Phase 2 sampling (AOC1-T6d, AOC1-BCW7)	Current 5 to 6 feet bgs: 8	2 samples collected previously 4 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 1 foot bgs post scour (current 5 to 6 feet bgs): 8	2 samples collected previously 4 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	Full suite at most locations except surface interval (0 to 0.5 foot bgs), which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • Data Validation: at least 10%.	Yes for deeper soils but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Data gaps evaluation determined only two additional sampling locations required due to infrequently detected compounds. Data for shallow depths are considered representative of deeper soil.** This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs in indoor air pathway. Did not collect Phase 1 samples from 5 to 6 feet bgs at two locations and from 9 to 10 feet bgs samples at two locations because of refusal.
					Current > 6 to 10 feet bgs: 9	3 samples collected previously 4 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 17	5 samples collected previously 8 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling					
					Current >10 to 15 feet bgs: 2	0 samples collected previously 0 samples collected in the Phase I sampling 2 samples proposed for Phase 2 sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 19	5 samples collected previously 8 samples collected in the Phase I sampling 6 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	**Data Use**	**Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively**	**Number of Soil Sampling Locations**	**Status of Soil Sampling**	**Number of Soil Samples**	**Status of Soil Samples**	**Number of Soil Samples**	**Status of Soil Samples**	**Analytical Suite[c,d]**	**Data Quality[e,f,g,h]**	**Representative[i]**	**Comparability[j]**	**Notes[k]**
AOC-4: Debris Ravine	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	57	8 locations completed previously 27 locations proposed in Phase I sampling 22 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs: 62	8 samples collected previously 34 samples collected in Phase I sampling 20 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 62	8 samples collected previously 34 samples collected in Phase I sampling 20 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable Dioxins/furans added	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for each exposure interval.** Very rugged area. Required sampling via long reach backhoe for certain locations. All locations extend to 6 feet bgs or refusal and sample from one location was collected at 8 feet bgs. Only 11 samples were collected in Phase 1 from 2 to 3 feet bgs because of refusal. Phase 2 sampling planned to fill nature and extent data gaps.
					0.5 to 3 feet bgs: 38	5 samples collected previously 11 samples collected in Phase I sampling 22 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 100	13 samples collected previously 45 samples collected Phase I sampling 42 samples proposed for Phase 2 sampling					
					3 to 6 feet bgs: 14	0 samples collected previously 2 samples collected in Phase I sampling 12 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 114	13 samples collected previously 47 samples collected in Phase I sampling 54 samples proposed for Phase 2 sampling					
					6 to 10 feet bgs: 13	0 samples collected previously 1 sample collected in Phase I sampling 12 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 127	13 samples collected previously 48 samples collected in Phase I sampling 66 samples proposed for Phase 2 sampling					
AOC-9: Southeast Fence Line	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	28	9 locations completed previously 13 locations completed in Phase I sampling 6 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs: 17	0 samples collected previously 13 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 017	0 samples collected previously 13 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs for most of the metals and PAHs Data Validation: at least 10%	Yes for deeper soils, but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Current and planned data appear sufficient to calculate EPCs for each exposure interval and each analyte.** Steep sloped area required Phase 1 sampling with long reach excavator for certain locations. Potential source is stormwater discharge pipe and/or auxiliary jacket cooling water leaks and spills from historically unbermed area. In Phase I sampling, most locations were terminated at 3 feet bgs; however, at two locations soil samples were collected at 5 to 6 feet bgs. Phase 2 sampling planned to fill nature and extent data gaps.
					0.5 to 3 feet bgs: 26	9 samples collected previously 13 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 43	9 samples collected previously 26 samples collected in Phase I sampling 8 samples proposed for Phase 2 sampling					
					3 to 6 feet bgs: 7	0 samples collected previously 2 samples collected in Phase I sampling 5 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 50	9 samples collected previously 28 samples collected in Phase I sampling 13 samples proposed for Phase 2 sampling					
					6 to 10 feet bgs: 6	0 samples collected previously 0 samples collected in Phase I sampling 6 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 56	9 samples collected previously 28 samples collected in Phase I sampling 19 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-10: East Ravine	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	45	9 locations completed previously 22 locations completed in Phase I sampling 14 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs: 43	8 samples collected previously 22 samples collected in Phase I sampling 13 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 43	8 samples collected previously 22 samples collected in Phase I sampling 13 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable Dioxin/furan analysis proposed for three locations if burn material is present	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for each depth interval for each analyte except dioxins/furans.** Some proposed Phase 1 locations were inaccessible to mechanical drilling equipment due to steep slopes and rugged terrain. Phase 1 samples were not collected from 2 to 3 feet bgs at two locations; from 5 to 6 feet bgs at three locations; and from 9 to10 feet bgs at five locations because of refusal. Phase 2 sampling planned to fill data gaps.
					0.5 to 3 feet bgs: 36	6 samples collected previously 20 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 79	14 samples collected previously 42 samples collected in Phase I sampling 23 samples proposed for Phase 2 sampling					
					>3 to 6 feet bgs: 28	0 samples collected previously 19 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 107	14 samples collected previously 61 samples collected in Phase I sampling 32 samples proposed for Phase 2 sampling					
					> 6 to 10 feet bgs: 26	0 samples collected previously 17 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 133	14 samples collected previously 78 samples collected in Phase I sampling 41 samples proposed for Phase 2 sampling					
AOC-10: East Ravine for the 2 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	31	0 locations completed previously 20 locations completed in Phase I sampling 11 locations proposed for Phase 2 sampling	Current 2 to 3 feet bgs: 36	6 samples collected previously 20 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	0 to 1 foot bgs post scour (current 2 to 3 feet bgs): 36	6 samples collected previously 20 samples collected in Phase I sampling 10 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable Dioxin/furan analysis proposed for three locations if burn material is present	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background HH screening values for all analytes ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for each depth interval for each analyte except dioxins/furans if they are analyzed.** This scenario assumes scouring of top 2 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. Some Phase 1 locations were inaccessible to mechanical drilling equipment due to steep slopes and rugged terrain. Phase 1 samples were not collected from 2 to 3 feet bgs at two locations; from 5 to 6 feet bgs at three locations; and from 9 to 10 feet bgs at five locations because of refusal. Phase 2 sampling planned to fill data gaps.
					Current >3 to 6 feet bgs: 28	0 samples collected previously 19 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 64	6 samples collected 39 samples collected in Phase I sampling 19 samples proposed for Phase 2 sampling					
					Current >6 to 10 feet bgs: 26	0 samples collected previously 17 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 90	6 samples collected 56 samples collected in Phase I sampling 28 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	**Data Use**	**Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively**	**Number of Soil Sampling Locations**	**Status of Soil Sampling**	**Number of Soil Samples**	**Status of Soil Samples**	**Number of Soil Samples**	**Status of Soil Samples**	**Analytical Suite[c,d]**	**Data Quality[e,f,g,h]**	**Representative[i]**	**Comparability[j]**	**Notes[k]**
AOC-10: East Ravine for the 2 feet Scouring Scenario (continued)					HHRA scenario only Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling 0 samples proposed for Phase 2 sampling	HHRA scenario only 0 to 10 feet bgs post scour (current > 2 to 14 feet bgs): 90	6 samples collected 56 samples collected in Phase I sampling 28 samples proposed for Phase 2 sampling					
					Current >6 to 10 feet bgs: 26	0 samples collected previously 17 samples collected in Phase I sampling 9 samples proposed for Phase 2 sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 54	0 samples collected previously 36 samples collected in Phase I sampling 18 samples proposed for Phase 2 sampling					
					Current >10 to 15 feet bgs: 1	0 samples collected previously 0 samples collected in Phase I sampling 1 sample proposed for Phase 2 sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 55	0 samples collected previously 36 samples collected in Phase I sampling 19 samples proposed for Phase 2 sampling					
AOC-11: Topographic Low Areas	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	34	No locations completed previously 19 locations completed (including 2 in the grassy areas) in Phase I sampling 15 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs: 32	0 samples collected previously 19 samples collected in Phase I sampling 13 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 32	0 samples collected previously 19 samples collected in Phase I sampling 13 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable Dioxin/furan analysis proposed for four locations	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for each depth interval for each analyte except dioxin/furans.** Four samples were collected during the installation of MW12. However, these were at depths greater than 10 feet bgs and will not be considered for the risk assessment. Horizontal and vertical coverage includes secondary proposed sampling locations. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected. If sufficient soil gas data are collected, the inhalation of VOCs in outdoor air will be evaluated using soil gas data.
					0.5 to 3 feet bgs: 31	0 samples collected previously 19 samples collected in Phase I sampling 12 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 63	0 samples collected previously 38 samples collected in Phase I sampling 25 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-11: Topographic Low Areas (continued)					3 to 6 feet bgs: 30	0 samples collected previously 18 samples collected in Phase I sampling 12 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 93	0 samples collected previously 56 samples collected in Phase I sampling 37 samples proposed for Phase 2 sampling					All samples extended down to 10 feet bgs in the Phase I sampling. Of these 19 Phase 1 sample locations, seven locations were supplemental samples and were only analyzed for PAHs and metals, with the exception of all samples collected at locations AOC11e-SS-1 and AOC11E-SS-2, which were also analyzed for PCBs. VOCs and SVOCs (except PAHs) were not detected in shallower samples, therefore, supplemental samples were not analyzed for VOCs and SVOCs (except PAHs). Soil samples collected at 9 to 10 feet bgs in Phase 1 were sent to the laboratory as supplemental soil samples pending analysis based on detected analytes in the shallower samples. Most of these samples were analyzed for PAHs and metals, with the exception of the 1 to 0 foot samples collected at AOC11e-1 and AOC11e-2, which were also analyzed for PCBs. VOCs and SVOCs (except PAHs) were not detected in shallower samples; therefore, supplemental samples were not analyzed for VOCs and SVOCs (except PAHs). Phase 2 sampling planned to fill data gaps.
					6 to 10 feet bgs: 30	0 samples collected previously 18 samples collected in Phase I sampling 12 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 123	0 samples collected previously 74 samples collected in Phase I sampling 49 samples proposed for Phase 2 sampling					
AOC-12: Fill Area	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	7	7 locations completed in Phase 1 sampling No data gaps identified. No Phase 2 sampling proposed.	0 to 0.5 foot bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	0 to 0.5 foot bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes for Phase I investigation; not for risk assessment. If contamination is identified in Phase I investigation, additional and representative data will be collected in Phase II sampling.	Yes	**Phase I data are adequate to support risk assessment and estimation of EPCs. No data gaps were identified.** No fill was identified during the geophysical survey. Currently, two surface soil samples and two 3-foot samples were collected for TAL/TCL list analysis. In addition, samples were collected at the bottom of the trenches, every 20 linear feet. Phase 2 sampling planned to fill data gaps.
					0.5 to 3 feet bgs: 7	0 samples collected previously 7 samples collected in Phase I sampling	0 to 3 feet bgs: 9	0 samples collected previously 9 samples collected in Phase I sampling					
					3 to 6 feet bgs: 5	0 samples collected previously 5 samples collected in Phase I sampling	0 to 6 feet bgs: 14	0 samples collected previously 14 samples collected in Phase I sampling					
					6 to 10 feet bgs: 4	0 samples collected previously 4 samples collected in Phase I sampling	0 to 10 feet bgs: 18	0 samples collected previously 18 samples collected in Phase I sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	**Data Use**	**Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively**	**Number of Soil Sampling Locations**	**Status of Soil Sampling**	**Number of Soil Samples**	**Status of Soil Samples**	**Number of Soil Samples**	**Status of Soil Samples**	**Analytical Suite[c,d]**	**Data Quality[e,f,g,h]**	**Representative[i]**	**Comparability[j]**	**Notes[k]**
AOC-14: Railroad Debris Site	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	46	25 locations completed previously 17 locations completed in Phase I sampling 4 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs: 38	17 samples collected previously 17 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 0.5 feet bgs: 38	17 samples collected previously 17 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Current and planned data appear sufficient to calculate EPCs for all depth intervals and for all analytes except dioxin/furans in the two shallowest depths.** Phase 2 analysis added dioxin/furans for four locations and all depths to address newly identified potential burn area. A total of four samples at the top depth will not be adequate to estimate EPCs. Eight samples at the second depth may not be adequate to estimate EPCs if less than five show detects. Maximum concentration may be used as EPCs for the two shallowest depths. Horizontal and vertical coverage includes secondary proposed sampling locations. All secondary proposed sampling locations were analyzed for full analytical suite, except surface interval, which was not analyzed for VOCs or TPH-P. Phase 1and 2 data were collected to 10 feet bgs (a sample will be collected at 15 feet bgs and held for analysis pending shallow sample results). All samples collected at 15 feet bgs were analyzed for the full analytical suite.
					0.5 to 3 feet bgs: 29	8 samples collected previously 17 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 67	25 samples collected previously 34 samples collected in Phase I sampling 8 samples proposed for Phase 2 sampling					
					3 to 6 feet bgs: 27	6 samples collected previously 17 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 94	31 samples collected previously 51 samples collected in Phase I sampling 12 samples proposed for Phase 2 sampling					
					6 to 10 feet bgs: 21	0 samples collected previously 17 samples collected in Phase I sampling 4 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 115	31 samples collected previously 68 samples collected in Phase I sampling 16 samples proposed for Phase 2 sampling					
AOC 27 – MW 24 Bench	**HHRA and ERA:** COPC Selection EPC Calculations	Soil	8	0 locations completed previously 0 locations completed in Phase I sampling 8 locations proposed for Phase 2 sampling	0 to 0.5 foot bgs:3	0 samples collected previously 0 samples collected in Phase I sampling 3 samples proposed for Phase 2 sampling	0 to 0.5 foot bgs: 3	0 samples collected previously 0 samples collected in Phase I sampling 3 samples proposed for Phase 2 sampling	Full suite except surface interval, which did not include VOCs and SVOCs Dioxin/furans at selected locations	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to support risk assessment is contingent upon whether contamination is identified during the Phase 2 Soil Investigation.** Five trenches are planned and assumed to extend to approximately 5 feet bgs, with a sample at the bottom of the trench. Additional samples may be collected in this AOC subject to the following planned surveys: geophysical, XRF, and asbestos. Additional surface or depth samples will be considered in evaluating data adequacy at the end of Phase 2.
					0.5 to 3 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling 0 samples proposed for Phase 2 sampling	0 to 3 feet bgs: 3	0 samples collected previously 0 samples collected in Phase I sampling 3 samples proposed for Phase 2 sampling					
					3 to 6 feet bgs: 5	0 samples collected previously 0 samples collected in Phase I sampling 5 samples proposed for Phase 2 sampling	0 to 6 feet bgs: 8	0 samples collected previously 0 samples collected in Phase I sampling 8 samples proposed for Phase 2 sampling					
					6 to 10 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling 0 samples proposed for Phase 2 sampling	0 to 10 feet bgs: 8	0 samples collected previously 0 samples collected in Phase I sampling 8 samples proposed for Phase 2 sampling					

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	**Data Use**	**Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively**	**Number of Soil Sampling Locations**	**Status of Soil Sampling**	**Number of Soil Samples**	**Status of Soil Samples**	**Number of Soil Samples**	**Status of Soil Samples**	**Analytical Suite[c,d]**	**Data Quality[e,f,g,h]**	**Representative[i]**	**Comparability[j]**	**Notes[k]**
Potential Pipeline Disposal Area	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	NA	NA	0 to 0.5 foot bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 0.5 foot bgs: NA	0 samples collected previously NA for Phase I sampling	NA	NA	NA	NA	The pipes have been identified during the geophysical survey. No trenching or sampling occurred in this area. Investigation approach in this area is being reevaluated. If contamination is identified in future soil investigations and if needed, additional characterization and risk assessment sampling for this AOC will be included as part of the Phase II sampling event.
					0.5 to 3 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 3 feet bgs: NA	0 samples collected previously NA for Phase I sampling					
					3 to 6 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 6 feet bgs: NA	0 samples collected previously NA for Phase I sampling					
					6 to 10 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 10 feet bgs: NA	0 samples collected previously NA for Phase I sampling					
Former 300B Pipeline Liquids Tank	**HHRA and ERA:** COPC Selection EPC Calculations	Soil Burrow air (modeled from soil concentrations)	5	0 locations completed previously 5 locations completed in Phase I sampling	0 to 0.5 foot bgs: 5	0 samples collected previously 5 samples collected in Phase I sampling	0 to 0.5 foot bgs: 5	0 samples collected previously 5 samples collected in Phase I sampling	Full suite plus PCBs	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes; provided pipeline liquids tank was the only source.	Yes	**No additional samples proposed for Phase 2. The few compounds reported above detection limits were infrequently detected, so additional data will not alter or improve the quality of the current data set.** This area has already been closed (CH2M HILL, 2006a). Closure suggests that most, if not all, of the contamination has been removed. Proposed sampling is to confirm closure of this area. If new sources are identified, additional samples may need to be collected (at least for the surface interval) if EPC calculations are needed. Phase 1 samples were not collected from 2 to 3 feet bgs at one location and from 9 to 10 feet bgs at four locations because of refusal.
					0.5 to 3 feet bgs: 4	0 samples collected previously 4 samples collected in Phase I sampling	0 to 3 feet bgs: 9	0 samples collected previously 9 samples collected in Phase I sampling					
					3 to 6 feet bgs: 1	0 samples collected previously 1 sample collected in Phase I sampling	0 to 6 feet bgs: 10	0 samples collected previously 10 samples collected in Phase I sampling					
					6 to 10 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	0 to 10 feet bgs: 10	0 samples collected previously 10 samples collected in Phase I sampling					

NOTES:

Information for this table was obtained from Part A Soil Investigation Work Plan (CH2M HILL, 2006a) and the updated figures for Part A Soil Investigation Work Plan posted on the DTSC website: http://www.dtsc-topock.com. Information presented in this table is current as of December 15, 2008 and includes historical sampling and Part A Phase I sampling information. The conclusions regarding representativeness and data adequacy will be based on the outcome of Step 6 of the data quality objectives (Table 1), which has yet to be performed. The intent of the matrix, when finalized, is to summarize all the relevant information pertaining to data usability and adequacy for determining EPCs.

[a] This matrix includes soil sampling information only for areas outside the compressor station. For HHRA, the soil sampling presented in this matrix will be used to evaluate two exposure areas (ARCADIS, 2008): (i) BCW, and (ii) the rest of the AOCs/subareas outside the compressor station. BCW includes a subarea of USBLM land north of the railroad (north of AOC 1) to be evaluated separately for potential future residential use. For the ERA, for small home ranging receptors, each AOC or subarea will be evaluated as separate exposure areas; for large home range receptors, two exposure areas will be evaluated: (i) BCW and AOC4 and (ii) the rest of the AOCs/subareas outside the compressor station.

[b]. Assumption is that horizontal and vertical extent will be characterized to background regardless of risk assessment needs. If a background value is not available, then the lesser of the soil ecological comparison value, the USEPA Regional Screening level, or DTSC CHHSL will be used. Horizontal coverage refers to the adequacy of the number of locations to support EPCs for the exposure area. The horizontal coverage was based on all the sample locations in the Phase 1 results and Phase 2 Work Plans (all sample locations indicated at least some surface interval [0/0.5/1/3/6/10 feet bgs]). Vertical coverage refers to the adequacy of sampling depth intervals to provide information to support calculation of EPCs for the four exposure intervals and the number of samples at each depth interval was reported. For calculation of EPCs, a minimum of 8 samples and 5 detects are required for the ERA, depths evaluated will include 0 to 0.5, 0 to 3, and 0 to 6 foot/feet bgs. For the HHRA, depths evaluated will include 0 to 0.5, 0 to 3, 0 to 6, and 0 to 10 foot/feet bgs. Vertical coverage for Phase 2 sampling was obtained from the Part A Work Plan (CH2M HILL, 2006a) and confirmed with the Soil Investigation team. The 0.5 foot bgs samples were collected from 0 to 0.5 feet bgs; the 3 feet bgs samples were collected from 2 to 3 feet bgs; the 6 feet bgs samples were collected from 5 to 6 feet bgs; and the 10 feet bgs samples were collected from 9 to 10 feet bgs.

[c]. Full suite of analytes and TAL/TCL analytes are listed in the Draft QAPP (CH2M HILL, 2008a,b); analyte classes include metals, PAHs, SVOCs, VOCs, TPH, PCBs, and pesticides.

[d]. Limited VOC and TPH data from the surface interval does not compromise the assessment to evaluate potential risks to human health or burrowing receptors.

TABLE 4-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock Compressor Station, Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					

[e]. Only Category 1 data which are considered suitable for risk assessment were included in the horizontal and vertical coverage evaluation in this matrix (CH2M HILL, 2006a).

[f]. Site-specific background concentrations are not yet final; preliminary site-specific background concentrations were estimated for metals with available data and reported in the QAPP (CH2M HILL, 2006a). The reporting limits were less than preliminary site-specific background concentrations for all metals (Draft QAPP; CH2M HILL, 2008a,b). For metals with no site-specific preliminary background concentrations, reporting limits were compared to California regional background concentrations (Bradford et al., 1996); the reporting limits for these metals were less than the regional background concentrations.

[g]. Human health screening values were based on the lesser of the CHHSLs and USEPA Regional Screening Levels. The reporting limits were less than the final human health screening values for most of the chemicals (Draft QAPP; CH2M HILL, 2008a,b).

[h]. ECVs were calculated for metals and PAHs (ARCADIS, 2008). The reporting limits were less than the ECVs for PAHs and for most of the metals except antimony, cadmium, lead, mercury, nickel, selenium, and zinc (Draft QAPP; CH2M HILL, 2008a,b). ECVs for the rest of the analytes have not yet been developed.

[i]. “Yes” indicates that data are considered representative; this is optimized by the appropriate placement of Phase I sample locations in areas suspected to have been impacted by site releases. Further, the analyte list captures those chemicals assumed to be associated with a potential release. Adequacy of the representativeness will be re-assessed once Phase 2 data are obtained. (Representativeness is defined as the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques and analytical procedures [DUA; CH2M HILL, 2008c]).

[j]. “Yes” indicates, as stated in the DUA Technical Memorandum (CH2M HILL, 2008c), that existing data sets were reported which consistent units and reporting limits for soil and sediment data were equivalent to those required by the QAPP Addendum (CH2M HILL, 2006b). The existing data sets are considered usable for risk assessment, and will be supplemented with additional data that meet the overall requirements of the Draft QAPP (CH2M HILL, 2008a,b) and thus, the existing Category 1 data should be very comparable to the data that will be generated during Phase I sampling. (Comparability is defined as the confidence in which one data set can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples and reporting the analytical results in standard units.)

[k]. Data considered sufficient to calculate EPCs assumes validation of Phase 2 soil data will not result in data unsuitable for risk assessment (e.g., “R” or reject qualified).

REFERENCES:

ARCADIS. 2008. *Human Health and Ecological Risk Assessment Work Plan, PG&E Topock Compressor Station, Needles, California*. August.

ARCADIS. 2009. *Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan, PG&E Topock Compressor Station, Needles, California*. February.

Bradford, G.R., A.C. Chang, A.L. Page, D. Bakhtar, J.A. Frampton, and H. Wright. 1996. *Background Concentrations of Trace and Major Elements in California Soils*. Kearney Foundation of Soil Science, Division of Agriculture and Natural Resources, University of California.

CH2M HILL. 2006a. *Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California*. November.

CH2M HILL. 2006b. *Quality Assurance Project Plan Addendum, PG&E Topock Program*. September 27.

CH2M HILL. 2008a. *Draft PG&E Topock Program Quality Assurance Project Plan*. June.

CH2M HILL. 2008b. *Addendum to the Draft PG&E Topock Program Quality Assurance Project Plan*. June.

CH2M HILL. 2008c. *Final Soil and Sediment Data Usability Assessment Technical Memorandum*. PG&E Topock Compressor Station, Needles, California. August.

CH2M HILL. 2008d. Soil Sampling Investigation Part A Figures (Updated): http://www.dtsc-topock.com/resources/RCRA_Investigations/soil_sample_wp_A/SoilSamplingPartAFigures_ALL.pdf.

ACRONYMS:

AOC = area of concern; BCW = Bat Cave Wash; bgs = feet below ground surface; bss = feet below sediment surface; CHHSLs = California Human Health Screening Levels; COPC = chemicals of potential concern; DTSC = Department of Toxic Substances Control; DUA = data usability assessment; ECV = ecological comparison values; EPC = exposure point concentration; ERA = ecological risk assessment; HH or HHRA = human health risk assessment; NA = not available or not applicable; QAPP = quality assurance project plan; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls; SVOCs = semi-volatile organic compounds; TAL/TCL = target analyte list metals/target compound list organics; TPH = total petroleum hydrocarbons; USBLM = U.S. Bureau of Land Management; USEPA=U.S. Environmental Protection Agency; VOCs = volatile organic compounds.

5.0 Decision 3 – Threat to Groundwater from Residual Soil Concentrations

This section presents the inputs and process used to evaluate Decision 3 – Threat to Groundwater from Residual Soil Concentrations at the Part A SWMU, AOCs, and UAs. Results of the Decision 3 evaluation, including proposed Phase 2 sample locations, if recommended, are provided in Appendix C.

5.1 Inputs to Decision 3

The inputs required for Decision 3 consist of the nature and extent of soil data from Decision 1, site-specific information required to calculate SSLs protective of groundwater, and screening-level groundwater modeling results, where necessary.

Existing and new soil data provide information on the nature and extent of COPCs. Key site-specific information required to calculate the SSLs include:

- Soil BTVs for metals and inorganic compounds, discussed in the *Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (CH2M HILL, 2009a) and in Appendix E to this report.
- Groundwater background values for inorganics, calculated as 95 percent upper tolerance limits and presented in *Groundwater Background Study Steps 3 and 4: Revised Final Report of Results, PG&E Topock Compressor Station* (CH2M HILL, 2009b). For organics, groundwater maximum contaminant levels and/or applicable drinking water standards were used.
- Volume and cross-sectional area of the potential source (that is, unit or area).
- Site-specific recharge and groundwater flow characteristics at each unit.
- Depth to groundwater, geochemical, and hydraulic characteristics of the vadose zone soil.

Inputs required for the screening-level groundwater modeling are the same as those for the SSL calculation, with the addition of transport parameters (dispersion, soil-water partition coefficients). USEPA literature and other technical literature served as the source for these parameters (USEPA, 2005; Xu M. and Y. Eckstein, 1995).

5.2 Threat to Groundwater from Residual Soil Concentrations Evaluation

A preliminary analysis was performed with the existing data set to assess the potential threat to groundwater and to assess if additional data, above and beyond that necessary for Decision 1, is needed to resolve Decision 3. Data collected to satisfy Decision 1 – Nature and

Extent Evaluation – will provide the representative data set that will be used to assess the threat to groundwater. Additional evaluations will be performed as appropriate as data are collected to resolve Decision 1. The preliminary conclusions regarding the threat to groundwater are based on available data and will be revisited after the implementation of the Soil RFI/RI Work Plan. The combined data set will then be evaluated for data gaps, and further conclusions regarding the threat to groundwater will be provided to the agencies and stakeholders for review prior to submittal of the RFI/RI Volume 3.

A conservative, three-tiered approach was used in the evaluation to assess which units may present a potential current or future threat to groundwater from COPCs in the vadose zone. The approach was presented in technical memorandum entitled *Calculation of Soil Screening Levels for Protection of Groundwater at the PG&E Topock Compressor Station* (CH2M HILL, 2008d) and includes:

- **Step 1.** The initial step in the evaluation process was to compare the metals concentrations in soil samples from each investigation area to the soil BTV to assess whether the concentrations are at or below background. If no individual COPC concentration from samples collected within a unit is greater than the BTV, or if the central tendency comparison evaluation concluded the COPC concentration in the sample population within a unit is not statistically greater than the COPC concentration in the background population, then no further analysis was required to assess the potential for leaching into groundwater for that COPC within the unit. This evaluation was completed for all metals detected in a given unit. If the deepest sample(s) in a boring or area exceeded the BTV, a data gap may have been identified for Decision 3.[1]

  Because organic compounds (PCBs, pesticides, volatile organic compounds, semivolatile organic compounds) do not have a soil BTV to compare to, all organic compounds were evaluated in Step 3 (see detailed discussion in Appendix C).

- **Step 2.** For detected COPCs with concentrations above BTVs, the detected concentrations were compared to the unit-specific SSL. The SSLs were calculated in accordance with USEPA (1996) and New Mexico Environment Department (2006) guidance, among others. A detailed example SSL calculation was provided in the technical memorandum entitled *Calculation of Soil Screening Levels for Protection of Groundwater at the PG&E Topock Compressor Station* (CH2M HILL, 2008d). The SSLs were calculated using highly conservative assumptions so that COPCs that are eliminated from further consideration in this step are eliminated with high confidence. If sample concentrations are at or below the SSL, then no further analysis is required to assess the potential for leaching into groundwater for those COPCs.

  If samples concentrations were above SSLs, the data were evaluated to assess whether the sample results indicated a potential current threat to groundwater. A potential current threat to groundwater was identified if one or both of the following conditions existed:

[1] Note that this may also represent a data gap for Decision 1. However, if concentrations are declining with depth and/or the concentration detected in the lowest sample collected is near the BTV, the available data may be considered adequate for Decision 1.

  - Vertical concentration trends of COPC increased with depth.
  - Soil data indicated elevated concentrations of compounds (as compared to the BTVs) in samples throughout the boring *and* at the depth of the soil/groundwater interface.

  If the evaluation did not indicate a potential current threat to groundwater, then the evaluation continued with Step 3.

- **Step 3.** If sample concentrations exceeded the SSL but did not indicate a potential current threat to groundwater, a vadose zone flow and transport model was used to evaluate the potential for leaching into groundwater. Modeling was performed using the HYDRUS-1D software package (Simunek et al., 1998) and is intended as a screening process using highly conservative assumptions. If the modeling results showed no exceedance of the groundwater background values, then no further evaluation was required. If the modeling results showed a COPC in groundwater at a concentration exceeding groundwater background values, the need for model refinement and possible additional data collection and/or development of a plan for a groundwater assessment was evaluated

The Step 3 modeling approach, model inputs, and assumptions are provided in Appendix C. Results of the modeling evaluation, and data gaps identified with regard to Decision 3 are discussed in detail in the Appendix C sub-appendices.

Additional modeling and model refinement, if needed, will be performed after new Phase 2 soil data are collected.

6.0 Decision 4 – Data Sufficiency to Support Corrective Measures Study/Feasibility Study

6.1 Inputs to Decision 4

Inputs to Decision 4 consist of soil property and contaminant distribution data (validated Phase 1 data and existing Category 1 data) and other information needed to support the CMS/FS decisions and remedial design. Inputs to Decision 4 include volumes of debris; specific soil physical and chemical properties that could influence the performance of certain remedial technologies (for example porosity, grain size, density, organic carbon content, soil chemical properties); waste characterization parameters for any soils that may need to be transported and disposed of offsite; and potential physical limitations on implementation of various technologies (surface or subsurface structures).

6.2 Data Sufficiency to Support Corrective Measures Study/ Feasibility Study Evaluation

A preliminary assessment of potential remedial technologies and presumptive remedies guided identification of the data needs to support the CMS/FS and remedial design. An initial list of suitable remedial technologies was presented in the approved *Final Corrective Measures/Feasibility Study Work Plan, Topock Compressor Station, Needles, California* (CH2M HILL, 2008e), referred to as the CMS/FS Work Plan. The following is a summary of the initial technologies presented in the CMS/FS Work Plan:

- **Excavation and Offsite Disposal:** involves excavation, transportation, and disposal of contaminated material from the Topock site to a permitted offsite disposal facility. Pretreatment may be required to meet disposal requirements of the offsite facility.
- **Excavation and Onsite Treatment:** is an *ex -situ* method that involves excavation of contaminated soil and treatment onsite by either soil washing or chemical reduction.
- **Soil Flushing:** is an *in -situ* method that involves application of water or additive-containing water to soil to enhance contaminant solubility. Soil flushing is used in combination with a groundwater remedial method. Contaminants are leached from soil into the groundwater, which is then remediated.
- **Solidification/Stabilization:** can be either *ex -situ* or *in -situ* and involves use of various chemical additives to physically bind or enclose contaminants within a stabilized mass (solidification) or to chemically reduce the contaminants' mobility by inducing chemical reaction between the stabilizing agent and the contaminants (stabilization).
- ***In -Situ* Chemical Reduction:** involves addition of reagents to react with targeted constituents in soil to chemically convert hazardous contaminants to non-hazardous or

less toxic compounds that are more stable, less mobile, and/or inert. Reductants could be applied to soil by infiltrating a liquid reductant from the surface, injecting a liquid reductant through wells, or injecting a gaseous reductant through wells.

- **Phytoremediation**: involves planting vegetation on contaminated soils. Contaminants are removed from soil through geochemical reactions in the root zone or through uptake by the roots and incorporation into the plant tissue. If contaminants become incorporated into the plants, the plant material may be periodically harvested and removed to a hazardous waste disposal facility. Phytoremediation is generally effective only for contaminants that are soluble in water and located at shallow depths that can be reached by the plant roots, or in combination with other measures, where it is used to reduce the amount of surface water infiltration to a deeper contaminated zone or to lower local groundwater levels to prevent contact with contaminated soils.
- **Capping in Place:** involves construction of a capping system on top of the contaminated area to contain and minimize exposure of the contaminants to the environment.
- **Soil Vapor Extraction:** involves application of a vacuum through a network of wells to remove contaminated vapor from the soil. Volatile contaminants are removed with the vapor stream. A treatment system is typically incorporated to remove the contaminants before the soil vapor is vented to the atmosphere.
- **Thermal Desorption:** involves heating the subsurface to accelerate the movement of contaminants from the soil into the soil vapor. It is typically combined with soil vapor extraction to remove the contaminants from the subsurface. By heating the subsurface, soil vapor extraction can be used for a wider range of contaminants with lower volatility. Heating can also speed up the removal of volatile contaminants, particularly if contaminants are present in the form of non-aqueous- phase liquids. Heating can be accomplished by injection of hot air or steam, or through use of electric current.
- ***In-situ* Vitrification**: involves intensive heating of the subsurface to completely melt the soil, which then cools into a glassy, vitrified block. Most organic contaminants are driven off or broken down during the heating. Inorganic contaminants are driven off or incorporated into the vitrified block and sequestered from the surrounding soil or groundwater.
- **Incineration:** involves burning excavated soil at high temperatures in a kiln or furnace. Incinerators are carefully designed to capture and treat the gases generated during combustion. Due to difficulties in permitting incinerators, most incineration is accomplished in offsite hazardous waste treatment facilities rather than with onsite incinerators. Depending on the contaminants present, the ash remaining may require disposal as a hazardous waste.

Treatability studies to collect data on technologies identified during the alternative development process are conducted, as appropriate, to provide additional information for evaluating technologies during the preparation of the CMS/FS.

The evaluation of data sufficiency to support the CMS/FS (that is, data requirements for the initial list of suitable remedial technologies listed above) was conducted by assessing the following for each individual unit:

- Lateral and vertical extents of COPCs and COPECs potentially posing an excess human health and/or ecological risk. The lateral and vertical extent information will be used to estimate required remediation volumes to determine the most appropriate and cost-effective remedial approach for each area potentially requiring remediation. This step cannot be completed until the baseline risk assessment is completed; however, if the nature and extent of contamination are sufficiently defined to satisfy Decision 1, sufficient data would be expected to be available to allow the completion of this portion of the evaluation for Decision 4 once the risk assessment has been completed.
- Waste characterization parameters for any soils that may be transported offsite for disposal (that is, total threshold limit concentrations [TTLC], soluble threshold limit concentrations [STLC], and toxicity characteristic leaching procedure [TCLP]). The TTLC and STLC are waste characterization criteria in the State of California. The TTLC simply requires standard chemical analysis of samples to determine total concentrations of COPCs using published USEPA methods. The detected concentrations are compared to the TTLCs to determine whether total COPC concentrations exceed the hazardous waste criteria. Total chemical concentrations are also compared to a concentration of 10 times the STLC (10 x STLC) and 20 times the TCLP (20 x TCLP) to determine whether leachability testing is required to determine if leachable concentrations of COPCs may exceed hazardous waste criteria. To evaluate COPC leachability relative to the SLTC, samples are subjected to the Waste Extraction Test specified in the Title 26 of the California Code of Regulations. The TCLP determination is a federal criterion for RCRA waste; leachable concentrations of COPCs using the TCLP are compared to applicable RCRA criteria. The Waste Extraction Test uses a tenfold dilution/extraction of the sample, and the TCLP uses a twentyfold dilution/extraction. Consequently, total sample concentrations below 10 times STLC and 20 times TLCP cannot exceed the applicable hazardous waste criteria.
- Specific soil physical properties that may affect the performance of the various technologies (that is, porosity, grain size, density, organic carbon content). Table 6-1 provides specific soil physical properties that are needed for applicable remedial technologies.
- Existing surface and subsurface features (that is, vegetation, nearby roads and road structures, culverts, subsurface utilities, bedrock, topography) that may affect the implementability of various technologies.
- White powder and debris mapping to estimate the extent, volumes, and type of debris. This information will be used to estimate required removal and/or remediation volumes to determine the most appropriate and cost-effective approach for each area containing white powder or debris.

The evaluation of data sufficiency to support the CMS/FS for each area was completed by evaluating the data summary for Decision 1 (presented in Appendix C) and by comparing the available data to the list presented above and in Table 6-1 to determine if any data gaps exist. The data gaps and additional sampling recommendations for each unit are included in the Appendix C sub-appendices.

TABLE 6-1
Additional Data Needs by Applicable Remedial Technologies
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

	Excavation and Offsite Treatment/ Disposal	**Excavation and Onsite Treatment**	**Soil Flushing**	**Solidification/ Stabilization**	***In* S-*situ* Chemical Reduction**	**Phytoremediation**	**Capping in Place**
Waste Characterization, Offsite Disposal [a]	Yes	No	No	No	No	No	No
Soil Physical Properties	Soil Classification	pH Particle Size Distribution Soil Classification	pH Particle Size Distribution Soil Classification	pH Soil Classification	Alkalinity pH Cation Exchange Capacity Particle Size Distribution Soil Classification	Soil Texture	Soil Classification Relative Compaction Atterberg Limits

[a] Waste Characterization Parameters Include:

TTLC – SW-846 6010B/7471A/7470A

STLC – Title 22, Division 4.5, Chapter 11, Article 5, Appendix II, Waste Extraction Test (WET)

TCLP for metals – SW-846 1311/SW-846 6010B/7470A

If organic compounds are suspected or “solvent like” odors are encountered additional analysis may be warranted. These may include but are not limited to or specifically required for any sample and will be determined on a case- by- case basis.

- TCLP SW-846 1311 (organic)
- Reactivity - Title 22, Division 4.5, Chapter 11, Article 3, Section 66261.23
- Ignitability - SW-846 1010/1020
- Corrosivity - SW-846 9040

7.0 Data Quality Objectives Steps 6 and 7

This section summarizes DQO Steps 6 and 7. The completed DQO Steps 1 through 7 for the 12 Part A SWMU, AOCs, and UAs included in this report are presented in Table 7-1.

7.1 Step 6: Acceptable Limits on Decision Error

Step 6 is intended to define acceptable limits on decision errors. A decision error would occur if, based on the available data, the project team chooses the wrong response action in the sense that a different response action would have been chosen if the project team had access "perfect data" or absolute truth. COPC concentrations are estimated using data that are subject to different variabilities at different stages of development, from field collection to sample analysis. The combination of all these errors is called "total study error." In some cases, total study error may lead to a decision error. Total study error is composed of two main components:

- **Sampling design error**. This error (variability) is influenced by the sample collection design, the number of samples, and the actual variability of the COPC concentration over space and time. Sampling must necessarily be limited to specific locations within a potentially impacted area, and this limited sampling may miss some features of the existing variation of the constituent concentration levels. Sampling design error occurs when the data collection design does not capture the complete variability within the media to the extent appropriate for the decision of interest.

- **Measurement error**. This error (variability) is influenced by imperfections in the measurement and analysis system. Random and systematic measurement errors may be introduced in the measurement process during physical sample collection, sample handling, sample preparation, sample analysis, and data reduction.

Potential decision errors can be evaluated quantitatively or qualitatively. For sites such as Topock, where the most appropriate sampling design is non-probabilistic, potential decision errors are evaluated qualitatively. Sample design errors are controlled through use of the CSM. Measurement error is controlled to an acceptable level by implementation of the Quality Assurance Project Plan (CH2M HILL, 2008a) and by rejection of data that do not meet the criteria specified in the Quality Assurance Project Plan.

Limits on decision error for the Part A soil investigation were reduced by ensuring, with the highest level of confidence feasible, that the Part A soil investigation sample locations were located in the appropriate areas. Appropriate areas consist of areas with known impacts or areas likely to have been impacted. These areas were identified based on site history information and current site conditions (that is, to identify the release point) and transport pathways (to identify likely contaminant locations). Site-specific CSMs were developed for each of the SWMU, AOCs, and UAs to assess whether or not the Part A soil investigation samples are located in the areas of impact or likely to have been impacted. During the development of the CSMs and completion of Step 6, uncertainties at each individual unit were assessed for:

- Source of contamination, including release point.
- Potential release mechanisms and transport pathways.
- Topographic conditions and constraints.

Site-specific CSMs are presented in Appendix C. The completed DQO Step 6 for the units included in this report is presented in Table 7-1.

7.1.1 Step 7: Optimize the Sampling Design for Obtaining Data

The purpose of Step 7 is to "identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs" (USEPA, 2000) in the context of site-specific constraints. The output of this step is the Phase 2 sampling design discussed with the stakeholders during the Part A Phase 1 data gaps evaluation process. This step documents the applicable activities of the sample design process to describe the reasons for selecting a sampling scheme, the reasons for selecting specific sampling locations, and the expected performance of the data collection design with respect to qualitative DQOs only, as was done for the Part A Phase 1 soil investigation.

Phase 2 sample locations were chosen to address specific data gaps identified based on specific DQO rules. The Phase 2 locations also reflect input from stakeholders during the two-day workshops and the joint DTSC and DOI February 2011 direction letter included as Attachment 1. To reduce the number of samples and disturbances to sensitive cultural resources, DOI and DTSC evaluated each originally proposed Phase 2 sample location to determine which, if any, sample locations could be eliminated. Approximately 50 sample locations were eliminated based on the following assumptions:

- Defining edges or detailed distribution of contamination in the wash channels is not necessary for technology assessment or risk evaluation. It is assumed that known contaminant concentrations measured at previous sample points extend between the points and to the wash boundaries.

- It is unlikely that significantly higher concentrations of contaminants exist in the areas that have not been sampled.

- It is unlikely that different types of contaminants exist in the areas that have not been sampled.

- Where vertical extent of contamination is defined, sufficient data are available to support modeling.

The Soil Part A Phase 2 proposed sample locations shown on figures and tables in Appendix C of this report are considered the Soil Part A Phase 2 sampling program for the Soil RFI/RI Work Plan.

TABLE 7-1
Data Quality Objectives – Part A Soil Investigation
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

STEP 1 Problem Statement	STEP 2 Decision Statement	STEP 3 Inputs to the Decision	STEP 4 Study Area Boundaries	STEP 5 Decision Rules
Contaminants in soil in AOCs/UAs outside the compressor station fence line resulting from historical compressor station practices may pose an unacceptable risk to humans or the environment, or threaten groundwater. Site-specific information is needed to: • Determine the nature and extent of soil and sediment contamination. • Estimate representative EPCs to support human health and ecological risk assessment being conducted separately from the Part A soil study. • Determine whether residual soil concentrations pose a threat to groundwater. • Estimate soil properties and contaminant distribution in support of the CMS/FS and/or remedial design.	**<u>Decision 1</u>** Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.	COPCs and COPECs by AOC/SWMU/UA Part A and representative Category 1 and 2 historic RFI/RI COPC and COPEC data grouped by AOC/SWMU/UA and medium Data usability matrix for soil and/or sediment (Appendix A) Comparison/screening values (background, risk-based, and regulatory screening values) CSMs Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	**Lateral Extent** Initially the same as the currently defined boundaries of each SWMU, AOC, and UA: • SWMU1/AOC 1: Within Bat Cave Wash from mouth of Debris Ravine north to the riparian area at mouth of Bat Cave Wash. • AOC 4: Within the ravine from a point directly south of the water tanks to the junction with Bat Cave Wash; north slope of ravine directly south from end of small access road west to west side of storage area. • AOC 9: Within the potential drainage path to the East Ravine from the break in the former storm drain; initially estimated to be from facility fence line two-thirds of the way east down the slope to the East Ravine; approximately 100 feet north to south centered on the alignment of the former storm drain. • AOC 10: Within the East Ravine from its head at the compressor station to its downstream mouth. Low areas, former discharge and outfall locations (where known), and/or former retention areas (as indicated by presence of vegetation or sedimentation) are of particular emphasis. • AOC 11: Within the drainage from its head at the compressor station to the low areas and/or former retention areas (as indicated by presence of vegetation or sedimentation) northwest of the compressor station access road, south of I-40, east of the compressor station fence line, and adjacent to the northeast side of the compressor station access road. Also within the potential former burn area on the plateau near the Transwestern Meter Station. • AOC 12: Areas indicated by former employees as sites of potential waste disposal. • AOC 14: The area north of I-40 bounded by Bat Cave Wash to the west, the former plant road to the east, and the railroad tracks to the north. • AOC 27: An area known as the MW-24 Bench, approximately 430 feet wide by 460 feet long, located north of the compressor station and south of I-40 between the Former Route 66 and slight ridge to the east, and Bat Cave Wash to the west. • AOC 28: Areas immediately surrounding three drip legs on the 300A and 300B pipelines to the east of the compressor station and one drip leg on the 300B pipeline west of the compressor station in Bat Cave Wash. AOC 28a is approximately 20 feet wide by 65 feet long, AOC28b is approximately 30 feet wide by 45 feet long, AOC 28c is approximately 20 feet wide by 50 feet long, and AOC 28d is 30is30 feet wide by 45 feet long. • UA-1 (Potential Pipeline Disposal Area): UA-1 is an area approximately 20 feet wide by 100 feet long, encompassing an area indicated by a former employee as the site for burial of asbestos-wrapped pipes. Two additional areas (UA-1A and UA1-B) were also identified as alternate areas for the burial of asbestos-wrapped pipes. UA-1A is approximately 25 feet wide by 100 feet long and UA-1B is approximately 15 feet wide and 425 feet long. • UA-2 (Former 300B Pipeline Liquids Tank): Area immediately surrounding the former location of a 900-gallon-capacity aboveground drip tank located southeast of the compressor station on a shelf in the hill next to a section of old Route 66. **Vertical Extent** Vertical study area boundaries extend from the ground surface to the water table. **Analytical Parameters** [a] *Chemical Parameters* (COPCs/ and COPECs) Title 22 metals, hexavalent chromium, TPH, volatile organic compounds, semivolatile organic compounds, and PAHs for all areas outside the fence line except UA-2. Volatile organic compounds and TPH-purgeable will not be analyzed in the surface (0.0 to 0.5 foot) soil samples. Dioxins and furans are COPCs/COPECs at	See Figure A-1 in Appendix A for the Decision 1 decision rule.

TABLE 7-1
Data Quality Objectives – Part A Soil Investigation
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

STEP 1 Problem Statement	STEP 2 Decision Statement	STEP 3 Inputs to the Decision	STEP 4 Study Area Boundaries	STEP 5 Decision Rules
			AOC-4 and AOC 27. Asbestos is a COPC for AOC 4, AOC14, AOC 27, and UA-1. COPCs/COPECs at UA-2 are limited to TPH and PAHs. Dioxins/furans, asbestos, and PCBs will be analyzed in samples collected from the upper end of AOC 1 where AOC 4 enters AOC 1. PCBs will be analyzed in samples collected from SWMU1, AOC 1, AOC 4, AOC 9, AOC 10, AOC 11, AOC 14, AOC 27, and AOC 28. Pesticides, and pH are also COPCs/COPECs at AOC 27. COPCs/COPECs at AOC 28 are limited to TPH, PAHs, and PCBs. Ten percent of the samples collected in all AOCs will be analyzed for the full inorganic and organic analysis suites per the TAL/TCL. During Phase 1, select samples were analyzed to characterize the soluble fraction of compounds present at concentrations exceeding 10 x TTLC or 20 x TCLP values. Samples were selected after Title 22 metals data had been received. PG&E performed SPLP on approximately two soil samples per AOC and analyzed the samples for hexavalent chromium and total chromium. These data were validated. **Temporal Boundaries** Validated Part A soil sampling data and representative Category 1 and Category 2 historic RFI/RI data (based on the final data usability assessment).	
	<u>Decision 2</u> Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.	Nature and extent of contamination assessment from Decision 1 Part A and representative Category 1 historic RFI/RI COPC and COPEC data grouped by exposure area and depth interval Data Usability Matrix for soil and/or sediment (Appendix A) RAWP CSMs Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	**Lateral Extent** Same as for Decision 1. **Vertical Extent** Vertical study area boundaries for Decision 2 are defined by potential maximum exposure depths. For human health risk assessment, the maximum exposure depth is 10 feet for all AOCs/SWMUs/UAs except for Bat Cave Wash (SWMU 1/AOC 1), which is 15 feet to account for possible scouring of the surface during runoff events. For ecological risk assessment, the maximum depth is 6 feet, except in Bat Cave Wash, where the maximum exposure depth for ecological receptors is 11 feet to account for possible scouring during run-off events. **Analytical Parameters** Same as for Decision 1. **Temporal Boundaries** Validated Part A soil sampling data and representative Category 1 historic RFI/RI data (based on the final data usability assessment).	See Figure A-2 in Appendix A for the Decision 2 decision rule.
	<u>Decision 3</u> Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat, or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.	Nature and extent of contamination assessment from Decision 1 COPCs by AOC/SWMU/UA Part A and representative Category 1 and 2 historic RFI/RI COPC and COPEC data grouped by AOC/SWMU/UA Data Usability Matrix for soil and/or sediment (Appendix A) Comparison/screening values (SSLs and groundwater/ drinking water ARARs) CSMs Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information	**Lateral Extent** Those portions of each AOC/SWMU/UA where COPC concentrations exceed SSLs. **Vertical Extent** Same as for Decision 1. **Analytical Parameters** *Chemical Parameters (COPCs/COPECs)* Same as for Decision 1. *Soil Characteristics* (to support modeling) Select samples will be analyzed for organic carbon content, grain size, Atterberg limits, gradation, and washes. **Temporal Boundaries** Same as for Decision 1.	See Figure A-3 in Appendix A for the Decision 3 decision rule.

TABLE 7-1
Data Quality Objectives – Part A Soil Investigation
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

STEP 1 Problem Statement	STEP 2 Decision Statement	STEP 3 Inputs to the Decision	STEP 4 Study Area Boundaries	STEP 5 Decision Rules
		AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA		
	<u>Decision 4</u> Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial action design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.	Nature and extent of contamination assessment from Decision 1 COCs from human health and ecological risk assessments Remedial action objectives and ARARs Risk-based and regulatory soil and/or sediment cleanup levels Estimated soil and debris volumes Waste classification testing results for soil, sediment, and/or debris as required Waste comparison/screening levels (TTLC, STLC, RCRA toxicity) Soil physical and chemical property information Geologic/hydrogeologic/hydrologic information Topographic information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	**Lateral Extent** Initially same as for Decision 1, to be refined based on results of risk assessments and threat to groundwater assessments. **Vertical Extent** Initially same as for Decision 1, to be refined based on results of risk assessments, threat to groundwater assessments, and remedial alternative practical constraints. **Analytical Parameters** *Chemical Parameters (COCs)* Initially same as COPCs/COPECs for Decision 1, to be refined to specific COCs based on results of risk assessments and threat to groundwater assessments. *Soil Characteristics* (to support remedial technology selection and feasibility evaluation) Select samples will be analyzed for organic carbon content, grain size, Atterberg limits, gradation, and washes. **Temporal Boundaries** Same as for Decision 1.	See Figure A-4 in Appendix A for the Decision 4 decision rule.

Notes:

[a] A comprehensive planned sample table, specifying analytes for all proposed samples, was provided in Appendix B of the Part A Soil Work Plan.

The list of analytical parameters is based on CSM and will be refined after each round of investigation/data evaluation. COCs will be selected based on the risk assessment.

ARARs = applicable or relevant and appropriate requirements.
PAH = polycyclic aromatic hydrocarbon.

8.0 Data Gaps Evaluation Summary

This section presents a summary of the data gaps evaluation described in Appendix C for SWMU1, AOC 1, AOC 4, AOC 9, AOC 10, AOC 11, AOC 12, AOC 14, AOC 27, AOC 28, UA 1, and UA 2. The combined Category 1 historical data and validated Part A Phase 1 data, if applicable, were used in evaluating whether sufficient data exist to make each of the four decisions. The data gaps evaluation concluded:

- **Decision 1**. Additional sampling to more precisely delineate the nature and extent of COPCs/COPECs and/or newly -identified compounds is proposed at SWMU 1 and AOCs 1, AOCs 4, 9, 10, 11, and 14. In addition, sampling is proposed to characterize the newly identified areas (debris, historic burn, and white powder areas) as part of AOCs 10 and 14 and the new AOCs (AOC 27 and AOC 28).

- **Decision 2**. No further data are required to calculate EPCs for COPCs/COPECs and newly identified compounds exceeding interim screening levels. Additional vertical extent data collected in the remaining areas (SWMU 1, and AOCs 1, 4, and AOC 11) for Decision 1 will also be used in further development of EPCs.

- **Decision 3**. The initial conservative screening evaluation indicated that certain metals in soil could not be eliminated as a potential threat to groundwater at AOCs 9 and 10. Additional sampling is proposed at AOCs 9 and 10 to satisfy Decision 1. Additional vertical extent data are also proposed in SWMU 1 and, AOCs 1, 4, and AOC 11 to satisfy Decision 1. All newly collected data will be used to refine modeling. Limited data have been collected at AOCs 27 and 28, and the Decision 3 evaluation for these units cannot be conducted at this time. Data are required to describe the nature, and lateral and vertical extents of contamination at these two units.

- **Decision 4**. As described in Section 6.0, certain waste characterization data and soil physical properties data are needed at all units. To minimize additional borings, soil physical property data are proposed to be collected only at those locations where borings are proposed for other purposes (two to three samples from each unit to be sampled during the Phase 2 investigation). The remaining information will be collected after the risk assessment has been completed, and the precise areas potentially requiring remediation have been defined.

Table 8-1 provides a summary of the proposed additional sampling to address the data gaps identified during this evaluation.

After collection of the Phase 2 samples presented in Appendix C, the data will be evaluated to assess if the data gaps have been resolved and to identify remaining uncertainties to be addressed in the risk assessment or CMS/FS.

TABLE 8-1
Proposed Phase 2 Sampling Summary
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

	Additional Number of Samples and Locations Proposed to Address Data Gaps			
Unit	**Decision 1 – Nature and Extent**	**Decision 2 – Data Sufficiency to Calculate EPCs**	**Decision 3 – Potential Impacts to Groundwater**	**Decision 4 – Data Sufficiency for CMS/FS**
SWMU 1	Eight additional locations (Appendix C1 Table C1-14).	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples from various depth intervals at two borings to evaluate soil physical properties (six samples total)
AOC 1	Thirty-three additional locations (Appendix C2 Table C2-19).	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples total from various depth intervals at five borings to evaluate soil physical properties (15 samples total)
AOC 4	Twenty-two additional locations (Appendix C10 Table C10-15).	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples from various depth intervals at one boring to evaluate soil physical properties
AOC 9	Six additional locations (Appendix C3 Table C3-16).	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples from various depth intervals at two borings to evaluate soil physical properties (six samples total)
AOC 10	Fourteen additional locations (Appendix C4 Table C4-18). Up to 20 XRF samples will be collected in the debris area on the slope to assist with identifying possible sample locations. The need for specific soil sample locations required to evaluate potential contamination associated with debris will be determined in collaboration with the stakeholders, and samples will be collected as directed by the agencies.	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples from various depth intervals at one boring to evaluate soil physical properties
AOC 11	Fifteen additional locations (Appendix C5 Table C5-19).	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples from various depth intervals at two borings to evaluate soil physical properties (six samples total)
AOC 12	None.	None	None.	None

TABLE 8-1
Proposed Phase 2 Sampling Summary
Soil Investigation Part A Phase 1 Data Gaps Evaluation Report,
Pacific Gas and Electric Company Topock Compressor Station Needles, California

	Additional Number of Samples and Locations Proposed to Address Data Gaps			
Unit	**Decision 1 – Nature and Extent**	**Decision 2 – Data Sufficiency to Calculate EPCs**	**Decision 3 – Potential Impacts to Groundwater**	**Decision 4 – Data Sufficiency for CMS/FS**
AOC 14	Four additional locations (Appendix C7 Table C7-15). Up to 20 XRF samples will be collected in the debris area east of the AOC to assist with identifying possible sample locations. If the applicable screening levels are not exceeded, no further sampling will occur at that location. However, if applicable screening levels are exceeded, soil samples will be collected at 0 to 0.5, 2 to 3, 5 to 6, and 9 to 10 feet below ground surface at that location and will be submitted to the laboratory for analysis for hexavalent chromium, PAHs, Title 22 metals, and asbestos.	None	Additional vertical extent data will be provided by locations defined for Decision 1, and refined modeling will be conducted.	Three samples total from various depth intervals at one boring to evaluate soil physical properties
AOC 27	Eight locations (Appendix C11, Table C11--2). Up to 40 XRF samples will be collected in this unit to assist with identifying possible sample locations. The need for specific soil sample locations required to evaluate potential contamination associated with debris will be determined in collaboration with the stakeholders, and samples will be collected as directed by the agencies. No more than 20 potholes//trenches will be installed.	None	Required lateral and vertical extent data will be provided by locations defined for Decision 1.	Three samples from various depth intervals at two borings to evaluate soil physical properties (six samples total)
AOC 28	Four locations (Appendix C12, Table C12-6).)	None	Required lateral and vertical extent data will be provided by locations defined for Decision 1.	Two samples total from various depth intervals at one boring to evaluate soil physical properties
UA 1	Not applicable.	Not applicable	Not applicable	Not applicable
UA 2	None.	None	None	None

XRF = x-ray fluorescence

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Attachment 1
DOI Direction Letter: “PG&E Topock Compressor Station Remediation Site – Topock Soil Investigation Part A Phase 1 Data Gaps Evaluation Report – Proposed Sample Locations, PG&E Topock Compressor Station, Needles, California”

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
FISH AND WILDLIFE SERVICE
BUREAU OF RECLAMATION

ELECTRONIC SUBMISSION

February 25, 2011

Ms. Yvonne Meeks
Manager – Environmental Remediation
Pacific Gas and Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

Subject: PG&E Topock Compressor Station Remediation Site – *Topock Soil Investigation Part A Phase 1 Data Gaps Evaluation Report – Proposed Sample Locations, PG&E Topock Compressor Station, Needles, California*.

The Department of the Interior, on behalf of itself and the Bureau of Land Management, the U.S. Fish and Wildlife Service, and the Bureau of Reclamation (collectively referred to as "DOI") and the California Department of Toxic Substances Control (DTSC) are providing direction to Pacific Gas and Electric (PG&E) regarding the Topock Soil Investigation Part A Phase 1 Data Gaps Evaluation Report and the proposed sampling locations provided therein.

The Data Gaps Evaluation Report was prepared to address supplemental soil characterization activities at the Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and other undesignated areas (UAs) identified in the Revised Final RCRA Facility Investigation/Remedial Investigation Report, Volume 1 – Site Background and History (referred to as the RFI/RI Volume 1) located outside the compressor station fence line. Through a series of meetings held with the agencies, Tribes, PG&E, and other stakeholders in 2010, sample locations were identified to address data gaps in the SWMUs and AOCs.

In response to concerns raised by the Tribes through letters provided by the Fort Mohave Indian Tribe (FMIT) consultant (Hargis + Associates, November 22, 2010) and the Hualapai Department of Cultural Resources (December 3, 2010) and as a result of tribal meetings held December 7, 2010, and January 13, 2011, DOI and DTSC have had several discussions regarding the possibility of reducing the number of samples proposed at the various SWMUs and AOCs. To reduce the number of samples and disturbances to sensitive cultural resources, the agencies evaluated each sample location to determine which, if any, sample locations could be eliminated based on the following factors:

- Is future evaluation of the nature and extent of contamination necessary to assess the risk to human health and the environment, assess the threat to groundwater and/or evaluate and select a remedy?
- Is further data collection necessary to capture maximum concentrations or additional contaminants that could drive risk, threat to groundwater, or remedy technology assessment?
- Are contaminants of a type or concentration that could pose a potential threat to groundwater present?
- Are additional data needed to evaluate technology screening or assessment?

Based on this evaluation, the agencies have identified sample locations that we believe should be eliminated or relocated from those presented in the Data Gaps Analysis and carried forward in the development of the Soil Work Plan.

Our willingness to eliminate these sample locations is based on evaluation of existing data and some basic assumptions applicable to the SWMUs/AOCs identified in the attached table:

- Defining edges or detailed distribution of contamination in the wash channels is not necessary for technology assessment or risk evaluation. It is assumed that known contaminant concentrations measured at previous sample points extend between the points and to the wash boundaries.
- It is unlikely that significantly higher concentrations of contaminants exist in the areas that have not been sampled.
- It is unlikely that different types of contaminants exist in the areas that have not been sampled.
- Where vertical extent of contamination is defined, sufficient data are available to support modeling.

A major premise of this approach is that the nature and extent of contamination, where not currently fully defined, can and will be further defined, as necessary, during remedial design and/or remedial action implementation. Therefore, the decision to exclude an area from additional sampling at this time is not to be construed as a determination that the area is not contaminated or that the full extent of contamination is precisely defined.

The agencies also note that the focus was on reducing numbers of samples. PG&E should carefully review the proposed reduced sample set and evaluate whether revisions, beyond those specified here, are necessary to meet previously defined data quality objectives. Examples of the potential data gaps include whether the elimination of certain points has inadvertently eliminated necessary sampling for TAL/TCL-related characterization data or collection of samples for physical parameter data that may be necessary to assess the overall threat to groundwater or for remedy assessment. For efficiency, PG&E should also determine if a groundwater well should be installed at any of the planned deep soil boring locations in support of the groundwater remedy.

During the series of data gap evaluation meetings between the Tribes, agencies, PG&E and stakeholders in October and November 2010 and January 2011, revisions were discussed, proposed, and agreed upon for the various investigation areas. PG&E should incorporate these revisions into the Soil Work Plan. These include, but are not limited to, relocating sample locations based on field observations (e.g., AOC 9, AOC-11, etc.) and a proposal to investigate AOC 14 south of Interstate 40 (MW-24 Bench). PG&E should also incorporate the grid-based sampling of the mouth of Bat Cave Wash as proposed by DOI in our December 15, 2010 email to PG&E.

As part of our evaluation, we are also proposing the use of an X-ray fluorescence (XRF) analyzer in debris areas to screen for the presence of metal contamination associated with the debris. This method is a non-intrusive method that can provide chemical data in debris areas to help guide the need for actions or further investigation. As part of the Soil Work Plan, PG&E should propose an evaluation of debris areas using non-intrusive XRF technology.

Ultimately, it is PG&E's responsibility to ensure that the necessary data are collected in order to move forward with assessing risk and the development of a corrective measures study/feasibility study. PG&E should, therefore, carefully evaluate the proposals described in this letter and submit a comprehensive Soil Work Plan that will satisfy the data quality objectives (DQOs) specified in the Soil Part A and Part B DQO documents and the stipulations described in the 1996 Corrective Action Consent Agreement between DTSC and PG&E.

If you have any questions, please contact me at (303) 445-2502 or Jose Marcos (DTSC) at (714) 484-5492, at your convenience.

Sincerely,

Pamela S. Innis

Pamela S. Innis
DOI Topock Remedial Project Manager

Karen Baker

Karen Baker, CHG, CEG
Performance Manager, Office of Geology
California Department of Toxic Substances Control

Attachment: DOI & DTSC Data Gap Summary Table

Cc: PG&E Topock Consultative Workgroup (CWG) Members

FINAL DOI-DTSC REVISIONS TO SOIL PART A DATA GAP TABLE				
Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
SWMU 1				
SWMU1-18	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1, #3, and #4 - Define lateral and vertical extent in southern part of AOC 1 and support CMS/FS	Hexavalent chromium, Title 22 metals, PCBs[a]; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the southern portion of the former percolation beds area. Move this location due east approximately 25 feet so that it is located within the boundaries of the white powder area. Significantly elevated chromium concentrations are detected in this former impoundment area and is noted more often in aerial photos than the "blue line" impoundment.
SWMU1-19	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gap #1, #3, and #4 - Define lateral and vertical extent in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PCBs[a]; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the central portion of the former percolation beds area.
SWMU1-20	14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1 and #3 - Define vertical extent at previous sample location SWU1-2	Hexavalent chromium, Title 22 metals, PCBs[a]	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the northern portion of the former percolation beds area.
SWMU1-21	14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gaps #1 and #3 - Define vertical extent at previous sample location SWU1-1	Hexavalent chromium, Title 22 metals, PCBs[a]	Defining the vertical extent of contamination in this primary source area is a critical data gap. This location is retained to define the vertical extent of contamination in the northern portion of the former percolation beds area.
SWMU1-22	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white powder material and soil	Hexavalent chromium, Title 22 metals, PCBs[a], SPLP[b] and general chemistry analyses[b]	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized potential pathway for site-related contamination to have migrated to Bat Cave Wash.
SWMU1-23	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white powder material and soil	Hexavalent chromium, Title 22 metals, PCBs[a], SPLP[b] and general chemistry analyses[b]	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized potential pathway for site-related contamination to have migrated to Bat Cave Wash.
SWMU1-24	None – pothole sample location	To resolve Data Gap #2 – Define lateral extent of white powder area and collect a sample of the white powder material and soil	Hexavalent chromium, Title 22 metals, PCBs[a], SPLP[b] and general chemistry analyses[b]	This location is retained to address the nature and extent of contamination associated with a previously uncharacterized potential pathway for site-related contamination to have migrated to Bat Cave Wash.

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AOC 1				
~~AOC1-BCW7~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW2~~	~~**Hexavalent chromium, Title 22 metals, PCBs**~~[a]	Replaced with DOI-specified tamarisk area sampling grid approach testing for hexavalent chromium, Title 22 metals, and PCBs
~~AOC1-BCW8~~	~~0, 2, and 5~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW6~~	~~**Hexavalent chromium, Title 22 metals, PCBs**~~[a]	
~~AOC1-BCW9~~	~~0, 2, and 5~~	~~To resolve Data Gaps #3- Define lateral extent at AOC1-BCW6~~	~~**Hexavalent chromium, Title 22 metals, PCBs**~~[a]	
~~AOC1-BCW10~~	~~0~~	~~To resolve Data Gaps #3- To confirm detections of certain metals at previous sample location AOC1-BCW6~~	~~**Hexavalent chromium, Title 22 metals, PCBs**~~[a]	
~~AOC1-BCW11~~	~~0, 2, and 5~~	~~To resolve Data Gaps #3,and #5- Define lateral extent at AOC1-BCW4 and support CMS/FS~~	~~Hexavalent chromium, PCBs~~[a]~~; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – 3 samples from boring~~	
~~AOC1-BCW12~~	~~0 and 2~~	~~To resolve Data Gaps #3- Define lateral and vertical extent at AOC1-BCW6~~	~~Hexavalent chromium, Title 22 metals, PCBs~~[a]	
~~AOC1-1~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
~~AOC1-2~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
~~AOC1-3~~	~~0, 2, 5, 9, 14, and 20~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
~~AOC1-4~~	~~0, 2, 5, 9, 14, and 20~~	~~To resolve Data Gaps #1 and #3 - Define lateral extent in bottom of Bat Cave Wash and support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PCBsa ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
~~AOC1-5~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral and vertical extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1

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Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
~~AOC1-6~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral and vertical extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination in wash east of SWMU 1
~~AOC1-7~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBsa~~	Existing data and streambed configuration adequately define and constrain lateral extent of contamination in wash east of SWMU 1
~~AOC1-8~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination in wash east of SWMU 1
AOC1-9 (contingent)	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]	These points are retained to characterize this uncharacterized slope area. Contingent upon AOC1-10 and AOC1-13
AOC1-10	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash	Hexavalent chromium, molybdenum, total chromium, PCBs[a]	These points are retained to characterize this uncharacterized slope area.
~~AOC1-11~~	~~0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
~~AOC1-12~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data and streambed configuration adequately define and constrain lateral extent of contamination to the west of SWMU 1
AOC1-13	0, 2, 5, 9, 14, 20, 30, 40, 50, 60, 70, and 80	To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]	These points are retained to characterize this uncharacterized slope area.
AOC1-14 (contingent)	0, 2, 5, 9, 14, 20, and 30	To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]	These points are retained to characterize this uncharacterized slope area. Contingent upon AOC1-10 and AOC1-13
~~AOC1-15~~	~~0, 2, 5, 9, 14, 20, and 30~~	~~To resolve Data Gap #1 - Define lateral extent in bottom of Bat Cave Wash~~	~~Hexavalent chromium, Title 22 metals, PCBs~~[a]	Existing data adequately define southern extent of contamination
AOC1-T1e	0, 2, 5, 9, and 14	To resolve Data Gap #1 - Define lateral extent at AOC1-T1c.	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]	This point is retained to characterize this uncharacterized flood area.
~~AOC1-T1f~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent at AOC1-T1b and at AOC1-T1c.~~	~~Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs~~[a]	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T1g	0, 2, 5, 9, and 14	To resolve Data Gap #1 - Define lateral extent at AOC1-T1c.	Hexavalent chromium, Title 22 metals, PAHs, pH, PCBs[a]	This point is retained to characterize this uncharacterized flood area.
~~AOC1-T2f~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Title 22 metals, PCBs~~[a]	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.

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~~AOC1-T2g~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Molybdenum, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T2h~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T2.~~	~~Title 22 metals, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T2i	0, 2	To resolve Data Gap #4 - Evaluate potential white powder	Title 22 metals, hexavalent chromium, pH, PCBs[a]	This point is retained to characterize this uncharacterized white powder area.
~~AOC1-T3d~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T3.~~	~~Hexavalent chromium, Title 22 metals, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T4d~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T4.~~	~~Hexavalent chromium, Title 22 metals, PCBs[a] PAHs~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
~~AOC1-T4e~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T4.~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
AOC1-T5d	0, 2, 5, 9, 14, and 20	To resolve Data Gaps #1 and #5- Define lateral extent near sample transect AOC1-T5 and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs[a] ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – 3 samples from boring	This location is retained to characterize this long-term terminal endpoint for sediment deposition.
~~AOC1-T5e~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #1 - Define lateral extent near sample transect AOC1-T5.~~	~~Copper, PAHs, PCBs[a]~~	Existing data for this portion of wash are adequate for remedial action decision making. It is unlikely that significantly higher concentrations exist in this portion of the wash.
New Point	0, 2, 5, 9, 14, and 20	Located at potential impoundment area where flow enters the culvert under the railroad bridge	Hexavalent chromium, Title 22 metals, PAHs, PCBs[a] ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – 3 samples from boring	This location is retained to characterize this potential long-term terminal endpoint for sediment deposition.
New Point	0, 2, 5, 9, 14, and 20	Located at potential impoundment area at IM-3 road crossing	Hexavalent chromium, Title 22 metals, PAHs, PCBsa ; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – 3 samples from boring	This location is retained to characterize this potential long-term terminal endpoint for sediment deposition.
AOC 4				

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Location ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments
AOC4-BCW1	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans	This data point is necessary to address the down stream extent of contamination potentially migrating into Bat Cave Wash from the Debris Ravine.
~~AOC4-BCW2~~	~~0, 2, 5, and 9~~	~~To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).~~	~~Title 22 metals, hexavalent chromium , PCBs and dioxins/furans~~	This data point is not critical to remedial action decision making for this portion of the wash
AOC4-BCW3	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans	These data points are retained as two transects to assess the potential for contamination migrating into Bat Cave Wash from the Debris Ravine. The specific migration pathway of contaminants emanating from the Debris Ravine is unknown.
AOC4-BCW4	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans	
AOC4-BCW5	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans	
AOC4-BCW6	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans, asbestos (surface soil sample only)	
AOC4-BCW7	0, 2, 5, and 9	To resolve Data Gap #2 - Extent of constituents associated with the discharge from the Debris Ravine (AOC 4).	Title 22 metals, hexavalent chromium , PCBs and dioxins/furans	This data point is retained to assess the influence of upstream conditions to distinguish Debris Ravine effects on soil in Bat Cave Wash.
AOC 9				

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Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
AOC10a-2	0, 2, 5 and 9	To resolve Data Gaps #3 and #4 - Define lateral and vertical extent downslope of AOC 9 and Subarea AOC 10a and support model refinement for Decision 3	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides	This data point is retained to assess the nature and extent of contamination within the surface drainage leading from the base of the slope at the primary pipe break release area.
AOC10a-3	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral and vertical extent downslope of AOC 9 and Subarea AOC 10a	Hexavalent chromium, Titl2 22, PAHs, PCBs, pesticides	This data point is retained to assess the downstream nature and extent of contamination within the surface drainage leading from AOC 9, and other surface discharges along the slope east of AOC 9.
AOC9-15	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral extent downslope of AOC 9	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides	This data point is retained to assess the nature and extent of contamination at a runoff pathway across the dirt road at the base of the slope beneath the primary pipe break release area.
AOC9-16	0, 2, 5 and 9	To resolve Data Gaps #3 and #5 - Define lateral extent and support CMS/FS	Hexavalent chromium, Title 22 metals, PAHs, PCBs, pesticides; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination at the base of the slope at the primary pipe break release area.
AOC9-17	9 and 14	To resolve Data Gaps #1 and #4 - Define vertical extent at cluster of previous sample locations (#4 through #9 and AOC9-8) and support model refinement for Decision 3	Hexavalent chromium	This data point is retained to verify the efficacy of the previous removal action and assess the vertical extent of contamination at the primary pipe break release area.
AOC9-18	5, 9, and 14	To resolve Data Gaps # 2 and 4 - Define vertical extent at previous sample location AOC9-5, and support model refinement for Decision 3	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the vertical extent of contamination where the vertical extent was undefined based on previous sampling.
~~AOC9-19~~	~~5, 9, and 14~~	~~To resolve Data Gaps #3 and 4 - Define vertical extent at previous sample location AOC9-3 and support modeling for Decision 3~~	~~Lead, zinc~~	Lead and zinc are unlikely to result in groundwater contamination or drive risk
~~AOC9-20~~	~~5, 9, and 14~~	~~To resolve Data Gaps #2 and 4 - Define vertical extent at previous sample location AOC9-10~~	~~Title 22 metals, PAHs~~	This location is in close proximity to AOC 9-18, which is adequate to define the vertical extent of contamination

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AOC9-21	0, 2, 5 and 9	To resolve Data Gaps #3 and #5 - Define lateral and vertical extent and support CMS/FS	Title 22 metals, PAHs, pesticides, PCBs; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination downslope of the primary pipe break release area.
AOC9-22	0, 2, 5 and 9	To resolve Data Gap #3 - Define lateral extent associated with AOC9-13	Mercury, lead, PAHs, pesticides, PCBs	This data point is retained to assess the influence of upstream conditions to distinguish AOC 9 effects on soil in surface drainage.
AOC 10				
AOC10-9	0, 2, 5,and 9	To resolve data gap #2 – Assess nature and extent associated with runoff from station access road to the low point north of Subarea 10d	Hexavalent chromium, Title 22 metals, PAHs	This point is retained to assess the potential for contamination entering the East Ravine from runoff
AOC10-10	0, 2, 5, and 9	To resolve data gap #1- Assess lateral extent associated with PS-21and nature and extent of potential impact from soil down slope from the outfall	Hexavalent chromium, Title 22 metals	This data point is retained to assess the potential for contaminated surface runoff entering the East Ravine from an outfall from the facility
~~AOC10-11~~	~~0, 2, 5, and 9~~	~~To resolve data gap #3 -Assess lateral extent between Subareas 10c and 10d~~	~~Hexavalent chromium, Title 22 metals, PAHs~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision making purposes
~~AOC10-12~~	~~0, 2, 5, and 9~~	~~To resolve data gap #4 - Assess potential impact from debris on northern slope (may not be technically feasible to get to proposed depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs~~	This location is in close proximity to AOC 10-20
AOC10-13	0, 2, 5, 9~~ and 14~~	~~To resolve data gaps #1, 4, and 7 -~~ Assess potential impacts from debris on south slope~~ and support CMS/FS, and the lateral extent between Subareas 10b and 10c~~	Hexavalent chromium, Title 22 metals, PAHs; pH, TPH, SVOCs, dioxins and furans (if burn material present), PCBs, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution))	Move this location to immediately adjacent to debris pile to assess potential impact from debris. This is an unknown debris site and should be tested for all potential contaminants. Existing data are adequate to define the lateral extent of contamination in the main part of the wash. May want to consider another location for soil physical parameter data sample.
AOC10-14	0, 2, 5, and 9	To resolve data gap #4 -Assess potential impacts from debris on south slope (may not be technically feasible to get to proposed depth)	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contamination entering the East Ravine from a debris pile

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Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
AOC10-15	~~0, 2, 5, and 9~~ White Powder Only	To resolve data gap #4 - Assess white powder material on north slope ~~(may not be technically feasible to get to proposed depth)~~	Hexavalent chromium, PAHs, pH, Title 22 metals,	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated
AOC10-16	~~0 and 2[a]~~ White Powder ~~Only~~ and discolored soil	To resolve data gap #4 -Assess white powder material and discolored soil on north slope ~~(may not be technically feasible to get to proposed depth)~~	Hexavalent chromium, PAHs, pH, Title 22 metals	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated
AOC10-17	0, 2, 5, and 9	To resolve data gap #4 – Assess potential impact from debris (dirt pile with green-colored wood)	Hexavalent chromium, pH, Title 22 metals	This data point is retained to assess potential contamination from the debris, including green-colored wood possibly indicative of chromium contamination
AOC10-18	0 and 2[a]	To resolve data gap #1 – Assess nature and extent of soil down slope from the potential outfall of the former trench drain	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contaminated surface runoff entering the East Ravine from an outfall from the facility
AOC10-19	0, 2, 5, and 9	To resolve data gap #4 - Assess debris on north slope (may not be technically feasible to get to proposed depth)	Hexavalent chromium, Title 22 metals, PAHs, pH, TPH, SVOCs, dioxins and furans (if burn material present), PCBs	This is an unknown debris site and should be tested for all potential contaminants
AOC10-20	~~0, 2, 5, and 9~~ White Powder and discolored soil	To resolve data gap #4 -Assess white powder material and discolored soil on north slope (may not be technically feasible to get to proposed depth)	Hexavalent chromium, PAHs, pH, Title 22 metals	Insufficient basis on which to drill boring at this location pending determination if white powder is contaminated
AOC10a-2	0, 2, 5, and 9	To resolve data gaps # 1 and 6 - Assess vertical and lateral extent and collect data to assess current threat to groundwater.	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and AOC 9.
AOC10a-3	0, 2, 5, and 9	To resolve data gap #1 -Assess lateral extent (down slope of AOC9 and Subarea 10a)	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and AOC 9.
~~AOC10b-5~~	~~0, 2, 5, and 9~~	~~To resolve data gap # 3 – Assess lateral extent up slope from AOC 10b-3~~	~~Hexavalent chromium, Title 22 metals~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision making purposes
~~AOC10c-6~~	~~14 To Groundwater~~	~~To resolve data gaps # 3 and 6 - Assess vertical extent at previous sample location AOC10c-1 and assess current threat to groundwater~~	~~Hexavalent chromium, total chromium~~	Dropping this sample location is contingent on the sampling of East Ravine Well Site H.

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~~AOC10c-7~~	~~14~~	~~To resolve data gap #3 - Assess vertical extent at previous sample location AOC10c-4~~	~~Title 22 metals, PAHs~~	In close proximity to MW-58BR that adequately defined vertical extent of contamination.
AOC10d-9	0, 2, 5, and 9	To resolve data gap #3 -Assess lateral extent associated with AOC 10d-3 and L-3	Hexavalent chromium, Title 22 metals, PAHs	This data point is retained to assess the potential for contaminated surface runoff into the East Ravine.
~~AOC10d-10~~	~~0, 2, 5, 9 and 14~~	~~To resolve data gaps #3 and 7 - Assess lateral and vertical (Zinc only) extent collect soil parameter information to support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PAHs; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision making purposes. May want to consider another location for soil physical parameter data sample.
Assorted debris locations		To resolve data gap #4 - Sampling of debris for ACM	ACM, XRF screen	XRF screen to assess potential for contamination in debris areas
AOC 11				
~~AOC11a-6~~	~~9, 14, and 19~~	~~To resolve Data Gaps #1 and #6 - Define vertical extent at AOC11a-1. Recollect at 9 feet verifying hexavalent chromium concentration. Collect data to assess current threat to groundwater.~~	~~Hexavalent chromium, lead~~	Existing data are adequate for remedial action decision making for this area
~~AOC11a-7~~	~~14 and 19~~	~~To resolve Data Gap #1 - Define vertical extent at AOC11a-5.~~	~~Title 22 metals~~	Existing data are adequate for remedial action decision making for this area
AOC11c-3	~~14, 19~~ To groundwater	~~To resolve Data Gaps #2 and #6 - Define vertical extent at previous sample location AOC11c-SS2.~~ Collect data to assess current threat to groundwater.	Hexavalent chromium, Title 22 metals, PCBs	This data point is retained to assess the vertical extent of contamination at this location
~~AOC11c-4~~	~~0, 2, 5, 9 and 14, 19~~	~~To resolve Data Gaps # 2 and #7 - Define lateral and vertical extent in AOC11c and support CMS/FS~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	In close proximity to AOC 11c-5

FINAL DOI-DTSC REVISIONS TO SOIL PART A DATA GAP TABLE				
Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
AOC11c-5	0, 2, 5, 9 and 14, 19	To resolve Data Gaps #2 and #6 - Define lateral and vertical extent in AOC11c. Collect data to assess current threat to groundwater.	Hexavalent chromium, Title 22 metals, PAHs, PCBs, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution)	This data point is retained to assess the vertical extent of contamination in this former retention basin
AOC11e-3	0, 2, 5, 9, and 14	To resolve Data Gap #3 - Define lateral and vertical extent upslope of AOC 11e (may not be technically feasible to get to depth)	Hexavalent chromium, Title 22 metals, PAHs, PCBs	Data point retained to assess potential for contamination associated with outfall
~~AOC11e-4~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #3 - Define lateral and vertical extent upslope of AOC 11e (may not be technically feasible to get to depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs~~	Data to be collected at AOC 11e5 will be adequate to assess this pathway for remedial action decision making purposes
AOC11e-5	0, 2, 5, 9, and 14	To resolve Data Gaps #3 and #7- Define lateral and vertical extent upslope of AOC 11e (may not be technically feasible to get to depth)) and support CMS/FS.	Hexavalent chromium, Title 22 metals, PAHs, PCBs; soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	This data point is retained to assess the nature and extent of contamination in this former retention basin Move in field if location fails depth.
AOC11e-6	~~14~~ To groundwater	To resolve Data Gap #4 - Define vertical extent in AOC 11e. Refine vadose zone leaching model.	Hexavalent chromium, Title 22 metals, PAHs, PCBs	This boring must extend to the water table, if technically feasible, to achieve objective of supporting vadose zone leaching model.
~~AOC11e-7~~	~~0, 2, 5, 9, and 14~~	~~To resolve Data Gap #3 - Define lateral and vertical extent upslope of AOC 11c (may not be technically feasible to get to depth)~~	~~Hexavalent chromium, Title 22 metals, PAHs, PCBs~~	Existing data and stream configuration adequately define and constrain lateral extent of contamination for remedial action decision making purposes
AOC11e-8	0	To resolve Data Gaps #5 and #8– Assess white powder material in newly identified white powder area	Title 22 metals, hexavalent chromium, general chemistry, pH	This data point is retain to assess the nature of the white powder
AOC11-1	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station .
~~AOC11-2~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area (burn area)~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans~~	Data to be collected at AOC 11-1 and AOC 11-3 will be adequate to characterize this area
AOC11-3	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area (burn area)	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans, PCBs	PCBs could be associated with waste oil burning
AOC11-4	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area (burn area)	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs , dioxins and furans, PCBs	PCBs could be associated with waste oil burning

FINAL DOI-DTSC REVISIONS TO SOIL PART A DATA GAP TABLE

Location ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments
~~AOC11-5~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Data to be collected upstream and downstream at other locations and configuration of drainage will adequately define lateral extent of contamination for remedial action decision making purposes
AOC11-6	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans	This data point is retained to assess the potential for contaminated surface runoff in the surface drainage leading from the compressor station and fire training area.
~~AOC11-7~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Data to be collected upstream and downstream at other locations and configuration of drainage will adequately define lateral extent of contamination for remedial action decision making purposes
AOC11-8	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs, dioxins and furans	This data point is retained to assess the potential for contaminated surface runoff in the terminal deposition area of the surface drainage leading from the compressor station and fire training area.
~~AOC11-9~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	Extraneous location?
~~AOC11-10~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	This location is dropped based on co-location with AOC 11-8. PG&E shall base the location of AOC 11-8 on accessibility to the lowest point.
~~AOC11-11~~	~~0, 2, 5, and 9~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	AOC 11-11 and AOC 11-12 are adequate for initial characterization of this area. These two locations should be located at the lowest points along the road. Two additional sample locations are to be located in the outfalls below the bench area contingent upon the results of AOC 11-11 and AOC 11-12.
AOC11-12 (contingent)	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	
AOC11-13 (contingent)	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	
AOC11-14	0, 2, 5, and 9	To resolve Data Gaps #5 and #8–Assess newly identified area	Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs	
~~AOC 11-15~~	~~0, 2, 5, and 10~~	~~To resolve Data Gaps #5 and #8–Assess newly identified area~~	~~Title 22 Metals, hexavalent chromium, pH, TPH, SVOCs, PAHs~~	
AOC 14				
~~AOC14-14~~	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #2 -Assess possible drainage from AOC14 (location may be relocated after field assessment) and the newly identified potential burn area west of AOC14~~	~~Dioxin and furans, hexavalent chromium, molybdenum, total chromium~~	AOC 1 data will be utilized to assess the bottom of the adjacent drainage.
~~AOC14-15[a]~~	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (accessible area at bottom of slope)~~	~~Hexavalent chromium, Title 22 metals, asbestos~~	To be screened with XRF.

FINAL DOI-DTSC REVISIONS TO SOIL PART A DATA GAP TABLE

Location ID	Depths (ft bgs)	Description/Rationale	Analytes	Rationale/Comments
~~AOC14-16~~[a]	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (area adjacent to debris) east of AOC14~~	~~Hexavalent chromium, pesticides PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-17~~	~~0 and 2~~	~~To resolve data gap #2 - Assess debris area (accessible area at bottom of slope)~~	~~Hexavalent chromium, pesticides, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-18~~	~~0 and 2~~	~~To resolve data gap #2 - Assess the newly identified debris area (area adjacent to debris) east of AOC14~~	~~Hexavalent chromium, pesticides, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos, dioxin and furans~~	To be screened with XRF.
~~AOC14-19~~	~~0 and 2~~	~~Define lateral and vertical extent in debris area~~	~~Hexavalent chromium, PAHs, PCBs, pH, SVOCs, Title 22 metals, TPH, VOCs, asbestos~~	To be screened with XRF.
AOC14-20	0, 2, 5, 9, and 14	Evaluate newly identified potential burn area	Dioxin and furans	This sample point is retained to assess potential contamination associated with a small pocket of burn waste debris observed at this location
AOC14-21	0, 2, 5, 9, and 14	To resolve data gaps #1 and #2 - Define lateral and vertical extent of exceedences in southwestern corner and assess the newly identified potential burn area west of AOC14	Dioxin and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH , soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring	Select locations based on waste observations. Sample locations 0-10 feet.
AOC14-22	0, 2, 5, 9, and 14	To resolve data gap #2 - Assess the newly identified potential burn area west of AOC14	Dioxin and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	
AOC14-23	0, 2, 5, 9, and 14	To resolve data gap #2 - Assess the newly identified potential burn area west of AOC14	Dioxin and furans, pesticides, PAHs, VOCs, SVOCs, Title 22 metals, hexavalent chromium, PCBs, TPH, pH	
~~AOC14-24~~	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #4 - Assess lateral (for vadose zone model refinement) and vertical extent of hexavalent chromium in vicinity of existing boring S4-4~~	~~Hexavalent chromium, soil physical parameters (Atterberg limits, relative compaction, alkalinity, cation exchange, capacity, and particle size distribution) – three samples from boring~~	Data collection at these locations will not significantly alter groundwater assessment (PG&E to verify).

FINAL DOI-DTSC REVISIONS TO SOIL PART A DATA GAP TABLE				
Location ID	**Depths (ft bgs)**	**Description/Rationale**	**Analytes**	**Rationale/Comments**
~~AOC14-25~~	~~0, 2, 5, 9, and 14~~	~~To resolve data gap #4 - Assess lateral (for vadose zone model refinement) and vertical extent of hexavalent chromium in vicinity of existing boring S4-4 (accessible area at bottom of slope)~~	~~Hexavalent chromium~~	Data collection at these locations will not significantly alter groundwater assessment (PG&E to verify).
Assorted debris locations			XRF screen	XRF screen to assess potential for metals-contamination in debris areas
MW-24 Bench Area	Surface Geophysical survey	To resolve data gap #3 - Obtain initial information	N/A	Sampling plan as discussed at TWG meeting in fall 2010 .

Attachment 2
Thiessen Polygon Spatial-Weighting Technique – General Information

ATTACHMENT 2

THIESSEN POLYGON SPATIAL-WEIGHTING TECHNIQUE – GENERAL INFORMATION

PG&E Topock Compressor Station, Needles, California

1.0 Introduction

USEPA (2001; 2005) recommends considering the use of spatial weighting techniques to calculate the exposure point concentration (EPC) when concentrations across the site exhibit positive spatial autocorrelation, meaning that samples located nearby each other have more similar concentrations than located further apart. Common spatial weighting techniques include Thiessen Polygons, Inverse Distance Weighting (IDW), and Kriging. USEPA has facilitated the application of these methods by developing public domain software including GEO-EAS[1], SADA[2], and FIELDS[3].

There are numerous examples of applications of spatial weighting techniques at hazardous waste sites. Sites in USEPA Regions IV, V, VII, and X are posted on the USEPA SADA web site (http://www.tiem.utk.edu/~sada/applications.shtml). In 2005, DTSC approved the use of Thiessen Polygons to define EPCs for the Santa Susana Field Laboratory in Ventura County, California[4]. There are also numerous examples of applications and overviews of geostatistical methods for calculating spatially-weighted upper confidence limits on the mean (95UCLs) available in the peer-reviewed literature. Two examples demonstrating approaches to calculating 95UCLs for constituents in surface soil using Thiessen Polygons are provided by Clifford et al., (1995) and Burmaster and Thompson (1997).

Consistent with EPA guidance, the applicability of spatial weighting methods will be explored as a refinement to the risk characterization at Topock Compressor Station, Needles, California. Specifically, spatial weighting methods will be used to develop EPCs if marginally significant risks are identified. If the most conservative risk estimates result in acceptable risks (i.e., a hazard quotient less than one using the NOAEL-based TRV and a site use factor of one), then spatial analysis of risks is not needed. Conversely, if the least conservative of the risk estimates results in significant risks (for example, a hazard quotient greater than 100 using the LOAEL-based TRV and a site use factor calculated from the receptor's home range), then refinement using spatial weighting may be deferred until other

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[1] Geostatistical Environment Assessment Software (GEO-EAS) (Englund and Sparks, 1988).

[2] Spatial Analysis Decision Analysis (SADA). Funded by USEPA Region V and U.S. Nuclear Regulatory Commission. http://www.tiem.utk.edu/~sada/index.shtml

[3] Field Environmental Decision Support (FIELDS). Funded by USEPA Region V. http://www.epa.gov/region5fields/

[4] Final workplan for risk assessment for Santa Susana Field Laboratory site is posted on the DTSC web site: http://www.dtsc.ca.gov/HazardousWaste/Projects/upload/SSFL_SRAM_Vol_1_2005_SRAM_Rev2_TXT_TBLS_FIGS_to_1_5-2.pdf

refinements are complete (e.g., validation of bioaccumulation factors). This Attachment summarizes how the Thiessen Polygon technique will be used to calculate 95UCLs, and includes a brief discussion of potential future applications to illustrate areas driving significant risks, if identified.

2.0 Methodology

Of the available spatial weighting techniques applied to risk assessments, Thiessen Polygons is perhaps the most common because it requires the fewest assumptions. Its popularity is likely because it is relatively easy to understand and implement, and it can yield more reliable (accurate) estimates of 95UCLs than non-spatial weighting techniques, particularly if the sampling design is non-random. USEPA (2004) provides a complete overview of the benefits and limitations of spatial interpolation methods and recommends a method that is "appropriate dependent upon the data, the purpose of the analysis, and the planned use of the predicted surface". A process for determining whether the spatial structure may support other interpolation techniques (e.g., IDW) or probability-based methods (kriging) is proposed in a poster presented by ARCADIS at recent Society of Environmental Toxicology and Chemistry (SETAC) North America and Northern California SETAC meetings (Orr, et.al., 2007). The poster is included as an attachment to this text. One major advantage of the Thiessen Polygon approach is that it does not require the use of substitution methods for non-detects, which have been shown to introduce bias in estimates of 95UCLs (USEPA, 2007). In addition, the Thiessen Polygon approach allows for the use of USEPA's ProUCL v.4 software, which provides the most robust estimates of 95UCLs for left-censored data (USEPA, 2007). Therefore, the Thiessen polygon spatial-weighting method is planned for the Topock risk assessment, if spatial-weighting of the EPCs is indicated by the initial risk estimates.

Thiessen Polygons are conceptually straight forward. An area under consideration is divided into polygons such that every polygon is associated with one and only one point sample. The unsampled area contained within each polygon is nearest to the associated sample and, therefore, the concentration for the entire area contained by the polygon is assumed to be equal to that of the associated sample. A weighting factor is then applied to a sample based on the proportion of the total exposure unit that is represented by the polygon associated with the sample. Samples located within areas of dense point sampling are associated with smaller polygons than samples located in less dense sampling areas. This method is sometimes considered a "declustering" technique because it effectively associates smaller polygon areas and weighting factors to samples in clusters.

Once a polygon network is established for a site, additional post-processing of the areas can be done to provide improved estimates of area averages (and 95UCLs). For example, subareas of the polygons can be "clipped" to reflect habitat boundaries (e.g., roadways or changes in habitat type), footprints of large structures or water bodies not included in the exposure unit, or subareas (e.g., hot spots) that will undergo a future remedy. An example of this is shown in Figure 1. A site-wide Thiessen Polygon network was developed for arsenic concentrations in surface soil, and then post processed to exclude a major roadway and several presumptive remedy areas (see polygons with cross-hatches on the north-eastern portion of Exposure Unit 2). In this example, it is also informative to note that the samples located inside the presumptive remedy areas can still contribute to the estimates of unsampled areas on the edges of the presumptive area boundaries (see polygons shaded in brown).

While the calculation of the spatially-weighted arithmetic mean concentration within an exposure unit is relatively straightforward, it can be more challenging to calculate the 95UCL. The following steps will be used in order to ensure that the ProUCL-based decision rules for identifying the most robust statistical method are consistently applied.

1. Identify all polygons (or portions of polygons) that are contained within the boundaries of an exposure unit. Note that the polygon may "originate" from a sample obtained outside the exposure unit.

2. Identify the concentration associated with each polygon and calculate the corresponding weighting factor, equal to the area of the polygon divided by the area of the exposure unit.

3. Use bootstrap resampling (i.e., resample with replacement) to generate a data set of equal sample size to the original data set in Step 2. Further details regarding bootstrap resampling techniques are provided in USEPA guidance (USEPA, 2001; USEPA, 2007). Use the spatial weighting factor to determine the probability that any given sample is selected for the bootstrap sample.

4. Repeat Step 3 many times (e.g., 250 or more) to generate an array of different bootstrapped data sets, all with sample sizes equal to the original data set (Step 2).

5. Import the entire database of bootstrapped data sets from Step 4 into ProUCL 4 and use ProUCL 4 to calculate 95UCLs. This is facilitated by using the "group by" run option in ProUCL 4. This step will yield as many estimates of 95UCLs as bootstrapped datasets (e.g., 250 or more).

6. Calculate summary statistics for the distribution of 95UCLs. Select the arithmetic mean of the 95UCLs to represent the final, spatially-weighted, 95UCL (i.e., the EPC). If the original data set includes non-detects, this method can yield asymmetric (right-skewed) distributions of 95UCLs such that the arithmetic mean is greater than the median. Use of the arithmetic mean 95UCL also more closely approximates the 95UCL for a data set that has equal weighting factors for all samples.

3.0 Uncertainties in Calculating Spatially-Weighted EPCs using Thiessen Polygons

Although the Thiessen polygon approach is conceptually simple, easily implemented, and generally yields more reliable estimates of EPCs than non-spatial methods, there are some limitations of the approach. Thiessen polygons generally do not result in a smoothly contoured surface because the polygons can be large in areas of less dense sampling, and only one value contributes to the concentration for the areas within the polygon. Other interpolation methods incorporate more information from neighboring samples, resulting in smoother, and often more realistic estimates of concentrations at unsampled areas.

The calculation of the 95UCL using Thiessen Polygons can sometimes be higher than one might expect, given the sample size and spatially-weighted variance of the concentrations. This is particularly true for left-censored data, and reflects the fact that USEPA has adopted decision rules in selecting the most robust 95UCL statistics that tend to be conservative. That is, the decision rules will generally result in a nonparametric statistic that yields *at least* 95% coverage of the mean (and often higher than 95%) when the degree of censoring is relatively high (e.g., > 50%) (USEPA, 2007).

4.0 Other Applications of Spatial Analysis

If significant risks are identified during the predictive ERA, additional evaluation or action will result and spatial analysis of risk-driving chemicals may be conducted. Spatial analysis is typically used if risks are identified after a validation study. Spatial analysis of risks using Thiessen polygon maps has proved useful for risk managers evaluating remediation scenarios at sites under DTSC oversight. Risk assessors and managers can review the relative risks posed by chemicals at various locations within an exposure unit. Relative hazard quotients can be calculated for individual polygons. Figure 1 illustrates this concept by using polygons to highlight subareas where arsenic concentrations may exceed a low and high risk-based screening level (RBSL). Another example of this application was presented at the SETAC North America Meeting in 2005 (Pattanayek, et. al., 2005). The presentation is attached to this text for reference.

5.0 References

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A practical decision process for calculating exposure point concentrations for spatially explicit risk assessments

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Matthew Kohberger and Bridgette DeShields (ARCADIS)
James Gleason (Trihydro Corporation)

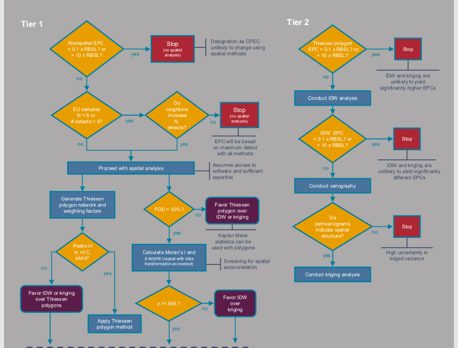
Abstract

It is generally recognized that the estimated Exposure Point Concentration (EPC) can be a major source of uncertainty in risk assessments, especially if spatial information inherent in the sample data and the activity patterns of receptors are ignored. Statistical methods and software tools for incorporating spatial information into sampling designs, as well as exposure assessments are becoming increasingly available. However, some methods can be costly to implement and may introduce uncertainties comparable to non-spatially explicit methods. Determining which methods and tools to implement after sampling has occurred can be especially challenging for large sites with many receptor populations and chemicals of potential ecological concern. A practical two-tiered decision process is proposed to guide site investigation teams in the selection of reliable and efficient methods for calculating the EPC for soils. Case studies are presented to compare the performance of "non-spatial" EPCs and "spatially-weighted" EPCs using Thiessen polygons, inverse distance weighting and kriging.

Goals of evaluation

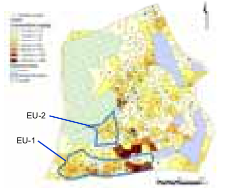
- Implement the decision tree on a variety of real-world surface soil data for metals.
- Determine if simple exploratory data analysis tools can be used to guide the method selection and indicate if major differences in 95UCLs can be expected.
- Identify major advantages and limitations of each method.
- Determine priorities for future research.

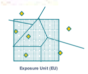
Decision tree



Thiessen polygons

Copper Thiessen polygon map





Weighting factor

$$w_i(\mathrm{EU}) = \frac{A_i}{\sum_{i=1}^{n} A_i}$$

w_i = weight of the i^{th} sampled location for i^{th} polygon that intersects the EU
A_i = area of portion of i^{th} polygon inside EU that is associated with i^{th} sampled location
n = number of polygons that intersect the EU

Spatially-weighted concentrations

$$\overline{C}_{EU} = \sum_{i=1}^{n} w_i \times C_i \qquad \hat{\sigma}^2_{EU} = \sum_{i=1}^{n} w_i \frac{(C_i - \overline{C}_{EU})^2}{(n-1)}$$

$\overline{C}_{EU}$ = spatially weighted arithmetic mean concentration within EU
$\hat{\sigma}^2_{EU}$ = spatially weighted sample variance where sample consists of C_i for all n polygons that intersect the EU

User-specified

- none

95UCL strategy

- use bootstrap simulation with probability weights (wi) to generate B=250 data sets
- batch run ProUCL 4 to generate 95UCLs for each data set; EPC = average 95UCL
- OR use custom SAS scripts that implement Kaplan Meier statistics in ProUCL4

- Weighting factors for highest concentrations are all greater than 1/n
- Weighting factors for low concentrations are evenly distributed about 1/n
- Suggests spatial weighting will yield a higher 95UCL

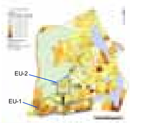
- Multiple high concentrations have high weighting factors
- Suggests spatial weighting will yield a higher 95UCL

Minimum Weighting Factor (w_i)	0.0003
Maximum w_i	0.06
Average w_i	0.02
Minimum Concentration (C_i) (mg/kg)	8.3
Maxmum C_i (mg/kg)	320

Frequency of Detects (FOD)	44/44
Arithmetic Mean C_i (mg/kg)	40
Weighted Mean C_i (mg/kg)	51
Weighted Mean C_i Detects (mg/kg)	51
Standard Deviation C_i (mg/kg)	65

Ecological risk-based screening levels for copper in soil
- Plants: 70 mg/kg (**endnote 1**), 100 mg/kg (**endnote 2**),
- Soil invertebrates: 50 mg/kg (**endnote 3**), 80 mg/kg (**endnote 1**)

Cobalt Thiessen polygon map



- Weighting factor for single maximum concentration is less than 1/n
- Weighting factors for low concentrations are grouped more often above 1/n
- Suggests spatial weighting will yield a lower 95UCL

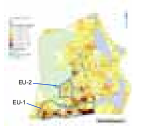
- Uniform distribution and maximum concentration with very low weighting factor
- Suggests spatial weighting will yield a lower 95UCL

Minimum Weighting Factor (w_i)	0.0003
Maximum w_i	0.06
Average w_i	0.02
Minimum Concentration (C_i) (mg/kg)	0.87
Maxmum C_i (mg/kg)	160

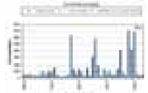
Frequency of Detects (FOD)	90/91
Arithmetic Mean C_i (mg/kg)	9.9
Weighted Mean C_i (mg/kg)	8.7
Weighted Mean C_i Detects (mg/kg)	8.8
Standard Deviation C_i (mg/kg)	17

Ecological risk-based screening levels for cobalt in soil
- Plants: 13 mg/kg (**endnote 1**), 20 mg/kg (**endnote 2**),
- Soil invertebrates: not available

Zinc Thiessen polygon map



- Weighting factor for higher concentrations tend to be greater than 1/n
- Weighting factors for low concentrations are evenly distributed about 1/n
- Suggests spatial weighting will yield a higher 95UCL



- Multiple high concentrations with high weighting factors
- Suggests spatial weighting will yield a higher 95UCL

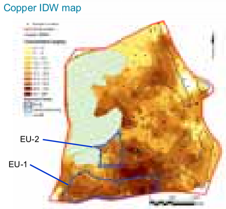
Minimum Weighting Factor (w_i)	0.0003
Maximum w_i	0.06
Average w_i	0.02
Minimum Concentration (C_i) (mg/kg)	31
Maxmum C_i (mg/kg)	710

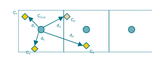
Frequency of Detects (FOD)	44/44
Arithmetic Mean C_i (mg/kg)	152
Weighted Mean C_i (mg/kg)	180
Weighted Mean C_i Detects (mg/kg)	180
Standard Deviation C_i (mg/kg)	184

Ecological risk-based screening levels for zinc in soil
- Plants: 50 mg/kg (**endnote 2**)
- Soil invertebrates: 200 mg/kg (**endnote 3**)

Inverse distance weighting (IDW)

Copper IDW map





Weighting factor

$$w_i(x,y) = \frac{\frac{1}{d_i^p}}{\sum_{i=1}^{n} \frac{1}{d_i^p}}$$

$w_i(x,y)$ = weight of the i^{th} sampled location associated with grid node at (x,y)
d_i = distance between the i^{th} sampled location and the grid node at (x,y)
p = positive exponent that determines how closer locations are weighted
n = number of sampled locations included in the estimate

Spatially-weighted concentrations

$$C(x,y) = \sum_{i=1}^{n} w_i(x,y) \times C_i$$

C(x,y) = concentration at unsampled location (x,y) (i.e., grid node)
C_i = concentration at i^{th} sampled location

User-specified

- n, p
- grid size
- nondetects (e.g., ½ reporting limit)

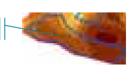
as p → 0, $w_i(\mathbf{u})$ → 1/n; C(x,y) → sample mean
as p → ∞ or n → 1, w_i for closest sample → 1; C(x,y) → Thiessen Polygon

95UCL strategy

- overlay a grid on site and determine C(x,y) for each grid cell that intersects EU
- use bootstrap simulation (equal weights per sample) with n = original sample size

Copper IDW grid

Original copper IDW map

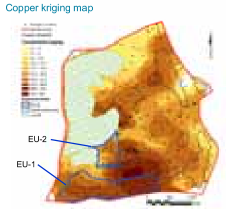


Grid

Subgrid with predicted values based on IDW for copper (n = 40)

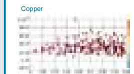
Kriging

Copper kriging map

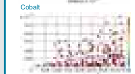


Semivariograms

Copper



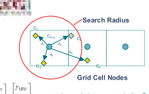
Cobalt



$$\gamma(h) = \left(\frac{1}{2N(h)}\right)\sum_{i=1}^{N(h)}(C_i - C_j)^2$$

$\gamma(h)$ = variogram for separation distance h (lag)
$N(h)$ = number of sample pairs (C_i, C_j) separated by distance h
C_i = concentration at i^{th} sampled location
C_j = concentration at j^{th} sampled location

- averaging one-half the difference squared in concentrations for all pairs of observations separated by approximately h



Weighting factor

$$\begin{bmatrix} \gamma_{1,1} & \gamma_{1,2} & \cdot & \cdot & \gamma_{1,n} & 1 \\ \gamma_{2,1} & \gamma_{2,2} & \cdot & \cdot & \gamma_{2,n} & 1 \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \gamma_{n,1} & \gamma_{n,2} & \cdot & \cdot & \gamma_{n,n} & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ \cdot \\ \cdot \\ w_n \\ \mu \end{bmatrix} = \begin{bmatrix} \gamma_{1,EU} \\ \gamma_{2,EU} \\ \cdot \\ \cdot \\ \gamma_{n,EU} \\ 1 \end{bmatrix}$$

- solve for all weights by minimizing variance of *prediction error* (kriging variance)

$\gamma_{i,j}$ = variogram between concentration C_i and all other concentrations (C_j) within specified search radius
$\gamma_{i,EU}$ = variogram between measured values C_i and the unsampled block (EU) (equal to average of ordinary kriging estimates for grid nodes within the block)
w_i = weight of the i^{th} measured value
μ = Lagrange multiplier

Spatially-weighted concentrations

$$C(x,y) = \sum_{i=1}^{n} w_i(x,y) \times C_i$$

$$\hat{\sigma}^2_{OK} = \hat{\sigma}^2 + \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j Cov_{i,j} - 2\sum_{i=1}^{n} w_i Cov_{i,0}$$

$$\hat{\sigma}^2_{BlockOK} = \hat{\sigma}^2 + \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j Cov_{i,j} - 2\sum_{i=1}^{n} w_i Cov_{i,EU}$$

Point Kriging vs. Block Kriging

$\hat{\sigma}^2_{OK}$ = kriging variance
$\hat{\sigma}^2_{BlockOK}$ = block kriging variance
$\hat{\sigma}^2$ = weighted sample variance
$Cov_{i,j}$ = covariance between measured pair (C_i, C_j)
$Cov_{i,0}$ = covariance between i^{th} observation and the point to be estimated (i.e., grid node)
$Cov_{i,EU}$ = average covariance between i^{th} observation and the points discretizing the EU

User-specified

- search radius
- grid size
- nondetects (e.g., ½ reporting limit)
- model fit to the semivariogram plot

Plus verification of assumptions

- *kriging errors are normally distributed* (may require data transformations such as lognormal or normal-score)
- *stationarity* (variance depends on distance and not on sample coordinates)
- *isotropy* (variance depends on distance but not direction)
- *minimual smoothing effect* (variance of kriged estimates is lower than that of true values)

95UCL strategy

- overlay a grid on site and determine C(x,y) for each grid cell that intersects EU
- use bootstrap simulation (equal weights per sample) with n = original sample size

Observations

- Plots of w_i vs C_i correctly indicate when Thiessen polygon 95UCL may be lower than non-spatial 95UCL, despite differences in sample size, skew and statistical method used to calculate 95UCL
- IDW and kriged estimates of 95UCL are comparable and lower than Thiessen polygon 95UCLs; this is likely due to the smoothing effect of large (30 m) grid cells. Iterative evaluations should be considered to determine optimal grid cell size based on the range of the semivariogram and average distance between sample locations.
- Unlike Thiessen polygon approach, interpolation methods (IDW and kriging) require estimates of non-detects using substitution (e.g., ½ DL), which introduces bias in both mean and variance estimates used in 95UCL calculations.

Statistic	Cobalt EU-1	Copper EU-1	Selenium EU-2	Zinc EU-1
FOD (native samples)	82/83	40/40	7/13	40/40
FOD (with Near. Neigh.)	90/91	44/44	8/15	44/44
Minimum (All data)	0.87	8.3	1.0	31
Maximum (All data)	160	320	11	710
Maximum Detect	160	320	11	710
Mean Detect	10	40	2.6	152
Moran's I Coefficient	0.004	0.02	0.01	0.03
Moran's I Z-score	1.53	4.27	2.82	5.60
95 UCL (non-spatial)	14	89	3.5	293
95 UCL (Thiessen polygons)	9.9	189	2.6	461
95 UCL (IDW)	NA	82	NA	152
95 UCL (Kriged)	NA	78	NA	168
95 UCL method (non-spatial)	95% KM (BCA)	95% Chebyshev (Mean, Sd)	95% KM (BCA)	95% Chebyshev (Mean, Sd)
95 UCL method (Thiessen polygons)	95% KM (BCA)	99% Chebyshev (Mean, Sd)	95% KM (Percentile Bootstrap)	99% Chebyshev (Mean, Sd)
95 UCL method (IDW)	NA	95% Chebyshev (Mean, Sd)	NA	95% Student's-t
95 UCL method (Kriged)	NA	95% Chebyshev (Mean, Sd)	NA	95% Approx. Gamma

Conclusions

- The decision tree appears to provide a reasonable balance between desired accuracy (reduction in bias of non-spatial EPCs) and level of effort.
- All three spatial methods require elaborate simulation experiments or simplifying assumptions regarding the distribution of the data. A ranking of the methods from least to greatest effort and number of assumptions is as follows: Thiessen polygon < IDW < kriging.
- IDW methods may be preferable to kriging for many data sets, considering the comparable 95UCL results and increased level of effort (analysis, documentation, communication) and modeling assumptions often required for kriging.
- Thiessen polygon methods are preferred over IDW and kriging because non-detects can be incorporated in the 95UCL calculation using appropriate methods recommended by USEPA (endnote 4).
- Future evaluations should include:
  - a systematic sensitivity analysis of (n,p,grid cell) for IDW and variography assumptions for kriging to determine if specific properties of a data set might favor kriging over IDW. These evaluations should be performed with cross validation (iteratively removing a single measured value and repeating the analysis).
  - develop an index of the relative magnitude of the non-spatial 95UCL and Thiessen polygon 95UCL based on readily calculated summary statistics (mean, standard deviation, sample size).
  - bootstrap simulations applied with spatial methods generate a distribution of 95UCLs from which the EPC is selected. A systematic evaluation of alternative statistics (mean, median, etc.) should be conducted to identify the least biased statistic.

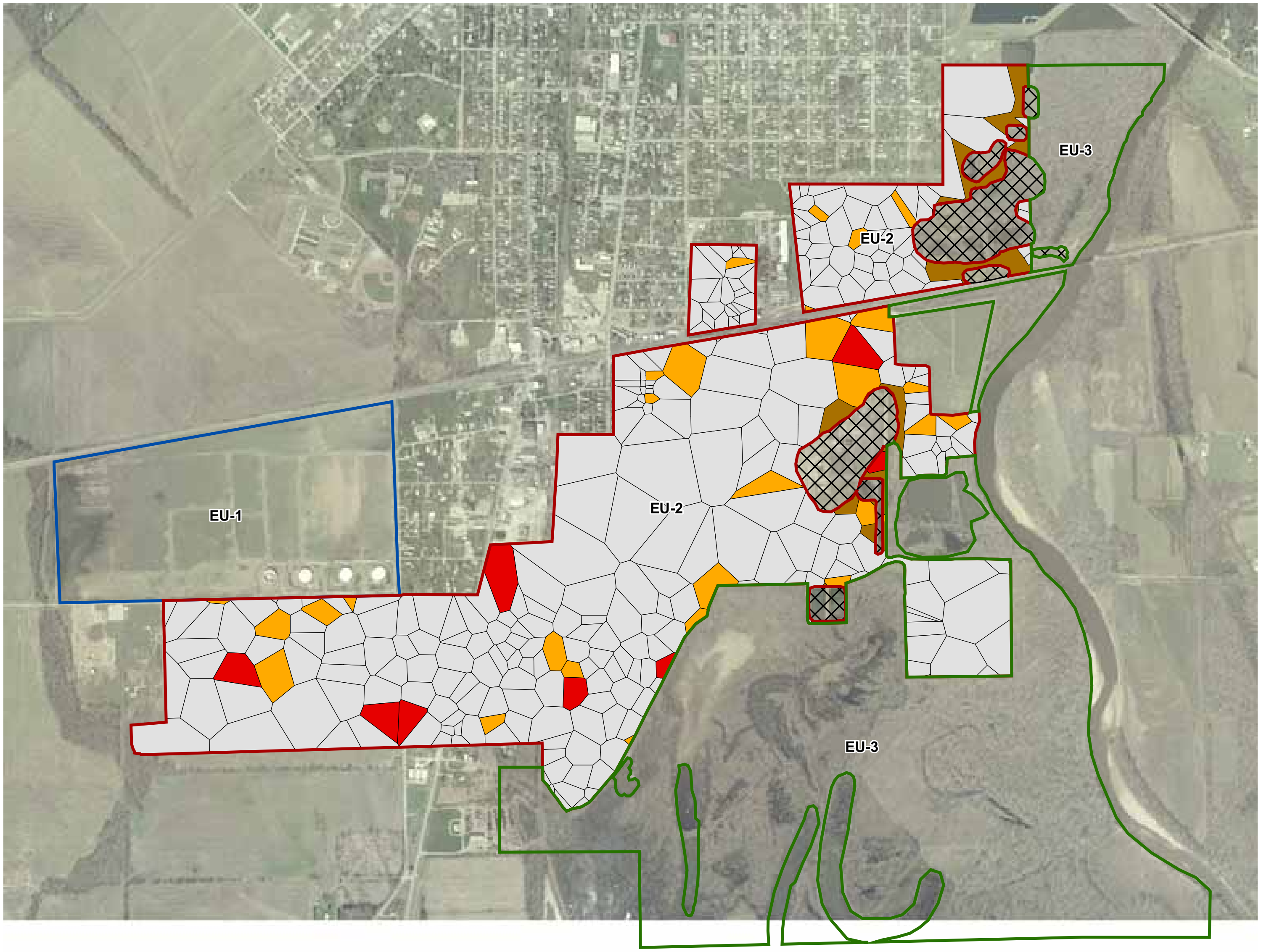
Endnotes

1. USEPA Ecological Soil Screening Levels (2007). Accessed at http://www.epa.gov/ecotox/ecossl
2. Oak Ridge National Laboratory (ORNL) Terrestrial Plant Screening Concentration. Based on phytotoxicity of chemicals in soil and soil solution from Efroymson, RA, ME Will, GW Suter II, and AC Wooten. 1997. Toxicological Benchmarks for Screening Contaminants of Potential concern for Effects on Terrrestrial Plants: 1997 Revision. U.S. Department of Energy ES/ER/TM-85/R3.
3. ORNL Toxicological Benchmark for Earthworms derived by choosing the 10th percentile value after rank-ordering Lowest Observed Effects Concentration (earthworms) from the literature; from Efroymson, RA, ME Will GW Suter II. 1997. Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. U.S. Department of Energy ES/ER/TM-126/R22.
4. Key references outlining USEPA's recommendations for calculating 95UCLs with left-censored data:
   - USEPA. 2006. On the Computation of the 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection Limit Observations. Office of Research and Development, Washington DC. EPA/600/R-06/22.
   - USEPA. 2007a. ProUCL Version 4.0 User Guide. Office of Research and Development. EPA/600/R-07/038. April.
   - USEPA. 2007b. ProUCL Version 4.0 Technical Guide. Office of Research and Development. EPA/600/R-07/041. April.

Acronyms

95UCL = 95 percent upper confidence limit for the arithmetic mean
CPEC = chemical of potential ecological concern
DL= detection limit
EU= exposure unit
EPC = exposure point concentration
IDW = inverse distance weighting
RBSL = risk-based screening level

ARCADIS
infrastructure, environment, facilities



LEGEND:

- PRESUMPTIVE REMEDY AREA
- EU-1
- EU-2
- EU-3

ARSENIC RESULTS:

- SOIL CONCENTRATION ≤ UTL
- SOIL CONCENTRATION ≤ LOW RBSL
- SOIL CONCENTRATION > LOW RBSL AND SOIL CONCENTRATION ≤ HIGH RBSL
- SOIL CONCENTRATION > HIGH RBSL
- SOIL CONCENTRATION > 10 x HIGH RBSL
- POLYGON ASSOCIATED WITH LOCATION INSIDE PRESUMPTIVE REMEDY AREA

0 1,000 2,000 Feet

GRAPHIC SCALE

BASELINE ECOLOGICAL RISK ASSESSMENT

ARSENIC - SHREW

BBL an ARCADIS company

Figure 1

10/18/06 SYR-85 MTK

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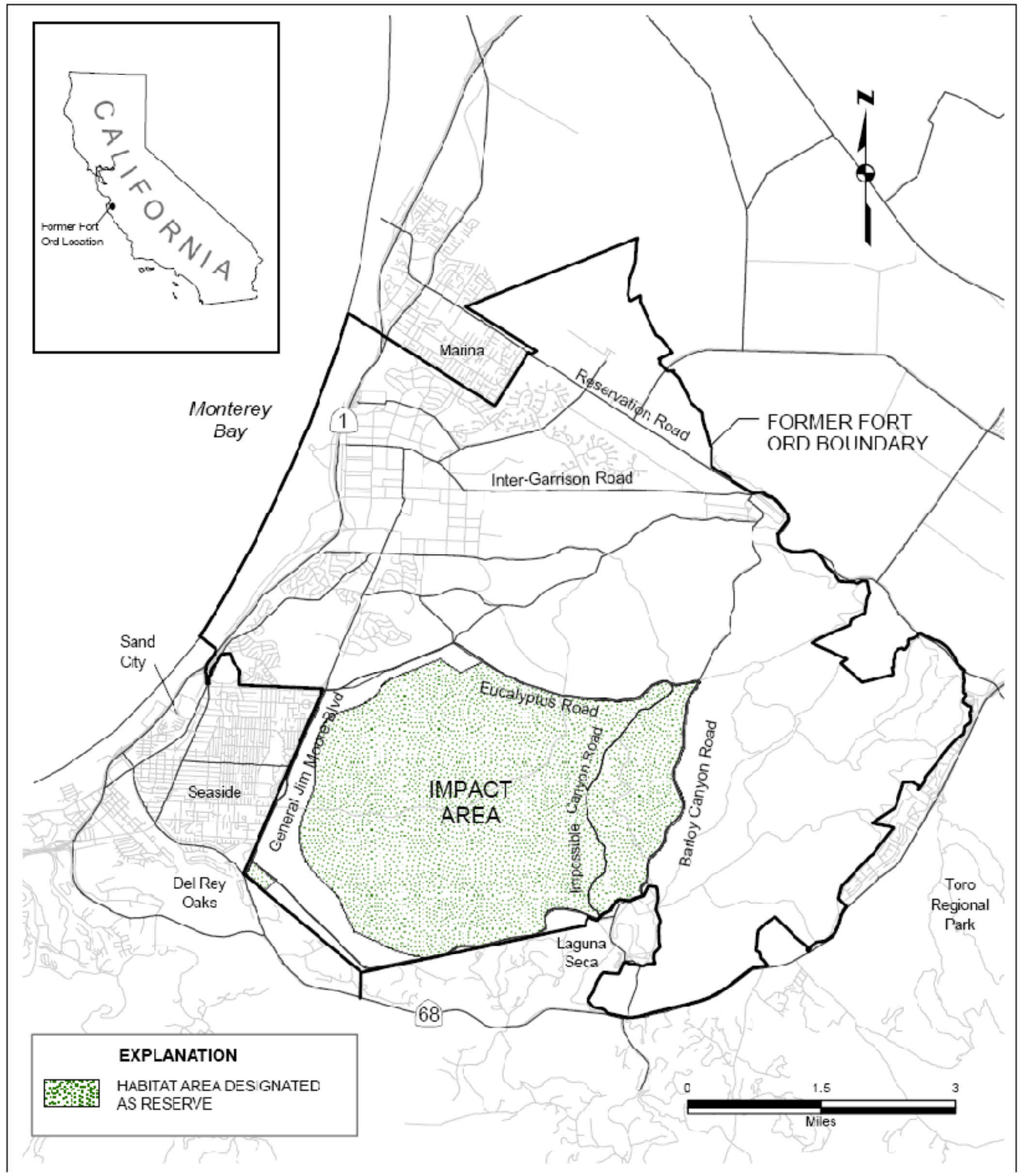
Evaluation of Remedial Scenarios for Metal Exposures at a Small Arms Firing Range in Central California

Mala Pattanayek[1], Bridgette R. DeShields[1], Genevieve M. DiMundo[2], Neal Navarro[3]
[1]Blasland, Bouck & Lee, Inc.; [2]formerly BBL, currently with Presidio Trust; [3]USACE

SETAC North America 26th Annual Meeting
Baltimore, Maryland
November 14, 2005

Site Location Map



Background of Impact Area

- 8,000 acres (inland ranges)
- In operation from 1917 – 1994
- Used for military munitions training exercises
- Consists of small arms ranges, long-distance weaponry, and multi-use ranges
- Study based on small arms ranges only
- Previous Assessments
  - Basewide RI/FS (1995)
  - Pilot Studies (1999 & 2001)
  - Basewide Range Assessments (2005)

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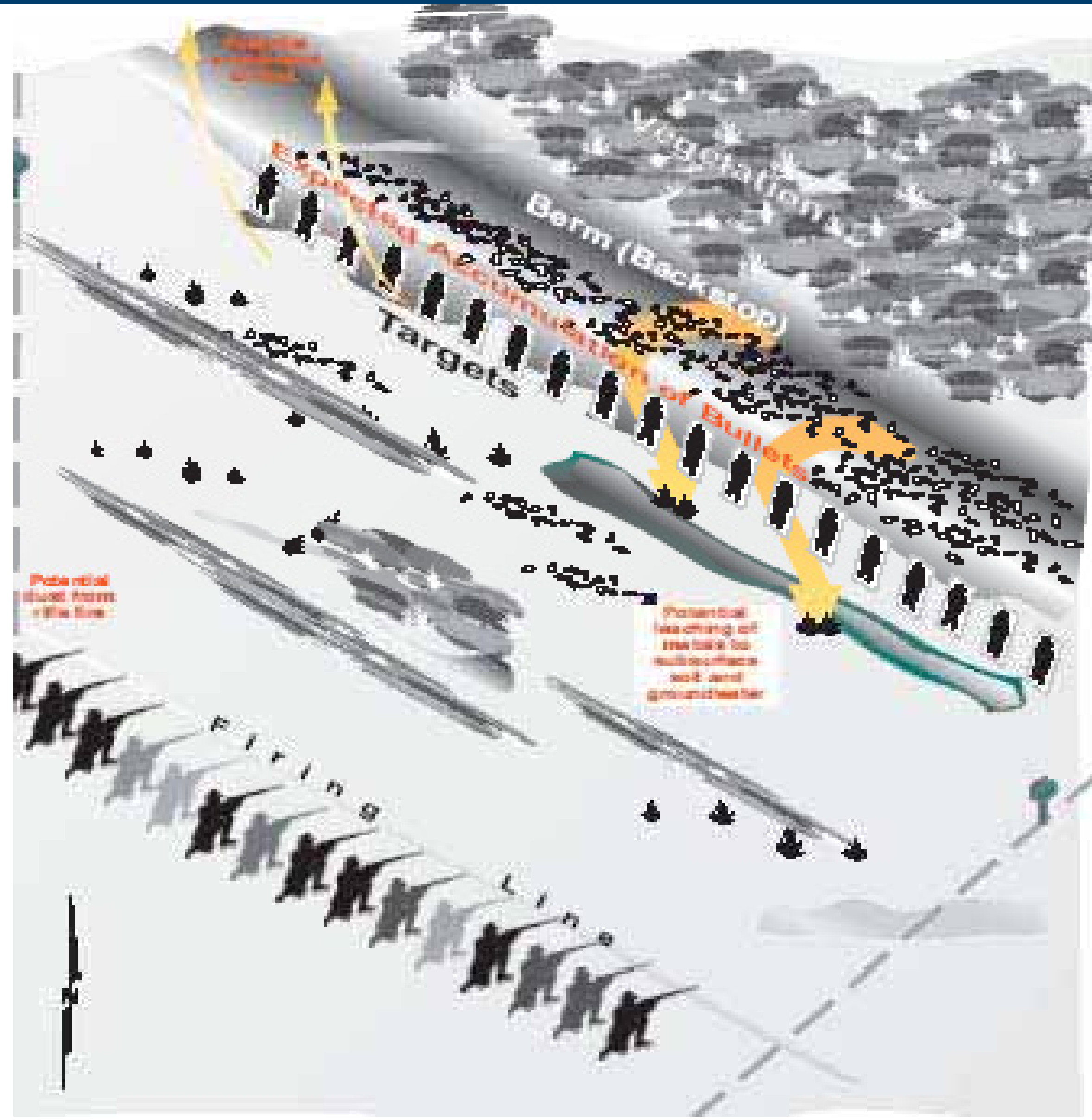
Small Arms Range CSM



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Why Do We Care ?

- 28,000 total acres at Fort Ord – 8,000 acres at Inland Ranges
  - 11,000 acres development
  - 17,000 acres habitat reserve (most of Inland Ranges)
- Many different habitats and rare species
  - geology, climate, topography

Central Maritime Chaparral

Endangered and Threatened Species

Sand Gilia

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Rare Species

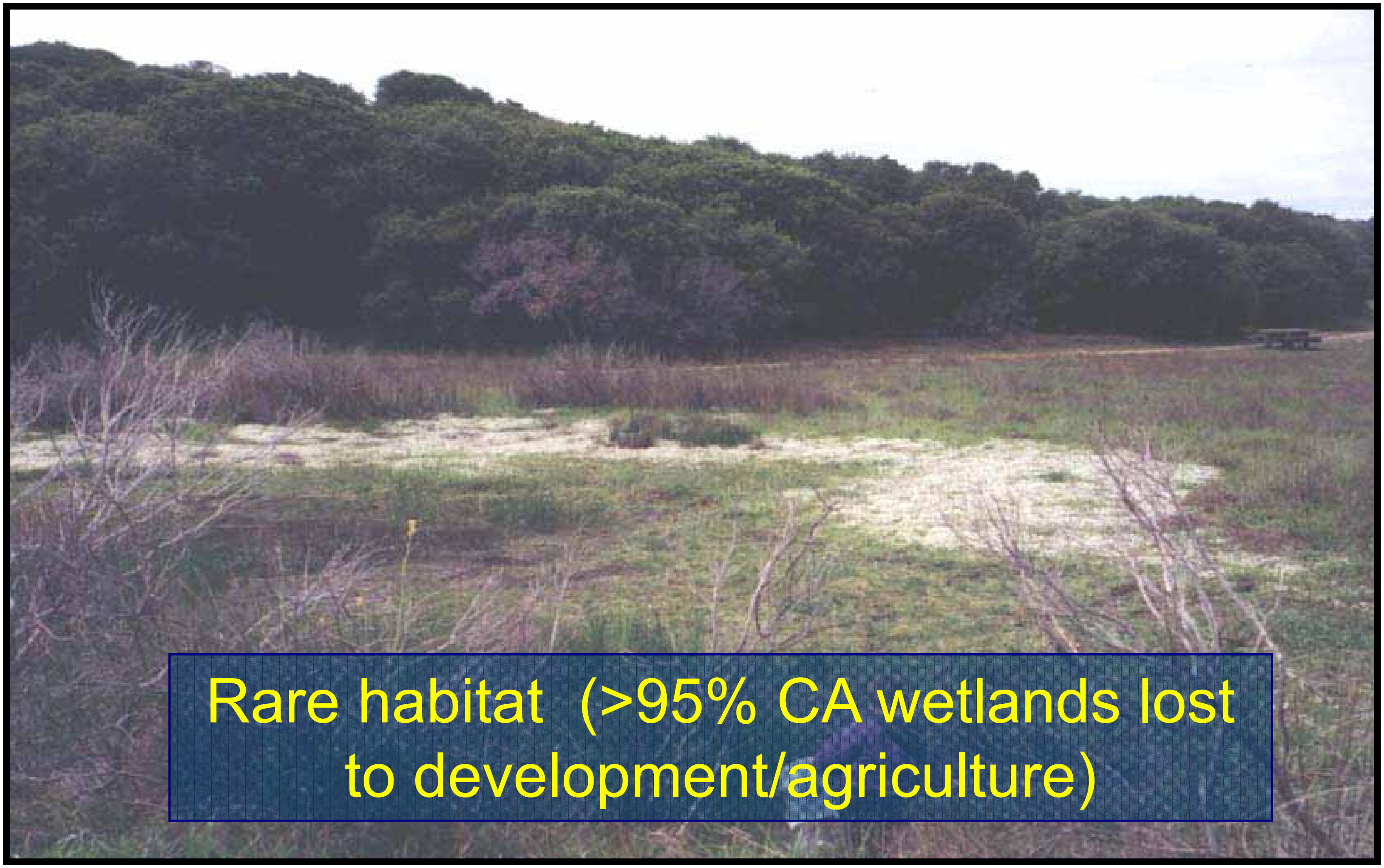
Black Legless Lizard

- Toro manzanita
- Eastwood's golden fleece
- Sandmat manzanita

- Tiger salamander
- California linderiella

Hooker's Manzanita

Wetlands and Vernal Ponds



Objectives

- Conduct Baseline Ecological Risk (BERA)
  - Used site-specific biota and lead bioavailability data (see poster WP175 on Wednesday)
- Evaluate risk reduction based on potential remedial scenarios
- Use results of the risk assessment as a tool for decision-making & risk management in forthcoming feasibility study (FS)

Baseline Ecological Risk Assessment

- Site: Impact area (8,000 acres)
- 22 ranges (berm, no berm, multi-use)
- Soil Samples: > 3,000
- Biota Samples: Plants, insects, lizards, and small mammals
- COPECs: Antimony, copper, and lead
- Receptors: Plants, invertebrates, reptiles, amphibians, birds, and mammals

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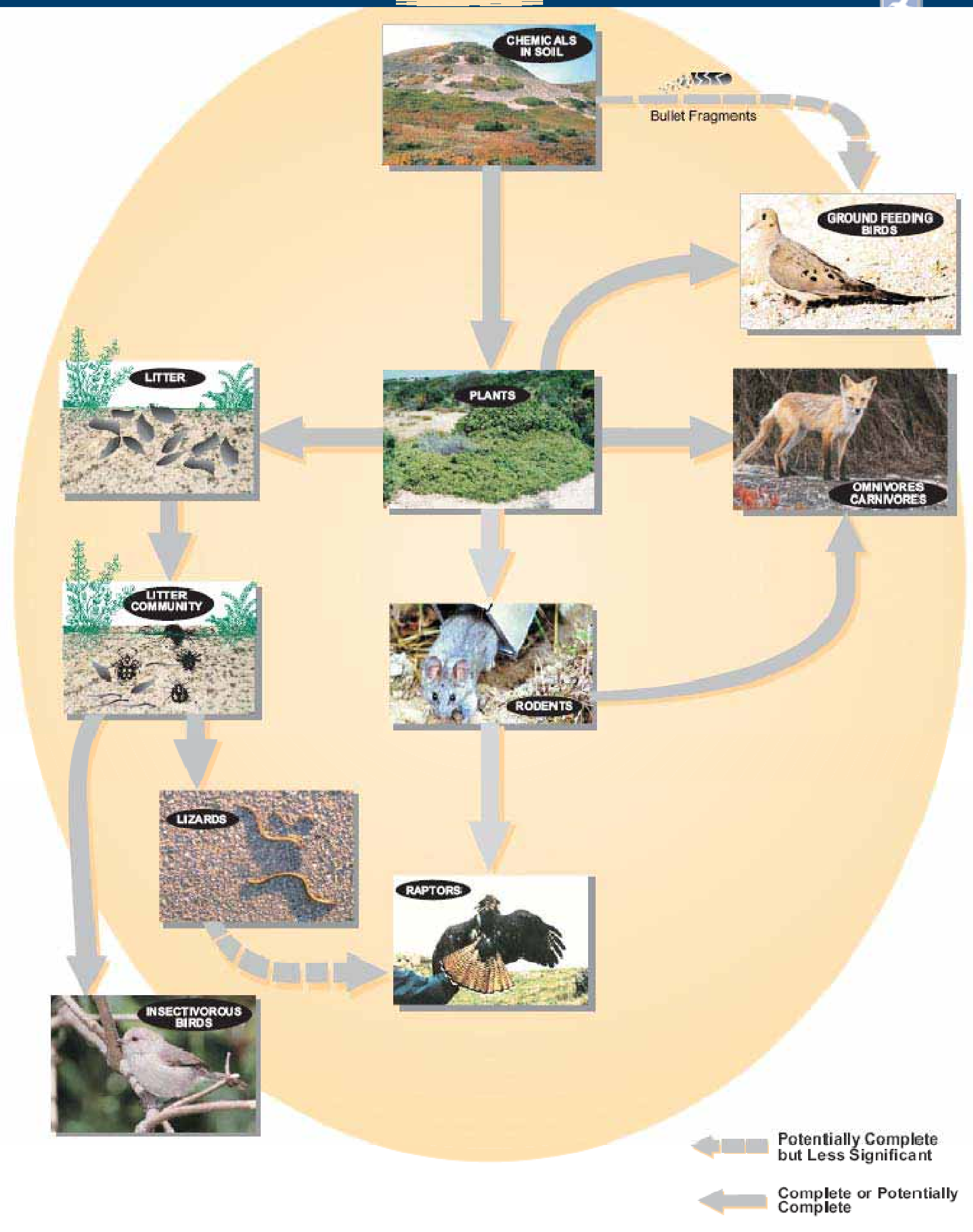
Conceptual Site Model



Results of the BERA

- Plants and Invertebrates
  - No risks for IA-wide at population level
  - HQs > 1 for copper and lead in 6 of the range areas
- Wildlife
  - HQs < 10 for antimony and copper
  - Lead was the main risk driver
  - Highest HQs for insectivorous birds (robin and bushtit)
- Aquatic Life and CTS
  - Low likelihood of risks due to small areas of exposure
- Reptiles
  - No toxicity values available
  - Uptake of metals in invertebrates and lizards were high
  - Unacceptable risks possible.

Next Steps

Developing Alternative Remedial Scenarios

Objective: Reduction in risks to levels protective of receptor populations with a focus on preserving quality habitat at the site.

Alternate Remedial Scenarios

- **Approach & Methods**
  1. Developed threshold concentrations for lead for each receptor
  2. Plotted lead threshold ranges on habitat-quality maps
  3. Used spatial approach to identify areas with elevated lead concentration along varying habitat quality
  4. Developed remedial scenarios in succession that removed additional areas and reduced risks further

Threshold Concentrations for Lead

- Thresholds developed to protect a range of receptors
  - Most sensitive (insectivorous and herbivorous birds and small mammals)
  - Less sensitive (raptors, carnivorous mammals, plants, and invertebrates)
  - Human Health Based Level of Concern referenced but not used as decision criteria
- Thresholds based on LOAELs and NOAELs, considering background
- For a target HQ = 1
  - Threshold = EPC/Baseline HQ

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Threshold for Lead in Surface Soil

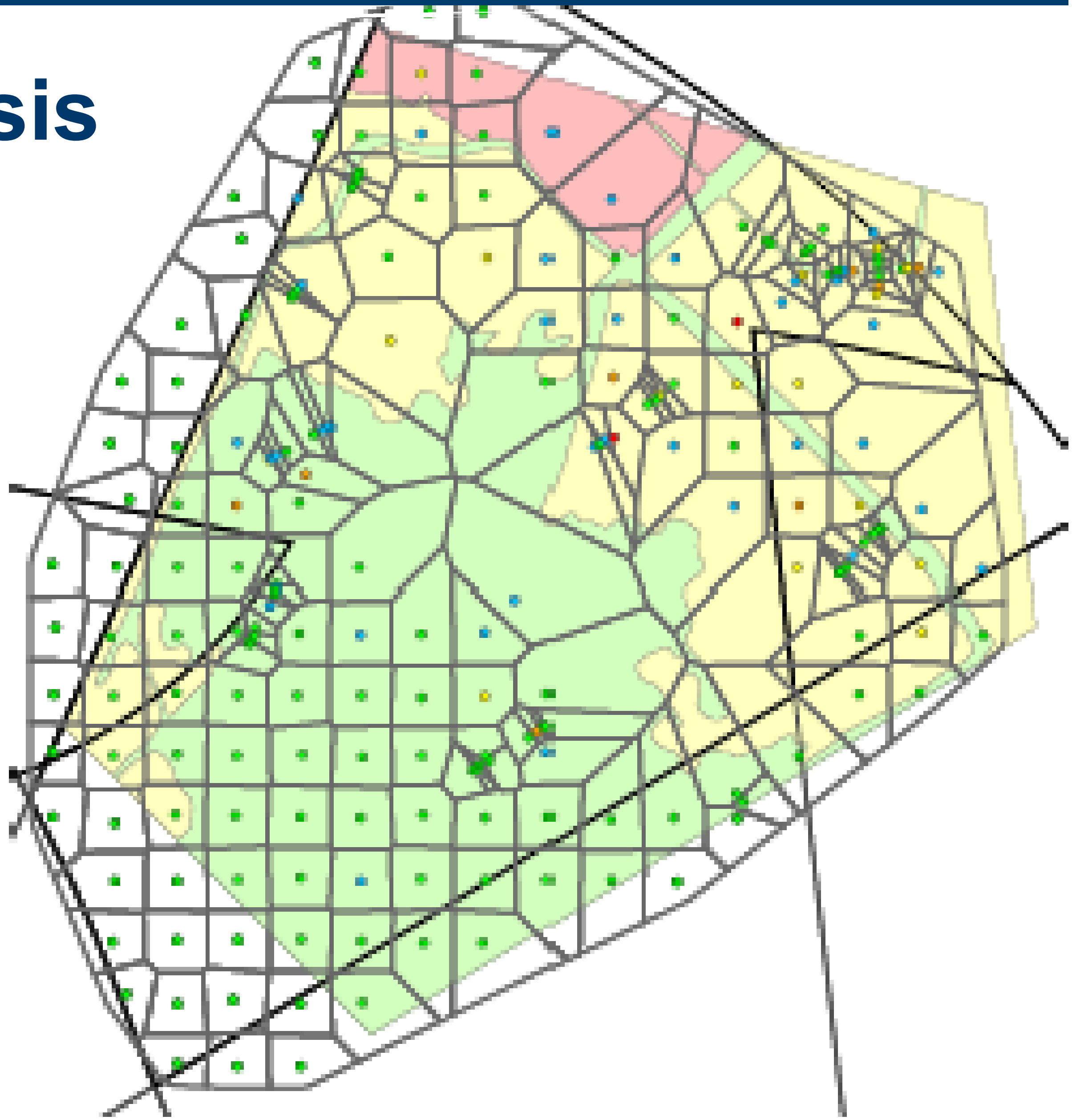
Lead Threshold (mg/kg)	NOAEL-based protection of…	LOAEL-based protection of…
225	All (except bushtit)	Insectivorous Birds (Robins)
450	Invertivorous Mammals	Herbivorous Birds
910	Carnivorous Bird	Invertivorous Mammals
1860	Herbivorous Small Mammals & Invertebrates	Carnivorous Birds & Human Health

Habitat Quality Mapping

Habitat Quality	Description of Areas
Low	Disturbed, largely unvegetated, and dominated by invasive species
Moderate	Partially disturbed and moderate amounts of invasive species
High	Largely undisturbed and dominated by native plant species
Very High	Undisturbed, dominated by native plant species, and potential areas for CTS

Spatial Analysis

Thiessen Polygons used to calculate area-weighted concentrations



Remedial Scenario 1

- Focused on least amount of habitat destruction (started in bare ground/low quality habitat)
- Identified sample locations with highest lead concentrations for Scenario 1
- Recalculated HQs by replacing Scenario 1 locations with background concentrations of antimony (8.2 mg/kg), copper (18.2 mg/kg), & lead (51.8 mg/kg)

Remedial Scenario 2

- If risk reduction was insufficient in Scenario 1, went to Scenario 2
- Focused on least amount of habitat destruction (started in low/moderate quality habitat)
- Identified sample locations with the next highest lead concentrations
- Recalculated HQs by replacing Scenario 2 locations with background concentrations of antimony, copper, and lead

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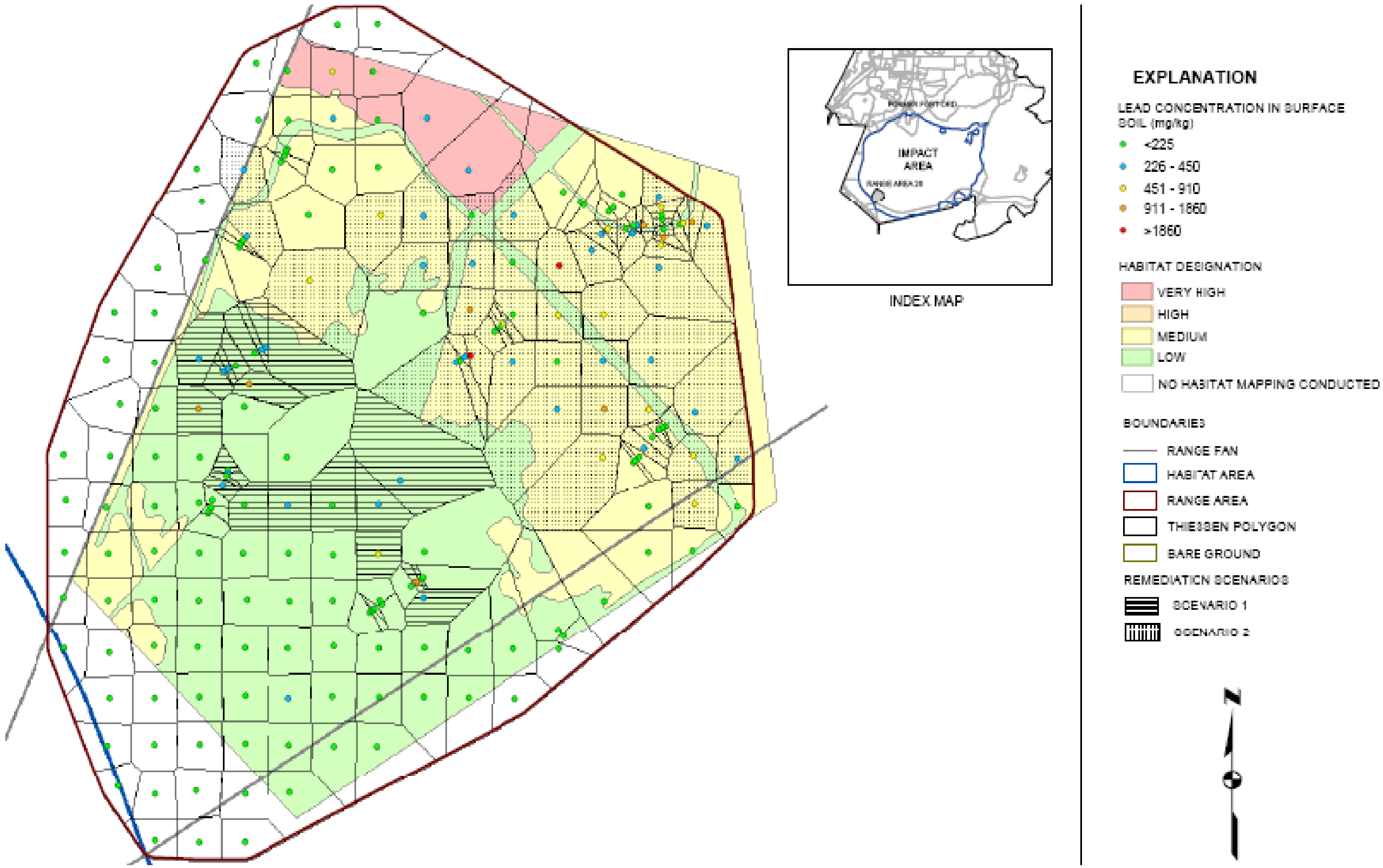
Remedial Scenarios 1 & 2



Remedial Scenario 3

- If risk reduction was insufficient in Scenario 2, went to Scenario 3
- Identified remaining sample locations with lead concentration > 225 mg/kg
- Including “hot spots”
- Recalculated HQs by replacing Scenario 3 locations with background concentrations of antimony, copper, and lead

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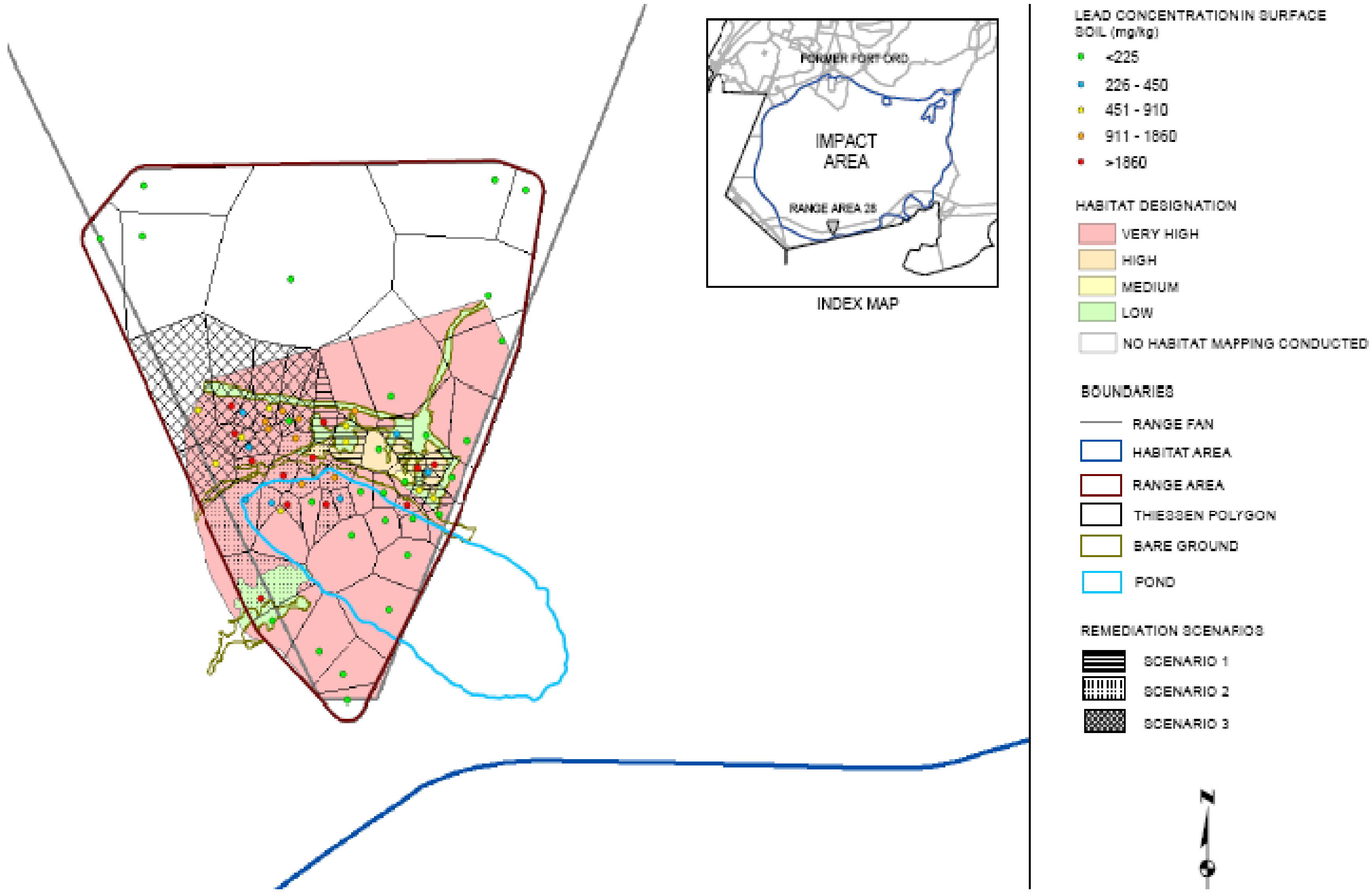
Remedial Scenarios 1, 2, and 3



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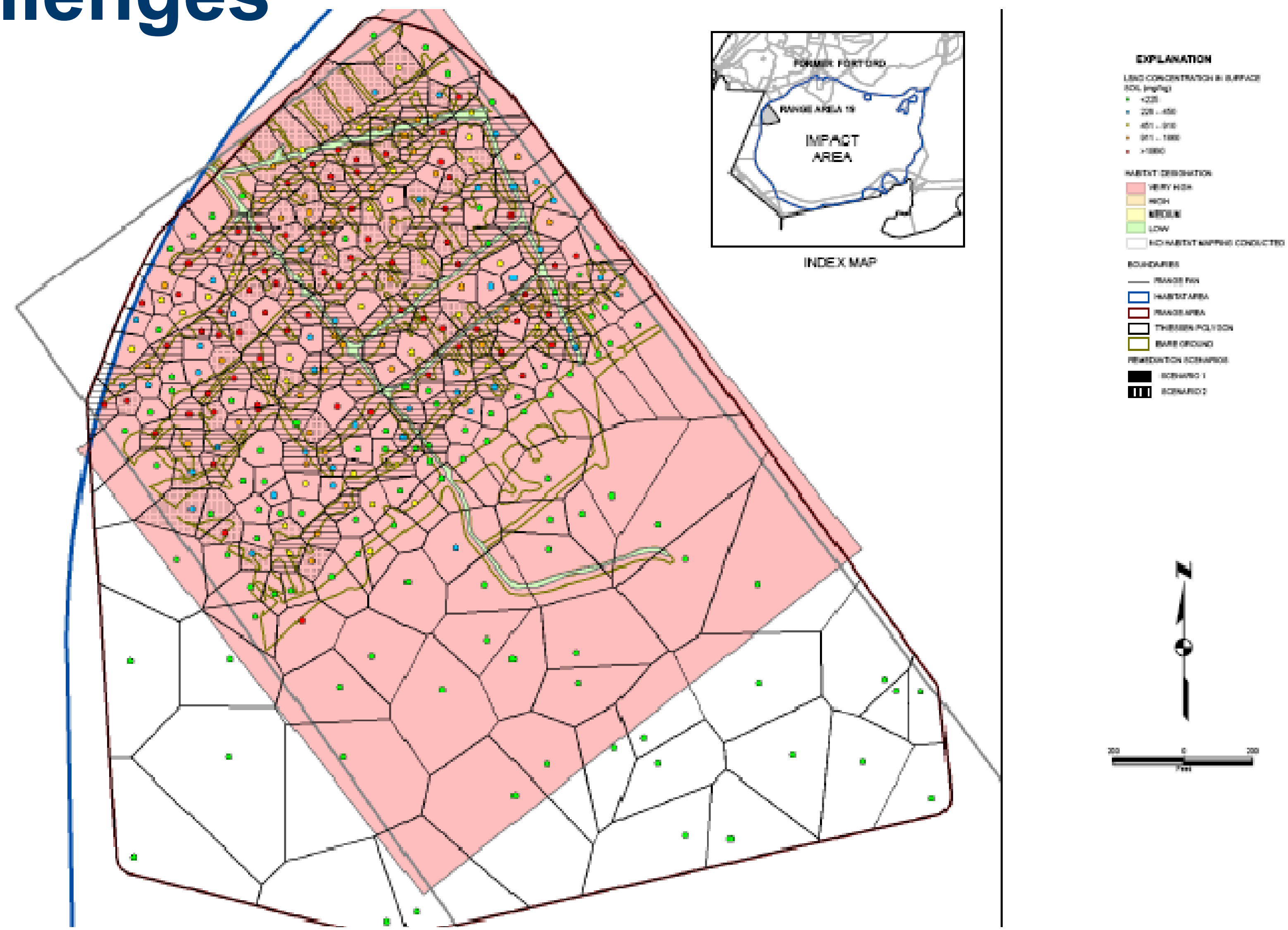
Challenges



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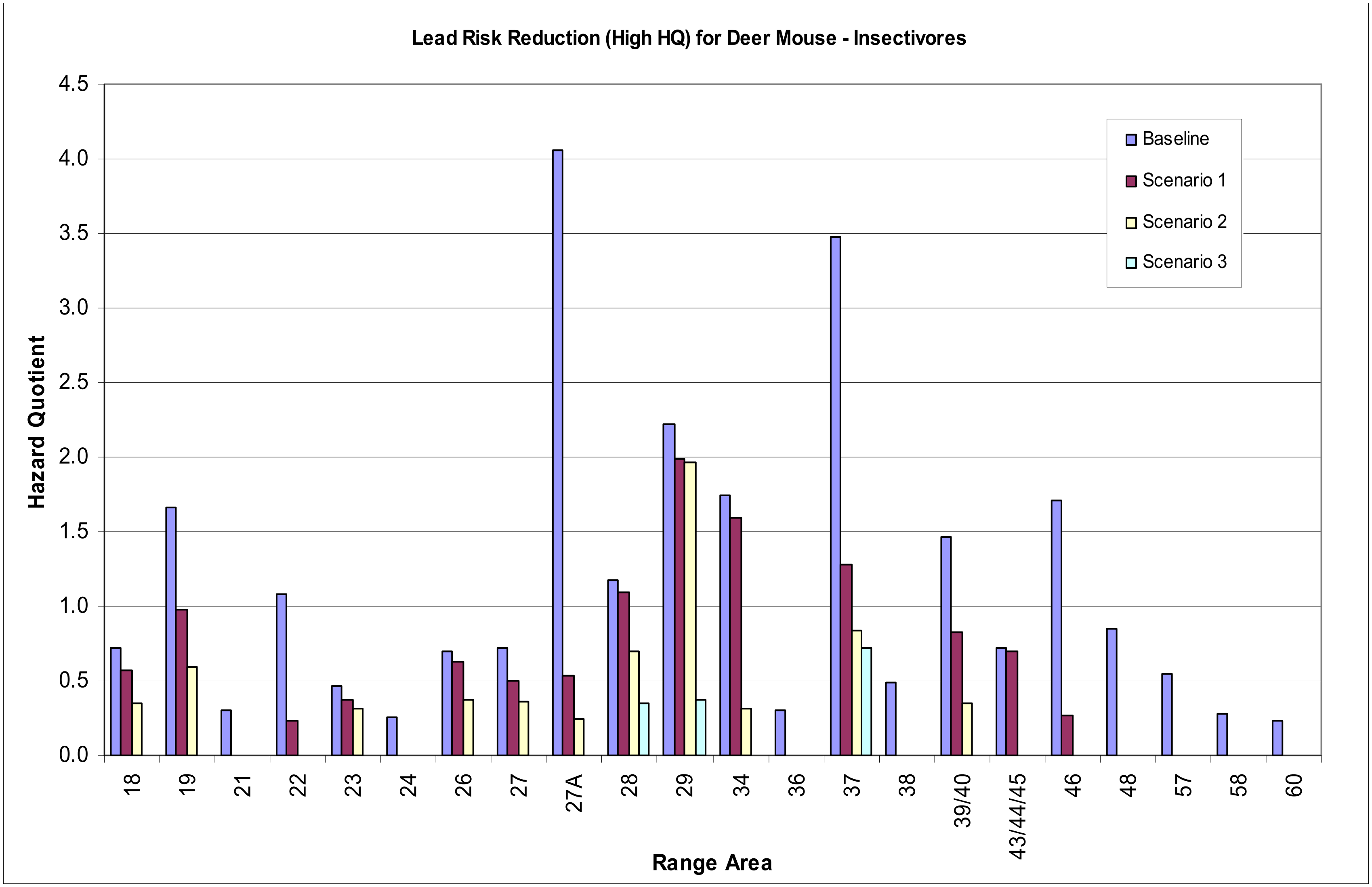
Reduction in Risks from BERA



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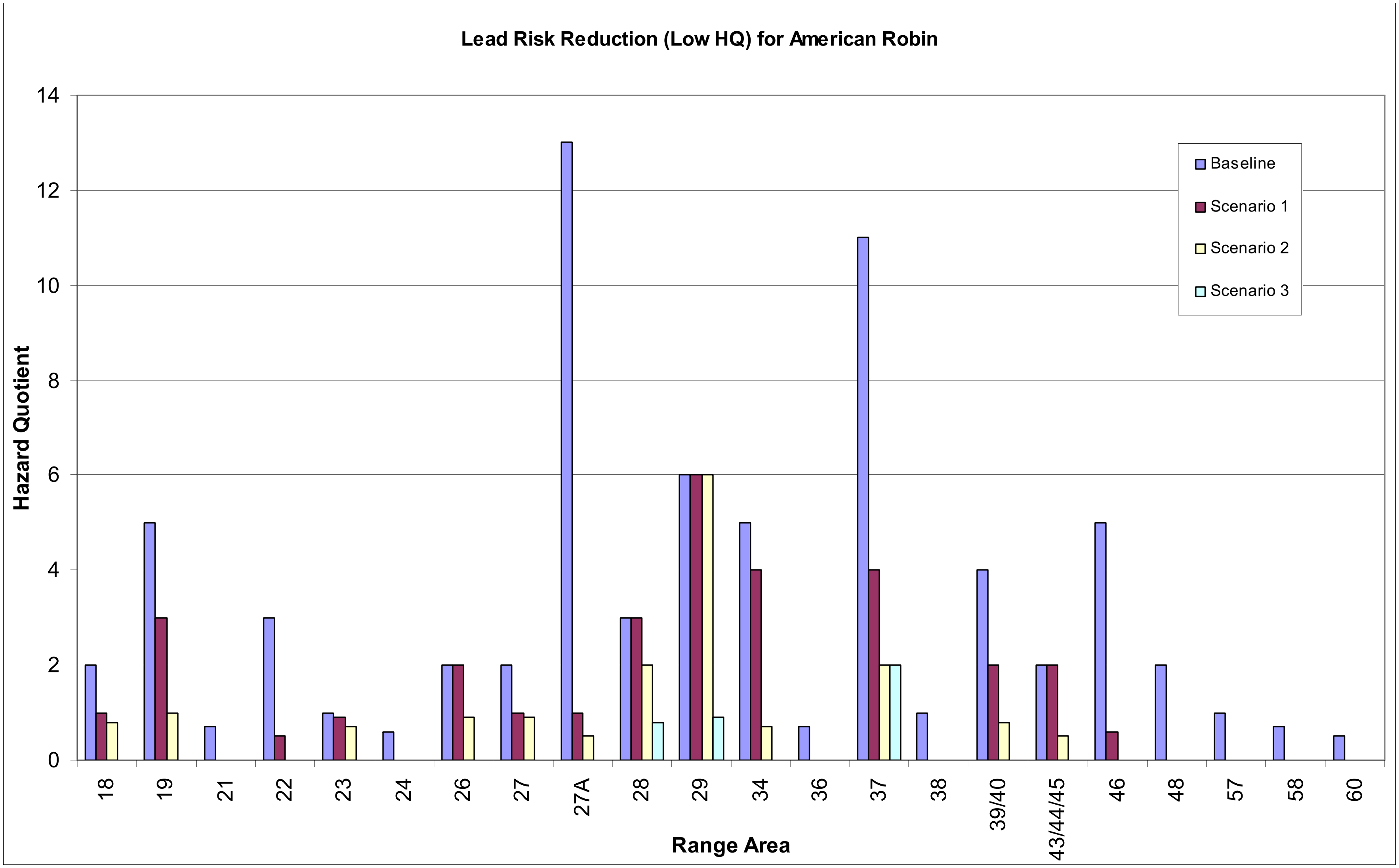
Reduction in Risks from BERA



Summary of Results

- Remedial scenarios were developed for 14 out of 22 range areas (HQs > 1 from BERA)
- Significant reduction in risks from baseline to Scenario 1/2/3
- At the cost of destroying high-quality habitat for most range areas

Conclusions

- Results of the BERA and the Remedial Scenario Evaluation
  - Not a recommendation for cleanup
  - Useful as a tool to weigh in risk management decisions and guide the development of remedial alternatives for the forthcoming FS

Acknowledgments

- Neal Navarro and David Eisen, USACE
- Gail Youngblood, U.S. Army (Fort Ord)
- Beth Flynn and Ed Ticken, MACTEC
- Peter Kelsall, Shaw E&I
- Field biologists
- Columbia Analytical Services

Appendix A
Data Quality Objectives Technical Memorandum – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California (on CD only)

Pacific Gas and Electric Company

Yvonne J. Meeks
Manager

Environmental Remediation
Gas Transmission & Distribution

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Location
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San Luis Obispo, CA 93405

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March 12, 2010

Jose Marcos
California Department of Toxic Substances Control
Geology Permitting and Corrective Action Branch
5796 Corporate Ave
Cypress, CA 90630

Pam Innis
DOI Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. Department of Interior
P.O. Box 25007 (D-108)
Denver, CO 80225-0007

Subject: RCRA Facility Investigation/Remedial Investigation
Soil Investigation Work Plan, Part A, Data Quality Objectives Steps 1 through 5
Technical Memorandum
PG&E Topock Compressor Station, Needles, California

Dear Mr. Marcos, Ms. Innis:

This letter transmits the Final Data Quality Objectives (DQOs) – Part A Soil Investigation Technical Memorandum (TM) for the PG&E Topock Compressor Station RCRA Facility Investigation/Remedial Investigation (RFI/RI). The technical memorandum addresses Steps 1 through 5 of the DQO process for the Part A Soil program. Steps 6 and 7 will be developed through discussions with the agencies and stakeholders during the Soil Part A data gaps evaluation, scheduled for Spring 2010.

This TM incorporates revisions made to the December 15, 2009 report based on comments received from DOI on January 22, 2010 and March 10, 2010, and DTSC on January 11, 2010, and from both agencies during a February 4, 2010 meeting. No additional changes have been made to the report.

The attached Response to Comments Table provides responses to specific comments provided by DOI in its January 22, 1010 cover letter and comments table. In addition, the Response to Comments Table provides a response to the DTSC comment provided by email.

If you have any questions regarding RFI/RI activities, please contact me at (805) 234-2257.

Very truly yours,

Yvonne Meeks

Yvonne Meeks

Enclosure

Cc: Karen Baker/DTSC
Aaron Yue/DTSC
Chris Guerre/DTSC
Rick Newell/DOI
Laura Kaweski/DTSC
Addie Farrell/AECOM

DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
1	General	M	There are several inconsistencies between statements in the text and Table 1 and the figures. Examples include Decision Statement 3, Box 2 decision on Figure 7, and the vertical boundaries for Decision 1. In general, Table 1 better reflects DOI's preferences. Please revise the text and figures for consistency with Table 1.	Text and Figures will be revised to be consistent with language in Table 1.
2	Section 2.1.3.1, CSM discussion	M	The CSM discussion includes statements regarding appropriate sampling that are premature for Step 1 of the DQOs. The whole point of the DQOs is to lay out a stepwise process for assessing what are appropriate and adequate samples to resolve the decisions. This section should focus strictly on describing the CSMs, as was proposed in DOI's suggested language. Refrain from offering statements about sampling at this point in the document.	Reference to sampling has been removed from the CSM discussion.
3	Section 2.1.3.1, groundwater discussions	E	This section refers to the groundwater CMS/FS in the future tense. This should be revised to reflect the final nature of the CMS/FS.	Text revised as requested.
4	Section 2.1.3.1, groundwater discussions	A	While DOI agrees that the focus of the DQOs is on soil, additional focused groundwater assessment may be warranted if soil investigations indicate a potential current threat to groundwater.	Modifications made to text as agreed upon during February 4, 2010 meeting with Agencies.

[a] Comment Types: A = Advisory comment, M = Mandatory Revision, P = Proposed Revision, C = Clarification Request, E = Editorial Revision recommended

DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
5	Sections 2.1.3.2 and 2.1.3.3,	A	It is noted that PG&E chose not to include DOI recommended language acknowledging the contaminant distribution uncertainties resulting from unpredictable scouring and re-deposition processes in washes and ravines. DOI contends it is not possible to predict with confidence the distribution of contamination in the washes and ravines except where impoundments or temporally stable depressions exist. PG&E's reluctance to explicitly acknowledge this point cannot serve as a basis for assuming a higher degree of sampling confidence in the upcoming Steps 6 and 7 than is warranted.	As agreed upon during the February 4, 2010 meeting with the Agencies, this comment will be addressed in Step 6 of the DQOs.
6	Section 2.1.3.3, 4th full paragraph on Page 7	M	The statement that the COPCs for transport to groundwater are primarily hexavalent and total chromium is speculative pending the results of the soil investigations. Remove the sentence.	Text revised as requested.
7	Section 2.1.3.4, second to the last sentence, VOCs in burrows	M	The CSM figure 5 shows the VOC pathway as a potentially complete route "not significant or not directly assessed." The work plan on page 3-13 states that "If complete pathways are identified based on upcoming sampling for VOCs, then the inhalation of burrow air will be evaluated for burrowing receptors. This pathway will be further evaluated and if found to be complete and significant, will be quantitatively evaluated and presented in the ERA." PG&E should not speculate at this point that this pathway is incomplete or insignificant. Remove the statement.	Text revised as requested.

[a] Comment Types: A = Advisory comment, M = Mandatory Revision, P = Proposed Revision, C = Clarification Request, E = Editorial Revision recommended

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Comment Number	Location	Type[a]	Comment	Comment Response
8	Section 2.4	M	The decision statements in the text should precisely match the decision statements on Table 1. In the case of Decision Statement 3, the phase "if warranted" was added to the text (as well as other modifications). This phrase is not in the decision statement on Table 1 and is not necessary since the decision is already that additional assessment or a response action is warranted. DOI prefers that the statements in Table 1 be used for all cases.	Text revised as requested.
9	Section 2.5.2, page 14, 3rd full paragraph	C	What is meant by "the identification of hot spots will be made through visual examination of the data"? How does this differ from evaluation for outliers?	Visual examination of the data is a qualitative assessment that includes consideration of relative concentrations in relation to nearest neighboring sampling locations (both horizontally and vertically), field observations of staining or debris, and topography. Outlier evaluation, if conducted, will be done quantitatively using applicable statistical tests. The text has been revised to include this clarification.
10	Section 2.5.4 and Table 1	C	Why were soil and waste volumes deleted as inputs for Decision 4? Estimation of soil and waste volumes would be critical for assessing removal alternatives in the CMS/FS.	Soil and waste volumes have been added back as inputs to Decision 4.
11	Section 2.6.1.1,	A	Maximum exposure depths are only applicable to Decision 2 (EPC estimation), not for Decision 1 (nature and extent). DOI will expect a high burden of proof of low permeability if bedrock is to be considered a barrier to vertical migration and sampling.	The text has been modified as agreed upon during February 4, 2010 meeting.
12	Section 2.6.1.2	M	Dioxins/furans and asbestos should be added for the upper portions of AOC-1 near the point where AOC-4 enters. Dioxins/furans and asbestos are COPCs for AOC-4 that could have migrated to the upper reaches of AOC-1.Total PCBs should be added as well.	Dioxins/furans, asbestos, and total PCBs will be analyzed in samples collected from AOC 1 near confluence of AOC 4.

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DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
13	2.7.1.2 and Figure 6	M	The decision rule for Decision 1 does not appropriately consider the process for determining the nature of contamination associated with TAL/TCL detections (whether they are COPCs). Specifically, PG&E proposes to assess whether or not detected TAL/TCL constituents are COPCs based on the very limited (10%) data set, and proposes to consider factors such as frequency of detection, concentrations, and distribution in making the determination. With only 10% of the samples being analyzed for TAL/TCL constituents, reliable estimates of frequency, maximum concentrations, and distribution cannot be made without additional sampling. In DOI's proposed decision rule, TAL/TCL constituents are first identified as potential COPCs by being detected. This then leads to additional sampling necessary to adequately assess their nature (e.g., using frequency of detection, concentrations, and distribution as determining factors in their selection as COPCs). Moreover, PG&E's decision rule does not provide for assessment of the extent of TAL/TCL COPCs. Rather it leads to the risk assessment to evaluate the nature of contamination. DOI requires that TAL/TCL constituents detected in the 10% of samples either be considered COPCs and then assessed for nature and extent along with the other COPCs (including collection of additional samples necessary to characterize the nature and extent), or be investigated further with additional sampling before any argument can be made to exclude them as COPCs.	The text and Figure 6 has been modified as agreed upon during the February 4, 2010 meeting.

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DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
14	Section 2.7.1.2	C	The issue of screening level development and its purported complexity as discussed in this section is unclear to DOI. For many TAL/TCL constituents, soil screening levels are already available from EPA (RSLs) and California (CHHSLs). For TAL/TCL COPCs without existing screening levels, risk based assessment might be necessary to determine whether they have the potential to be risk drivers. However, this could only be accomplished once the nature of the COPCs has been assessed through an appropriate level of sampling, as discussed above.	The text has been modified as agreed upon during February 4, 2010 meeting.
15	Section 2.7.1.2	C	EPA has recently (December 2009) updated its RSLs. In some cases, the updated RSLs are lower than the CHHSLs. Screening should be conducted against the most stringent of the RSL and CHHSL levels. Also, neither the RSLs nor the CHHSLs have screening levels for petroleum compounds, which are PCOCs for some AOCs. The California Regional Water Quality Control Board-San Francisco Bay Region has published soil ESLs for TPH-gasoline, diesel, and motor oil (residual range) that are commonly used in California as screening levels. What is PG&E's intent with regard to screening of petroleum compounds?	The hierarchy of screening values, as presented in the Draft Part A Soil Sampling Workplan was to use California values (i.e., CHHSLs) where they exist over EPA RSLs, as they incorporate California-specific assumptions regarding toxicity and exposure (e.g., dermal absorption). Screening is not conducted specifically against the most stringent of the RSL and CHHSL levels. The RSL is only used, instead of the CHHSL, in those instances where the toxicity values used in the CHHSLs are outdated. Specifically, the following exceptions to the general hierarchy are as follows: • PCBs (use RSL, which incorporates more recent updated oral cancer slope factor, consistent with the AOC 4 discussions); • cadmium (calculate a 'modified' CHHSL, because consistent with USEPA, CA no longer considers cadmium to be carcinogenic via oral exposure. Calculated a 'modified'

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				CHHSL (as opposed to using the RSL), because CA has a more conservative inhalation potency factor than USEPA (0.0042 versus 0.0018 (ug/m3)$^{-1}$); • cobalt (use RSL, because the toxicity value for cobalt has been updated); and • vanadium (use RSL, because the toxicity value has been updated). Based on discussions with DOI and DTSC, and because the RSLs and CHHSLs do not have screening levels for petroleum compounds, the Environmental Screening Levels (ESLs) developed by staff of the California Regional Water Quality Control Board-San Francisco Bay Region will be used to screen soil samples analyzed for TPH-gasoline, diesel, and motor oil. It is important to note that the use of ESLs will be limited only for petroleum hydrocarbons defined as TPH-gasoline, diesel, and motor oil. Individual hydrocarbon compounds that comprise TPH, such benzene, toluene, ethyl benzene, xylenes, and polycyclic aromatic hydrocarbons will be screened based on appropriate RSLs or CHHSLs. The Regional Board has developed several TPH ESLs based on different end points, such as leaching to groundwater, human health (ESLs are developed for both a

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				Hazard Index of 0.2 and 1.0), and gross contamination. TPH ESLs for the protection of terrestrial species are not available. PG&E proposes to use the ESLs developed for a residential exposure scenario for human health, based on a Hazard Index of 1.0. Using screening levels that are based on a Hazard Index of 1.0 is consistent with the CHHSLs and RSLs, which for noncancer endpoints are based on an HI of 1.0. Leaching of TPH to groundwater will be evaluated by assessing leaching of the individual hydrocarbon compounds that comprise TPH. From ESL Table K-1, the following TPH Screening levels are proposed: TPH-G = 540 mg/kg TPG-D = 540 mg/kg TPH-MO = 1,800 mg/kg
16	Section 2.7.1.3 and Figure 6	M	Box 8, which includes the statement that nature and extent have been adequately defined, is not a suitable endpoint if additional sampling is judged to be warranted but infeasible (i.e., path from Box 13). All that can be said in that case is that no further data collection is required. DOI's recommended Decision Rule appropriately addressed this condition by adding the phrase "no further data collection is necessary to resolve Decision 1" to the equivalent of Box 13.	Comment noted - Figure will be modified.
17	Section 2.7.2.2, 1st bullet	E	There is a typo in the 1st bullet. Should read "… at a given unit, combination <u>of</u> units, or portion …"	Text revised as suggested.

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DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
18	Section 2.7.2.3, 2nd bullet	E	There is a typo in the 2nd bullet, second sentence. Box number is missing. Should be Box 7.	Text revised as suggested.
19	Section 2.7.2.3, 2nd bullet	E	There is a typo in the 2nd bullet. The flow path leads back to Box 2 to restart the process, not Box 1.	Text revised as suggested.
20	Section 2.7.2.3, 3rd paragraph	M	Determining the “various soil technologies being considered” at this phase of the soil investigation is premature and cannot be utilized in determining whether the proposed characterization depth is valid. This is particularly true since the soils investigation information will also be used to evaluate groundwater impacts.	Assume comment is referring to Section 2.7.1.3. Text revised as suggested.
21	Section 2.7.3.1 and Figure 8	M	PG&E chose to eliminate DOI’s recommended path for responding to evidence of a current impact to groundwater without modeling (Box 5 of DOI’s revisions to the draft Decision Rule for Decision 3). Modeling is appropriate for assessing potential future threat in cases where existing data indicate groundwater is not likely to be currently affected, but soil exceeds groundwater protection levels. However, modeling typically would not be an appropriate response in cases where existing data indicate a current impact to groundwater is possible. Please add the DOI recommended path for moving directly to plan development in the event that data indicate a current impact to groundwater may exist.	Text revised as suggested.
22	Section 2.7.4.3, 2nd bullet	E	There is a typo in the 2nd bullet. The flow path leads back to Box 2 to restart the process, not Box 1.	Text revised as suggested
23	Figure 7	M	Box 2 introduces new language “calculate/determine a reliable EPC” versus the language in the text (and recommended by DOI) of “calculate a representative EPC”. The process is in fact calculation of a representative EPC. Revise the language on Figure 7 as recommended by DOI and included in Section 2.7.2.2.	Comment noted. Figure 7 has been modified to be consistent with the text.

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DOI Comments – January 22, 2010

Comment Number	Location	Type[a]	Comment	Comment Response
24	Figure 8	M	Please add Box 1 to be "Combine Part A and historical RFI/RI data" as recommended in DOI's revisions to the draft Decision 3 Decision Rule. PG&E omitted this box leaving the question of which data to be compared unanswered.	Text revised as suggested

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DTSC Comments – January 11, 2010

Comment Number	Location	Comment	Response
1	Section 2.7.1.3 (Box 11 decision)	The discussions leading to the possible outcomes for this box should indicate that the agencies shall be consulted prior to determining the outcome of Box 11.	Comment noted and text has been revised.

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Data Quality Objectives Steps 1 through 5 – Part A Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California

PREPARED FOR: Pacific Gas and Electric Company

PREPARED BY: CH2M HILL

DATE: December 14, 2009

Revised: March 12, 2010

1.0 Introduction

The purpose of this technical memorandum is to document the results of Steps 1 through 5 of the data quality objectives (DQO) process for Phase 2 of the soil investigation outside the fence line of the Topock Compressor Station (referred to as Phase 2 of the Soil Part A program). The California Department of Toxic Substances Control's (DTSC's) August 10, 2007 conditional approval letter for the Soil Part A Work Plan specifically rejected the DQO sections in that workplan while directing PG&E to implement Phase 1 of the soil sampling program in accordance with the work plan. DTSC, the United States Department of the Interior (DOI), and Pacific Gas and Electric Company (PG&E) then convened a series of meetings to collaboratively develop the DQOs for evaluating Phase 1 data and identifying sampling needs for Phase 2 of the soil Part A program. Steps 1 through 5 were addressed during several meetings held from June through September 2008. Steps 6 and 7 will be addressed during meetings to be held in the first half of 2010.

The Soil Part A program addresses 9 Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and other undesignated areas (UAs) outside the Topock Compressor Station fence line. These areas are SWMU 1/AOC 1, AOCs 4, 9, 10, 11, 12, and 14; Undesignated Area (UA) 1 -- the Potential Pipeline Disposal Area; and UA 2 -- the Former 300B Pipeline Liquids Tank. These units are shown in Figure 1. (All figures are provided at the end of this technical memorandum).

The DQO process is a recognized procedure for defining project objectives and decisions, and optimizing sampling and other information-gathering programs to balance uncertainty, site disturbances, and cost in an acceptable manner. The goal of the DQO process is to ensure that data collected at each stage of the investigation process are of sufficient quantity and quality to enable the specified decisions to be made.

The United States Environmental Protection Agency (USEPA) has issued detailed guidance for the DQO process (USEPA, 2000, 2006a-b). The DQO process consists of seven steps:

- **Step 1: State the Problem.** Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem. Identify resources available to resolve the problem, and develop the conceptual site model.
- **Step 2: Identify the Decision(s)**. Identify the principal study questions that require new environmental data to address the contamination problem and what actions may result to resolve the problem statement.
- **Step 3: Identify the Inputs to the Decision**. Identify the information and environmental measurements that are needed to resolve principal study questions
- **Step 4: Define the Study Boundaries**. Specify the spatial and temporal aspects of the environmental media that the data must represent to support the decision.
- **Step 5: Develop a Decision Rule**. For each principal study question, define the statistical parameter(s) of interest, specify action levels, and integrate the previous DQO outputs into "if…then" statements that describe the logical basis for choosing among alternative actions.
- **Step 6: Specify Tolerable Limits on Decision Errors**. Define the decision makers' tolerable decision error rates based on the consequences of making an incorrect decision.
- **Step 7: Optimize the Design**. Evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

While the steps of the DQO process are described sequentially above, the iterative nature of the DQO process allows one or more of these steps to be revisited as more information on the problem is obtained. Detailed DQOs for the subsequent phases of the soil investigation will be developed during those phases.

This technical memorandum addresses Steps 1 through 5 of the DQO process for Phase 2 of the Soil Part A program. DTSC, DOI, and PG&E agreed to defer Steps 6 and 7 pending completion of Phase 1 sampling and analysis, and to address those two steps once validated data from the Phase 1 Part A site investigation are available for each of the AOCs. An understanding of the characteristics of the Phase 1 data is necessary to guide decisions on the tolerable limits on decision errors for Phase 2 data.

2.0 Data Quality Objectives

Steps 1 through 5 of the DQO process for Phase 2 were completed collaboratively by DTSC, DOI, and PG&E for all of the investigation areas included in the Soil Part A Work Plan. This section provides a detailed description of the assumptions for each step and the process for implementing each step. A summary of the DQOs for Steps 1 through 5 is provided in Table 1.

2.1 Step 1: Problem Statement

Step 1 consists of defining the problem and includes review of existing information; identification of the planning team; development of a conceptual model of the environmental hazard to be investigated (site conceptual model); identification of available resources, constraints, and deadlines; and a brief discussion of potential remedial/closure options. These components are described in detail below.

2.1.1 Problem Definition

Historic practices at the Topock Compressor Station have resulted in known and potential releases of constituents of potential concern (COPCs) and constituents of potential ecological concern (COPECs) in several locations in the vicinity of the station. These locations are defined in the approved *Revised Final RCRA Facility Investigation/Remedial Investigation Report, Volume 1 – Site Background and History* (Revised Final RFI/RI Volume 1) (CH2M HILL, 2007). The Soil Part A program addresses SWMU 1/AOC 1, AOCs 4, 9, 10, 11, 12, and 14; UA 1, the Potential Pipeline Disposal Area; and UA 2, the Former 300B Pipeline Liquids Tank. The existing data regarding these units have been documented in the Soil Part A Work Plan.

The overall problem statement for the Soil Part A program is:

Contaminants in soil in AOCs/UAs outside the compressor station fence line resulting from historical compressor station practices may pose an unacceptable risk to humans or the environment, or threaten groundwater. Additional site-specific information is needed to:

- *Determine the nature and extent of soil and sediment contamination*
- *Estimate representative exposure point concentrations (EPCs) to support human health and ecological risk assessment being conducted separately from the Part A soil study*
- *Determine whether residual soil concentrations pose a threat to groundwater*
- *Estimate soil properties and contaminant distribution in support of the Corrective Measures Study/Feasibility Study (CMS/FS) and/or remedial design*

The nature and extent of soil COPCs and soil COPECs associated with former compressor station practices at or affecting these units must be defined to determine whether unacceptable risks or impacts to groundwater occur currently or could occur in the future, and whether soil remediation is required and should be implemented. The extent of the soil COPCs and COPECs must be understood in sufficient detail laterally and vertically to allow risk assessment to be conducted and remedial decisions to be made.

2.1.2 Conceptual Site Models

The conceptual site model (CSM) is a schematic representation of how constituents released from a source may be transported to the surrounding environmental media and ultimately may come into contact with human or ecological receptors. The CSM includes known and suspected sources of contamination, types of constituents and affected media, known and potential routes of migration, and known or potential human and environmental receptors.

The CSMs provide the framework for where and to what depths investigations should occur and the factors that must be considered in developing screening values. The CSMs also support the identification of potential remedial technologies. Information on contaminant transport and migration mechanisms and potentially exposed receptors helps guide the necessary investigation of the lateral and vertical extent of contamination. Detailed investigation-area-specific CSMs were developed for the *Human Health and Ecological Risk Assessment Work Plan, Topock Compressor Station, Needles, California* (RAWP; ARCADIS, 2008a). The CSMs originally presented in the RAWP were based on knowledge from historical data. Those CSMs have been updated to incorporate the findings of the Groundwater Risk Assessment (GWRA; ARCADIS 2009), and included herein as Figures 2 through 5. The focus of the CSMs is on evaluating potential exposure pathways to human and ecological receptors.

The CSMs rely on the detailed information on the physical characteristics and setting of the study area, including surface features, meteorology, site geology, surface water hydrology, site hydrogeology, land use, cultural resources, and ecology presented in Appendix A of the Part A Work Plan.

2.1.3 Constituent Release, Migration, and Potential Exposure Pathways

Figures 2 through 5 depict the conceptual contaminant release, migration, and potential exposure pathways for the following areas and receptors:

- Figure 2 - Bat Cave Wash: recreational, tribal, worker, and hypothetical future groundwater uses
- Figure 3 - AOCs 4, 9, 10, 11, 12, and 14, and UA-1 and UA-2: recreational, tribal, worker, and hypothetical future groundwater uses
- Figure 4 - Bat Cave Wash: future hypothetical residential user north of the railroad
- Figure 5 - Bat Cave Wash and other areas outside the compressor station: ecological receptors

2.1.3.1 Overview of Release and Migration Pathways

For simplicity, this discussion addresses the common features of the four CSMs. All CSMs have surface soil as the primary source medium. All CSMs also include the release mechanism where COPCs in surface soil may be eroded and entrained in stormwater/ surface water runoff and subsequently re-deposited as contaminated soil in other areas within a wash or ravine. Entrained soil may be transported to areas of standing or flowing water and then be deposited in downstream areas. Soil that is inundated with water even in the absence of storm events is considered sediment. When entrained soil is deposited in these areas, it is considered sediment, and may result in the presence of contaminated sediment.

In order for soil to be entrained in run-off, it must be scoured from another portion of the project area. Such potential 'scouring' events were discussed with the agencies, and various hypothetical soil scouring depths were agreed upon in order to identify Phase 2 sampling needs and the relevant exposure depth intervals that would be used to assess the potential significance of chemical impacts (ARCADIS, 2008a).

Contaminated surface soil or sediment resulting from entrainment of affected soils are secondary source media or exposure media and may be ingested or contacted directly. COPCs/COPECs may also be entrained as dust in ambient air, leading to potential inhalation exposure and/or surface re-deposition (ARCADIS, 2008a).

All CSMs also show that contaminants in surface soil may also percolate or infiltrate into the subsurface to affect subsurface soil and groundwater as secondary source media. Contaminated subsurface soil may be ingested, contacted directly, or inhaled as dust during intrusive events.

Historical data show that volatile organic compounds (VOCs) have been infrequently detected at very low concentrations in soil; therefore, historical data suggest that volatilization is an insignificant secondary release mechanism. However, as indicated in Table 1, additional soil sampling is proposed to further evaluate the presence of compounds that may volatilize and affect ambient air, potentially leading to inhalation exposure. As shown on the CSMs, if VOCs are present in groundwater, the VOCs may also be volatilized to affect ambient air, leading to inhalation exposure. However, the GWRA concluded that VOCs were infrequently detected at low levels in groundwater. Therefore, the GWRA concluded that volatilization from pumped groundwater and subsequent inhalation of VOCs was an insignificant pathway.

The CSMs all include a migration pathway showing groundwater potentially impacted by subsurface soil contamination, with subsequent migration of contaminated groundwater to extraction wells and discharge to surface water, leading to potential ingestion and dermal contact exposure routes. These potential exposure pathways were the subject of the GWRA (ARCADIS, 2009) for releases to SWMU 1/AOC 1. The GWRA concluded that hexavalent chromium is the only risk-related chemical of concern (COC) for the groundwater CMS/FS (CH2M HILL, 2009)[1]. The GWRA also concluded that discharge of chemically-affected groundwater to surface water is an insignificant pathway based on a review of site-specific groundwater and surface water data. Accordingly, the GWRA (ARCADIS, 2009) concluded that quantitative surface water human health and ecological risk assessments are not warranted.

The focus of this technical memorandum is to develop DQOs for: (1) guiding the soil sampling activities and (2) evaluating soil data (e.g., evaluating the potential for previously unidentified soil contamination to impact groundwater quality). Therefore, surface and subsurface soil are the primary media of interest for data collection and evaluation.

2.1.3.2 Human Health Potential Migration and Exposure Pathways for Bat Cave Wash

In Bat Cave Wash, the primary source of contamination for the surface soil is historic direct discharge of untreated wastewater at SWMU 1, the Former Percolation Bed (see Figures 2 and 4). Topography generally limits surface runoff pathways in Bat Cave Wash to the floor

[1] Because there is no current direct human exposure pathway for contact with impacted site groundwater, there is no human or population currently at risk of adverse health effects due to the presence of chemicals in the groundwater. Further, because there is no significant ecological exposure pathway for contact with impacted site groundwater, there is no ecological population currently at risk of adverse effects due to the presence of COPCs in the groundwater

of the wash. Periodic runoff and flash flood events may disturb the soil bed, resulting in rapid erosion, movement, and re-deposition of material down wash. These events can cover surface soil and expose subsurface soil, and are referred to as scouring events.

Windblown contamination from the wash may not be fully constrained within the bed of the wash. While it is possible for surface soil contaminants eroded and dispersed by wind to potentially affect areas outside the wash limits, aerial deposition of windblown contamination is generally expected to follow a pattern of decreasing concentrations with increasing distance from Bat Cave Wash.

North of the railroad, future residential use of the wash is hypothesized by DOI (see Figure 4). Residential activities hypothesized by DOI include eating homegrown produce and poultry. Garden produce and poultry could contact contaminants directly from contaminated surface soil, or could contact contaminants through irrigation with impacted groundwater. The GWRA has already evaluated irrigation with contaminated groundwater, and concluded that potential human exposure to produce and poultry irrigated with impacted groundwater is insignificant relative to the potential exposure resulting from direct ingestion and dermal contact with impacted groundwater (ARCADIS, 2009). Soil data proposed for collection in Part A will be used to evaluate the potential significance of contact of homegrown produce and poultry with contaminants in soil. Therefore, for this pathway, surface and subsurface soil (depths consistent with garden produce root growth) are the media of interest for soil sampling north of the railroad.

Soil data for Bat Cave Wash will be used to evaluate potential risk from contaminated surface and subsurface soil that may be ingested or contacted directly, or soil particles that may be entrained as dust in ambient air, leading to potential inhalation exposure. The hypothetical future resident and maintenance worker both are assumed to participate in intrusive activities as described in the RAWP (ARCADIS, 2008a).

2.1.3.3 Human Health Potential Migration and Exposure Pathways for AOCs 4, 9, 10, 11, 12, and 14, and UA-1 and UA-2

This section addresses other areas (i.e., AOCs 4,9,10,11, and 14 and UA-1 and UA-2) besides Bat Cave Wash where contaminants may be present due to the migration pathways shown on Figure 3 and described above (see Section 2.1.3.1). The primary sources for release to surface soil in these areas include: discharges/runoff from the compressor station, disposal of debris, leaking above ground tank, and potential pipe disposal area. Constituents known to have been released at the Topock Compressor Station consist of non-volatile compounds. These constituents were released primarily as liquids. Some constituents may also have been released as dust on the station (i.e., from sand blasting) and would have been deposited onto the ground surface. These constituents would also have been transported outside the facility fence line via stormwater runoff.

Local topography is the primary feature to consider when examining releases of constituents from the Topock Compressor Station to areas outside the fence line via surface runoff. The compressor station is located on a ridgeline bordered by low areas (washes and ravines) on the north, east, west, and southwest sides of the station. Higher-elevation terrain is located to the south and southeast. In the past, runoff from the compressor station would have preferentially entered and/or accumulated in low-lying areas, including the Debris

Ravine (AOC 4), the East Ravine (AOC 10), and other topographic low areas (AOC 11) contiguous with the compressor station fence line, potentially contaminating surface soil.

Topography generally limits surface runoff pathways in the ravines to the floor of the ravines. Within the East Ravine, several impoundment berms were constructed across the ravine in the past. Within the Debris Ravine and AOC 11, periodic runoff events disturb the soil bed, resulting in rapid erosion, movement, and re-deposition of material downstream. Impoundment areas and stable low-lying areas are most likely to contain contaminated soil.

Potential groundwater contamination extent and migration is not restricted by topography. Contaminated groundwater originating from the ravines, if present, could migrate in directions different from the topographic slope. The groundwater impact of discharges to AOC 1/SWMU 1 were thoroughly evaluated outside the boundaries of Bat Cave Wash by the RFI/RI and the GWRA.

Prior investigation results indicate that COPCs released to SWMU 1 (Former Percolation Bed) have also entered groundwater. While soluble constituents have the potential to have been transported to groundwater at other locations outside the compressor station, the quantity of liquids released and the frequency of release would only be a small fraction of the volume of liquid released to SWMU 1.

Solid materials and debris have been disposed of at the Debris Ravine (AOC 4) and the Railroad Debris Site (AOC 14). Debris may have been disposed of at the Fill Area (AOC 12) and UA 1 (Potential Pipeline Disposal Area). In these locations, debris of various types was physically placed into the unit. In many cases, the debris was subsequently covered with soil. In addition, white powdery material is present in SWMU 1, within the bank of Bat Cave Wash below the compressor station.

COPCs associated with the debris located in these areas and the white powder in Bat Cave Wash could be located in the immediate vicinity of the debris or powder and in surrounding and underlying soil. In some cases, stormwater runoff could transport debris, powder, and contaminated soil to lower-lying areas.

Soil data for each area will be used to evaluate potential risk from contaminated surface and subsurface soil that may be ingested or contacted directly, or soil particles that may be entrained as dust in ambient air, leading to potential inhalation exposure.

2.1.3.4 Ecological Potential Exposure and Migration Pathways for Bat Cave Wash and Other Areas

Figure 5 depicts the ecological CSM for Bat Cave Wash and AOCs 4, 9, 10, 11, 12, and 14, and UA-1 and UA-2. The primary sources and primary source medium (surface soil) are the same as depicted for human exposure. The ecological CSM differs from the human CSMs in the receptors and the distinction between shallow soil and deeper soil, reflecting the potential for exposure of plants, invertebrates, and burrowing mammals in shallow soil but not deeper soil. Potential exposure media include surface soil, shallow soil, and sediment, as well as aquatic and terrestrial biota tissue (which can lead to exposure via ingestion), direct contact, root uptake, or inhalation of particulates.

2.1.4 Potentially Exposed Receptors

The investigation areas are located in and adjacent to public lands, including the Havasu National Wildlife Refuge and land owned by United States Bureau of Reclamation (managed by United States Bureau of Land Management [BLM]). Access limitations are due primarily to topography and climate. There is no active effort to limit human access to the area. Thus, there are both potential human and ecological receptors for soil. Potential exposures to groundwater from SWMU 1 (Former Percolation Bed) and AOC 1 (Bat Cave Wash) have been addressed in Final RFI/RI Volume 2 (Groundwater) and the GWRA (ARCADIS, 2009).

2.1.4.1 Potential Human Receptors

The human receptor populations are grouped as follows:

- Bat Cave Wash – recreational user, tribal user, maintenance worker, hypothetical future groundwater user, and hypothetical future resident (north of the railroad only)
- Other AOCs/UAs outside the compressor station fence line – recreational user, tribal user, maintenance worker, and hypothetical future groundwater user

Recreational users hiking in or visiting the wildlife refuge would be expected potentially to come into contact with soil intervals (see below) defined as: surface (0 to 0.5 ft bgs) and shallow (0 to 3 ft bgs). Maintenance workers may come into contact with subsurface soils as deep as 10 feet (bgs) if a gas pipeline has to be fully exposed for maintenance work (defined as subsurface II). PG&E is working with tribal representatives to develop a tribal use scenario and to define the specific land-use locations and exposure assumptions that would be representative of tribal use of the land.

The GWRA (ARCADIS, 2009) evaluated the potential groundwater impacts associated with Bat Cave Wash, as well as any potential groundwater impacts located outside the wash. The assumption was made that the groundwater, in the future, could be hypothetically used as a potable source of water across any site location, even if residential use is not planned for that area. Therefore, the hypothetical future groundwater user is included on CSM Figures 2 through 4 since the groundwater was evaluated in the GWRA for all areas sampled regardless of well location.

It is unlikely in the foreseeable future that the land currently occupied by the Havasu National Wildlife Refuge and managed by the United States Fish and Wildlife Service will become residential. However, BLM has specifically requested an evaluation of a future residential use on its property. Therefore, although future residential land use is a highly unlikely scenario, a future hypothetical residential land use scenario will be evaluated for BLM property in Bat Cave Wash north of the railroad. PG&E plans to continue owning and operating the associated property outside the fence line as supporting areas for the compressor station for the foreseeable future. Accordingly, the reasonably anticipated future use of the PG&E-owned land is for ongoing industrial operations.

Federal workers may be engaged in land management activities on Refuge and BLM land, such as sampling, fire suppression, or various types of foliage or wildlife maintenance. The recreational and maintenance worker receptors are expected to be protective of the federal worker receptor.

2.1.4.2 Potential Ecological Receptors

Ecological receptors outside the compressor station may include terrestrial flora and fauna associated with Mojave Creosote scrub, Mojave wash scrub, Desert Riparian, and Tamarisk Thicket habitats. Representative animal receptors present in the vicinity of the site include birds such as raptors, songbirds, ground-nesting birds, and species tolerant of human disturbance (e.g., dove and raven). Snakes, lizards, small mammals, larger herbivores, and larger carnivorous mammals such as the desert kit fox are also present. Representative terrestrial receptors include larger burrowing animals (e.g., kit fox) capable of burrowing to depths of several feet bgs and deep-rooted plants such as mesquite. Other representative terrestrial plant species include creosote bush and associated species such as spineflower (*Chorizanthe brevicornu*) and cheesebush (*Hymenoclea salsola*).

2.1.4.3 Leaching to Groundwater

A potential indirect exposure route associated with soil is the potential for residual COPCs in soil to leach to groundwater. If the rate of leaching is sufficiently high, concentrations of COPCs in groundwater could potentially pose a risk if receptors are exposed to groundwater or groundwater migrates to a location where it can affect surface water. There are no current uses of the groundwater near the facility. As indicated above, potential risks associated with groundwater affected by SWMU 1/AOC 1 are being addressed separately.

2.1.4.4 Potential Exposure Depth Intervals

Based on the types of receptors likely to be found in the investigation areas and nearby areas, the types of activities likely to occur, and the nature of the soils in the area, four exposure depth intervals are of interest; surface soil, shallow soil, subsurface soil to 6 ft bgs and subsurface soil to 10 ft bgs. For human health, exposure intervals for soil are surface soil (0 to 0.5 foot bgs), shallow soil (0 to 3 feet bgs), subsurface soil I (0 to 6 feet bgs), and subsurface soil II (0 to 10 feet bgs). For ecological receptors, exposure intervals for soil are surface soil (0 to 0.5 foot bgs), shallow soil (0 to 3 feet bgs), and subsurface soil I (0 to 6 feet bgs).

2.2 Planning Team

The planning team for the Soil Part A program consists of PG&E, DTSC, DOI, and the tribes. Designated representatives from these organizations will meet to evaluate data and determine whether each of the decisions to be made can be made with a sufficient level of certainty.

2.3 Constraints, Resources, and Deadlines

Resources available to complete the soil RFI/RI and subsequent steps in the RCRA corrective action and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) programs consist of PG&E staff and consultants, DTSC and DOI staff and consultants, and tribal staff and consultants. Resources are limited in terms of available knowledgeable staff and project deadlines (as outlined in the project “rainbow” schedule). The Soil Part A program is on the critical path to determining and implementing the final soil remedy for the project.

There are physical, cultural, and biological constraints on the site investigation and remediation effort. Physical constraints outside the fence line consist of challenging topography, limited access, and possible presence of high-pressure gas lines and other utilities. The remote location of the compressor station also makes certain investigation and remediation activities more difficult. In addition, the site is located in and around sensitive habitat areas. The site is also located in an area rich in cultural and historical resources. Several federally recognized tribes have identified areas of traditional, religious, and cultural importance in the vicinity of the Topock Compressor Station..

The physical constraints and the types of COPCs and COPECs released limit the potential remedial actions that could be employed to address constituents posing an unacceptable risk to human health and the environment or threat to groundwater. For the purposes of developing these DQOs, the potential remedial actions fall into three categories: (1) no further action, (2) institutional controls, and (3) certain remedial technologies and will be further defined in the CMS/FS workplan.

2.4 Step 2: Identify the Decisions

Step 2 consists of identifying the decisions to be made in the Part A soil study. Activities completed in this step consist of identifying the principal study questions, defining the alternative actions that may be taken based upon the range of possible outcomes , and combining the alternative actions and the principal study questions into decision statements.

The Part A soil investigation sampling and analysis activities are intended to provide site-specific information to:

- Determine the nature and extent of soil and sediment contamination
- Estimate representative exposure point concentrations (EPCs) to support human health and ecological risk assessment being conducted separately from the Part A soil study
- Determine whether residual soil concentrations pose a potential threat to groundwater
- Estimate soil properties and contaminant distribution in support of the Corrective Measures Study/Feasibility Study (CMS/FS) and/or remedial design

Based on these objectives, four principal study questions were identified. The principal study questions and alternative outcomes of the questions are discussed below. A decision statement is provided for each. Decision statements are summarized in Table 1.

1. What are the nature and extent of residual soil and/or sediment COPC and/or COPEC concentrations resulting from historic compressor station practices?

   The alternative outcomes of this question are: (a) the nature and extent of residual soil and/or sediment concentrations are fully defined based on sample data; or (b) it is infeasible or unwarranted to fully define the nature and extent of soil and/or sediment concentrations based on sample data, and uncertainties will be addressed in the risk assessment and/or CMS/FS.

   Decision Statement: Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of soil and/or sediment concentrations based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment and/or CMS/FS.

2. What are representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices?

   The alternative outcomes of this question are: (a) representative EPCs can be determined based on sample data; or (b) it is infeasible to determine representative EPCs based on sample data, and uncertainties will be addressed in the risk assessment.

   Decision Statement: Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.

3. Do residual soil concentrations resulting from historic compressor station practices pose a potential threat to groundwater?

   The alternative outcomes of this question are: (a) conclude a threat to groundwater may exist, warranting either further site investigation or remedial action to protect groundwater, or (b) conclude no threat to groundwater exists and no further action is needed to protect groundwater.

   Decision Statement: Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat, or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address potential threats to groundwater.

4. What are the site-specific soil properties and contaminant distribution relative to CMS/FS decisions and/or remedial design, if remediation is anticipated?

   The alternative outcomes of this question are: (a) site-specific soil property and contaminant distribution information can be fully determined based on sample data to support the CMS/FS and remedial design; or (b) it is infeasible to fully determine site-specific soil property and contaminant distribution information based on sample data, and uncertainties will be addressed in the CMS/FS decisions and remedial design.

   Decision Statement: Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.

2.5 Step 3: Inputs to the Decision

Once the necessary decisions have been determined, the next step is to identify the inputs required to make the decisions. While there may be significant overlap between the inputs required for the various decisions, the inputs for each decision are defined separately, to ensure all required inputs have been identified. Inputs for each decision are also listed on Table 1.

2.5.1 Inputs to Decision 1 – Nature and Extent of COPCs/COPECs

Three types of information have to be available and considered when assessing whether the nature and extent of contamination at a site are adequately understood: (1) usable COPC and COPEC concentration data, (2) potential contaminant fate and transport mechanisms, and (3) screening and comparison values.

Both existing and new data may provide usable COPC and COPEC concentrations for soil and sediment. Newly collected COPC and COPEC concentration data must meet data quality criteria (including reporting limits and other criteria) set forth in the *Draft PG&E Program Quality Assurance Project Plan* (QAPP) (CH2M HILL, 2008a) to be considered usable. Existing data were evaluated in the *Final Soil and Sediment Data Usability Assessment Technical Memorandum, PG&E Topock Compressor Station* (CH2M HILL, 2008b). Category 1 and 2 data will be used to delineate the nature and extent of contamination. Collectively, new data meeting the criteria set forth in the QAPP and Category 1 and 2 data identified in the Data Usability Assessment are considered usable COPC and COPEC data for Decision 1. Sufficient usable data must be available for each unit. These usable COPC and COPEC concentration data must be compared to background and other screening levels to assess whether the delineation of nature and extent is adequate.

As described in the Revised Final RFI/RI Volume 1 (CH2M HILL, 2007), five phases of data collection have been completed to date to support characterization of SWMUs and AOCs at the Topock Compressor Station. Data collected from implementation of the Part A Work Plan will be combined with the usable data from the existing data set.

The CSMs are an input to Decision 1 because they describe the potential transport mechanisms and fate of COPCs and COPECs potentially released into the environment. This ensures that site data are collected in the appropriate locations.

Six types of comparison/screening levels were identified for this study: background soil concentrations (CH2M HILL 2009), ecological comparison values (ECVs) that are calculated to be protective of the species potentially present in the area outside the fence line, DTSC California human health screening levels (CHHSLs) for residential use (OEHHA, 2005), USEPA regional screening levels (RSLs) for residential use for those compounds for which CHHSLs are unavailable (USEPA, 2008), Environmental Screening Levels (ESLs) developed by staff of the California Regional Water Quality Control Board-San Francisco Bay Region for screening soil samples analyzed for total petroleum hydrocarbons (TPH) gasoline, diesel, and motor oil (RWQCBSF, 2008), and project specific screening levels developed for COPCs/COPECs identified from TAL/TCL data. All six types of screening levels will be specifically used to assess the extent of contamination, and do not necessarily indicate the presence of unacceptable risk (which will be evaluated in the Baseline Risk Assessment). Ideally, the extent of contamination will be defined to the lowest of the applicable delineation action levels. As noted in the discussion for Step 1, physical, cultural, and biological constraints may limit the feasibility of sampling in certain areas.

The background soil study determined that background metals concentrations are generally consistent throughout the study area and the soil column, and that there are no ambient levels of polycyclic aromatic hydrocarbons (PAHs) or pesticides. The results of the background soil study and the statistical analyses describing the characteristics, uses, and limitations of the background soils dataset will be submitted separately as a technical memorandum for review and approval by DTSC and the federal agencies. A series of statistical tests will be conducted to assess whether concentrations of constituents detected in the soil at the various units are elevated above background. There is no single statistical test that can be used to determine when concentrations in soil represent background levels. Rather, there are several tests that may be used to support this determination. To evaluate whether the concentrations of constituents across the exposure area are comparable to background concentrations, the use of both point estimates (e.g., the 95 percent upper tolerance limit) and statistical distributional tests (comparisons of means and medians) may be used to compare the concentrations of constituents detected to background concentrations.

ECVs have been developed for metals and those organic constituents encountered in the top 6 feet of soil. ECVs will be used to a maximum depth of 6 feet bgs, consistent with DTSC guidance for ecological risk assessment (CalEPA, 1998) and as agreed for burrowing animals in the RAWP (ARCADIS, 2008a). CHHSLs, RSLs, ESLs, and project specific screening levels developed for TAL/TCL COPCs/COPECs will be used to a maximum depth of 10 feet bgs, consistent with the RAWP for human health risk assessment for exposure to soil (ARCADIS, 2008a).

2.5.2 Inputs to Decision 2 – Data to Support EPC Calculations

The inputs required for Decision 2 include COPC and COPEC concentrations in soil and sediment within the exposure areas and depth categories defined in the RAWP (ARCADIS, 2008a). Only COPC and COPEC data meeting data quality Category 1 standards may be used for the risk assessment. A Data Usability Matrix for Soil Risk Assessment has been developed to aid in evaluating data usability and adequacy for risk assessment purposes and will be used as a Decision 2 input tool (See Table A-1, Appendix A). The matrix lists the total number of existing and newly collected samples per AOC and sub AOC areas, identifying horizontal and vertical coverages, exposure depths as defined in the RAWP (ARCADIS, 2008a), analytical suites, data quality, representativeness and comparability.

Approaches for developing the human health and ecological risk assessments and estimating representative EPCs are specified in the RAWP (ARCADIS, 2008a). The EPC is a conservative estimate of the average chemical concentration in an environmental medium to which a receptor may be exposed. The EPC is constituent-specific and is estimated for each individual exposure area within a site. The risk assessments will calculate EPCs based on specific data groupings and depth categories, as discussed below. Therefore, it is critical to consider those data groupings and depth categories when determining the inputs needed for estimation of representative EPCs.

For the human health risk assessment, the exposure areas outside the fence line consist of: (1) Bat Cave Wash (which includes SWMU 1/AOC 1 and the portion of the drainage feature extending north to the river); (2) the remaining AOCs/UAs located outside the compressor station fence line; and (3) 1/8-acre parcels within Bat Cave Wash north of the railroad (for the hypothetical future residential user only). Once data are available from the soil sampling activities, additional refinements to the exposure areas may occur.

The EPCs for direct soil contact (i.e., soil ingestion, dermal contact, and inhalation of particulates) will be estimated based on separate data groups for each of the exposure areas and will consider the following separate depth categories for each receptor: 0 to 0.5 foot bgs, 0 to 3 foot bgs, 0 to 6 foot bgs, and 0 to 10 foot bgs. Typically, the soil EPCs will be the 95% upper confidence limit (UCL) on the arithmetic mean for the exposure area and depth category being considered. Additionally, specific areas of hot spots may warrant specific assessment. In general, the identification of hot spots will be conducted through visual examination of the data. Visual examination of the data is a qualitative assessment that includes consideration of relative concentrations in relation to nearest neighboring sampling locations (both horizontally and vertically), field observations of staining or debris, and topography. Additional assessment may consist of evaluating the site data for outliers, which if conducted, will be done quantitatively using applicable statistical tests and may require additional and/or alternative statistical evaluations for identifying the appropriate EPCs.

EPCs in air from dust will be modeled from soil data by dividing the concentration of each constituent in the soil by a particulate emission factor. As stated in the preceding paragraph, the EPCs for direct contact pathways, including particulate inhalation, will be estimated using data from the four listed depth intervals, as appropriate, for the receptor as identified in the RAWP. EPCs in air from VOCs, if present, will be modeled from soil data based on a volatilization factor equation.

For the ecological risk assessment, the exposure areas for the large home range receptors consist of Bat Cave Wash and AOC 4 as one exposure area, and AOCs 9, 10, 11, 12, and 14 and UA-1 as another single exposure area. For the small home range receptors, the ecological risk assessment will initially include each individual AOC/UA as a separate exposure area. Once data are available from the soil sampling activities, additional refinements to the exposure areas may occur.

For direct exposure, the ecological risk assessment will evaluate representative EPCs from soils within the depth categories of 0 to 0.5 foot bgs, 0 to 3 foot bgs, and 0 to 6 foot bgs, which are consistent with three of the categories specified for the human health risk assessment. Therefore, soil data needed to address direct exposure for the ecological risk assessment conform to data needs for the human health risk assessment.

Typically, the EPCs for soil and sediment COPECs will be the 95% UCL on the arithmetic mean. The maximum detected concentration may be selected if the data do not support a valid UCL calculation. Additionally, specific areas of hot spots may warrant specific assessment.

If a potentially complete pathway from soil to burrow air for VOCs is identified based on the Part A investigation results, transport modeling, active soil gas sampling and analysis, and sampling and analyzing burrow air are all alternatives that could be considered. If transport modeling is conducted, burrow air concentrations will be estimated using soil data from the 0 to 6 feet interval.

Exposure modeling will be used to estimate representative EPCs for biota tissue from soil concentrations from the same depth categories as for the soil EPCs.

2.5.3 Inputs to Decision 3 – Impacts to Groundwater

The inputs required for Decision 3 consist of information that is required to calculate soil screening levels (SSLs) protective of groundwater and to conduct modeling, where necessary. These inputs are shown in Table 1. Soil background concentrations are also an input to this decision because SSLs will only be calculated for metals where soil concentrations exceed background. SSLs consider the volume and cross-sectional area of the potential source and will thus be developed on a unit-specific basis. Groundwater maximum contaminant levels and groundwater background values will define the maximum allowable concentrations of COPCs in groundwater. USEPA literature and other technical literature will serve as the source for modeling parameters. Existing and new site data will provide information on the nature and extent of COPCs, depth to groundwater, and geotechnical, geochemical, and hydraulic characteristics of the vadose zone soil.

2.5.4 Inputs to Decision 4 – Data for CMS/FS

Inputs to Decision 4 consist of soil property and contaminant distribution data and other information needed to estimate required remediation volumes and to determine the most appropriate and cost-effective remedial approach for each area potentially requiring remediation. Inputs to Decision 4 include volumes of soil and debris, specific soil physical and chemical properties that could influence the performance of certain remedial technologies (e.g., porosity, grain size, density, organic carbon content, soil chemical properties), and waste characterization parameters for any soils that may need to be transported offsite.

New and existing analytical data will provide information regarding chemical and physical soil characteristics and waste characterization parameters. New and existing data regarding the nature and extent of COPCs and COPECs, coupled with results of the human health and ecological risk assessments will provide the volumes of soil potentially requiring remediation. New and existing data will be supplemented by USEPA and other technical literature regarding physical and chemical properties of COPCs and soils and the performance and requirements of specific remedial technologies. Debris mapping will be conducted to estimate the types and volumes of debris present in areas where solid materials were discarded.

2.6 Step 4: Study Boundaries

Study boundaries include spatial (lateral and vertical), temporal, and analytical boundaries for each unit or group of units, as appropriate. Constraints that could interfere with sampling are also identified in this step and are reflected in the definition of the boundaries. Boundaries must be defined for each decision individually, as the scale at which data will be evaluated and the data populations of interest may vary for each decision. Temporal boundaries are required because a given medium or unit may change over time. Practical constraints may limit the spatial and/or temporal boundaries or regions that will be included in the study. Practical constraints associated with the Topock RCRA corrective action/CERCLA program consist primarily of access limitations (physical, cultural, historical, or biological constraints) but may also include other factors such as soil characteristics and the presence of bedrock. Study boundaries, especially the lateral and vertical study boundaries, are subject to change as additional data are collected. The study boundaries associated with each of the decisions are summarized in Table 1.

2.6.1 Decision 1 Study Boundaries – Nature and Extent of COPCs and COPECs

Lateral Boundaries

Lateral boundaries for Decision 1 are initially estimated based on the current boundaries of each individual unit as estimated in the Revised Final RFI/RI Volume 1 (CH2M HILL, 2007). For AOCs within drainages, such as AOC 1, AOC 4, AOC 9, AOC 10, and AOC 11, the lateral boundaries are expected to be constrained by topography in the up-drainage and cross-drainage directions. The down-drainage extent is not constrained and remains to be defined through sampling and analysis.

For AOC14, the lateral boundary is initially estimated to be bounded by Bat Cave Wash to the west, the former plant road and historic Route 66 to the east, Interstate 40 to the south, and the railroad tracks to the north. For AOC-12 and UA-1, the locations and extents of the AOCs are estimated based on anecdotal information on past waste disposal, and are shown on Figure 1, and as described in the Revised Final RFI/RI Volume 1 (CH2M HILL 2007).

For UA-2, the lateral boundary is the area surrounding the location of the former aboveground drip tank.

Where units are adjacent, the lateral study boundaries are defined at a clear physical demarcation to the extent feasible. For example, the western lateral study boundary for AOC 4 is at the mouth of the Debris Ravine where it joins Bat Cave Wash.

The specific lateral boundaries for each unit are shown in Table 1.

2.6.1.1 Vertical Boundaries

The vertical boundary of the soil investigation for Decision 1 extends from the ground surface to the water table.

2.6.1.2 Analytical Boundaries

Analytical boundaries for Decision 1 include both chemical (COPCs, COPECs, and general chemistry) parameters and soil physical characteristics. Sample location tables were included in the Part A Soil Workplan (a separate table was provided for each AOC). In addition, a comprehensive planned sample table, specifying analytes for all proposed samples, was provided in Appendix B of the workplan. Similar tables will be provided for the Phase 2 sampling program.

Chemical Parameters

Chemical parameters were defined for each individual unit and may be refined following completion of the Phase 1 sampling program. The list of analytical parameters at each unit is based on the site use and release history described in the Revised Final RFI/RI Volume 1 (CH2M HILL, 2007) and fate and transport mechanisms, as documented in the CSMs. Based on the available information, it was determined Title 22 metals, hexavalent chromium, total petroleum hydrocarbons, volatile organic compounds, semivolatile organic compounds, and PAHs are COPCs/COPECs for all areas outside the fence line except UA-2. VOCs are not considered COPCs/COPECs for surface soil. Dioxins and furans are COPCs/COPECs at AOC-4. Asbestos is a COPC for AOC 4, AOC-14, and UA 1 (asbestos is not a COPEC).

COPCs/COPECs at UA-2 are limited to total petroleum hydrocarbons and PAHs. Dioxins/furans, asbestos, and PCBs will be analyzed in samples collected from the upper end of AOC 1 where AOC 4 enters AOC 1. Ten percent of the samples collected in all AOCs will be analyzed for the full suite of inorganic and organic analyses per the CERCLA Target Analyte List (TAL) and Target Compound List (TCL). Select samples were analyzed to characterize the soluble fraction of compounds present at concentrations exceeding 10 times the total threshold limit concentration or 20 times the toxicity characteristic leaching procedure values. The samples selected will be determined based on the Title 22 metals analysis results.

2.6.1.3 Temporal Boundaries

All historic RFI/RI and new Part A soil sampling Category 1 data and acceptable Category 2 data (based on the final Data Usability Assessment) will be evaluated for determination of the nature and extent of contamination.

2.6.2 Decision 2 Study Boundaries – Data to Support Calculation of EPCs

2.6.2.1 Lateral Boundaries

The lateral study boundaries for Decision 2 are the same as for Decision 1.

2.6.2.2 Vertical Boundaries

Vertical study area boundaries for Decision 2 are defined by potential maximum exposure depths. Based on the types of receptors likely to be found in the investigation areas and nearby areas, the types of activities likely to occur, and the nature of the soils in the area, four exposure depth intervals are of interest; surface soil, shallow soil, subsurface soil to 6 feet bgs and subsurface soil to 10 feet bgs. For human health, exposure intervals for soil are surface soil (0 to 0.5 foot bgs), shallow soil (0 to 3 feet bgs), subsurface soil I (0 to 6 feet bgs), and subsurface soil II (0 to 10 feet bgs). Depths up to 10 feet bgs are appropriate for maintenance workers. Depths up to 3 feet bgs are appropriate for all human receptor populations being evaluated including: recreational users, tribal users, maintenance workers, and hypothetical future residents. Depths of 0 to 6 feet bgs and 0 to 10 feet bgs apply only to the maintenance worker and the hypothetical future resident (north of the railroad). For ecological receptors, exposure intervals for soil are surface soil (0 to 0.5 foot bgs), shallow soil (0 to 3 feet bgs), and subsurface soil I (0 to 6 feet bgs). Thus, the vertical study boundary for Decision 2 is 10 feet bgs, except at SWMU 1/AOC 1 where scouring scenarios will be considered. For SWMU 1/AOC 1, the vertical study boundary for Decision 2 is 15 feet bgs. This additional 5 feet of sampling depth (10 to 15 feet bgs) is needed to account for potential exposure 10 feet below the surface AFTER a 5 foot scouring event has occurred.

2.6.2.3 Analytical Boundaries

The same analytical boundaries for chemical parameters that apply to Decision 1 apply to Decision 2.

2.6.2.4 Temporal Boundaries

The same temporal boundaries that apply to Decision 1 apply to Decision 2; however, only existing Category 1 data will be considered for use in the risk assessment.

The Data Usability Matrix for Soil Risk Assessment lists the various Risk Assessment study boundaries for existing and newly collected data (Appendix A – Table A-1).

2.6.3 Decision 3 Study Boundaries - Impacts to Groundwater

2.6.3.1 Lateral Boundaries

The definition of lateral study boundaries for Decision 3 will be an iterative process. Initially, the lateral study boundaries for Decision 3 will be the same as for Decision 1. Following completion of the Phase 1 data evaluation, Decision 3 study boundaries will be refined to consist of those areas with COPC/COPEC concentrations exceeding the SSLs.

2.6.3.2 Vertical Boundaries

The vertical study area boundaries for Decision 3 are the same as for Decision 1.

2.6.3.3 Analytical Boundaries

The same analytical boundaries for chemical parameters that apply to Decision 1 also apply to Decision 3. Additional data regarding soil characteristics may be collected if needed to complete any required modeling. Select samples will be analyzed for organic carbon content, grain size, Atterberg limits, gradation, and washes.

2.6.3.4 Temporal Boundaries

The temporal boundaries for Decision 3 are the same as for Decision 1.

2.6.4 Decision 4 Study Boundaries – Inputs to CMS/FS

2.6.4.1 Lateral Boundaries

Initially, human health screening levels (RSLs, CHHSLs, and ESLs), ecological comparison values, and project specific screening levels developed for TAL/TCL COPCs/COPECs developed for this project will be used to define the lateral study boundaries for Decision 4. Results of the human health and ecological risk assessments will refine the lateral boundaries for remedial actions.

2.6.4.2 Vertical Boundaries

The vertical study area boundary for Decision 4 is the maximum depth for which remedial actions may be taken at the site to achieve remedial action objectives. The maximum depth for which soil remedial actions may be taken is determined by a combination of feasible technology types as defined in the CMS/FS workplan and physical or other constraints on soil remediation.

2.6.4.3 Analytical Boundaries

The same analytical boundaries for chemical parameters and soil characteristics that apply to Decision 1 also apply to Decision 4. Additional data regarding physical soil characteristics may be collected if needed to complete any required modeling and to support remedial technology selection and feasibility evaluation.

2.6.4.4 Temporal Boundaries

The temporal boundaries for Decision 4 are the same as for Decision 1.

2.7 Step 5: Decision Rule

Decision rules are "if…, then…" statements that describe the actions to be taken depending on the site-specific findings. A decision flow chart was developed for each of the four decisions identified in these DQOs. The decision process depicted on Figures 6 through 9 is described below.

2.7.1 Decision 1 - Nature and Extent of COPCs - Decision Rules and Decision Process

Refer to Figure 6 for the following discussion of the decision rule for Decision 1. The decision rule is applied separately for each AOC, SWMU, and UA.

2.7.1.1 Boxes 1 through 3

Once the Part A Phase 1 soil samples have been collected and the data have been validated (Boxes 1 and 2), the Phase 1 data and existing historic RFI/RI data sets for each AOC/SWMU/UA will be combined.

The data collected during the Phase 1 investigation will be validated as described in the QAPP (CH2M HILL, 2008a) and the *Draft Soil Addendum for the Topock Compressor Station, RCRA Facility Investigation/Remedial Investigation* (CH2M HILL, 2008c). The validated data will then be combined with existing data. Existing data were evaluated in the Data Usability Assessment (CH2M HILL, 2008b), and only data meeting data quality Category 1 or 2 requirements will be used to assess the nature and extent of COPCs and COPECs.

During this step, the existing data will also be reviewed to assess whether they are still considered reliable. If site conditions have changed substantially (e.g., as in Bat Cave Wash following the 2006 high runoff events), the data will be assessed to determine whether it is likely that the changes in site conditions have altered the conditions at that particular location. This data assessment process will be limited to surface and near-surface samples, as deeper samples would not be expected to be affected. Any surface or near-surface data for organic COPCs and COPECs will also be noted, as organic constituents located in surface and near-surface soils may have degraded under the influence of high surface temperatures and/or light. Older data for organic compounds will be compared to newer data for organics in the same vicinity.

2.7.1.2 Boxes 4 through 8

Once the new and existing data sets have been combined and reviewed, the combined data set for each unit will be first be reviewed to assess whether, as a result of the TAL/TCL analysis, any new compounds that qualify as COPCs/COPECs have been identified in the areas outside the compressor station (Box 4). Box 4 consists of the following decision:

Are any new COPCs/COPECs identified as a result of the TCL/TAL analysis?

If new compounds have been identified, a decision will be made in conjunction with DTSC and DOI to determine whether the detected compound represents a new COPC or COPEC. The decision whether any newly identified compounds may represent new COPCs and/or COPECs will be based on multiple factors including:

- Potential for the compound to be related to the compressor station (e.g., potential for the compound to be associated with past activities at the compressor station and/or to be a breakdown product of constituents known to have originated at the compressor station)
- Frequency of detection
- Concentrations detected, and
- Distribution of detections.

The outcome of Box 4 can be

***Yes**: new COPCs/COPECs have been identified, or*

***No**: no new COPCs/COPECs have been identified.*

It should be noted that it is possible for new compounds to be detected without these compounds necessarily being designated as COPCs/COPECs. Additional sampling may be warranted in order to make this decision.

If the outcome from the decision in Box 4 is yes, the next step is to determine whether screening values will be required for the newly-identified COPCs/COPECs (Box 5A). If the outcome from Box 4 is no, the decision process moves to Box 5C, and the decision process continues with comparison to screening levels (see discussion below).

The decision for Box 5A is:

Is development of screening value for new COPCs/COPECs required?

The possible outcomes for this decision step are:

***No**: Screening values are not required.*

***Yes**: Screening values are required.*

Screening levels may not need to be developed because they already exist. If screening levels do not need to be developed, the process moves to Box 7, evaluation of lateral and vertical extent. Screening may not be required because the frequency of detection and/or detected concentrations of these compounds are too low to merit the likely complex effort of developing screening levels. The decision to develop additional screening levels will be made in conjunction with DTSC and DOI. If screening levels are not developed the significance of the new COPCs and any associated uncertainties would be addressed in the risk assessment (Box 6A).

If screening levels will be required for any new COPCs/COPECs they will be developed by PG&E and require concurrence from DTSC and DOI (Box 5B). Once appropriate screening levels are available for all COPCs/COPECs the lateral and vertical extent of these compounds can be evaluated.

Following the identification of potential new COPCs/COPECs, all data will then be compared to screening criteria (Box 5C). The combined data tables will flag each occurrence of a COPC or COPEC exceeding one or more of the screening criteria. The following sets of screening values will be used:

- Background soil concentrations of metals (CH2M HILL, 2008d).
- CHHSLs for residential use, where available (OEHHA, 2005).
- RSLs for residential use for constituents for which CHHSLs are not available (USEPA, 2008).
- ESLs for residential use for petroleum hydrocarbon compounds TPH-gasoline, diesel, and motor oil.
- Preliminary ECVs developed by ARCADIS for PG&E (ARCADIS, 2008b)

- Project specific screening levels developed for COPCs/COPECs identified from TAL/TCL data.

ECVs have been developed for metals and select organics. ECVs have only been developed for organic COPECs that have been detected. Certain ECVs for metals are lower than the background soil concentrations and/or method quantitation limits; in these cases, the background concentration or method quantitation limit will be used in lieu of the ECV when determining whether delineation is adequate.

The initial comparison will be on a point-by-point basis for all depths (i.e., a simultaneous lateral and vertical assessment). The detected concentrations at each unit will first be compared to either the background concentrations (for metals) or the lowest applicable screening criterion for organic compounds. The lowest applicable organic screening value may differ depending on depth (ECVs are applicable to a maximum depth of 6 feet bgs; CHHSLs/RSLs are applicable to a depth of 10 feet bgs).

As a further check for metals, a population (central tendency) comparison such as the Wilcoxon Rank Sum Test will be performed for the population of detected concentrations to the applicable background data set, provided there are sufficient detections of the metal in question to allow a meaningful statistical comparison to be made.

If any COPCs or COPECs are present above background concentrations or the lowest applicable screening criterion for organic compounds, the locations of the COPC or COPEC concentrations exceeding the initial screening will be examined to determine whether nearby samples provide an adequate perimeter (lateral) or base (vertical) of samples to meet the initial screening criteria. In addition to point by point comparisons of site data to screening levels, spatial trends will be reviewed graphically (Box 6B).

Spatial trends will be evaluated both laterally and vertically. For lateral delineation, for samples potentially containing elevated levels of COPCs or COPECs, concentration trends toward the perimeter of the unit will be reviewed to ensure that concentrations are generally decreasing toward the perimeter. Vertical concentration trends will also be reviewed for each boring showing elevated concentrations of COPCs or COPECs. Potential hot spots will be identified through the presence of clusters of elevated concentrations of COPCs/COPECs. Evaluation of spatial trends will include the following considerations:

- Lateral concentration trends toward the edge of a unit or affected area (i.e., potential hot spot) within a unit
- Vertical concentration trends in each boring, and throughout a given unit or area
- Distribution of detections and non-detections of each constituent within a unit, and
- Where applicable, concentrations trends at the upstream unit.

For ease of evaluation, COPC and COPEC concentrations exceeding the screening criteria will be presented in different colors on the figures, according to the lowest concentration screening criterion exceeded.

The spatial trends analysis will used to make the decision identified in Box 7:

Are lateral and vertical boundaries of COPCs/COPECs including hot spots, if applicable, defined?

The possible outcomes of Box 7 are:

> ***Yes:*** *the lateral and vertical extent of COPCs/COPECs including any hot spots are defined, or*
>
> ***No:*** *the lateral and vertical extent of COPCs/COPECs including any hot spots are not fully defined*

This evaluation will be conducted for each compound, and may indicate that the boundaries of some but not all compounds at a given unit are adequately defined. If all boundaries are defined for a given unit, no further data are required to resolve Decision 1 (Box 8). The determination that COPC/COPEC boundaries have been adequately defined at a specific unit will be made in consultation with DTSC and DOI.

2.7.1.3 Boxes 10 through 13

If the determination is made that the boundaries have not been adequately defined, additional sampling of specific compounds may be required to complete the delineation of the lateral and vertical extent of contamination and/or hot spots. The specific areas where COPC/COPEC boundaries are not adequately defined will provide the basis for further sampling recommendations (Box 10). The information developed pursuant to Box 9 will be used to define the additional sampling needed to delineate a chemical boundary or define potential hot spots in each area identified as needing further delineation. The extent of additional sampling recommended will be defined in consultation with DTSC, and DOI. Once the additional sampling necessary to create a complete delineation has been defined (Box 10), Box 11 requires the following decision:

Would additional sampling significantly improve data quality, or risk assessment or site remediation decisions, and is the additional sampling feasible?

The possible outcomes for the decision in Box 11 are as follows:

> ***Yes****: Additional data would significantly improve data quality and/or risk assessments and site remediation decisions, and the additional data collection is feasible*
>
> ***No*** *The additional data would not significantly improve data quality and/or risk assessments and site remediation decisions, and is therefore not necessary; or, while additional data would significantly improve data quality and/or risk assessments and site remediation decisions, the additional data collection is not feasible due to physical or institutional constraints*

Data quality may be improved if existing sample results for the COPC or COPEC in question at the given unit are for older samples that may no longer represent current conditions (e.g., surface soil results in Bat Cave Wash collected prior to 2006 high runoff events), or have data flags that could limit the reliability of the data.

The risk assessment team will review the value of the additional sampling for improving the risk characterization for the specific COPC/COPEC at the given unit. Risk characterization may be improved by additional sampling if: the existing number of samples for an exposure area or designated hot spot is low; the detection limits did not achieve adequate concentrations for risk assessment purposes; the total number of samples in a given exposure depth interval is low; or the lateral or vertical distribution is uncertain at a level significant to the risk decisions.

Remedial decision making may be improved if the area or volume of potentially-impacted soil could be defined more precisely. Thus, additional sampling in areas where samples are spaced relatively far apart and/or where vertical characterization is limited might be considered to improve remedial decision making. If there are remaining uncertainties regarding soil physical properties in areas where remediation may be required, remedial decision-making could also be improved through the collection of additional data pertaining to the physical characteristics of interest.

If it is concluded in Box 11 that additional sampling is not feasible or warranted, then no further sampling is required and remaining uncertainties would be addressed in the risk assessment or CMS/FS (Box 13), and no further sampling is required to resolve Decision 1. The agencies will be consulted prior to concluding additional sampling is not feasible or warranted.

If additional data collection is desirable and feasible, the additional sampling needs will be defined, the sampling will be conducted and the new data will be validated (Box 12). After the data are validated, the flowchart leads back to Box 3 to reinitiate the data evaluation process.

2.7.1.4 Box 14

Once it has been determined that the nature and extent of contamination have been adequately defined and no further data collection is necessary to resolve Decision 1, the flow chart leads to Boxes 14A through 14C that refer to the decision rules for Decisions 2, 3, and 4. Those decision rules (Figures 7, 8, and 9) address data sufficiency for estimating EPCs, assessment of threat to groundwater, and data sufficiency for estimating soil properties and contaminant distribution to support the CMS/FS and remedial design.

2.7.2 Decision 2 – Data to Support Calculation of EPCs- Decision Rules and Decision Process

Refer to Figure 7 for the following discussion of the decision rule for Decision 2. This decision rule follows from the decision rule for Decision 1.

2.7.2.1 Box 1

The first step in addressing Decision 2 is to group all Part A soil investigation and Category 1 historic RFI/RI soil and sediment data by exposure area and depth category defined in the Risk Assessment Work Plan (ARCADIS, 2008a),as discussed below.

2.7.2.2 Boxes 2 through 4

Boxes 2 though 4 consist of the evaluation of data adequacy and additional data needs, if warranted. Box 2 addresses the following decision:

> *Are sufficient Category 1 data available to calculate representative EPCs for each exposure area and applicable depth interval (as defined in the Risk Assessment Work Plan)?*

The outcomes of the decision in Box 2 are:

- **Yes** – If sufficient Category 1 data exist to calculate representative EPCs for each exposure area and depth interval, the flow chart leads to Box 3, which concludes no further data collection is necessary to resolve Decision 2, and Box 9, for the calculation of representative EPCs and conduct of the risk assessments. The RAWP defines the process to be used to calculate EPC, assess risk and determine whether chemicals present at a given unit, combination of units, of portion of a unit potentially pose an unacceptable risk. The risk assessment will recommend which chemicals for which areas should be carried into the CMS to provide information for risk management decisions

- **No** - If the Category 1 data are not sufficient to calculate representative EPCs for each exposure area and depth interval, the flow chart leads to Box 4 to determine what additional samples are necessary to allow calculation of representative EPCs. In this step, PG&E, in consultation with DOI and DTSC, will define specific sampling needs.

The Box 2 decision will be resolved by comparing the existing medium-specific data for each exposure area and depth interval with the data requirements imposed by the acceptable limits on decision errors to be developed for Step 6 of the DQOs, coupled with professional judgment from the risk assessment experts. Box 4 will also consider the Step 6 requirements when defining the additional samples needed.

2.7.2.3 Box 5

Box 5 addresses the feasibility of collecting the additional samples identified as desirable in Box 4. As discussed for Decision 1, there are significant physical and other practical limitations on sampling in the areas outside the fence line. The proposed additional sampling effort will be evaluated by PG&E in consultation with DOI, DTSC and the stakeholders to determine if implementation of the sampling effort is feasible. The outcomes of Box 5 are:

- **No** – Further sampling is not feasible. The flow chart leads to Box 8 (EPC uncertainties are addressed in the risk assessment), and no further sampling is necessary to resolve Decision 2 (Box 3).
- **Yes** – Further sampling is feasible. The flow chart leads to Box 6. Additional sample collection is conducted and the data are validated. The flow chart then leads to Box 7 to combine the newly collected data with the previous Category 1 and Part A Phase 1 data set, and from there back to Box 2 to restart the decision rule with the new data set.

2.7.3 Decision 3 – Threat to Groundwater - Decision Rules and Decision Process

Refer to Figure 8 for the following discussion of the decision rule for Decision 3. This decision rule follows from the decision rule for Decision 1.

2.7.3.1 Boxes 1 through 5

The same data set used for Decision 1 will be used for Decision 3. The combined data set will be compared against soil screening levels. The combined data tables will flag each occurrence of a COPC exceeding the relevant SSL.

Box 3 addresses whether the screening level assessment based on SSLs indicates a threat to groundwater.

The potential outcomes of Box 3 are:

- **Yes** – A potential threat to groundwater exists from residual soil contamination at this AOC/UA based on the screening level assessment. Additional assessment is warranted. The flow chart leads to Box 5 to assess whether data indicate a potential current threat to groundwater exists.
- **No** – No threat to groundwater is indicated by the screening level assessment for this AOC/SWMU/UA. The flowchart leads to Box 4; no further sampling is required to resolve Decision 3.

The decision criteria used for this decision are the SSLs. The development of SSLs is described in the *Calculation of Soil Screening Levels for Protection of Groundwater at the PG&E Topock Compressor Station Technical Memorandum* dated August 1, 2008 (CH2M HILL, 2008e). SSLs will be calculated for each unit. COPC concentrations within each unit will first be compared to the SSLs developed for that unit. If COPC concentrations are all below SSLs, then soil within that unit does not pose a potential threat to groundwater.

SSLs are highly conservative screening concentrations; SSLs were chosen as the first step in evaluating the potential threat of leaching to groundwater because they are a simple, conservative screening tool. The calculation process for SSLs does not take into consideration changes in concentration with depth but assumes that the maximum concentration detected at any point in the soil column is present at the groundwater interface and that all constituents are completely leachable. If SSLs are exceeded for any COPC at any unit, it does not mean that that particular COPC in soil in that particular unit necessarily poses a potential threat of leaching to groundwater; rather, it is an indication of a potential threat. More site-specific and detailed evaluation (modeling) may be appropriate to better assess the potential threat of leaching to groundwater for that specific compound at that unit.

Box 5 addresses whether data indicate a potential current threat to groundwater exists.

Box 5 addresses the following decision:

Do data indicate a potential current groundwater impact?

Outcomes of Box 5 are:

- **Yes** – Soil data indicate a current groundwater impact. The flowchart leads to Box 12, which requires either the development of a plan for an AOC-specific groundwater assessment and/or inclusion of the potential source area in the CMS/FS and characterization of any uncertainties in the CMS/FS.
- **No** – A potential future threat to groundwater exists from residual soil contamination at this AOC/UA based on the screening level assessment. Additional assessment is warranted. The flow chart leads to Box 6 to conduct vadose zone modeling to further assess the potential impact.

The criteria for resolving this decision are vertical concentration trends of compounds in each boring, and throughout a given unit or area location. If soil data indicates elevated concentrations of compounds (as compared to screening criteria) in samples throughout the boring and at the depth of the soil/groundwater interface, a potential for a current impact to groundwater exists.

Boxes 6 and 7 address quantitative vadose zone modeling to assess whether residual soil concentrations could affect groundwater in the future even if current groundwater impacts are not indicated. The HYDRUS-1D (Simunek et al., 1998) vadose zone model will be used. HYDRUS is a finite-element model for one-dimensional solute fate and transport simulations that incorporates sorption along with dispersion in the vadose zone. Critical input to the model will be an estimate of the mass of the COPC(s) present in soil, based on soil sample data. Box 7 addresses the following decision:

Does modeling indicate the potential for soil-related impacts to groundwater?

Outcomes of Box 7 are:

- **Yes** – Modeling indicates the potential for future impacts to groundwater from the residual soil contamination at the AOC/SWMU/UA. The flowchart leads to Box 8 to assess whether additional site-specific refinement of the model is warranted to better simulate site conditions.
- **No** – Modeling does not indicate a potential impact to groundwater. The flowchart leads to Box 4; no further sampling is required to resolve Decision 3.

The criteria for resolving this decision are the simulated groundwater concentrations relative to groundwater chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) for COPCs. The target groundwater concentrations used to assess potential impacts to groundwater are the California State groundwater maximum contaminant levels (MCLs), both primary and secondary. The MCLs have been defined as chemical-specific ARARs)in Volume 2 of the Resource Conservation & Recovery Act (RCRA) facility investigation (RFI) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation (RI) Revised Final Report (CH2M HILL, 2009).

2.7.3.2 Boxes 8 and 9

Boxes 8 and 9 address the need for collecting additional data in support of model refinement. Box 6 addresses the following decision:

Is further site-specific refinement of the model warranted?

The primary consideration for this decision is the evaluation of the potential uncertainty in the refined model results (i.e., would the refined model be significantly more reliable?). The decision to pursue a more refined model on which to base decision making will be made PG&E in consultation with DTSC and DOI.

The outcomes of Box 8 are:

- **Yes** – Further refinement is warranted. The flow chart leads to Box 9 to assess whether additional data collection is necessary to support the model refinement.
- **No** – Further refinement of the model is not warranted. The flowchart leads to Box 12, which requires either the development of a plan for an AOC-specific groundwater assessment or inclusion of the potential source area in the CMS/FS and characterization of any uncertainties in the CMS/FS.

If further refinement is warranted, the next decision is a determination of whether additional data collection is required to refine the model. Refinements would not necessarily require additional sampling, because refinements may also be achieved through further literature research regarding physical and chemical characteristics, more detailed modeling of the area of interest (i.e., smaller "cells"), and/or use of a model more specifically targeted at the compound in question. Box 9 states:

Is additional data collection required to refine the model?

The outcomes of Box 9 are:

- **Yes** – Additional sampling is required. The flow chart leads to Box 10 to determine additional data collection needs.
- **No** – Further data collected is not required. The flowchart leads to Box 14, and the model is refined without additional sample collection.

The need for additional data collection may be due to a variety of factors. It is likely that a number of assumptions will have had to be made as part of the initial modeling effort; for example site-specific leaching data (soluble threshold limits concentration and/or toxicity characteristic leaching procedure data) may not be available for all compounds of interest. It may also be determined that, rather than this type of waste characterization analysis, a DI-WET or similar modified testing method would have been more appropriate to characterize the in-situ leaching potential in the areas outside the fence line.

2.7.3.3 Boxes 10 and 11

Boxes 10 through 11 define the additional data needed and the feasibility of collecting the desired data. Following the decision in Box 9 that additional data collection is required to refine the model, the data to be collected are determined in Box 10. From Box 10, the process flows to Box 11, which addresses the following decision:

Is additional data collection feasible?

Considerations for this decision are the types of data that need to be collected to refine the model and the feasibility of collecting additional samples. Feasibility of sample collection may be limited by physical, cultural/historical, and/or biological factors. The decision regarding the feasibility of additional data collection will be made by PG&E in consultation with DTSC and DOI.

Outcomes of Box 11 are:

- **Yes** – Additional data collection is feasible. The flow chart leads to Box 13 to collect the additional samples and validate the newly collected data. From there, the flowchart leads to Box 14 to refine the model, and then to back Box 6 to conduct the refined modeling.
- **No** – Additional data collection is not feasible. The flowchart leads to Box 12, which requires either the development of a plan for groundwater assessment or inclusion of the potential source area in the CMS/FS and characterization of any uncertainties in the CMS/FS.

2.7.4 Decision 4 – Inputs to CMS/FS and Remedial Design - Decision Rules and Decision Process

Refer to Figure 9 for the following discussion of the decision rule for Decision 4. This decision rule follows from the decision rule for Decision 1.

2.7.4.1 Box 1

The first step in addressing Decision 4 is to compile Part A soil investigation and historic RFI/RI soil property data and nature and extent of contamination information from Decision 1.

2.7.4.2 Box 2

Box 2 addresses the following decision:

Are soil property and contaminant distribution data (see Decision) sufficient to support the CMS/FS and/or remedial design?

The outcomes of the decision in Box 2 are:

- **Yes** – If sufficient soil property and contaminant distribution information is available to support the CMS/FS and/or remedial design, the flow chart leads to Box 3, which concludes no further sampling is necessary to resolve Decision 4, and Box 9, for conduct of the CMS/FS and remedial design.
- **No** - Available soil property and contaminant distribution information is insufficient to support the CMS/FS and/or remedial design, the flow chart leads to Box 4 to determine what additional samples are necessary to support the CMS/FS and/or remedial design.

Considerations for this decision are the availability of site-specific soil property data, such as porosity, grain size, Atterberg limits, organic carbon content, and chemical makeup, and contaminant distribution information. Once the delineation of the nature and extent of COPCs and COPECs at each unit is complete as defined for Decision 1, areas and volumes of soil potentially requiring remediation can be calculated. Consequently, sufficient data on contaminant distribution are available when the Decision 1 data needs are met. The actual volumes of soil ultimately requiring remediation will be determined based on the results of the risk assessment and other factors considered in developing remediation action objectives.

A preliminary assessment of potential remedial technologies and presumptive remedies will guide identification of the data needs to support the CMS/FS and remedial design. Once an initial list of suitable remedial technologies has been agreed upon the approved CMS/FS workplan, soil property data requirements will be identified and will be compared to the available soil property data to assess whether sufficient data are available to support remedy alternative evaluation and selection, and/or remedial design.

2.7.4.3 Boxes 5 through 8

Box 5 addresses the feasibility of collecting the additional samples. As discussed for Decision 1, there are significant physical and other practical limitations on sampling in the areas outside the fence line. The proposed additional sampling effort will be evaluated by PG&E in consultation with DOI, DTSC, and the stakeholders to determine if implementation of the sampling effort is feasible. The outcomes of Box 5 are:

- **No** – Further sampling is not feasible. The flow chart leads to Box 6 (uncertainties are addressed in the CMS/FS and/or remedial design), and no further data collection is necessary to resolve Decision 4 (Box 3).
- **Yes** – Further sampling is feasible. The flow chart leads to Box 7. Additional data collection is conducted, the data are validated as appropriate, and the new and existing data are combined (Box 8). The flow chart then leads back to Box 2 to restart the decision rule with the expanded data set.

2.8 Steps 6 and 7: Acceptable Limits on Decision Error and Optimize Sampling Design

Step 6 is intended to define acceptable limits on decision errors. A decision error would occur if, based on the available data, the project team chooses the wrong response action in the sense that a different response action would have been chosen if the project team had access "perfect data" or absolute truth. The purpose of Step 7 is to *"identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs"* (USEPA 2000). The output of this step will be the Phase 2 sampling design agreed upon by the stakeholders during the Part A Phase 1 data gaps evaluation process. Following compilation of and initial assessment of the Phase 1 soil data, DOI, DTSC and PG&E, in consultation with stakeholders, will reconvene to develop Steps 6 and 7 of the DQO process.

3.0 References

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Table

TABLE 1
Data Quality Objectives – Part A Soil Investigation
PG&E Topock Compressor Station, Needles, California

STEP 1 Problem Statement	STEP 2 Decision Statement	STEP 3 Inputs to the Decision[1]	STEP 4 Study Area Boundaries	STEP 5 Decision Rules
Contaminants in soil in AOCs/UAs outside the compressor station fence line resulting from historical compressor station practices may pose an unacceptable risk to humans or the environment, or threaten groundwater. Site-specific information is needed to: Determine the nature and extent of soil and sediment contamination Estimate representative exposure point concentrations (EPCs) to support human health and ecological risk assessment being conducted separately from the Part A soil study Determine whether residual soil concentrations pose a threat to groundwater Estimate soil properties and contaminant distribution in support of the Corrective Measures Study/Feasibility Study (CMS/FS) and/or remedial design	<u>**Decision 1**</u> Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices. If determination of the full nature and extent of contamination based on sample data is not feasible or is not warranted, address uncertainties in the risk assessment or CMS/FS.	COPCs and COPECs by AOC/SWMU/UA Part A and representative Category 1 and 2 historic RFI/RI COPC and COPEC data grouped by AOC/SWMU/UA and medium Data Usability Matrix for Soil and/or sediment (Appendix A) Comparison/screening values (background, risk-based, and regulatory screening values) Conceptual Site Models (CSMs) Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	<u>Lateral Extent</u> Initially the same as the currently defined boundaries of each SWMU, AOC and UA: SWMU1/AOC 1: Within Bat Cave Wash from mouth of Debris Ravine north to the riparian area at mouth of bat cave wash. AOC 4: Within the ravine from a point directly south of the water tanks to the junction with Bat Cave Wash; north slope of ravine directly south from end of small access road west to west side of storage area. AOC 9: Within the potential drainage path to the East Ravine from the break in the former storm drain; initially estimated to be from facility fence line 2/3 of the way east down the slope to the East Ravine; approximately 100 feet north to south centered on the alignment of the former storm drain. AOC 10: Within the East Ravine from its head at the compressor station to its downstream mouth. Low areas, former discharge and outfall locations (where known), and/or former retention areas (as indicated by presence of vegetation or sedimentation) are of particular emphasis. AOC 11: Within the drainage from its head at the compressor station to the low areas and/or former retention areas (as indicated by presence of vegetation or sedimentation) northwest of the compressor station access road, south of I-40, and east of the compressor station fence line. AOC 12: Areas indicated by former employees as sites of potential waste disposal. AOC 14: The area north of I-40 bounded by Bat Cave Wash to the west, the former plant road to the east, and the railroad tracks to the north. UA-1 (Potential Pipeline Disposal Area): An area approximately 20 feet wide by 100 feet long, encompassing an area indicated by a former employee as the site for burial of asbestos wrapped pipes. UA-2 (Former 300B Pipeline Liquids Tank): Area immediately surrounding the former location of a 900-gallon-capacity aboveground drip tank located southeast of the compressor station on a shelf in the hill next to a section of old Route 66. <u>Vertical Extent</u> Vertical study area boundaries extend from the ground surface to the water table. <u>Analytical Parameters</u>[1] *Chemical Parameters* (COPCs and COPECs) Title 22 metals, hexavalent chromium, total petroleum hydrocarbons, VOCs, SVOCs, and PAHs for all areas outside the fence line except UA-2. VOCs and TPH-purgeable will not be analyzed in the surface (0.0 – 0.5 foot) soil samples. Dioxins and furans are COPCs/COPECs at AOC-4. Asbestos is a COPC for AOC 4, AOC-14, and UA-1. COPCs/COPECs at UA-2 are limited to total petroleum hydrocarbons and PAHs. Dioxins/furans, asbestos, and PCBs will be analyzed in samples collected from the upper end of AOC 1 where AOC 4 enters AOC 1.Ten percent of the samples collected in all AOCs will be analyzed for the full inorganic and organic analysis suites per the CERCLA Target Analyte List and Target Compound List.	See Figure 6 for the Decision 1 decision rule

[1] A comprehensive planned sample table, specifying analytes for all proposed samples, was provided in Appendix B of the Part A Soil Workplan.

TABLE 1
Data Quality Objectives – Part A Soil Investigation
PG&E Topock Compressor Station, Needles, California

STEP 1 **Problem Statement**	**STEP 2** **Decision Statement**	**STEP 3** **Inputs to the Decision**[1]	**STEP 4** **Study Area Boundaries**	**STEP 5** **Decision Rules**
			During Phase 1, select samples were analyzed to characterize the soluble fraction of compounds present at concentrations exceeding 10 x TTLC or 20 x TCLP values. Samples were selected after Title 22 metals data had been received. PG&E performed SPLP on approximately 2 soil samples per AOC and analyzed for Cr(VI) and Cr(T). These data were validated. <u>Temporal Boundaries</u> Validated Part A soil sampling data and representative Category 1 and Category 2 historic RFI/RI data (based on the final Data Usability Assessment) .	
	<u>Decision 2</u> Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices that may pose unacceptable risks to current or future human or ecological receptors. If determination of representative EPCs based on sample data is not feasible, address uncertainties in the risk assessment or CMS/FS.	Nature and extent of contamination assessment from Decision 1 Part A and representative Category 1 historic RFI/RI COPC and COPEC data grouped by exposure area and depth interval Data Usability Matrix for soil and/or sediment (Appendix A) RAWP CSMs Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	<u>Lateral Extent</u> Same as for Decision 1. <u>Vertical Extent</u> Vertical study area boundaries for Decision 2 are defined by potential maximum exposure depths. For human health risk assessment, the maximum exposure depth is 10 feet for all AOCs/SWMUs/UAs except for Bat Cave Wash (SWMU 1/AOC 1), which is 15 feet to account for possible scouring of the surface during runoff events. For ecological risk assessment, the maximum depth is 6 feet, except in Bat Cave Wash, where the maximum exposure depth for ecological receptors is 11 feet to account for possible scouring during run-off events. <u>Analytical Parameters</u> Same as for Decision 1 <u>Temporal Boundaries</u> Validated Part A soil sampling data and representative Category 1 historic RFI/RI data (based on the final Data Usability Assessment)	See Figure 7 for the Decision 2 decision rule
	<u>Decision 3</u> Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater. If so, conduct additional site-specific assessment of the threat, or implement response actions to mitigate the threat. If not, no further assessment or response actions are necessary to address threat to groundwater.	Nature and extent of contamination assessment from Decision 1 COPCs by AOC/SWMU/UA Part A and representative Category 1 and 2 historic RFI/RI COPC and COPEC data grouped by AOC/SWMU/UA Data Usability Matrix for soil and/or sediment (Appendix A) Comparison/screening values (SSLs and groundwater/ drinking water ARARs) CSMs Geologic/hydrogeologic/hydrologic information Topographic information Soil physical and chemical property information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	<u>Lateral Extent</u> Those portions of each AOC/SWMU/UA where COPC concentrations exceed SSLs <u>Vertical Extent</u> Same as for Decision 1. <u>Analytical Parameters</u> *Chemical Parameters (COPCs/COPECs)* Same as for Decision 1. *Soil Characteristics* (to support modeling) Select samples will be analyzed for organic carbon content, grain size, Atterberg limits, gradation, and washes. <u>Temporal Boundaries</u> Same as for Decision 1	See Figure 8 for the Decision 3 decision rule

TABLE 1
Data Quality Objectives – Part A Soil Investigation
PG&E Topock Compressor Station, Needles, California

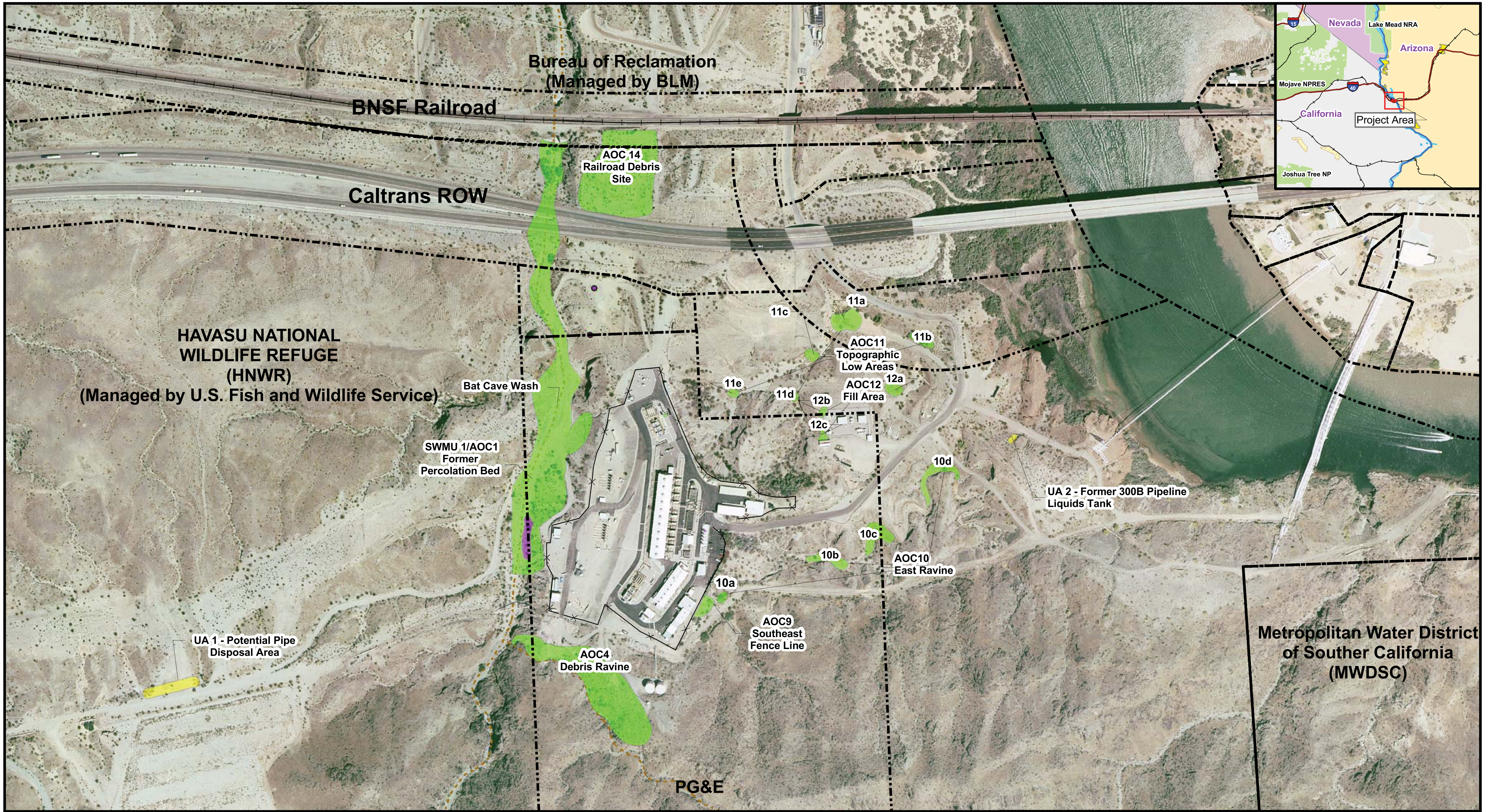
STEP 1 Problem Statement	STEP 2 Decision Statement	STEP 3 Inputs to the Decision[1]	STEP 4 Study Area Boundaries	STEP 5 Decision Rules
	Decision 4 Determine the site-specific soil property and contaminant distribution information necessary to support the CMS/FS decisions and remedial action design. If full determination of site-specific soil property and contaminant distribution information based on sample data is not feasible, address uncertainties in the CMS/FS and remedial design.	Nature and extent of contamination assessment from Decision 1 COCs from human health and ecological risk assessments Remedial action objectives and ARARs Risk-based and regulatory soil and/or sediment cleanup levels Estimated soil and debris volumes Waste classification testing results for soil, sediment, and/or debris as required Waste comparison/screening levels (TTLC, STLC, RCRA toxicity) Soil physical and chemical property information Geologic/hydrogeologic/hydrologic information Topographic information AOC/SWMU/UA location and use history information Cultural and historic information by AOC/SWMU/UA Infrastructure information by AOC/SWMU/UA	Lateral Extent Initially same as for Decision 1, to be refined based on results of risk assessments and threat to groundwater assessments Vertical Extent Initially same as for Decision 1, to be refined based on results of risk assessments and threat to groundwater assessments, and remedial alternative practical constraints Analytical Parameters *Chemical Parameters (COCs)* Initially same as COPCs/COPeCs for Decision 1, to be refined to specific COCs based on results of risk assessments and threat to groundwater assessments *Soil Characteristics* (to support remedial technology selection and feasibility evaluation) Select samples will be analyzed for organic carbon content, grain size, Atterberg limits, gradation, and washes. Temporal Boundaries Same as for Decision 1	See Figure 9 for the Decision 4 decision rule

Notes:

1) The list of analytical parameters is based on CSM and will be refined after each round of investigation/data evaluation. COCs will be selected based on the risk assessment.

VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
TPH - Total Petroleum Hydrocarbons
CSMs - Conceptual Site Models
ARARs - Applicable or Relevant and Appropriate Requirements
mg/kg - milligrams per kilogram
CMS/FS – Corrective Measures Study/Feasibility Study
PAHs – Polycyclic Aromatic Hydrocarbons

Figures



LEGEND

- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)
- Other Undesignated Areas
- Compressor Station Fence Line

* UA - Undesignated Area

N

Feet
0 175 350 700

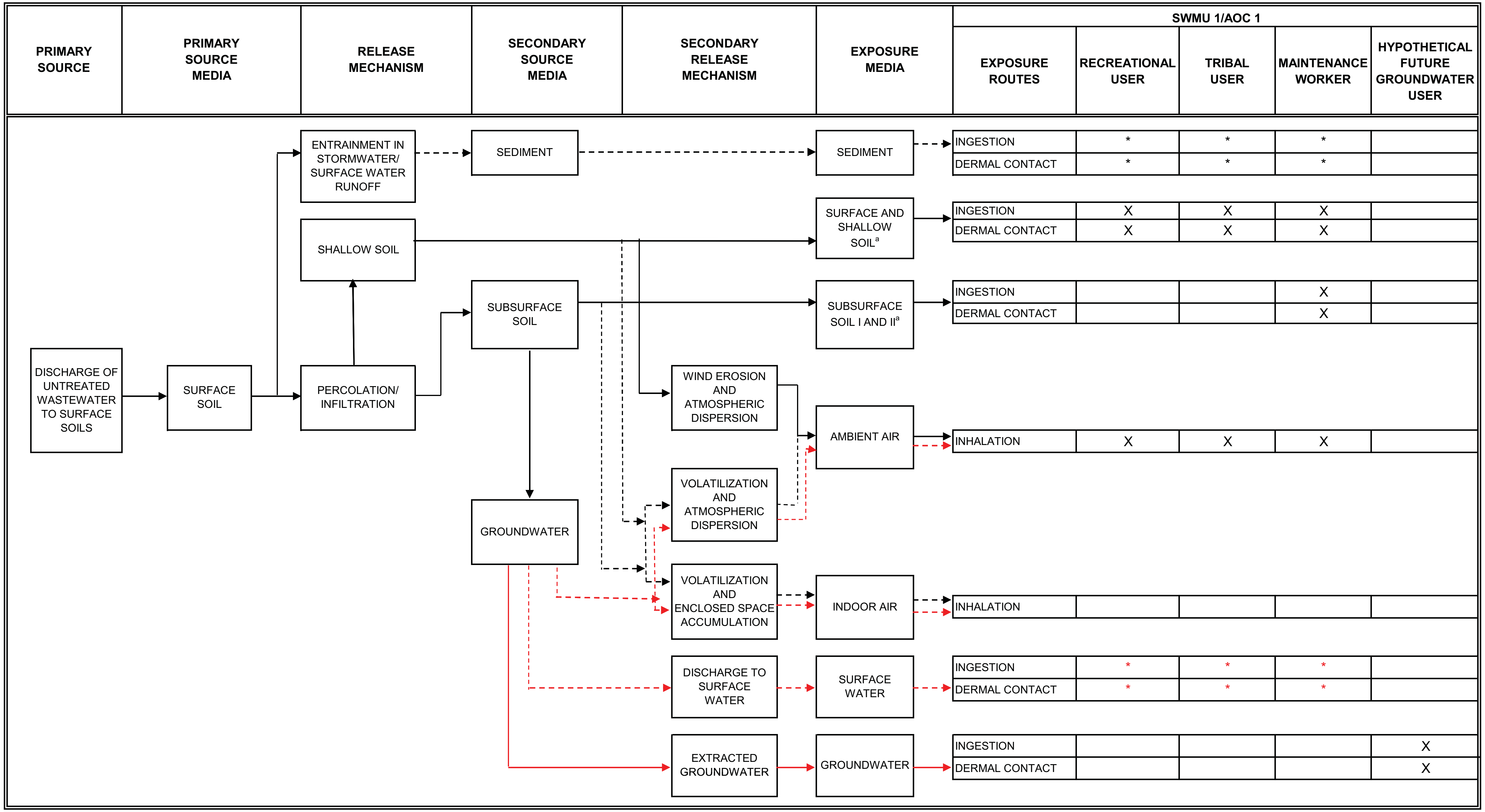
FIGURE 1
SOLID WASTE MANAGEMENT UNITS (SWMUS), AREAS OF CONCERN (AOCS), AND OTHER UNDESIGNATED AREAS ADDRESSED BY THE DATA QUALITY OBJECTIVES FOR THE PART A SOIL INVESTIGATION
DATA QUALITY OBJECTIVES - PART A SOIL INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

FIGURE 2

UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR BAT CAVE WASH: RECREATIONAL, TRIBAL, AND WORKER USES

PACIFIC GAS AND ELECTRIC COMPANY

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009).

a For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).

→ Potentially complete transport pathway to be included in the quantitative soil risk assessment.

- - → Potentially complete transport pathway to be further evaluated in the soil risk assessment.

→ (red) Quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a); Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

- - → (red) Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a).

X Potentially complete exposure route to be included in the quantitative soil risk assessment; quantitative evaluation of groundwater exposure route completed in the GWRA (ARCADIS, 2009a).

* Potentially complete exposure route to be further evaluated in the soil risk assessment.

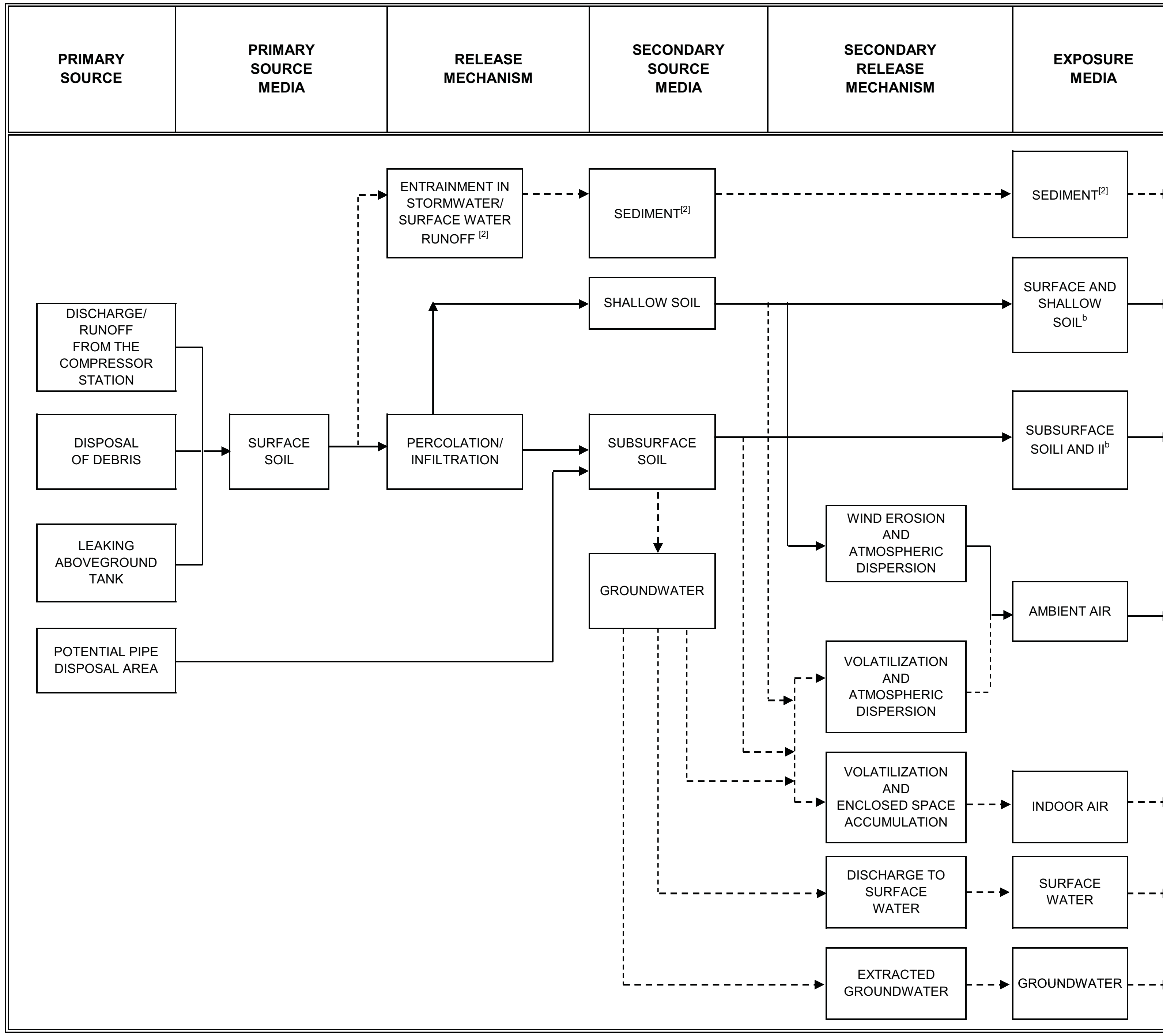
* (red) Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).

FIGURE 3

UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR AOCS 4, 9, 10, 11, 12, 14, and POTENTIAL PIPELINE DISPOSAL AREA (OUTSIDE THE COMPRESSOR STATION) [a]

PACIFIC GAS AND ELECTRIC COMPANY

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



EXPOSURE MEDIA	AOCs 4, 9, 10, 11, 12, AND 14 AND POTENTIAL PIPE DISPOSAL AREA[a]				
	EXPOSURE ROUTES	RECREATIONAL USER	TRIBAL USER	MAINTENANCE WORKER	HYPOTHETICAL FUTURE GROUNDWATER USER
SEDIMENT[2]	INGESTION	*	*	*	
	DERMAL CONTACT	*	*	*	
SURFACE AND SHALLOW SOIL[b]	INGESTION	X	X	X	
	DERMAL CONTACT	X	X	X	
SUBSURFACE SOILI AND II[b]	INGESTION			X	
	DERMAL CONTACT			X	
AMBIENT AIR	INHALATION	X	X	X	
INDOOR AIR	INHALATION				
SURFACE WATER	INGESTION	*	*	*	
	DERMAL CONTACT	*	*	*	
GROUNDWATER	INGESTION				*
	DERMAL CONTACT				*

NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009a).

[2] Applicable to AOC 10 only.

[a] The Former 300B Pipeline Liquids Tank Area outside the compressor station has already been closed (CH2M HILL, 2007), but DTSC has requested additional investigation (CalEPA, 2007). If complete pathways are identified based on the results, the Former 300B Pipeline Liquids Tank Area will also be included in the Human Health Risk Assessment (HHRA).

[b] For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).

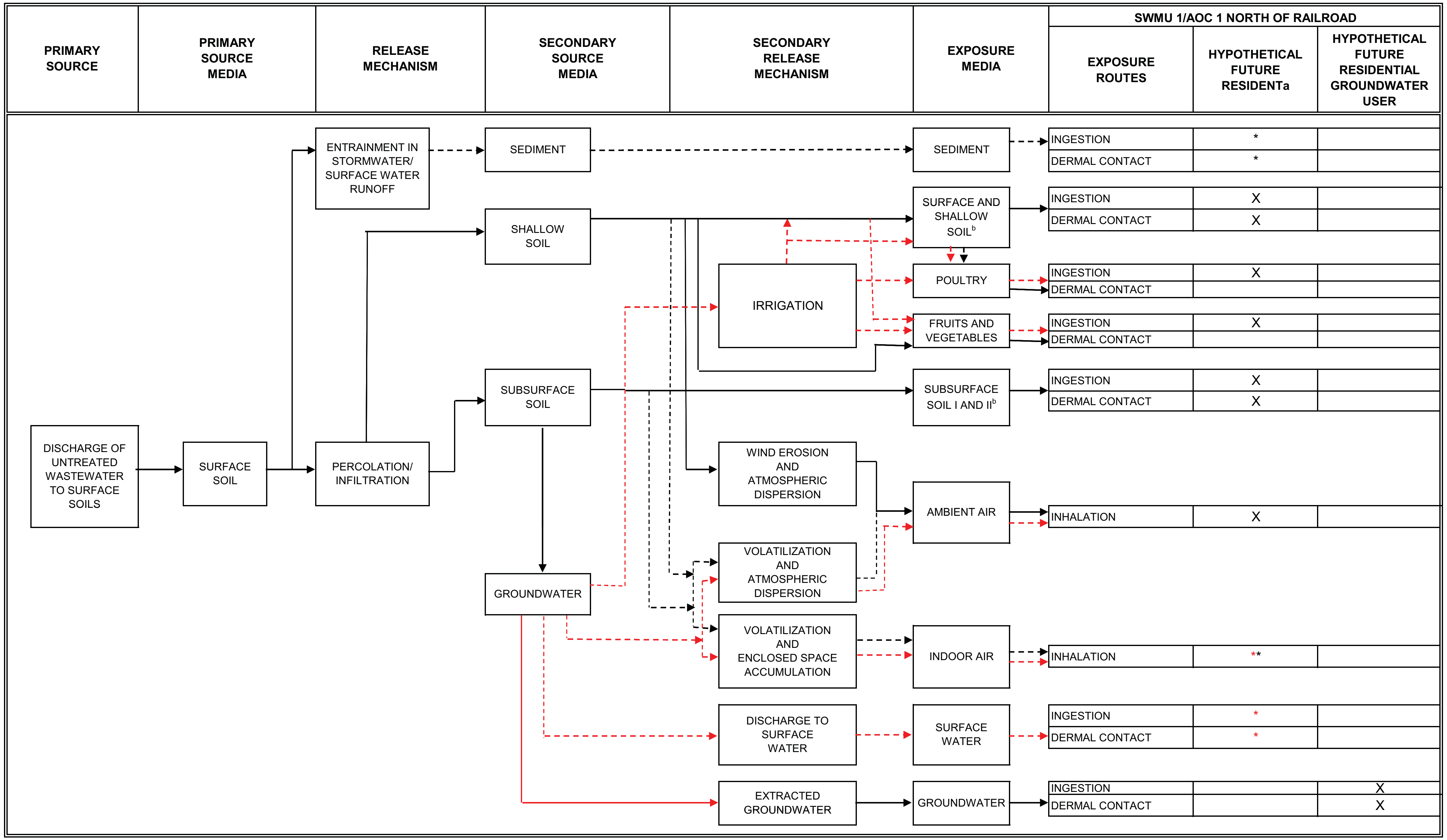
——► Potentially complete transport pathway to be included in the quantitative risk assessment.

- - -► Potentially complete transport pathway to be further evaluated in the risk assessment; Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

X Potentially complete exposure route to be included in the quantitative risk assessment.

* Potentially complete exposure route to be further evaluated in the risk assessment.

FIGURE 4
UPDATED[1] PRELIMINARY HUMAN HEALTH CSM FOR BAT CAVE WASH:
HYPOTHETICAL FUTURE RESIDENTIAL USE NORTH OF RAILROAD
PACIFIC GAS AND ELECTRIC COMPANY
HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



NOTES:

[1] Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS,

a As described in the text, the U.S. Bureau of Land Management (USBLM) has requested that the risk assessment assume future unrestricted use of their property. Accordingly, a future hypothetical residential scenario for contact with soils will be evaluated for property owned by USBLM.

b For applicable soil exposure depth, please see Fig 3-1 in the RAWP (ARCADIS, 2008).

→ Potentially complete transport pathway to be included in the quantitative soil risk assessment.

- - → Potentially complete transport pathway to be evaluated qualitatively in the soil risk assessment.

→ (red) Quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a); Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.

- - → (red) Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a).

X Potentially complete exposure route to be included in the quantitative soil risk assessment; quantitative evaluation of the groundwater pathway completed in the GWRA (ARCADIS, 2009a).

* Potentially complete exposure route to be further evaluated in the soil risk assessment.

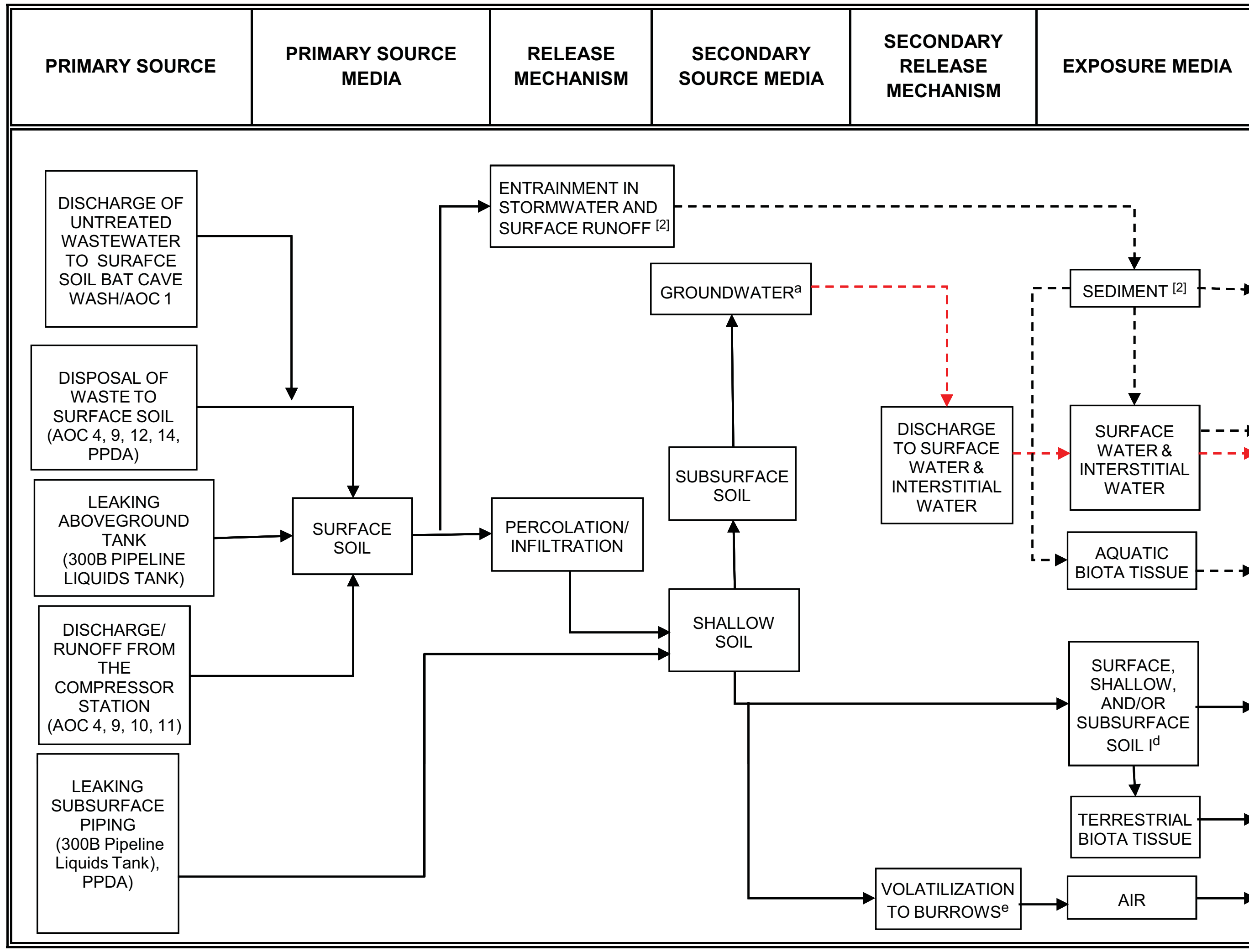
* (red) Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).

FIGURE 5

UPDATED[1] ECOLOGICAL CONCEPTUAL SITE MODEL

PACIFIC GAS AND ELECTRIC COMPANY

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT WORK PLAN



EXPOSURE MEDIA	EXPOSURE ROUTES	AOCs 1, 4, 9, 10, 11, 12, AND 14 AND POTENTIAL PIPE DISPOSAL AREA[a,b] PLANTS	INVERTEBRATES	FISH	REPTILES/ AMPHIBIANS	BIRDS	MAMMALS
SEDIMENT [2]	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	*	*	*	*	*	*
	INGESTION		*	*	*	*	*
SURFACE WATER & INTERSTITIAL WATER	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	**	**	**	**	**	**
	INGESTION		**	**	**	**	**
AQUATIC BIOTA TISSUE	INGESTION			*	*	*	*
SURFACE, SHALLOW, AND/OR SUBSURFACE SOIL I[d]	DERMAL ABSORPTION, DIRECT CONTACT, ROOT UPTAKE	X	X		O	O	O
	INGESTION		X		O	X	X
TERRESTRIAL BIOTA TISSUE	INGESTION				O	X	X
AIR	INHALATION				O[c]		O[c]

NOTES:

[1]	Conceptual site model (CSM) from the Topock Final Human Health and Ecological Risk Assessment Work Plan (RAWP; ARCADIS, 2008) and updated with information based on the Topock Groundwater Risk Assessment (GWRA; ARCADIS, 2009a).
[2]	Applicable to AOC 1 and AOC 10 only.
a	As requested by California's Department of Toxic Substances Control (DTSC), the groundwater-to-phreatophytes pathway and consumption of phreatophytes by herbivores were evaluated in the GWRA (ARCADIS, 2009a) and exposure and risk were found to be insignificant.
——▶	Potentially complete exposure pathway
- - -▶	Soil/sediment potential pathway under evaluation (separate assessment)
- - -▶ (red)	Insignificant transport pathway as evaluated in the GWRA (ARCADIS, 2009a). Part A Phase I data will be reviewed in the data gaps assessment to evaluate potential future impacts or current localized impacts to groundwater from soil.
*	Soil/sediment exposure route under evaluation (separate assessment)
* (red)	Insignificant exposure route as evaluated in the GWRA (ARCADIS, 2009a).
X	Potentially complete exposure route
O	Potentially complete exposure route not significant or not directly assessed
AOC	Area of concern
PPDA	Potential Pipeline Disposal Area

a. The Former 300B Pipeline Liquids Tank area has already been closed (CH2M HILL, 2007), but DTSC has requested additional investigation (CalEPA, 2007). If complete pathways are identified based on the results, the Former 300B Pipeline Liquids Tank area will be included in the Ecological Risk Assessment (ERA).

b. For the large home range ecological receptors, two exposure areas will be evaluated: (i) BCW (AOC 1) and AOC 4 and (ii) all other remaining AOCs outside the compressor station (AOCs 9, 10, 11, 12, 14, Potential Pipeline Disposal Area).
For small home range ecological receptors, the Potential Pipeline Disposal Area and each AOC outside the compressor station (AOCs 4, 9, 10, 11, 12, 14) will be evaluated as separate exposure areas (See Section 3 of the RAWP; ARCADIS, 2008).
All exposure pathways inside the compressor station are considered incomplete and will not be evaluated for ecological receptors.

c. Potential inhalation exposure in burrows was included for the Former 300B Pipeline Liquids Tank area only based on the potential presence of volatile organic compounds (VOCs).

d. For applicable soil exposure depth, please see Fig 3-1 in the RAWP Addendum (ARCADIS, 2009b).

e. Applicable soil depth is 0-6 feet below ground surface (bgs) for volatilization to burrow air.

References for Figures 2, 3, 4, and 5.

ARCADIS. 2008. Revised Human Health and Ecological Risk Assessment Work Plan, Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles, California.

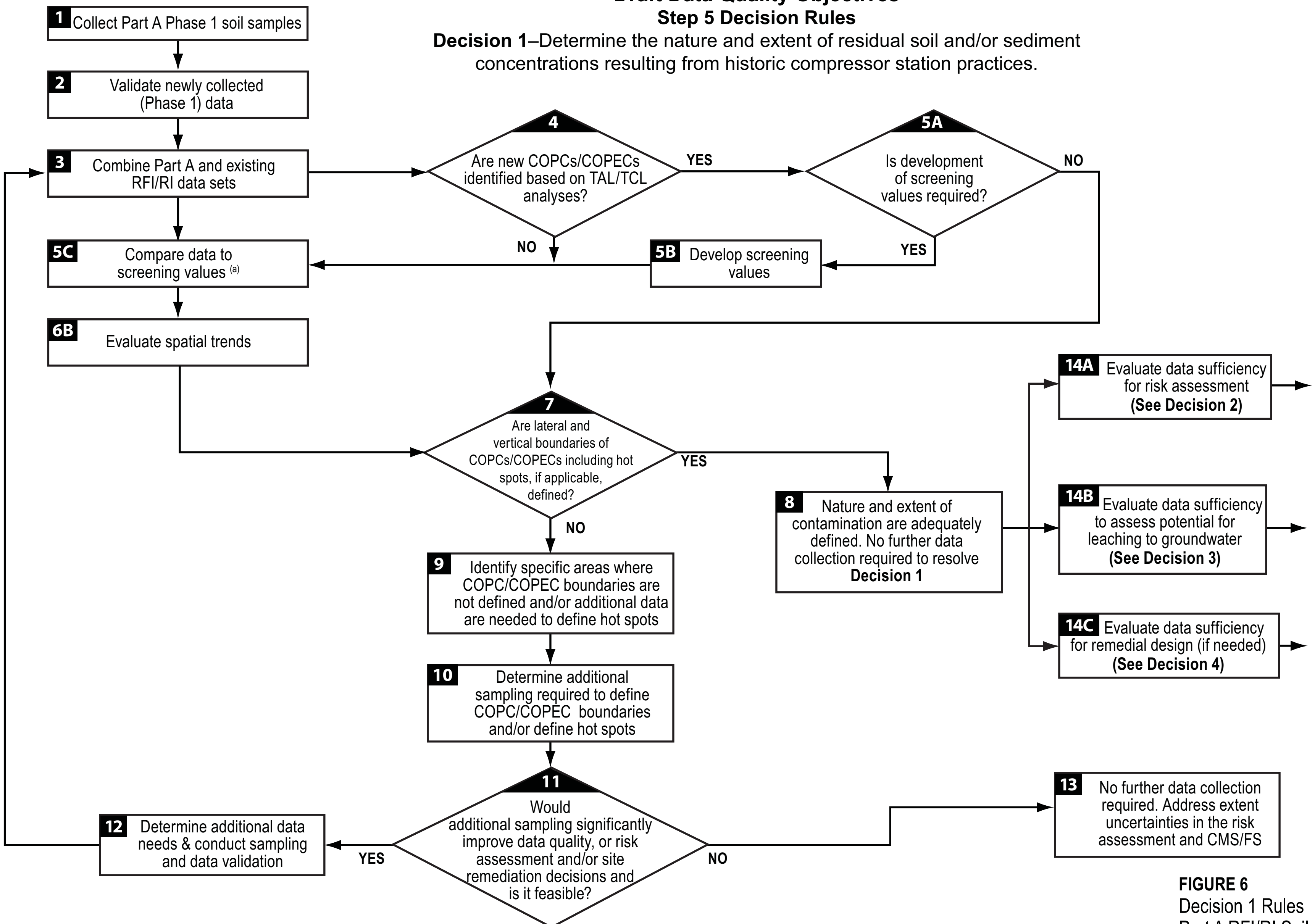
ARACDIS. 2009a. Human and Ecological Risk Assessment of Groundwater Impacted by Activities at Solid Waste Management Unit (SWMU) 1/ Area of Concern (AOC 1 and SWMU 2, Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles, California. November.

ARACDIS. 2009b. Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan, Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles, California. February.

CH2M HILL. 2007. Pipeline Liquids Tank Closure, Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles, California. Technical Memorandum. April 26.

CalEPA. 2007. Letter “Comments and Conditional Approval of the RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Pacific Gas and Electric (PG&E) Topock Compressor Station, Needles, California. August 10.

Draft Data Quality Objectives
Step 5 Decision Rules
Decision 1–Determine the nature and extent of residual soil and/or sediment concentrations resulting from historic compressor station practices.



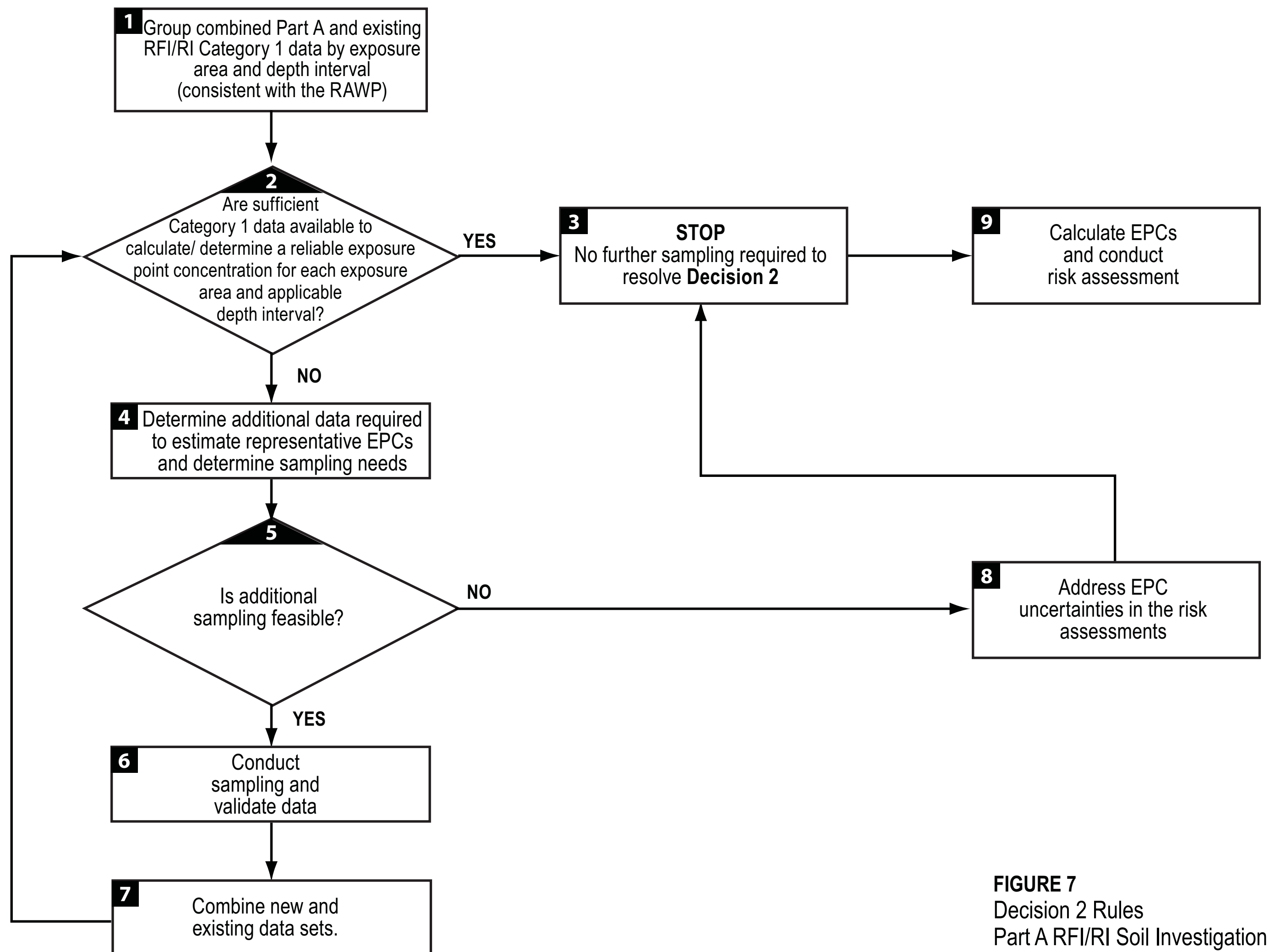
Notes:
– Steps are for each unit (SWMU, AOC, or UA)
– [a] Screening levels will include background (for metals), CHHSLs, ECVs, and Soil Screening Levels for protection of groundwater

FIGURE 6
Decision 1 Rules
Part A RFI/RI Soil Investigation
PG&E Topock Compressor Station
Needles, California

CH2MHILL

Draft Data Quality Objectives
Step 5 Decision Rules

Decision 2–Determine representative EPCs for residual soil and/or sediment contamination resulting from historic compressor station practices that may pose unacceptable risks to current or future human or ecological receptors.



Notes:
EPC: Exposure Point Concentration
RAWP: Risk Assessment Workplan

FIGURE 7
Decision 2 Rules
Part A RFI/RI Soil Investigation
PG&E Topock Compressor Station
Needles, California

Draft Data Quality Objectives
Step 5 Decision Rules

Decision 3–Determine whether residual soil concentrations resulting from historic compressor station practices may threaten groundwater.

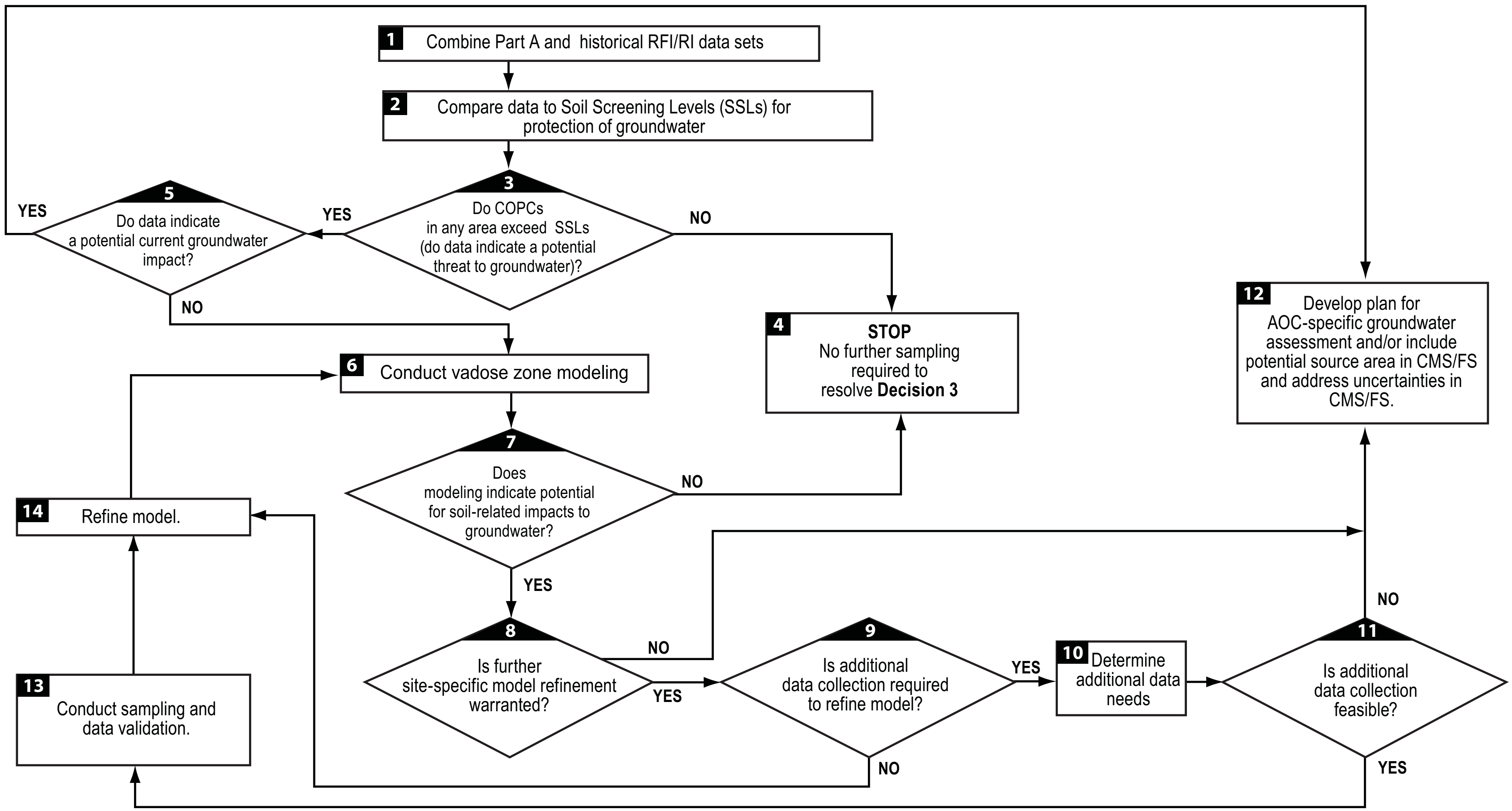


FIGURE 8
Decision 3 Rules
Part A RFI/RI Soil Investigation
PG&E Topock Compressor Station
Needles, California

Notes:
SSL: Soil Screen Levels for protection of groundwater
COPCs: Chemicals of Potential Concern
CMS/FS: Corrective Measure Study/Feasibililty Study

Draft Data Quality Objectives
Step 5 Decision Rules

Decision 4–Determine site-specific soil property and contaminant distribution information necessary to support CMS/FS decisions and/or remedial design.

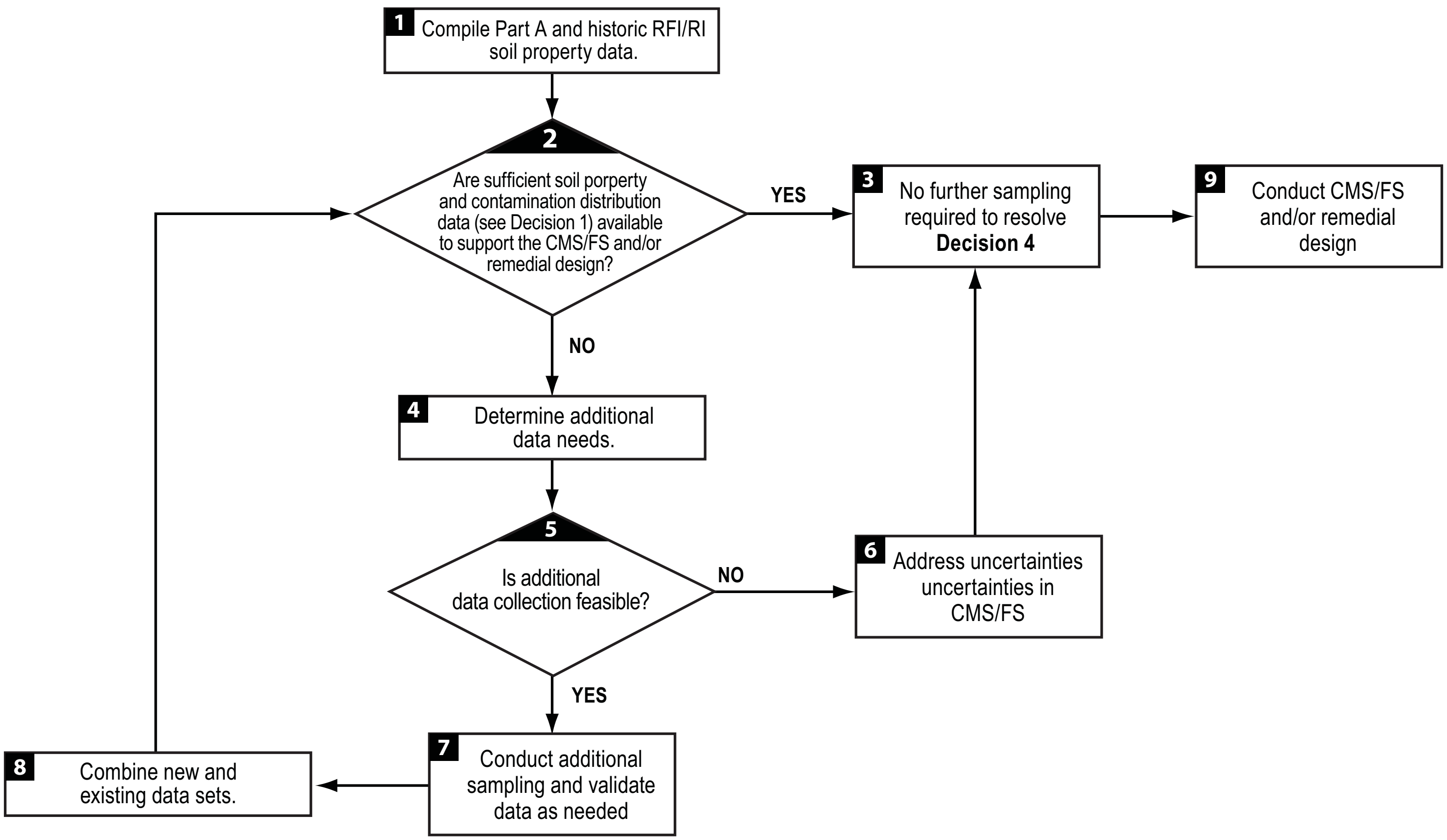


FIGURE 9
Decision 4 Rules
Part A RFI/RI Soil Investigation
PG&E Topock Compressor Station
Needles, California

Notes:
CMS/FS: Corrective Measure Study/Feasibililty Study

Appendix A
Data Usability Matrix for Risk Assessment

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Upland BCW for Current Conditions	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	86	35 locations completed previously 51 locations completed in Phase I sampling	0 to 0.5 foot bgs: 73	23 samples collected previously 50 samples collected in Phase I sampling	0 to 0.5 foot bgs: 73	23 samples collected previously 50 samples collected in Phase I sampling	Full suite at most locations except surface interval (0 to 0.5 feet bgs), which did not include VOCs or TPH-purgeable	Category 1 Data (excluded Category 3 data from 8 locations [DS-1 through DS-4 and PB-1 through PB-4]) Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** The Phase I samples include sampling locations north of the railroad (BCW1 through BCW5), locations south of railroad, and locations from Banks and White Powdery areas. Samples were not collected from 7 to 8 feet bgs at 7 locations and from 9 to 10 feet bgs at 4 locations because of refusal. The proposed Phase I sampling in the Part A Work Plan (CH2M HILL, 2006a) for 0.5 or 1 feet bgs sample was collected at 0 to 0.5 feet bgs at the start of native material when feasible. Vertical coverage of the samples previously collected assumes samples collected from the Banks were at the 0 to 0.5 feet bgs depth interval. If sampling depth interval was not specified in the Work Plan (CH2M HILL, 2006a), that sample was not included in the vertical coverage for any depth.
					0.5 to 3 feet bgs: 65	15 samples collected previously 50 samples collected in Phase I sampling	0 to 3 feet bgs:138	38 samples collected previously 100 samples collected in Phase I sampling					
					>3 to 6 feet bgs: 64	14 samples collected previously 50 samples collected in Phase I sampling	0 to 6 feet bgs: 202	52 samples collected previously 150 samples collected in Phase I sampling					
					>6 to 10 feet bgs: 68	18 samples collected previously 50 samples collected in Phase I sampling	0 to 10 feet bgs: 270	70 samples collected previously 200 samples collected in Phase I sampling					

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Upland BCW for the 2 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	70	19 locations completed previously 51 locations completed in Phase I sampling	Current 2 to 3 feet bgs: 65	15 samples collected previously 50 samples collected in Phase I sampling	0 to 1 feet bgs post scour (current 2 to 3 feet bgs): 65	15 samples collected previously 50 samples collected in Phase I sampling	Full suite	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** This scenario assumes scouring of top 2 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. The Phase I samples include sampling locations north of the railroad (BCW1 through BCW5) and White Powdery areas.
					Current >3 to 6 feet bgs: 64	14 samples collected previously 50 samples collected in Phase I sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 129	29 samples collected previously 100 samples collected in Phase I sampling					
					Current >6 to 10 feet bgs: 68	18 samples collected previously 50 samples collected in Phase I sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 197	47 samples collected previously 150 samples collected in Phase I sampling					
					HHRA scenario only. Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	HHRA scenario only. 0 to 10 feet bgs post scour (current > 2 to 12 feet bgs): 197	47 samples collected previously 150 samples collected in Phase I sampling					

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Upland BCW for the 5 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	71	20 locations completed previously 51 locations completed in Phase I sampling	Current 5 to 6 feet bgs: 62	12 samples collected previously 50 samples collected in the Phase I sampling	0 to 1 foot bgs post scour (current 5 to 6 feet bgs): 62	12 samples collected previously 50 samples collected in Phase I sampling	Full suite	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data validation: at least 10%	Yes; all locations extend to at least 10 feet bgs	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** This scenario assumes scouring of top 5 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. The Phase I samples include sampling locations north of the railroad (BCW1 through BCW5) and White Powdery areas.
					Current > 6 to 10 feet bgs: 68	18 samples collected previously 50 samples collected in Phase I sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 130	30 samples collected previously 100 samples collected in Phase I sampling					
					Current >10 to 15 feet bgs: 8	2 samples collected previously 6 samples collected in Phase I sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 138	32 samples collected previously 106 samples collected in Phase I sampling					

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-1: Riparian BCW	**HHRA and ERA:** Screening Pathway Analysis	Sediment	10	9 locations completed previously (SED 5 through 12 and SS-1) 1 location (BCW-6) completed in Phase I sampling; this sample was collected in a transitional environment between soil and sediment..	0 to 0.5 foot bss: 2	1 sample collected previously 1 sample collected in Phase I sampling	0 to 0.5 foot bss: 2	1 sample collected previously 1 sample collected in Phase I sampling	. Hexavalent chromium and Title 22 metals for all samples; limited samples with full suite analysis.	Category 1 Data Meets requirements of the QAPP Background concentrations not available Data Validation: at least 10%	Data is limited for a predictive ecological risk assessment, but adequate for screening purposes for ERA and HHRA. Deep vertical coverage is good. All locations extend to at least 10 feet bss. Shallow horizontal coverage is limited; four samples from 0 to 0.5 foot bss.	Yes	**Sufficiency of data for screening purposes as defined in the RAWP will be evaluated during the data gaps assessment.** Much of the area is inaccessible without road building through thick riparian vegetation.
					0.5 to 3 feet bss:9	8 samples collected previously 1 sample collected in Phase I sampling	0 to 3 feet bss: 11	9 samples collected previously 2 samples collected in Phase I sampling					
					3 to 6 feet bss: 0	0 samples collected previously 0 samples collected in Phase I sampling due to refusal	0 to 6 ft bss: 11	9 samples collected previously 2 samples collected in Phase I sampling					
					6 to 10 feet bss: 0	0 samples collected previously 0 samples proposed in Phase I sampling	0 to 10 feet bgs: 11	9 samples collected previously 2 samples collected in Phase I sampling					

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
North of AOC 1: USBLM Land north of the railroad	**HHRA (residential)** COPC Selection EPC Calculations	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables	13	8 locations completed previously (SS-2, SS-7, SS-8, SSB-8, SSB-9, DS-3, DS-4, and MW-13) 5 locations completed in Phase I sampling (BCW-1 through BCW-5)	0 to 0.5 foot bgs: 10	5 samples collected previously 5 samples collected in Phase I sampling	0 to 0.5 foot bgs: 10	5 samples collected previously 5 samples collected in Phase I sampling	Full suite at most locations except surface interval (0 to 0.5 foot bgs), which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes Data Validation: at least 10%.	Yes for deeper soils but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs in indoor air pathway. Did not collect samples from 5 to 6 feet bgs at two locations and from 9- 10 feet bgs samples at two locations because of refusal.
					0.5 to 3 feet bgs: 10	5 samples collected previously 5 samples collected in Phase I sampling	0 to 3 feet bgs: 20	10 samples collected previously 10 samples collected in Phase I sampling					
					3 to 6 feet bgs: 5	2 samples collected previously 3 samples collected in Phase I sampling	0 to 6 feet bgs: 25	12 samples collected previously 13 samples collected in Phase I sampling					
					6 to 10 feet bgs: 6	3 samples collected previously 3 samples collected in Phase I sampling	0 to 10 feet bgs: 31	15 samples collected previously 16 samples collected in Phase I sampling					
North of AOC 1: USBLM Land north of	**HHRA (residential)**	Soil Modeled from soil	8	3 locations completed previously	Current 2 to 3 feet bgs: 7	2 samples collected	0 to 1 feet bgs post scour	2 samples collected	Full suite at most locations except surface interval	Category 1 Data Meets requirements	Yes for deeper soils but limited for surface	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during**

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
the railroad for the 2 feet Scouring Scenario	COPC Selection EPC Calculations	concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables		(SSB-8, SSB-9, and MW-13) 5 locations completed in the Phase I sampling (BCW-1 through BCW-5)		previously 5 samples collected in the Phase I sampling	(current 2 to 3 feet bgs): 7	previously 5 samples collected in the Phase I sampling	(0 to 0.5 foot bgs), which did not include VOCs or TPH-purgeable.	of the QAPP; the reporting limits are less than: • Site specific background • HH screening values for all analytes Data Validation: at least 10%.	soil (0 to 0.5 foot bgs)		**the data gaps assessment.** This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs in indoor air pathway. Did not collect samples from 5 to 6 feet bgs at two locations and from 9- 10 feet bgs samples at two locations because of refusal.
					Current >3 to 6 feet bgs: 6	2 samples collected previously 4 samples collected in the Phase I sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 13	4 samples collected previously 9 samples collected in Phase I sampling					
					Current >6 to 10 feet bgs: 7	3 samples collected previously 4 samples collected in the Phase I sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 20	7 samples collected previously 13 samples collected in the Phase I sampling					
					Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in the Phase I sampling	0 to 10 feet bgs post scour (current > 2 to 12 feet bgs): 20	7samples collected previously 13 samples collected in the Phase I sampling					
North of AOC 1: USBLM Land north of	**HHRA (residential)** COPC	Soil Modeled from soil	8	3 locations completed previously (SSB-8, SSB-	Current 5 to 6 feet bgs: 6	2 samples collected previously	0 to 1 foot bgs post scour (current 5 to	2 samples collected previously	Full suite at most locations except surface interval (0 to 0.5 foot	Category 1 Data Meets requirements of the QAPP; the	Yes for deeper soils but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.**

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
the railroad for the 5 feet Scouring Scenario	Selection EPC Calculations	concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Fruits and Vegetables		9, and MW-13) 5 locations completed in the Phase I sampling (BCW-1 through BCW-5)		4 samples collected in the Phase I sampling	6 feet bgs): 6	4 samples collected in the Phase I sampling	bgs), which did not include VOCs or TPH-purgeable.	reporting limits are less than: • Site specific background • HH screening values for all analytes Data Validation: at least 10%.			This area will be evaluated separately for a future residential scenario only. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected and evaluated for the inhalation of VOCs in indoor air pathway. Did not collect samples from 5 to 6 feet bgs at two locations and from 9- 10 feet bgs samples at two locations because of refusal.
					Current > 6 to 10 feet bgs: 7	3 samples collected previously 4 samples collected in the Phase I sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 13	5 samples collected previously 8 samples collected in Phase I sampling					
					Current >10 to 15 feet bgs: 0	0 samples collected previously 0 samples collected in the Phase I sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 13	5 samples collected previously 8 samples collected in the Phase I sampling					

Table A-1
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PG&E Topock
Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-4: Debris Ravine	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	35	8 locations completed previously 27 locations proposed in Phase I sampling	0 to 0.5 foot bgs: 42	8 samples collected previously 34 samples collected in Phase I sampling	0 to 0.5 foot bgs: 42	8 samples collected previously 34 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** Very rugged area. Required sampling via long reach backhoe for certain locations.. All locations extend to 6 feet bgs or refusal and sample from 1 location was collected at 8 feet bgs. Vertical coverage evaluation was based on the proposed sampling at locations shown in the updated figures (CH2M HILL, 2008d on DTSC website) but not listed in the Part A Work Plan (CH2M HILL, 2006a) and confirmed by the Soil Investigation team. It follows similar sampling depths proposed for this area in the Part A Work Plan (CH2M HILL, 2006a). Only 11 samples were collected from 2 to 3 feet bgs because of refusal.
					0.5 to 3 feet bgs: 16	5 samples collected previously 11 samples collected in Phase I sampling	0 to 3 feet bgs: 58	13 samples collected previously 45 samples collected Phase I sampling					
					3 to 6 feet bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	0 to 6 feet bgs: 60	13 samples collected previously 47 samples collected in Phase I sampling					
					6 to 10 feet bgs: 1	0 samples collected previously 1 sample collected in Phase I sampling	0 to 10 feet bgs: 61	13 samples collected previously 48 samples collected in Phase I sampling					

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AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-9: Southeast Fence Line	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	22	9 locations completed previously 13 locations completed in Phase I sampling	0 to 0.5 foot bgs: 13	0 samples collected previously 13 samples collected in Phase I sampling	0 to 0.5 foot bgs: 13	0 samples collected previously 13 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs for most of the metals and PAHs Data Validation: at least 10%	Yes for deeper soils, but limited for surface soil (0 to 0.5 foot bgs)	Yes	**Sufficiency of data to calculate EPCs for each exposure interval will be determined during the data gaps assessment.** Steep sloped area required sampling with long reach excavator for certain locations. Potential source is stormwater discharge pipe and/or auxiliary jacket cooling water leaks and spills from historically unbermed area.. Vertical coverage evaluation were based on the proposed sampling in the Part A Work Plan (CH2M HILL, 2006a), updated figures (CH2M HILL, 2008d on DTSC website), and confirmed by the Soil Investigation team that the 0.5 to 1 foot bgs were collected at 0 to 0.5 foot bgs at the start of native material if feasible. In Phase I sampling, most locations were terminated at 3 feet bgs; however, at two locations soil samples were collected at 5 to 6 feet bgs.
					0.5 to 3 feet bgs: 22	9 samples collected previously 13 samples collected in Phase I sampling	0 to 3 feet bgs: 35	9 samples collected previously 26 samples collected in Phase I sampling					
					3 to 6 feet bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	0 to 6 feet bgs: 37	9 samples collected previously 28 samples collected in Phase I sampling					
					6 to 10 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	0 to 10 feet bgs: 37	9 samples collected previously 28 samples collected in Phase I sampling					

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-10: East Ravine	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	31	9 locations completed previously 22 locations completed in Phase I sampling	0 to 0.5 foot bgs: 30	8 samples collected previously 22 samples collected in Phase I sampling	0 to 0.5 foot bgs: 30	8 samples collected previously 22 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for each depth interval will be determined during the data gaps assessment.** Some locations were inaccessible to mechanical drilling equipment due to steep slopes and rugged terrain. Sample were not collected from 2 to 3 feet bgs at two locations; from 5 to 6 feet bgs at three locations; and from 9 to10 feet bgs at five locations because of refusal.
					0.5 to 3 feet bgs: 26	6 samples collected previously 20 samples collected in Phase I sampling	0 to 3 feet bgs: 56	14 samples collected previously 42 samples collected in Phase I sampling					
					>3 to 6 feet bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	0 to 6 feet bgs: 75	14 samples collected previously 61 samples collected in Phase I sampling					
					> 6 to 10 feet bgs: 17	0 samples collected previously 17 samples collected in Phase I sampling	0 to 10 feet bgs: 92	14 samples collected previously 78 samples collected in Phase I sampling					

Table A-1
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AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-10: East Ravine for the 2 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	20	0 locations completed previously 20 locations completed in Phase I sampling	Current 2 to 3 feet bgs: 26	6 samples collected previously 20 samples collected in Phase I sampling	0 to 1 feet bgs post scour (current 2 to 3 feet bgs): 26	6 samples collected previously 20 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for each depth interval will be determined during the data gaps assessment.** This scenario assumes scouring of top 2 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. Some locations were inaccessible to mechanical drilling equipment due to steep slopes and rugged terrain. Samples were not collected from 2 to 3 feet bgs at two locations; from 5 to 6 feet bgs at three locations; and from 9 to 10 feet bgs at five locations because of refusal.
					Current >3 to 6 feet bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	0 to 4 feet bgs post scour (current >2 to 6 feet bgs): 45	6 samples collected 39 samples collected in Phase I sampling					
					Current >6 to 10 feet bgs: 17	0 samples collected previously 17 samples collected in Phase I sampling	0 to 8 feet bgs post scour (current >2 to 10 feet bgs): 62	6 samples collected 56 samples collected in Phase I sampling					
					HHRA scenario only Current > 10 to 12 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	HHRA scenario only 0 to 10 feet bgs post scour (current > 2 to 14 feet bgs): 62	6 samples collected 56 samples collected in Phase I sampling					

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AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-10: East Ravine for the 5 feet Scouring Scenario	**HHRA and ERA:** COPC Selection EPC Calculations Pathway Analysis Hot Spot Analysis	Soil Modeled from soil concentrations: • Biota (ERA)	19	0 locations completed previously 19 locations completed) in Phase I sampling	Current 5 to 6 feet bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	0 to 1 foot bgs post scour (current 5 to 6 feet bgs): 19	0 samples collected previously 19 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for each depth interval will be determined during the data gaps assessment.** This scenario assumes scouring of top 5 feet of soil. Exposure depths adjusted accordingly for this future scenario based on current data. Please see the Revised RAWP Addendum (ARCADIS, 2009) for scouring scenario exposure depths. Some locations were inaccessible to mechanical drilling equipment due to steep slopes and rugged terrain. Samples were not collected from 5 to 6 feet bgs at three locations and from 9 to 10 feet bgs at five locations because of refusal. Vertical coverage evaluation was based on the proposed sampling in the Part A Work Plan (CH2M HILL, 2006a), updated figures (CH2M HILL, 2008d on DTSC website) and confirmed by the Soil Investigation team that the samples at 0.5 to 1 foot bgs were collected at 0 to 0.5 foot bgs at the start of native material when feasible. Vertical coverage evaluation was based on the proposed sampling at locations shown in the updated figures (CH2M HILL, 2008d on DTSC website) but not listed in the Part A Work Plan (CH2M HILL, 2006a) and it follows similar sampling depths proposed for this area in the Part A Work Plan (CH2M HILL, 2006a).
					Current >6 to 10 feet bgs: 17	0 samples collected previously 17 samples collected in Phase I sampling	0 to 5 feet bgs post scour (current >5 to 10 feet bgs): 36	0 samples collected previously 36 samples collected in Phase I sampling					
					Current >10 to 15 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	0 to 10 feet bgs post scour (current >5 to 15 feet bgs): 36	0 samples collected previously 36 samples collected in Phase I sampling					

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AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-11: Topographic Low Areas	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	19	No locations completed previously 19 locations completed (including 2 in the grassy areas) in Phase I sampling	0 to 0.5 foot bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	0 to 0.5 foot bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for each depth interval will be determined during the data gaps assessment.** Four samples were collected during the installation of MW12. However, these were at depths > 10 feet bgs and will not be considered for the risk assessment. Horizontal and vertical coverage includes secondary proposed sampling locations. If presence of VOCs in soils indicates a concern for potential migration to indoor air, soil gas data will need to be collected. If sufficient soil gas data are collected, the inhalation of VOCs in outdoor air will be evaluated using soil gas data. Vertical coverage evaluation was based on the proposed sampling in the Part A Work Plan (CH2M HILL, 2006a), updated figures (CH2M HILL, 2008d on DTSC website), and confirmed by the Soil Investigation team that for 0.5 to 1 foot bgs, samples were collected at 0 to 0.5 foot bgs at the start of native material when feasible.
					0.5 to 3 feet bgs: 19	0 samples collected previously 19 samples collected in Phase I sampling	0 to 3 feet bgs: 38	0 samples collected previously 38 samples collected in Phase I sampling					

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-11 (continued): Topographic Low Areas					3 to 6 feet bgs: 18	0 samples collected previously 18 samples collected in Phase I sampling	0 to 6 feet bgs: 56	0 samples collected previously 56 samples collected in Phase I sampling					All samples extended down to 10 feet bgs in the Phase I sampling. Of these 19 sample locations, seven locations were supplemental samples and were only analyzed for PAHs and metals, with the exception of all samples collected at locations AOC11e-SS-1 and AOC11E-SS-2, which were also analyzed for PCBs. VOCs and SVOCs (except PAHs) were not detected in shallower samples, therefore, supplemental samples were not analyzed for VOCs and SVOCs (except PAHs). Soil samples collected at 9 to 10 feet bgs were sent to the laboratory as supplemental soil samples pending analysis based on detected analytes in the shallower samples. Most of these samples were analyzed for PAHs and metals, with the exception of the 1-0 ft samples collected at AOC11e-1 and AOC11e-2, which were also analyzed for PCBs. VOCs and SVOCs (except PAHs) were not detected in shallower samples; therefore, supplemental samples were not analyzed for VOCs and SVOCs (except PAHs).
					6 to 10 feet bgs: 18	0 samples collected previously 18 samples collected in Phase I sampling	0 to 10 feet bgs: 74	0 samples collected previously 74 samples collected in Phase I sampling					

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AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-12: Fill Area	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	NA	NA	0 to 0.5 foot bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	0 to 0.5 foot bgs: 2	0 samples collected previously 2 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes for Phase I investigation; not for risk assessment. If contamination is identified in Phase I investigation, additional and representative data will be collected in Phase II sampling.	Yes	**Sufficiency of data to support risk assessment is contingent on whether contamination is identified during Phase I Soil Investigation. Phase I data will be reviewed for adequacy to support risk assessment and data gaps, if any, will be identified.** No fill was identified during the geophysical survey. Currently, two surface soil samples and two 3-foot samples were collected for TAL/TCL list analysis. In addition, samples were also collected at the bottom of the trenches, every 20 linear feet. If debris and/or contamination is identified during the Phase I investigation, if needed, additional characterization and risk assessment sampling for this AOC will be included as part of the Phase II sampling event.
					0.5 to 3 feet bgs: 7	0 samples collected previously 7 samples collected in Phase I sampling	0 to 3 feet bgs: 9	0 samples collected previously 9 samples collected in Phase I sampling					
					3 to 6 feet bgs: 5	0 samples collected previously 5 samples collected in Phase I sampling	0 to 6 feet bgs: 14	0 samples collected previously 14 samples collected in Phase I sampling					
					6 to 10 feet bgs: 4	0 samples collected previously 4 samples collected in Phase I sampling	0 to 10 feet bgs: 18	0 samples collected previously 18 samples collected in Phase I sampling					

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					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
AOC-14: Railroad Debris Site	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	42	25 locations completed previously 17 locations completed in Phase I sampling	0 to 0.5 foot bgs: 34	17 samples collected previously 17 samples collected in Phase I sampling	0 to 0.5 feet bgs: 34	17 samples collected previously 17 samples collected in Phase I sampling	Full suite except surface interval, which did not include VOCs or TPH-purgeable.	Category 1 Data Meets requirements of the QAPP; the reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes	Yes	**Sufficiency of data to calculate EPCs for all depth intervals will be determined during the data gaps assessment.** Horizontal and vertical coverage includes secondary proposed sampling locations. All secondary proposed sampling locations were analyzed for full analytical suite, except surface interval which was not analyzed for VOCs or TPH-P. Data will be collected to 10 feet bgs (a sample will be collected at 15 feet bgs and held for analysis pending shallow sample results). All samples collected at 15 feet bgs were analyzed for the full analytical suite.
					0.5 to 3 feet bgs: 25	8 samples collected previously 17 samples collected in Phase I sampling	0 to 3 feet bgs: 59	25 samples collected previously 34 samples collected in Phase I sampling					
					3 to 6 feet bgs: 23	6 samples collected previously 17 samples collected in Phase I sampling	0 to 6 feet bgs: 82	31 samples collected previously 51 samples collected in Phase I sampling					
					6 to 10 feet bgs: 17	0 samples collected previously 17 samples collected in Phase I sampling	0 to 10 feet bgs: 99	31 samples collected previously 68 samples collected in Phase I sampling					

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

			Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]								
					Sampling Depth		Exposure Depth						
AOC or SubAOC Area[a]	**Data Use**	**Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively**	**Number of Soil Sampling Locations**	**Status of Soil Sampling**	**Number of Soil Samples**	**Status of Soil Samples**	**Number of Soil Samples**	**Status of Soil Samples**	**Analytical Suite[c,d]**	**Data Quality[e,f,g,h]**	**Representative[i]**	**Comparability[j]**	**Notes[k]**
Potential Pipeline Disposal Area	**HHRA and ERA:** COPC Selection EPC Calculations Hot Spot Analysis	Soil Modeled from soil concentrations: • Air – Dust (HHRA) • Air – VOCs (HHRA) in outdoor air • Biota (ERA)	NA	NA	0 to 0.5 foot bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 0.5 foot bgs: NA	0 samples collected previously NA for Phase I sampling	NA	NA	NA	NA	The pipes have been identified during the geophysical survey. No trenching or sampling occurred in this area. Investigation approach in this area is being reevaluated. If contamination is identified in future soil investigations and if needed, additional characterization and risk assessment sampling for this AOC will be included as part of the Phase II sampling event.
					0.5 to 3 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 3 feet bgs: NA	0 samples collected previously NA for Phase I sampling					
					3 to 6 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 6 feet bgs: NA	0 samples collected previously NA for Phase I sampling					
					6 to 10 feet bgs: NA	0 samples collected previously NA for Phase I sampling	0 to 10 feet bgs: NA	0 samples collected previously NA for Phase I sampling					

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

AOC or SubAOC Area[a]	Data Use	Data Type (Matrix) for Potentially Complete Pathways that will be Evaluated Quantitatively	Horizontal Coverage (Sampling Locations)[b]		Vertical Coverage (Number of Samples)[b]				Analytical Suite[c,d]	Data Quality[e,f,g,h]	Representative[i]	Comparability[j]	Notes[k]
					Sampling Depth		Exposure Depth						
			Number of Soil Sampling Locations	Status of Soil Sampling	Number of Soil Samples	Status of Soil Samples	Number of Soil Samples	Status of Soil Samples					
Former 300B Pipeline Liquids Tank	**HHRA and ERA:** COPC Selection EPC Calculations	Soil Burrow air (modeled from soil concentrations)	5	0 locations completed previously 5 locations completed in Phase I sampling	0 to 0.5 foot bgs:5	0 samples collected previously 5 samples collected in Phase I sampling	0 to 0.5 foot bgs: 5	0 samples collected previously 5 samples collected in Phase I sampling	Full suite plus PCBs	Category 1 Data Meets requirements of the QAPP; he reporting limits are less than: • Site-specific background • HH screening values for all analytes • ECVs or most of the metals and PAHs Data Validation: at least 10%	Yes; provided pipeline liquids tank was the only source.	Yes	**Sufficiency of data for site characterization; if contamination is identified in samples collected from existing locations or recently sampled Phase I sampling locations that will warrant a risk assessment for this area, then additional samples may be required to complete the risk assessment.** This area has already been closed (CH2M HILL, 2006a). Closure suggests that most, if not all, of the contamination has been removed. Proposed sampling is to confirm closure of this area. If new sources are identified, additional samples may need to collected (at least for the surface interval) if EPC calculations are needed. Samples were not collected from 2 to 3 feet bgs at one location and from 9 to 10 feet bgs at four locations because of refusal.
					0.5 to 3 feet bgs: 4	0 samples collected previously 4 samples collected in Phase I sampling	0 to 3 feet bgs: 9	0 samples collected previously 9 samples collected in Phase I sampling					
					3 to 6 feet bgs: 1	0 sample collected previously 1 sample collected in Phase I sampling	0 to 6 feet bgs: 10	0 samples collected previously 10 samples collected in Phase I sampling					
					6 to 10 feet bgs: 0	0 samples collected previously 0 samples collected in Phase I sampling	0 to 10 feet bgs: 10	0 samples collected previously 10 samples collected in Phase I sampling					

Table A-1
Data Usability Matrix for Soil Risk Assessment
PG&E Topock
Needles, California

Notes: Information for this table was obtained from Part A Soil Investigation Work Plan (CH2M HILL, 2006a) and the updated figures for Part A Soil Investigation Work Plan posted on the DTSC website: http://www.dtsc-topock.com . Information presented in this table is current as of December 15, 2008 and includes historical sampling and Part A Phase I sampling information. The conclusions regarding representativeness and data adequacy will be based on the outcome of Step 6 of the data quality objectives (Table 1), which has yet to be performed. The intent of the matrix, when finalized, is to summarize all the relevant information pertaining to data usability and adequacy for determining EPCs.

a. This matrix includes soil sampling information only for areas outside the compressor station. For HHRA, the soil sampling presented in this matrix will be used to evaluate two exposure areas (ARCADIS, 2008): (i) BCW, and (ii) the rest of the AOCs/subareas outside the compressor station. BCW includes a sub area of USBLM land north of the railroad (north of AOC 1) to be evaluated separately for potential future residential use. For the ERA, for small home ranging receptors, each AOC or subarea will be evaluated as separate exposure areas; for large home range receptors, two exposure areas will be evaluated: (i) BCW and AOC4 and (ii) the rest of the AOCs/subareas outside the compressor station.

b. Assumption is that horizontal and vertical extent will be characterized to background regardless of risk assessment needs. If a background value is not available then the lesser of the soil ecological comparison value, the USEPA Regional Screening level, or DTSC CHHSL will be used. Horizontal coverage refers to the adequacy of the number of locations to support EPCs for the exposure area. The horizontal coverage was based on all the sample locations in the Work Plans (all sample locations indicated at least some surface interval [0/0.5/1/3/6/10 feet bgs]). Vertical coverage refers to the adequacy of sampling depth intervals to provide information to support calculation of EPCs for the four exposure intervals and the number of samples at each depth interval was reported. For calculation of EPCs, a minimum of 8 samples and 5 detects are required for the ERA, depths evaluated will include 0 to 0.5, 0 to 3, and 0 to 6 foot/feet bgs. For the HHRA, depths evaluated will include 0 to 0.5, 0 to 3, 0 to 6, and 0 to 10 foot/feet bgs. Vertical coverage for Phase I sampling was obtained from Part A Work Plan (CH2M HILL, 2006a) and confirmed with the Soil Investigation team. The 0.5 foot bgs sample were collected from 0 to 0.5 feet bgs; the 3 feet bgs samples were collected from 2 to 3 feet bgs; the 6 feet bgs samples were collected from 5 to 6 feet bgs; and the 10 feet bgs samples were collected from 9 to 10 feet bgs.

c. Full suite of analytes and TAL/TCL analytes are listed in the Draft QAPP (CH2M HILL, 2008a,b); analyte classes include metals, PAHs, SVOCs, VOCs, TPH, PCBs, and pesticides.

d. Limited VOC and TPH data from the surface interval does not compromise the assessment to evaluate potential risks to human health or burrowing receptors.

e. Only Category 1 data which are considered suitable for risk assessment were included in the horizontal and vertical coverage evaluation in this matrix (CH2M HILL, 2006a).

f. Site-specific background concentrations are not yet final; preliminary site-specific background concentrations were estimated for metals with available data and reported in the QAPP (CH2M HILL, 2006a). The reporting limits were less than preliminary site-specific background concentrations for all metals (Draft QAPP; CH2M HILL, 2008a,b). For metals with no site-specific preliminary background concentrations, reporting limits were compared to California regional background concentrations (Bradford et al., 1996); the reporting limits for these metals were less than the regional background concentrations.

g. Human health screening values were based on the lesser of the CHHSLs and USEPA Regional Screening Levels. The reporting limits were less than the final human health screening values for most of the chemicals (Draft QAPP; CH2M HILL, 2008a,b).

h. ECVs were calculated for metals and PAHs (ARCADIS, 2008). The reporting limits were less than the ECVs for PAHs and for most of the metals except antimony, cadmium, lead, mercury, nickel, selenium, and zinc (Draft QAPP; CH2M HILL, 2008a,b). ECVs for the rest of the analytes have not yet been developed.

i. "Yes" indicates that data are considered representative; this is optimized by the appropriate placement of Phase I sample locations in areas suspected to have been impacted by site releases. Further, the analyte list captures those chemicals assumed to be associated with a potential release. Adequacy of the representativeness will be re-assessed once Phase I data are obtained. [Representativeness is defined as the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques and analytical procedures (DUA; CH2M HILL, 2008c)].

j. "Yes" indicates, as stated in the DUA Technical Memorandum (CH2M HILL, 2008c), that existing datasets were reported which consistent units and reporting limits for soil and sediment data were equivalent to those required by the QAPP Addendum (CH2M HILL, 2006b). The existing datasets with are considered usable for risk assessment, and will be supplemented with additional data that meet the overall requirements of the Draft QAPP (CH2M HILL, 2008a,b) and thus, the existing Category 1 data should be very comparable to the data that will be generated during Phase I sampling. [Comparability is defined as the confidence in which one dataset can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples and reporting the analytical results in standard units].

k. Data considered sufficient to calculate EPCs assumes validation of Phase I soil data will not result in data unsuitable for risk assessment (e.g., "R" or reject qualified).

REFERENCES:

ARCADIS. 2008. Human Health and Ecological Risk Assessment Work Plan, PG&E Topock Compressor Station, Needles, California. August.

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Bradford, G.R., A.C. Chang, A.L. Page, D.Bakhtar, J.A. Frampton, and H. Wright. 1996. Background Concentrations of Trace and Major Elements in California Soils. Kearney Foundation of Soil Science, Division of Agriculture and Natural Resources, University of California.

CH2M HILL. 2006a. Draft RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, PG&E Topock Compressor Station, Needles, California. November.

CH2M HILL. 2006b. Quality Assurance Project Plan Addendum, PG&E Topock Program. September 27.

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CH2M HILL. 2008b. Addendum to the Draft PG&E Topock Program Quality Assurance Project Plan. June.

CH2M HILL. 2008c. Final Soil and Sediment Data Usability Assessment Technical Memorandum. PG&E Topock Compressor Station, Needles, California. August.

CH2M HILL. 2008d. Soil Sampling Investigation Part A Figures (Updated): http://www.dtsc-topock.com/resources/RCRA_Investigations/soil_sample_wp_A/SoilSamplingPartAFigures_ALL.pdf

ACRONYMS:

AOC = area of concern; BCW = Bat Cave Wash; bgs = feet below ground surface; bss = feet below sediment surface; CHHSLs = California Human Health Screening Levels; COPC = chemicals of potential concern; DTSC = Department of Toxic Substances Control; DUA = data usability assessment; ECV = ecological comparison values; EPC = exposure point concentration; ERA = ecological risk assessment; HH or HHRA = human health risk assessment; NA = not available or not applicable; QAPP = quality assurance project plan; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls; SVOCs = semi-volatile organic compounds; TAL/TCL = target analyte list metals/target compound list organics; TPH = total petroleum hydrocarbons; USBLM = U.S. Bureau of Land Management; USEPA=U.S. Environmental Protection Agency; VOCs = volatile organic compounds.

Appendix B
Investigation Procedures, Field Methodology, and White Powder/Debris Mapping Results (on CD only)

Contents

Acronyms and Abbreviations

AOC	Area of Concern
bgs	below ground surface
GPS	global positioning system
IDW	investigation-derived waste
IM	Interim Measure
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
SWMU	Solid Waste Management Unit
TPH	total petroleum hydrocarbons
UA	undesignated area
UU	undifferentiated utility
VOC	volatile organic compound
Water Board	California Regional Water Quality Control Board
XRF	X-ray fluorescence

APPENDIX B

Investigation Procedures and Field Methodology

B.1 Introduction

This appendix describes field activities performed as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) Soil Investigation Part A, Phase 1. The following sections summarize field methodology, debris and white powder material mapping, trenching observations, and any deviations from the *RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A Work Plan* (CH2M HILL, 2006) pertaining to the field activities performed in 2008. The primary objectives of this soil investigation were to determine the nature and extent of contamination and to collect sufficient data for the purposes of performing human and ecological risk assessments and evaluating remedial action alternatives.

B.1.1 Approvals and Authorizations

The Part A Phase 1 soil investigation was executed in conformance with the following approvals and authorizations:

- DTSC and DOI conditionally approved the Soil Part A Work Plan on August 10, 2007 (DTSC, 2007) and June 4, 2008 (DOI, 2008), respectively.
- Clarification of DTSC's conditional approval was documented in the "Clarification to Responses to PG&E Topock Compressor Station Soil Investigation Part A Work Plan August 10, 2007 Conditional Approval Letter" (CH2M HILL, 2007a).
- Pre-construction and post-construction biological surveys were conducted in compliance with the *Programmatic Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Action* (CH2M HILL, 2007b).

B.2 Field Methodology

This section describes the methods used in field activities related to embankment modification; X-ray fluorescence (XRF) analyzer field screening; installation of soil boreholes; and collection of soil, debris, and white powder material samples.

B.2.1 Embankment Modification

An existing embankment within Area of Concern 10 (AOC 10) was modified to provide access for soil sampling equipment to subareas AOC 10b and -10c. Excavation equipment was used to re-grade the material comprising the upper one-half of the embankment such that the slope of a portion of the embankment was shallower. The material that was displaced during grading was moved to the east and west of the existing embankment slope to create shallower sloping "ramps." The lower half of the embankment was not disturbed such that surface water flow in the upper portion of AOC 10 would not flow freely to the lower portion.

Prior to conducting the embankment modification, an XRF threshold value for total chromium (300 milligrams per kilogram) was developed jointly with United States Department of the Interior to determine if implementation of erosion control measures was needed during this work (CH2M HILL, 2008). As the total height of the embankment was lowered during modification, soil samples were collected within the embankment from the excavated surface from three locations equally spaced along the length of the feature. Samples collected were analyzed for screening analysis of total chromium using a portable XRF analyzer (Section B.2.2) and one confirmation soil sample was collected and analyzed for total chromium and hexavalent chromium using an off-site laboratory. The results of the analyses were compared to the XRF threshold value. Based on results of the analyses it was determined that erosion control measures were not required. However, temporary silt fence was installed downstream of the embankment to impede the migration of sediments as a Best Management Practice (BMP).

B.2.2 X-ray Fluorescence Field Screening

A portable XRF analyzer was used to assist with identifying sample and trench locations in AOC 4 and to determine if erosion controls were necessary during the AOC 10 embankment modification by field screening soil samples for total chromium. The XRF analyzer was calibrated daily in the field with standards provided by the XRF manufacturer. Soil samples were collected using a clean stainless-steel trowel, placed in clean zip-top bags, and analyzed in the field for total chromium using the XRF analyzer. XRF analyzer results were recorded in the field notebook.

B.2.3 Installation of Boreholes and Soil Sample Collection

Four methods of subsurface soil collection were used during the RFI/RI Soil Investigation Part A, Phase 1. Methods for collecting soil samples included drilling, excavation, trenching, and hand sampling. Attachment B1 contains boring logs and trench logs associated with the RFI/RI Soil Investigation Part A, Phase 1.

B.2.3.1 Drilling

Boreholes were drilled using rotosonic and direct-push methods. A limited access (track mounted), "mini" rotosonic drill rig was used to install the rotosonic boreholes. Boreholes were advanced with a 4-inch-inner-diameter core barrel and then over-drilled with 5-inch- or 6-inch-outer-diameter drill pipe (drive casing), as necessary. Continuous cores were collected via a core barrel attached to the end of the 4-inch drive casing advanced ahead of the outer casing, generally in 5-foot intervals. The cores were placed in plastic sample bags.

A limited access (track-mounted) direct-push rig (Marl M5T), also capable of hollow-stem auger drilling, was used to install the direct-push boreholes. Continuous direct-push cores were collected using a hydraulic hammer to advance a 4-foot-long, 1.5-inch-diameter, hollow core stainless-steel sampler lined with a dedicated acetate liner into the ground. If borehole advancement by direct-push was impeded due to adverse subsurface conditions, hollow-stem augers were used to displace gravels or cobbles, and then direct-push coring was continued.

Soil samples were collected from drilled boreholes at pre-designated depth intervals in accordance with the sample collection and handling procedures described in Section B.2.4. Once drilling and sampling activities were complete, each borehole was backfilled with a mixture of clean sand and bentonite chips, and hydrated.

B.2.3.2 Trenching and Potholing

An excavator or backhoe was used to install trenches and potholes to evaluate the presence, nature, and extent of buried debris, and collect soil samples in areas where site conditions were unsuitable for drilling. Trenches and potholes were deepened gradually so that subtle changes in lithology and buried debris could be documented. Soil samples for laboratory analysis were collected directly from the excavator or backhoe bucket from soils that were not in contact with the bucket. Soil samples were collected at pre-designated depth intervals in accordance with the sample collection and handling procedures described in Section B.2.4.

Excavated material was used to backfill the excavation from which it originated.

B.2.3.3 Hand Tools

Hand tools, which include stainless-steel trowels, slide hammers, and hand augers, were used for samples collected between 0 and 3 feet below ground surface (bgs) in areas that could not be accessed by drilling or excavation equipment. Soil samples collected in the depth interval from 0 to 1 foot bgs were collected using a stainless-steel trowel. Soil samples collected in the depth interval from 1 to 3 feet bgs were collected using a hand auger or a slide hammer to drive a core sampler into the undisturbed soil to the desired sampling depth. Soil samples were collected at pre-designated depth intervals in accordance with the sample collection and handling procedures described in Section B.2.4.

Each hole created using hand tools was backfilled using the material removed from that hole.

B.2.4 Sample Collection and Handling

This section describes the procedures for the collection and handling of soil, debris, and white powder material samples.

B.2.4.1 Soil, White Powder Material, and Debris Sample Collection for Inorganic, Semivolatile Organic Compounds, Pesticides, and Polychlorinated Biphenyls Analyses

Upon retrieval of the soil from the drilling cores or excavations, the soil was logged for lithology in accordance with the Unified Soil Classification System by or under the supervision of a California Professional Geologist. Soil and white powder samples requiring inorganic, semivolatile organic compounds, pesticides, and polychlorinated biphenyls analyses were collected directly from the drilling core or backhoe/excavator bucket using stainless-steel trowels. The collected material was then put through a stainless-steel sieve to remove any rocks and other debris from the soil sample prior to being homogenized in a stainless-steel bowl. After homogenization, the soil was transferred to unpreserved glass sample jars.

Debris (e.g., wood, dry wall, etc.) samples were collected using stainless-steel trowels, as appropriate, and depending on the size of the debris, either placed into glass sample jars or large plastic zip-top bags. Samples of white powder material were collected using stainless-steel trowels and were placed directly into glass jars; these samples were not homogenized.

B.2.4.2 Soil Sample Collection for VOC and TPH-gasoline Analyses

Soil sample aliquots designated for VOC and TPH-gasoline analyses were collected immediately upon opening the relatively undisturbed drilling core, or recovery from an excavation, (i.e., before geologic logging or the collection of other soil sample aliquots) to minimize the potential for volatilization of compounds to the atmosphere. VOC and TPH-gasoline aliquots were collected using dedicated plastic syringes. Using the syringes, a specific volume of sample, which correlates to an approximate target mass, was transferred directly from the drilling core or backhoe/excavator bucket into pre-preserved sample vials. The sample vials were chilled prior to use to minimize evaporation of the preservative when opened. Syringes could not be used to collect sample from soils consisting of loose sand and gravel. In this case, stainless-steel trowels were used to transfer the soil into the vials for volume measurement prior to preservation.

B.2.4.3 Sample Management and Storage

Samples were placed immediately into field coolers with ice; VOC and TPH-gasoline containers were arranged in the sample cooler standing upright. The field coolers were taken to the sample management area, where the samples were transferred into a refrigerator and/or freezer. If transport of a sample to the laboratory was scheduled for a pickup more than 24 hours after sampling, samples were stored in the freezer.

B.2.4.4 Shipping

Samples collected for chemical analysis were transported to the laboratory via courier, generally on a daily basis. Samples collected for geotechnical analyses were shipped via Federal Express. Chains-of-custody accompanied all samples to the laboratory.

B.2.5 Decontamination and Management of Investigation-derived Waste

This section discusses procedures for decontamination of the soil sampling equipment and the management of investigation-derived waste (IDW).

B.2.5.1 Decontamination

Drilling and excavation equipment (i.e., drilling rig, backhoe/excavator tracks, etc.) was cleaned prior to mobilization to the Pacific Gas and Electric Company (PG&E) Topock Compressor Station and were cleaned between investigation areas as determined necessary by the field team leader. When appropriate, equipment was transported to the designated decontamination area (Figure B-1) and steam cleaned. If necessary, equipment was cleaned using dry methods prior to leaving an excavation area to prevent the tracking of material out of the area. Equipment blanks were collected at a frequency of one per sampling crew per day where non-dedicated equipment was used. Results of equipment blanks are discussed in Appendix D.

Rotosonic and direct-push drilling pipe and core barrels were steam cleaned at the designated decontamination area between boreholes. The direct-push core barrels were fitted with dedicated acetate liners for each core. Backhoe/excavator buckets were steam cleaned before work began and between sampling locations using a dry brush.

All hand tools were cleaned between sample locations. Each field team established a mobile decontamination unit in each sample area. The mobile decontamination units included three containers: one with Liquinox soap and two with rinse water. After each sample, the stainless-steel mixing bowl, stainless-steel sieve, and trowel were cleaned thoroughly in the Liquinox soap mixture with a brush and then rinsed twice in each of the consecutive rinse buckets.

B.2.5.2 Management of Investigation-derived Waste

Drill cuttings were contained at the drilling location in a receptacle (i.e., skid hopper or equivalent) that could be safely moved with a forklift or loader. As necessary, the hopper was emptied into roll-off bins located in the decontamination area. For the duration of the field event, approximately 15 yards of soil were contained in one bin. A composite soil sample, comprising four sub-samples, was used to characterize the IDW prior to offsite disposal. Refer to Attachment B2 for soil manifest and complete analytical results.

Liquid IDW was contained at the decontamination area in a tank that could be safely moved by a forklift or loader. As necessary, the tank was emptied at the Topock Compressor Station Interim Measures 3(IM No. 3) onsite treatment facility. Waste characterization for the liquid IDW disposed at the IM No. 3 treatment facility was not required per approval from the California Regional Water Quality Control Board (Water Board, 2006).

B.3 Debris and White Powder Material Mapping

The following section describes the mapping process and results for debris and/or white powder material mapping at AOC 4, AOC 10, Solid Waste Management Unit (SWMU) 1, and AOC 14. Due to the varying nature of site topography in each of these areas, methods of documentation and inventory of the debris and/or white powder material varied.

B.3.1 Debris Mapping and Results in AOC 4 – Debris Ravine

Debris mapping within AOC 4 was performed by creating a grid to accurately capture the extent of debris in and on the slopes of the steep ravine (Figure B-2). The grid was placed in over areas of containing the most extensive debris within AOC 4 and captured most of the debris in and on the slopes of the steep ravine. The ravine was sectioned off in 20-foot by 10-foot grid squares using rope and stakes. Global positioning system (GPS) coordinates were taken near the stakes at the top and bottom of each rope line. The debris was then noted and each grid section was photo documented, and described below.

Debris observed at AOC 4 generally consisted of broken glass, wooden slats, miscellaneous industrial debris, concrete slabs, rebar, scrap metal, and miscellaneous burned debris, as shown in Attachment B3, Photographs 1 through 4. The most extensive debris was observed along the western portion of the primary ravine slope of AOC 4 and included three large pieces of concrete, wooden slats, white powder material, scrap metal, and piping, as shown in Attachment B3, Photographs 5 and 6. Debris is also observed to the east along the ravine floor, as shown in Attachment B3, Photograph 7. Two samples of the wooden slats were collected (AOC4-Wood1 and AOC4-Wood2) and were sent to the laboratory for analyses, as listed in Table B-1.

Debris observed in grid section B, shown in Figure B-2, consisted of a large piece of concrete and wood debris, as shown in Attachment B3, Photograph 8. White powder material, shown in Attachment B3, Photograph 9, was found in quadrant B30, shown in Figure B-2. A sample of the white powder material was collected (AOC4-B30) and sent to the laboratory for analyses, as listed in Table B-1.

A pile of wooden slats was observed in grid sections C and D near the bottom of the ravine, as shown in Attachment B3, Photographs 10 through 12. No other debris was observed in these grid sections; however, green stained soil was observed near the top of grid section D.

No debris was observed in grid sections E through I, shown in Attachment B3, Photograph 13. Green stained soil was observed in section G, as shown in Attachment B3, Photograph 14.

B.3.2 White Powder and Debris Mapping in AOC 10 – East Ravine

As part of the conditional approval of the RCRA Facility Investigation/Remedial Investigation, Soil Investigation Work Plan, Part A, DTSC requested that the white powder and metal debris observed in AOC 10 be mapped. PG&E conducted a site walk at AOC 10 in May 2009 to map the white powder and debris areas. White powder was observed in the ravine bottom within subarea 10d and between subareas 10c and 10d. Several areas of miscellaneous debris were identified, as shown on Figure B-3. Miscellaneous debris consisted of pieces of metal, cans, tires, concrete rubble, tiles, and bricks. A small dirt pile with small pieces of green wood was observed near the access road adjacent to subarea 10d, this debris pile is being evaluated as part of AOC 10 (see Appendix C, Attachment C-4). Two areas of discolored soil were observed in the debris areas located on northern ravine wall, as shown on Figures C4-1 through C4-10. Following recent heavy rainfall in January 2010, an additional white powder area was discovered on the slope near the station access road north and slightly west of subarea 10b; these areas are also shown Figures C4-1 through C4-10.

B.3.3 White Powder Material and Debris Mapping in SWMU 1 – Former Percolation Bed

Several areas of surficial white powder material were identified in SWMU 1 during previous investigations and site visits. The surficial extent of the white powder material quantified by various methods, as described below, and was plotted on a figure.

In SWMU 1, the white powder material was visually documented, photographed, and plotted in Figure B-4. White powder material was observed in the slope near sample locations SWMU1-WP8 and SWMU1-WP10, as shown in Figure B-4. A white powder lens was also observed at the toe of the slope near the floor of Bat Cave Wash beginning at sample location SWMU1-WP6a and tapering off at 10 feet south of sample location

SWMU1-WP7, as shown in Figure B-4. These observations are further investigated and discussed in Section B.5.1.

B.3.4 White Powder Material and Debris Mapping AOC 14 – Railroad Debris Site

Several areas of surficial white powder material were identified in AOC 14 during previous investigations and site visits. The surficial extent of the white powder material was quantified by various methods, as described below, and was plotted on a figure.

The extent of the white powder material in six areas of AOC 14 (AOC14-WP1 through AOC14-WP6) was documented by walking the perimeter of the visible white powder material, recording the GPS coordinates, and plotting those areas on a figure. The seventh area (AOC14-WP7) was located from a photograph of the I-40 road cut. The seven areas of white powder material observed are shown in Figure B-5. Sampling locations AOC14-1, AOC14-2, AOC14-11, AOC14-12, and AOC14-13 were collocated within white powder areas. White powder material areas AOC14-WP2, AOC14-WP5, and AOC13-WP6 were the only areas that had no sampling locations in the immediate proximity. During drilling activities at AOC 14, white powder material and/or debris were encountered in borings AOC14-2 (at 0.5 foot bgs) and AOC14-3 (at 2-3 feet bgs). Samples of the white powder material and debris were collected at these two locations and were sent to the laboratory for analyses, as shown in Table B-1.

In May 2009 PG&E conducted a site walk at AOC 14 in to map the debris areas. Debris was observed on the hill above AOC 14 towards the east. The debris consisted of concrete rubble, transite, cans, and miscellaneous trash; these debris areas are shown on Figures C7-1 to C7-7. No sampling has occurred in these debris areas. Nature and extent of contamination in these debris areas has not been defined. Section 8 presents the proposed Part A, Phase 2 sample locations within these debris areas.

Additional debris and burned debris was also identified on the west side of AOC 14, near a small drainage feature in the western wall of Bat Cave Wash near the northwestern edges of AOC 14 (see Figures C7-1 to C7-7). Some debris was noted on the side of the wash. The nature and extent of the debris toward Bat Cave Wash have not been defined.

B.4 Newly Identified Debris, Historic Burn, and White Powder Areas

In a letter dated May 15, 2009, DTSC directed PG&E to, among other items, to submit a formal description of historic burning operations, and of any previously undocumented disposal practices, at the Topock Compressor Station. PG&E has gathered information from interviews with current and former PG&E employees regarding historic burn activities on or near the PG&E Topock Compressor Station, as well as waste disposal activities that were not previously documented. PG&E attempted to contact many former PG&E employees and was successful in interviewing a total of twelve current and former PG&E employees on these topics, in addition to the fourteen interviewed during 2006. The information derived from the majority of the employee interviews and documentation of previously unidentified disposal practices was submitted to DTSC and DOI in a letter dated August 14, 2009 (PG&E 2009a). Supplemental information was provided in letters dated October 15, 2009 (PG&E

2009b), January 15, 2010 (PG&E 2010a), and January 29, 2010 (PG&E 2010b). All employee interviews were completed in time for the January 29, 2010 information submittal.

In addition, the major storm event in January 2010 exposed five new white powder areas (one in Bat Cave Wash, three in East Ravine, and one in AOC 11). These newly-identified areas are shown on Figure B-6 and are also included in the individual AOC data gaps evaluations in Appendix C.

B.5 Trenching

This section summarizes observations made during trenching activities at SWMU 1, AOC 4, and AOC 12. Soil and debris samples were collected from the trenches, as listed in Table B-1. Soil lithology and debris were logged by, or under the direction of a California Professional Geologist; the trench logs are located in Attachment B1.

B.5.1 SWMU 1 – Former Percolation Bed

Eight trenches were advanced into the eastern slope of Bat Cave Wash within SWMU 1 between October 5, 2008 and October 7, 2008 to assess the extent of white powder material. The locations of the eight trenches (SWMU1 WP1h, SWMU1 WP2h, SWMU1 WP3h, SWMU1 WP5h,[1] SWMU1 WP6h, SWMU1 WP7, SWMU1 WP8, and SWMU1 WP10) are shown in Figure B-4 and in Attachment B4, Photograph 1. Trench logs for these trenches are included in Attachment B1, B-1 through B-7.Trench dimensions were determined in the field to characterize extent while retaining slope integrity. Soil and white powder samples were collected from the trenches, as listed in Table B-1. Sample intervals are discussed below. Trench SWMU1 WP1h is located near the northern end of the white powder material and was approximately 4.5 feet long by 3 feet wide and extended approximately 7.5 feet into the slope, as shown in Attachment B4, Photograph 2. White powder material was not observed in this trench, shown in Attachment B4, Photographs 3 through 6. However, debris and green stained soil was observed in the north sidewall near the surface, as shown in Attachment B4, Photographs 7 and 8. Samples were collected at 0-0.5, 2-3, 5-6, and 9-10 feet bgs.

Trench SWMU1 WP3h was approximately 6.5 feet long by 3 feet wide and extended approximately 5 feet into the slope. A 1-foot-thick layer of white powder material was observed in the sidewalls of this trench, as shown in Attachment B4, Photographs 9 through 11. Due to the white powder observations in the sidewalls of this trench, a step-out trench (SWMU1 WP2h) was advanced approximately 3 feet north of trench SWMU1 WP3h, as shown in Figure B-4 and in Attachment B4, Photograph 12. A thin white powder material lens was observed on the south wall of this step-out trench. Samples were collected at 0-0.5, 2-3, and 5-6 feet bgs.

Trench SWMU1 WP5h was approximately 6 feet long by 3 feet wide and extended 10 feet into the slope. Only a small lens of white powder material was observed in the southern sidewall of the trench, as shown in Attachment B4, Photographs 13 through 16. Samples were collected at 0-0.5, 2-3, and 5-6 feet bgs. A sample of the white powder material (SWMU1 WP5h at 2-3 feet bgs) was collected and sent to the laboratory of analyses, as listed

[1] Because sample locations were named relative to prior sample locations, there is no location 4.

in Table B-1. Trench SWMU1 WP6h was approximately 4 feet long by 3 feet wide and extended approximately 10 feet into the slope. Two small white powder material lenses were observed in this trench, and small outcrops of white powder material were also observed in the back wall and north sidewall of the trench at approximately 2 feet bgs, as shown in Attachment B4, Photograph 17. Samples were collected at 0-0.5, 2-3, 5-6, and 9-10 feet bgs. A sample of the white powder material (SWMU1 WP6h at 0-0.5 foot bgs) was collected and sent to the laboratory of analyses, as listed in Table B-1.

Trench SWMU1 WP7 was approximately 9 feet long by 3 feet wide and extended approximately 11 feet into the slope. A 2-foot-thick layer of consolidated white chalky material was observed in the trench, as shown in Attachment B4, Photographs 18 through 20. Samples were collected at 0-0.5, 2-3, 5-6, and 9-10 feet bgs. A sample of the white powder material (SWMU1 WP7 at 2-3 feet bgs) was collected and sent to the laboratory of analyses, as listed in Table B-1. The white chalky material layer had a small area of red staining, shown in Attachment B4, Photograph 21. Under the layer of consolidated chalky material, a 1-foot layer of green stained soil was observed. In addition, a surficial layer of white powder material was observed at the toe of the slope beginning at sample location SWMU1 WP6a and tapering off 10 feet south of trench SWMU1 WP7, as shown in Figure B-4. Based on this observation, a small trench was advanced into the slope approximately 3 feet above the surficial layer. The horizontal lens of white powder material was observed beneath the surficial rock and rubble layer, as shown in Attachment B4, Photograph 22.

Trench SWMU1 WP8 was approximately 7 feet long by 3 feet wide and extended 10 feet into the slope, as shown in Attachment B4, Photograph 23. A 6-inch layer of green stained soil was observed beneath a surficial rock and rubble layer. Under the green stained soil layer, a layer of white powder material approximately 1 foot thick, followed by a second layer of green stained soil approximately 1 foot thick, were observed in this trench, as shown in Attachment B4, Photographs 24 through 26. Samples were collected at 0-0.5, 2-3, 5-6, and 9-10 feet bgs.

Trench SWMU1 WP10 was approximately 10 feet long by 3 feet wide and extended 9 feet into the slope, as shown in Attachment B4, Photograph 27. A layer of green stained soil approximately 6 inches thick was observed beneath a surficial rock and rubble layer. Under the green stained soil layer, a layer of white powder material approximately 6 inches thick, followed by a second layer of green stained soil approximately 6 inches thick, and followed by a second layer of white powder material approximately 1 foot thick, were observed in this trench, as shown in Attachment B4, Photographs 28 through 30. A sample of the white powder material (SWMU1 WP10 at 2-3 feet bgs) was collected and sent to the laboratory of analyses, as listed in Table B-1. Samples were collected at 0-0.5, 2-3, 5-6, and 9-10 feet bgs.

B.5.2 AOC 4 – Debris Ravine

Four trenches (AOC4-T1 through AOC4-T4) were advanced in AOC 4 between October 22, 2008 and October 24, 2008 to determine the nature and extent of buried debris. Trench locations were chosen based on visual observations of debris and on XRF analyzer field screening results for total chromium. Trench locations are shown in Figure B-2. Trench logs for these trenches are included in Attachment B1, B-8 through B-11.

Trench AOC4-T1 was installed slightly east of the established debris mapping grid, as shown in Figure B-2. The trench was approximately 8 feet by 2 feet and extended to 4 feet bgs, as shown in Attachment B5, Photograph 1. No significant debris was observed in this trench, with the exception of a metal wire in the east sidewall, shown in Attachment B5, Photograph 2. AOC4-T1a was collected in the center of the trench at 0.5 and 3 feet bgs.

Trench AOC4-T2 was installed to determine the extent of fill in the eastern portion of the ravine. The trench was approximately 20 feet by 2 feet and extended to 6 feet bgs, as shown in Attachment B5, Photograph 3. Trench AOC4-T2 extended into the undisturbed interior of the ravine, which was approximately 1 foot of fill. Debris observed in this trench included trash, household burned trash, laboratory glassware, tiles, and rope, as shown in Attachment B5, Photographs 4 and 5. There were three sampling locations in this trench: AOC4-T2a (3-4 feet bgs), AOC4-T2b (2-3 and 7-8 feet bgs), and AOC4-T2c (0-0.5 and 2-3 feet bgs).

Trench AOC4-T3 was installed at the top of the primary ravine slope, as shown in Attachment B5, Photograph 6. This trench was approximately 25 feet long by 3 feet wide and extended to 4.5 feet bgs, as shown in Attachment B5, Photograph 7. A rusted pipe was observed in the west sidewall, shown in Attachment B5, Photograph 8. There was also green stained soil and a yellow coated rock found in this trench. There were three sampling locations in this trench: AOC4-T3a (2-3 feet bgs), AOC4-T3b (2-3 feet bgs), and AOC4-T3c (2-3 feet bgs).

Trench AOC4-T4 was also located at the top of the primary ravine slope, west of trench AOC4-T3 (Attachment B5, Photograph 9). This trench was approximately 25 feet long by 3 feet wide and extended to 4.5 feet bgs. No debris or discolored soil was observed in this trench. There were three sampling locations in this trench: AOC4-T4a (2-3 feet bgs), AOC4-T4b (2-3 feet bgs), and AOC4-T4c (2-3 feet bgs).

B.5.3 AOC 12 – Fill Area

Five trenches were proposed in AOC 12 to assess three potential debris disposal areas (AOC 12a, AOC 12b, and AOC 12c), as shown on Figure B-1. Trench logs for these trenches are included in Attachment B1, Figures B-12 through B-16. Prior to trenching activities at AOC 12, a geophysical survey was performed at each trench location to attempt to locate buried debris and to identify the location of underground utility infrastructure. The results of the surveys identified two alignments crossing AOC 12a, which were positively identified by PG&E via hand digging as a PG&E gas pipeline and associated cathodic protection wire. In AOC 12b and AOC 12c, geophysical results indicated two undifferentiated utilities (UUs) extending east from aboveground storage tank bunker pipe stub-outs.

The trenches were advanced in AOC 12 at the locations specified in the work plan between September 20, 2008 and September 22, 2008. Aside from the underground utility structures, anomalies that may be attributable to buried debris were not observed. Complete geophysical survey results are presented in Attachment B6.

Trench AOC12a-T1, located in potential disposal area AOC 12a, was approximately 18 feet long by 2.5 feet wide and extended to 8 feet bgs. There were two sampling locations in this trench: AOC12a-T1a (0-0.5, 2-3, and 7-8 feet bgs) and AOC12a-T1c (7-8 feet bgs). Trench AOC12a-T2 is perpendicular to and intersects trench AOC12a-T1, as shown on Figure B-1.

Trench AOC12a-T2 was approximately 12 feet long by 2.5 feet wide and extended to 8 feet bgs to native material, as shown in Attachment B7, Photograph 1. There were two sampling locations in this trench: AOC12a-T2a (6-7 feet bgs) and AOC12a-T2b (7-8 feet bgs). No debris was observed in either of these trenches.

Trench AOC12b-T1, located in potential disposal area AOC 12b, was approximately 35 feet long by 2.5 feet wide and extended to 3 feet bgs to native material, as shown in Attachment B7, Photographs 2 and 3. There were two sampling locations in this trench: AOC12b-T1a (2-3 feet bgs) and AOC12b-T1b (2-3 feet bgs). No debris was observed in the trench.

In area AOC 12c, two trenches were advanced (AOC12c-T1 and AOC12c-T2). Trench AOC12c-T1 was approximately 20 feet long by 2.5 feet wide and extended to 11 feet bgs, as shown in Attachment B7, Photograph 4. There were three sampling locations in this trench: AOC12c-T1a (0-0.5, 2-3, and 10-11 feet bgs), AOC12c-T1b (2-3, 3-4, and 10-11 feet bgs), and AOC12c-T1c (10-11 feet bgs).

Trench AOC12c-T2 intersects trench AOC12c-T1, as shown in Figure B-1. Trench AOC12c-T2 was approximately 20 feet long by 2.5 feet wide and extended to 8 feet bgs, as shown in Attachment B7, Photographs 5 and 6. There were two sampling locations in this trench: AOC12c-T2a (7-8 feet bgs) and AOC12c-T2b (7-8 feet bgs). A large piece of concrete (at approximately 1.5 feet bgs), small piece of wire (at approximately 5 feet bgs), an 18-inch wooden slat, plastic debris, and a bung cover from a polyethylene drum were observed in trench AOC12c-T1, as shown in Attachment B7, Photographs 7 and 8.

B.6 Geophysical Survey - UA 1 – Potential Pipeline Disposal Area

A geophysical survey was performed in UA 1 to evaluate the potential presence of buried asbestos-wrapped metal pipes in this area and to identify the location of underground utility infrastructure. Results of the geophysical survey did not suggest the presence of buried pipes in this area; however, several small metallic anomalies and two UUs were observed sporadically across the UA 1 area. One UU was truncated in the north and extended out of the survey area in the south, and the other UU was located in the southern portion of the survey area trending east-west. Complete geophysical survey results are presented in Attachment B6.

Following the geophysical survey, further visual assessment of the area in the vicinity of UA 1 identified miscellaneous pipe band clamps and small quantities of insulation to the east of UA 1. A pronounced soil mound approximately 100 feet long by 25 feet wide is also observed in this area. The initial location of UA 1 was based on tentative identification by a former employee; due to the long period of time that had elapsed since the disposal activities allegedly took place, it is possible that the area initially identified was off-set from the actual location.

B.7 Deviations from the Draft Work Plan

Table B-1 lists deviations from the Draft Work Plan. Deviations to the workplan fall into two categories:

1. Additional samples or locations added based on agency comments
2. Collection of proposed samples not possible due encountering refusal or groundwater

B.8 References

California Department of Toxic Substances Control (DTSC). 2007. *Comments and Conditional Approval of the RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)*. August 10.

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CH2M HILL. 2006. *Draft Facility Investigation/Remedial Investigation Soil Investigation Work Plan*. November.

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Pacific Gas & Electric Company (PG&E). 2009a. Letter from Ms. Yvonne Meeks/PG&E to Ms. Karen Baker/DTSC. "May 15, 2009 DTSC Direction to Sample Wells and Request to Document Burn Activities At and Near the Topock Compressor Station." August 14.

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__________. 2010a. Letter from Ms. Yvonne Meeks/PG&E to Ms. Karen Baker/DTSC. "December 10, 2009 DTSC Letter Regarding Historic Burn Activities and Disposal Practices At and Near the Topock Compressor Station." January 15.

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Table

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
Background															
BKG-01	9/18/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-01	9/18/08	2 - 3	X	X										Rotosonic	
BKG-02	9/18/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-02	9/18/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-03	9/18/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-03	9/18/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-04	9/18/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-04	9/18/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-05	9/19/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-05	9/19/08	2 - 3 and 5 - 6	X	X										Rotosonic	
BKG-06	9/19/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-06	9/19/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-07	9/19/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-07	9/19/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-08	8/23/08	0 - 0.5	X	X	X		X							Hand Tools	
BKG-08	8/23/08	1 - 2	X	X										Hand Tools	
BKG-09	8/23/08	0 - 0.5	X	X	X		X							Hand Tools	Bedrock encounter at 1 ft bgs; not able to collect proposed soil sample at 1-2 ft bgs.
BKG-10	9/19/08	0 - 0.5	X	X	X		X							Hand Tools	
BKG-10	9/19/08	1 - 2	X	X										Hand Tools	
BKG-11	9/19/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-11	9/19/08	1 - 2	X	X										Rotosonic	
BKG-12	8/23/08	0 - 0.5	X	X	X		X							Hand Tools	
BKG-12	8/23/08	2 - 3 and 5 - 6	X	X										Hand Tools	Bedrock encounter at 6 ft bgs; not able to collect proposed soil sample at 9-10 ft bgs.
BKG-13	9/20/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-13	9/20/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-14	9/20/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-14	9/20/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-15	9/20/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-15	9/20/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-16	9/23/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-16	9/23/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	
BKG-17	9/20/08	0 - 0.5	X	X	X		X							Rotosonic	
BKG-17	9/20/08	2 - 3, 5 - 6, and 9 - 10	X	X										Rotosonic	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
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Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC 1 - Area Around Former Percolation Bed															
AOC1-BCW1	9/20/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-BCW1	9/20/08	2 - 3	X	X	X	X				X			X	Rotosonic	Granite bolder encountered at 5.5 ft bgs; not able to collect proposed soil samples at 5-6 and 9-10 ft bgs.
AOC1-BCW2	10/4/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-BCW2	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-BCW3	10/4/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-BCW3	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-BCW4	10/4/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-BCW4	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-BCW5	10/4/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-BCW5	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X					X			X	Rotosonic	
AOC1-BCW6	8/22/08	0 - 0.5	X	X	X	X					X		X	Hand Tools	
AOC1-BCW6	8/22/08	2 - 3	X	X	X					X			X	Hand Tools	Cobble encountered at 4.2 ft bgs; not able to collect proposed soil samples at 5-6 and 9-10 ft bgs.
AOC1-T1a	10/16/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-T1a	10/16/08	2 - 3	X	X	X					X			X	Rotosonic	
AOC1-T1a	10/16/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T1b	10/16/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-T1b	10/16/08	2 - 3	X	X	X					X			X	Rotosonic	
AOC1-T1b	10/16/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T1c	10/16/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-T1c	10/16/08	2 - 3	X	X	X					X			X	Rotosonic	
AOC1-T1c	10/16/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T2a	10/5/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-T2a	10/16/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T2b	10/16/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
AOC1-T2b	10/16/08	2 - 3	X	X	X					X			X	Rotosonic	
AOC1-T2b	10/16/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T2c	10/8/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-T2c	10/8/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T2d	10/7/08	0 - 0.5	X	X	X				X				X	Rotosonic	

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Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC1-T2d	10/7/08	2 - 3, 5 - 6, 9 - 10, 19 - 20, 29 - 30, 39 - 40, 49 - 50, 59 - 60, and 69 - 70	X	X	X			X					X	Rotosonic	Groundwater encountered at 72 ft bgs; not able to collect proposed soil samples at 79-80, 89-90, and 99-100 ft bgs. An SPLP extraction was performed on soil samples collected at 2 -3 and 5-6 ft bgs, and leachate was analyzed for total and hexavalent chromium.
AOC1-T2e	10/16/08	0 - 0.5	X	X	X				X				X	Rotosonic	
AOC1-T2e	10/16/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
AOC1-T3a	10/5/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC1-T3a	10/17/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC1-T3a	10/17/08	5 - 6 and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T3b	10/5/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T3b	10/17/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T3c	10/5/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T3c	10/5/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T4a	10/3/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T4a	10/3/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T4b	10/2/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T4b	10/2/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T4c	10/4/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC1-T4c	10/4/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC1-T4c	10/4/08	5 - 6 and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T5a	10/4/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T5a	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T5b	10/4/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC1-T5b	10/4/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC1-T5b	10/4/08	5 - 6 and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T5c	10/4/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC1-T5c	10/4/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Direct-Push	
AOC1-T6a	9/30/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC1-T6a	9/30/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Excavator	
AOC1-T6b	9/30/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC1-T6b	9/30/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Excavator	
AOC1-T6c	9/30/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC1-T6c	9/30/08	2.5 - 3	X	X	X					X			X	Excavator	
AOC1-T6c	9/30/08	5.5 - 6	X	X	X			X					X	Excavator	Bedrock encountered at 6 ft bgs; not able to collect proposed soil samples at 9-10 ft bgs.

SWMU 1 - Former Percolation Bed

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
SWMU1-1	10/16/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-1	10/16/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-1	10/16/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	An SPLP extraction was performed on the soil sample collected at 5-6 ft bgs, and leachate was analyzed for total and hexavalent chromium
SWMU1-2	10/15/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-2	10/15/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-3	10/6/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-3	10/6/08	2 - 3	X	X	X	X				X			X	Rotosonic	
SWMU1-3	10/6/08	5 - 6, 9 - 10, 19 - 20, 29 - 30, 39 - 40, 49 - 50, 59 - 6-, 69 - 70, and 79 - 80	X	X	X			X					X	Rotosonic	Groundwater encountered at 77 ft bgs; not able to collect proposed soil samples at 89-90 and 99-100 ft bgs. An SPLP extraction was performed on the soil sample collected at 5-6 ft bgs, and leachate was analyzed for total and hexavalent chromium.
SWMU1-4	10/15/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-4	10/15/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-4	10/15/08	5 - 6, 7 - 8, 9 - 10, and 13 - 14	X	X	X			X					X	Rotosonic	
SWMU1-5	10/15/08	9 - 10, 13 - 14, 15 - 16, and 19 - 20	X	X	X			X					X	Rotosonic	
SWMU1-6	10/15/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-6	10/15/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-7	10/15/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-7	10/15/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-8	10/15/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-8	10/15/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	An SPLP extraction was performed on the soil sample collected at 2-3 ft bgs, and leachate was analyzed for total and hexavalent chromium.
SWMU1-9	10/14/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-9	10/14/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-9	10/14/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-10	10/14/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-10	10/14/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-11	10/15/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-11	10/15/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-11	10/15/08	5 - 6 and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-12	10/14/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-12	10/14/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-13	10/14/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-13	10/14/08	2 - 3, 5 - 6, and 9 - 10	X	X	X					X			X	Rotosonic	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

			Analytical Suite[a]												
Sample Location	**Sample Date**	**Sample Depth (ft bgs)**	**Metals**	**Hexavalent Chromium**	**PAHs**	**PCBs**	**Pesticides**	**VOCs, SVOCs, TPH-purgable, and TPH-extractable**	**SVOCs and TPH-extractable**	**CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable**	**CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable**	**Asbestos**	**pH**	**Collection Method**	**Deviation from Draft Work Plan and Notes**
SWMU1-14	10/14/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-14	10/14/08	2 - 3, 5 - 6, and 9 - 10	X	X	X			X					X	Rotosonic	
SWMU1-15	9/22/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-15	9/22/08	2 - 3	X	X	X	X				X			X	Rotosonic	
SWMU1-15	9/22/08	5 - 6, 9 - 10, 19 - 20, 29 - 30, 39 - 40, 49 - 50, 59 - 6-, 69 - 70, 79 - 80, and 89 - 90	X	X	X			X					X	Rotosonic	Bedrock encountered at 90 ft bgs; not able to collect proposed soil sample at 99-100 ft bgs.
SWMU1-16	9/21/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-16	9/21/08	2 - 3 and 5 - 6	X	X	X			X					X	Rotosonic	
SWMU1-17	9/21/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-17	9/21/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-17	9/21/08	5 - 6	X	X	X			X					X	Rotosonic	
SWMU1-17	9/21/08	9 - 10	X	X	X				X				X	Rotosonic	
SWMU1-WP-1h	10/7/08	0 - 0.5	X	X	X	X					X		X	Excavator	
SWMU1-WP-1h	10/7/08	2 - 3	X	X	X					X			X	Excavator	
SWMU1-WP-1h	10/7/08	5 - 6 and 9 - 10	X	X	X			X					X	Excavator	Excavator was not able to collect samples within a one-foot depth interval, therefore, the proposed sample at 7 -8 ft bgs was not collected.
SWMU1-WP-3a	10/14/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-WP-3a	10/14/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-WP-3a	10/14/08	5 - 6, 7 - 8, 9 - 10, 11 - 12, and 13 -14	X	X	X			X					X	Rotosonic	
SWMU1-WP-3h	10/7/08	0 - 0.5	X	X	X				X				X	Excavator	
SWMU1-WP-3h	10/7/08	2 - 3 and 5 - 6	X	X	X			X					X	Excavator	
SWMU1-WP-5a	10/5/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-WP-5a	10/5/08	2 - 3	X	X	X					X			X	Rotosonic	
SWMU1-WP-5a	10/5/08	5 - 6, 7 - 8, 9 -10, 11 - 12, and 13 - 14	X	X	X			X					X	Rotosonic	
SWMU1-WP-5h	10/7/08	0 - 0.5	X	X	X	X					X		X	Excavator	
SWMU1-WP-5h	10/7/08	2-3 and 5-6	X	X	X			X					X	Excavator	White powder material was observed and sampled at 2-3 ft bgs. Hardpan encountered at 7 ft bgs; not able to collect proposed soil samples 7-8 and 9-10 ft bgs.
SWMU1-WP-6a	10/5/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-WP-6a	10/5/08	2 - 3	X	X	X	X				X			X	Rotosonic	
SWMU1-WP-6a	10/5/08	5 - 6, 7 - 8, 9 -10, 11 - 12, and 13 - 14	X	X	X			X					X	Rotosonic	
SWMU1-WP-6h	10/6/08	0 - 0.5	X	X	X	X					X		X	Excavator	White powder material was observed and sampled.
SWMU1-WP-6h	10/6/08	2 - 3	X	X	X	X				X			X	Excavator	
SWMU1-WP-6h	10/6/08	5 - 6 and 9 - 10	X	X	X			X					X	Excavator	Excavator was not able to collect samples within a one-foot depth interval, therefore, the proposed sample at 7 -8 ft bgs was not collected.

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
SWMU1-WP-T3a	10/5/08	0 - 0.5	X	X	X	X					X		X	Rotosonic	
SWMU1-WP-T3a	10/5/08	2 - 3, 5 - 6, 7 - 8, 9 - 10, 11 - 12, and 13 -14	X	X	X					X			X	Rotosonic	
SWMU1-WP-7	10/6/08	0 - 0.5	X	X	X	X					X		X	Excavator	
SWMU1-WP-7	10/6/08	2 - 3	X	X	X	X				X			X	Excavator	White powder material was observed and sampled.
SWMU1-WP-7	10/6/08	5 - 6 and 9 - 10	X	X	X			X					X	Excavator	Excavator was not able to collect samples within a one-foot depth interval, therefore, the proposed sample at 7 -8 ft bgs was not collected.
SWMU1-WP-8	10/6/08	0 - 0.5	X	X	X	X					X		X	Excavator	
SWMU1-WP-8	10/6/08	2 - 3	X	X	X	X				X			X	Excavator	
SWMU1-WP-8	10/6/08	5 - 6 and 9 - 10	X	X	X			X					X	Excavator	Excavator was not able to collect samples within a one-foot depth interval, therefore, the proposed sample at 7 -8 ft bgs was not collected.
SWMU1-WP-9	9/21/08	0 - 0.5	X	X	X				X				X	Rotosonic	
SWMU1-WP-9	9/21/08	2 - 3, 5 - 6, 7 - 8, 9 - 10, 11 - 12, and 13 -14	X	X	X			X					X	Rotosonic	
SWMU1-WP-10	10/5/08	0 - 0.5	X	X	X				X				X	Excavator	
SWMU1-WP-10	10/5/08	2-3, 5 - 6 and 9 - 10	X	X	X			X					X	Excavator	White powder material was observed and sampled at 2-3 ft bgs. Excavator was not able to collect samples within a one-foot depth interval, therefore, the proposed sample at 7 -8 ft bgs was not collected.
AOC 4 - Debris Ravine															
AOC4-1	10/14/08	0 - 0.5	X	X	X	X					X			Hand Tools	
AOC4-1	10/14/08	0.5 - 1	X	X	X				X					Hand Tools	
AOC4-1	10/14/08	2 - 3	X	X	X					X				Hand Tools	
AOC4-2	10/3/08	0 - 0.5 and 0.5 - 1	X	X	X				X			X		Excavator	
AOC4-3	8/24/08	0 - 0.5 and 0.5 - 1	X	X	X				X					Hand Tools	Gravel encountered at 1.2 ft bgs; not able to collect proposed soil sample at 2-3 ft bgs.
AOC4-4	8/24/08	0 - 0.5	X	X	X	X					X	X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.
AOC4-5	10/3/08	0 - 0.5	X	X	X				X			X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.
AOC4-6	8/24/08	0 - 0.5	X	X	X				X			X		Excavator	
AOC4-6	8/24/08	0.5 - 1	X	X	X				X			X		Excavator	
AOC4-6	10/3/08	2 - 3	X	X	X			X				X		Excavator	
AOC4-7	10/3/08	0 - 0.5	X	X	X	X					X	X		Excavator	Proposed soil samples at 0.5-1 and 2-3 ft bgs were not able to be collected due excavation integrity.
AOC4-8	10/3/08	0 - 0.5	X	X	X				X			X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.
AOC4-9	8/24/08	0 - 0.5	X	X	X				X			X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.
AOC4-10	10/3/08	0 - 0.5	X	X	X				X			X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

			Analytical Suite[a]												
Sample Location	Sample Date	Sample Depth (ft bgs)	Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC4-11	10/3/08	0 - 0.5	X	X	X	X					X	X		Hand Tools	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 0.5-1 and 2-3 ft bgs.
AOC4-12	10/3/08	0 - 0.5 and 0.5 - 1	X	X	X				X				X	Hand Tools	
AOC4-12A	8/24/08	0 - 0.5	X	X	X				X					Hand Tools	
AOC4-13	8/24/08	0 - 0.5	X	X	X	X					X	X		Hand Tools	
AOC4-14	8/24/08	0 - 0.5	X	X	X				X			X		Hand Tools	
AOC4-15	9/19/08	0 - 0.5 and 0.5 - 1	X	X	X				X			X		Excavator	
AOC4-15	9/19/08	2 - 3	X	X	X			X				X		Excavator	
AOC4-B10	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	
AOC4-B20	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-B30	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid. White powder material was observed and sampled.
AOC4-D10	10/5/08	0 - 0.5	X	X	X				X					Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-D20	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-D30	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-DE5	10/5/08	0 - 0.5	X	X	X	X					X	X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-GH10	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-GH30	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-I20	10/5/08	0 - 0.5	X	X	X				X			X		Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-I30	10/5/08	0 - 0.5	X	X	X				X					Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-Z25	10/5/08	0 - 0.5	X	X	X				X					Excavator	Additional sample collected to characterize stained soil found in the AOC4 surface debris mapping grid.
AOC4-SS-1	9/19/08	0 - 0.5	X	X	X				X					Hand Tools	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC4-SS-2	10/3/08	0 - 0.5	X	X	X				X					Hand Tools	
AOC4-SS-3	10/3/08	0 - 0.5	X	X	X				X					Hand Tools	
AOC4-Stained	10/4/08	0 - 0.5	X	X	X	X					X			Hand Tools	Stained soil found in surface debris mapping grid. An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC4-T1a	10/22/08	0 - 0.5	X	X	X	X					X	X		Excavator	
AOC4-T1a	10/22/08	3.5 - 4	X	X	X			X						Excavator	
AOC4-T2a	10/22/08	3.5 - 4	X	X	X			X						Excavator	
AOC4-T2b	10/22/08	2 - 3 and 7 - 8	X	X	X			X				X		Excavator	
AOC4-T2c	10/22/08	0 - 0.5	X	X	X				X					Excavator	
AOC4-T2c	10/22/08	2.5 - 3	X	X	X			X				X		Excavator	
AOC4-T3a	10/23/08	2.5 - 3	X	X	X			X				X		Excavator	
AOC4-T3b	10/23/08	2.5 - 3	X	X	X			X						Excavator	
AOC4-T3c	10/23/08	2.5 - 3	X	X	X			X						Excavator	
AOC4-T4a	10/23/08	2.5 - 3	X	X	X	X				X				Excavator	
AOC4-T4b	10/23/08	2.5 - 3	X	X	X			X						Excavator	
AOC4-T4c	10/23/08	2.5 - 3	X	X	X			X						Excavator	
AOC4-Wood1	10/3/08	NA	X	X	X				X					NA	
AOC4-Wood2	10/3/08	NA	X	X	X				X					NA	
AOC 9 - Southeast Fence Line															
AOC9-1	10/1/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-1	10/1/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-2	9/18/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-2	9/18/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-3	9/18/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-3	9/18/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-4	9/18/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-4	9/18/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-5	10/1/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC9-5	10/1/08	2 - 3	X	X	X	X				X			X	Excavator	
AOC9-6	9/18/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-6	9/18/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-7	9/18/08	0 - 0.5	X	X	X				X				X	Excavator	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC9-7	9/18/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-8	10/1/08	0 - 0.5	X	X	X				X				X	Excavator	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC9-8	10/1/08	2.5 - 3 and 5.5-6	X	X	X			X					X	Excavator	
AOC9-9	10/1/08	0 - 0.5	X	X	X				X				X	Excavator	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a] Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC9-9	10/1/08	2.5 - 3 and 5.5-6	X	X	X			X					X	Excavator	
AOC9-10	10/1/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-10	10/1/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-11	9/18/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC9-11	9/18/08	2 - 3	X	X	X					X			X	Excavator	
AOC9-12	10/1/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC9-12	10/1/08	2 - 3	X	X	X	X				X			X	Excavator	
AOC9-13	9/19/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC9-13	9/19/08	2 - 3	X	X	X			X					X	Excavator	
AOC9-14	10/2/08	0 - 0.5	X	X	X				X			X	X	Excavator	Sample location added to collect a sample of white powder material found 45 ft south of end of compressor station and in line with "swamp cooler".
AOC9-14	10/2/08	2 - 3	X	X	X			X				X	X	Excavator	Soil sample collected beneath white powder material found at the surface (0-0.5 ft bgs).
AOC 10 - East Ravine															
AOC10-1	10/2/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC10-1	10/2/08	2 - 3 and 5 - 6	X	X	X			X					X	Excavator	
AOC10-1	10/2/08	9 - 10	X	X	X			X						Excavator	
AOC10-2	10/2/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC10-2	10/2/08	2 - 3 and 5 - 6	X	X	X			X					X	Excavator	
AOC10-2	10/2/08	7 - 8	X	X	X			X						Excavator	Bedrock encountered at 8 ft bgs; not able to collect proposed soil samples at 9-10 ft bgs.
AOC10-3	9/19/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10-3	9/19/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC10-3	9/19/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10-3	9/19/08	9 - 10	X	X	X									Direct-Push	
AOC10-4	9/19/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10-4	9/19/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10-4	9/19/08	9 - 10	X	X	X									Direct-Push	
AOC10-5	9/19/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	Bedrock encountered at 8.2 ft bgs; not able to collect proposed soil sample at 9-10 ft bgs.
AOC10-5	9/19/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC10-5	9/19/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10-6	9/20/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10-6	9/20/08	2 - 3	X	X	X			X					X	Direct-Push	Bedrock encountered at 3 ft bgs; not able to collect proposed soil samples at 5-6 and 9-10 ft bgs.
AOC10-7	9/20/08	0 - 0.5	X	X	X				X				X	Direct-Push	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC10-7	9/20/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	Bedrock encountered at 8 ft bgs; not able to collect proposed soil sample at 9-10 ft bgs.
AOC10-8	8/22/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 2-3, 5-6, and 9-10 ft bgs.
AOC10a-1	10/17/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	Bedrock encountered at 0.5 ft bgs; not able to collect proposed soil samples at 2-3, 5-6, and 9-10 ft bgs.
AOC10b-1	9/30/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10b-1	9/30/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC10b-1	9/30/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10b-1	9/30/08	9 - 10	X	X	X			X						Direct-Push	
AOC10b-2	9/30/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10b-2	9/30/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10b-2	9/30/08	9 - 10	X	X	X			X						Direct-Push	
AOC10b-3	9/30/08	0 - 0.5	X	X	X				X				X	Direct-Push	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC10b-3	10/1/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10b-3	10/1/08	9 - 10	X	X	X			X						Direct-Push	
AOC10b-4	9/30/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10b-4	9/30/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10b-4	9/30/08	9 - 10	X	X	X			X						Direct-Push	
AOC10c-1	10/1/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10c-1	10/1/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC10c-1	10/1/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10c-1	10/1/08	9 - 10	X	X	X			X						Direct-Push	
AOC10c-2	10/1/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10c-2	10/1/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC10c-2	10/1/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10c-2	10/1/08	9 - 10	X	X	X			X						Direct-Push	
AOC10c-3	10/2/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10c-3	10/2/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10c-3	10/2/08	9 - 10	X	X	X			X						Direct-Push	
AOC10c-4	10/1/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10c-4	10/1/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10c-4	10/1/08	9 - 10	X	X	X			X						Direct-Push	
AOC10c-5	10/1/08	0 - 0.5	X	X	X				X				X	Direct-Push	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a] Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC10c-5	10/1/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	An SPLP extraction was performed on the soil sample collected at 2 -3 ft bgs, and leachate was analyzed for total and hexavalent chromium.
AOC10c-5	10/1/08	9 - 10	X	X	X			X						Direct-Push	
AOC10d-1	9/18/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10d-1	9/18/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC10d-1	9/18/08	9 - 10	X	X	X									Direct-Push	
AOC10d-2	9/17/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10d-2	9/17/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC10d-2	9/17/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10d-2	9/17/08	9 - 10	X	X	X									Direct-Push	
AOC10d-3	9/17/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC10d-3	9/18/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC10d-3	9/18/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC10d-3	9/18/08	9 - 10	X	X	X									Direct-Push	
AOC10d-4	9/18/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC10d-4	9/18/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	An SPLP extraction was performed on the soil sample collected at 2 -3 ft bgs, and leachate was analyzed for total and hexavalent chromium.
AOC10d-4	9/18/08	9 - 10	X	X	X									Direct-Push	
AOC10-XRF-01	8/25/08	0 -0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-02	8/25/08	0 - 0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-03	8/25/08	0 - 0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-04	9/21/08	0 - 0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-05	9/21/08	0 - 0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-06	9/21/08	0 - 0.5	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-7	9/21/08	1 - 2	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-8	9/21/08	1 - 2	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-9	9/21/08	1 - 2	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC10-XRF-10	9/21/08	3 - 4	X	X										Hand Tools	Confirmation samples for embankment modification to create an access route into the ravine.
AOC 11 - Topographic Low Areas															
AOC11a-1	9/21/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC11a-1	9/21/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC11a-1	9/21/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC11a-1	9/21/08	9 - 10	X	X	X									Direct-Push	
AOC11a-2	9/21/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a] Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC11a-2	9/21/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC11a-2	9/21/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC11a-2	9/21/08	9 - 10	X	X	X									Direct-Push	
AOC11a-3	9/20/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC11a-3	9/20/08	2 - 3	X	X	X					X			X	Direct-Push	
AOC11a-3	9/20/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC11a-3	9/20/08	9 - 10	X	X	X									Direct-Push	
AOC11a-4	9/20/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC11a-4	9/20/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC11a-4	9/20/08	9 - 10	X	X	X									Direct-Push	
AOC11a-5	9/21/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC11a-5	9/21/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	
AOC11a-5	9/21/08	9 - 10	X	X	X									Direct-Push	
AOC11a-SS-1	9/21/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X									Direct-Push	
AOC11a-SS-2	9/21/08	0 - 0.5 and 2 - 3	X	X	X									Direct-Push	Bedrock encountered at 3.5 ft bgs; not able to collect proposed soil samples at 5-6 and 9-10 ft bgs.
AOC11a-SS-3	9/20/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X									Direct-Push	
AOC11b-1	9/17/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC11b-1	9/17/08	2 - 3	X	X	X					X			X	Excavator	
AOC11b-1	9/17/08	5 - 6	X	X	X			X					X	Excavator	
AOC11b-1	9/17/08	9 - 10	X	X	X									Excavator	
AOC11b-2	9/17/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC11b-2	9/17/08	2 - 3 and 5 - 6	X	X	X			X					X	Excavator	
AOC11b-2	9/17/08	9 - 10	X	X	X									Excavator	
AOC11c-1	9/21/08	0 - 0.5	X	X	X				X				X	Direct-Push	
AOC11c-1	9/22/08	2 - 3 and 5 - 6	X	X	X			X					X	Direct-Push	An SPLP extraction was performed on the soil sample collected at 2 -3 ft bgs, and leachate was analyzed for total and hexavalent chromium.
AOC11c-1	9/22/08	9 - 10	X	X	X									Direct-Push	
AOC11c-2	9/21/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC11c-2	9/22/08	2 - 3	X	X	X	X				X			X	Direct-Push	
AOC11c-2	9/22/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC11c-2	9/22/08	9 - 10	X	X	X									Direct-Push	
AOC11c-SS-1	9/21/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X									Direct-Push	
AOC11c-SS-2	9/22/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X									Direct-Push	
AOC11d-1	9/23/08	0 - 0.5	X	X	X	X					X		X	Direct-Push	
AOC11d-1	9/23/08	2 - 3	X	X	X	X				X			X	Direct-Push	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a] Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC11d-1	9/23/08	5 - 6	X	X	X			X					X	Direct-Push	
AOC11d-1	9/23/08	9 - 10	X	X	X			X						Direct-Push	
AOC11e-1	9/23/08	0 - 0.5	X	X	X				X				X	Excavator	
AOC11e-1	9/23/08	2 - 3 and 5 - 6	X	X	X			X					X	Excavator	
AOC11e-1	9/23/08	9 - 10	X	X	X			X						Excavator	
AOC11e-2	9/24/08	0 - 0.5	X	X	X	X					X		X	Excavator	
AOC11e-2	9/24/08	2 - 3	X	X	X	X				X			X	Excavator	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC11e-2	9/24/08	5 - 6	X	X	X	X		X					X	Excavator	
AOC11e-2	9/24/08	9 - 10	X	X	X	X		X						Excavator	
AOC11e-SS-1	9/23/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X	X			X					Excavator	
AOC11e-SS-2	9/23/08	0 - 0.5, 2 - 3, 5 - 6, and 9 - 10	X	X	X	X			X					Excavator	
AOC 12 - Fill Area															
AOC12a-T1a	9/22/08	0 - 0.5	X	X	X	X					X	X	X	Excavator	
AOC12a-T1a	9/22/08	2 - 3	X	X	X	X				X		X	X	Excavator	
AOC12a-T1a	9/22/08	7 - 8	X	X	X			X				X	X	Excavator	
AOC12a-T1c	9/22/08	7 - 8	X	X	X			X				X	X	Excavator	
AOC12a-T2a	9/22/08	6 - 7	X	X	X			X				X	X	Excavator	
AOC12a-T2b	9/22/08	7 - 8	X	X	X			X				X	X	Excavator	
AOC12b-T1a	9/20/08	2 - 3	X	X	X			X				X	X	Excavator	
AOC12b-T1b	9/20/08	2 - 3	X	X	X			X				X	X	Excavator	
AOC12c-T1a	9/20/08	0 - 0.5	X	X	X	X					X	X	X	Excavator	
AOC12c-T1a	9/20/08	2 - 3	X	X	X					X		X	X	Excavator	
AOC12c-T1a	9/20/08	10 - 11	X	X	X			X				X	X	Excavator	
AOC12c-T1b	9/20/08	2 - 3, 3 - 4, and 10 - 11	X	X	X			X				X	X	Excavator	
AOC12c-T1c	9/20/08	10 - 11	X	X	X			X				X	X	Excavator	
AOC12c-T2a	9/20/08	7 - 8	X	X	X			X				X	X	Excavator	
AOC12c-T2b	9/20/08	7 - 8	X	X	X			X				X	X	Excavator	
AOC 14 - Railroad Debris Site															
AOC14-1	9/30/08	0 - 0.5	X	X	X	X					X	X		Rotosonic	
AOC14-1	9/30/08	2 - 3	X	X	X					X				Rotosonic	
AOC14-1	9/30/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-2	9/30/08	0 - 0.5	X	X	X	X					X	X		Rotosonic	
AOC14-2	10/1/08	0.5 - 1.5	X	X	X			X				X		Hand Tools	White powder material was observed and sampled.
AOC14-2	9/30/08	2 - 3	X	X	X					X		X		Rotosonic	

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a] Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC14-2	9/30/08	5 - 6	X	X	X			X						Rotosonic	An SPLP extraction was performed, and leachate was analyzed for total and hexavalent chromium.
AOC14-2	9/30/08	9 - 10	X	X	X			X				X		Rotosonic	
AOC14-2	9/30/08	14 - 15	X	X	X			X						Rotosonic	
AOC14-3	10/1/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-3	10/1/08	2 - 3	X	X	X					X				Rotosonic	
AOC14-3	10/1/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-4	10/1/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-4	10/1/08	2 - 3	X	X	X					X				Rotosonic	
AOC14-4	10/1/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-5	10/2/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-5	10/2/08	2 - 3	X	X	X					X		X		Rotosonic	
AOC14-5	10/2/08	5 - 6 and 9 - 10	X	X	X			X						Rotosonic	
AOC14-5	10/2/08	14 - 15	X	X	X			X				X		Rotosonic	
AOC14-6	10/2/08	0 - 0.5	X	X	X				X					Rotosonic	
AOC14-6	10/2/08	2 - 3, 5 - 6, 9 - 10, and 14 - 15	X	X	X			X						Rotosonic	
AOC14-7	10/2/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-7	10/2/08	2 - 3	X	X	X					X				Rotosonic	
AOC14-7	10/2/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-8	10/2/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-8	10/2/08	2 - 3	X	X	X					X				Rotosonic	
AOC14-8	10/2/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-9	10/1/08	0 - 0.5	X	X	X				X					Rotosonic	
AOC14-9	10/1/08	2 - 3	X	X	X			X				X		Rotosonic	
AOC14-9	10/1/08	5 - 6, 5 - 6, 9 - 10, and 14 - 15	X	X	X			X						Rotosonic	
AOC14-10	10/1/08	0 - 0.5	X	X	X	X					X			Rotosonic	
AOC14-10	10/1/08	2 - 3, 5 - 6, 9 - 10, and 14 - 15	X	X	X					X				Rotosonic	
AOC14-11	10/1/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X						Rotosonic	
AOC14-12	9/30/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X				X		Rotosonic	
AOC14-13	10/1/2008	3 - 3.25	X	X	X			X				X		Hand Tools	White debris was observed and sampled.
AOC14-13	9/30/08	5 - 6, 9 - 10, and 14 -15	X	X	X			X				X		Rotosonic	An SPLP extraction was performed on the soil sample collected at 5-6 ft bgs, and leachate was analyzed for total and hexavalent chromium.
AOC14-SS-1	10/1/08	0 - 0.5	X	X	X				X			X		Rotosonic	
AOC14-SS-1	10/1/08	2 - 3	X	X	X			X				X		Rotosonic	
AOC14-SS-1	10/1/08	5 - 6	X	X	X			X				X		Rotosonic	
AOC14-SS-1	10/1/08	9 - 10 and 14 - 15	X	X	X			X						Rotosonic	

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes
AOC14-SS-2	10/1/08	0 - 0.5	X	X	X				X					Rotosonic	
AOC14-SS-2	10/1/08	2 - 3, 5 - 6, 9 - 10, and 14 - 15	X	X	X			X						Rotosonic	
AOC14-SS-3	10/2/08	0 - 0.5	X	X	X				X					Rotosonic	
AOC14-SS-3	10/2/08	2 - 3, 5 - 6, 9 - 10, and 14 - 15	X	X	X			X						Rotosonic	
AOC14-SS-4	10/2/08	0 - 0.5	X	X	X				X					Rotosonic	
AOC14-SS-4	10/2/08	2 - 3	X	X	X			X						Rotosonic	
AOC14-SS-4	10/2/08	5 - 6	X	X	X			X				X		Rotosonic	
AOC14-SS-4	10/2/08	9 - 10 and 14 - 15	X	X	X			X						Rotosonic	
UA 2 - Former 300 B Pipeline Liquids Tank															
UA2-300B-1	9/23/08	0 - 0.5	X	X	X	X					X			Hand Tools	
UA2-300B-1	9/23/08	0.5 - 1	X	X	X	X			X					Hand Tools	
UA2-300B-1	10/23/08	2.5 - 3	X	X	X	X				X				Hand Tools	
UA2-300B-1	10/23/08	5.5 - 6	X	X	X	X		X						Hand Tools	
UA2-300B-2	10/3/08	0 - 0.5 and 0.5 to 1	X	X	X	X			X					Direct-Push	
UA2-300B-2	10/3/08	2 - 3	X	X	X	X		X						Direct-Push	Refusal encountered at 5 ft bgs; not able to collect proposed soil sample at 5-6 ft bgs.
UA2-300B-3	10/3/08	0 - 0.5 and 0.5 to 1	X	X	X	X			X					Direct-Push	
UA2-300B-3	10/3/08	2 - 3 and 5 - 6	X	X	X	X		X						Direct-Push	
UA2-300B-4	10/3/08	0 - 0.5 and 0.5 to 1	X	X	X	X			X					Direct-Push	
UA2-300B-4	10/3/08	2 - 3	X	X	X	X		X						Direct-Push	Refusal encountered at 5 ft bgs; not able to collect proposed soil sample at 5-6 ft bgs.
UA2-300B-5	10/3/08	0 - 0.5	X	X	X	X					X			Direct-Push	
UA2-300B-5	10/3/08	0.5 - 1	X	X	X	X			X					Direct-Push	
UA2-300B-5	10/3/08	2 - 3	X	X	X	X				X				Direct-Push	Refusal encountered at 5.5 ft bgs; not able to collect proposed soil sample at 5-6 ft bgs.

Notes:

[a] Agencies requested that 10 percent of all soil samples collected in an AOC/SWMU be analyzed for the United States Environmental Protection Agency CLP TAL/TCL analytical suite.

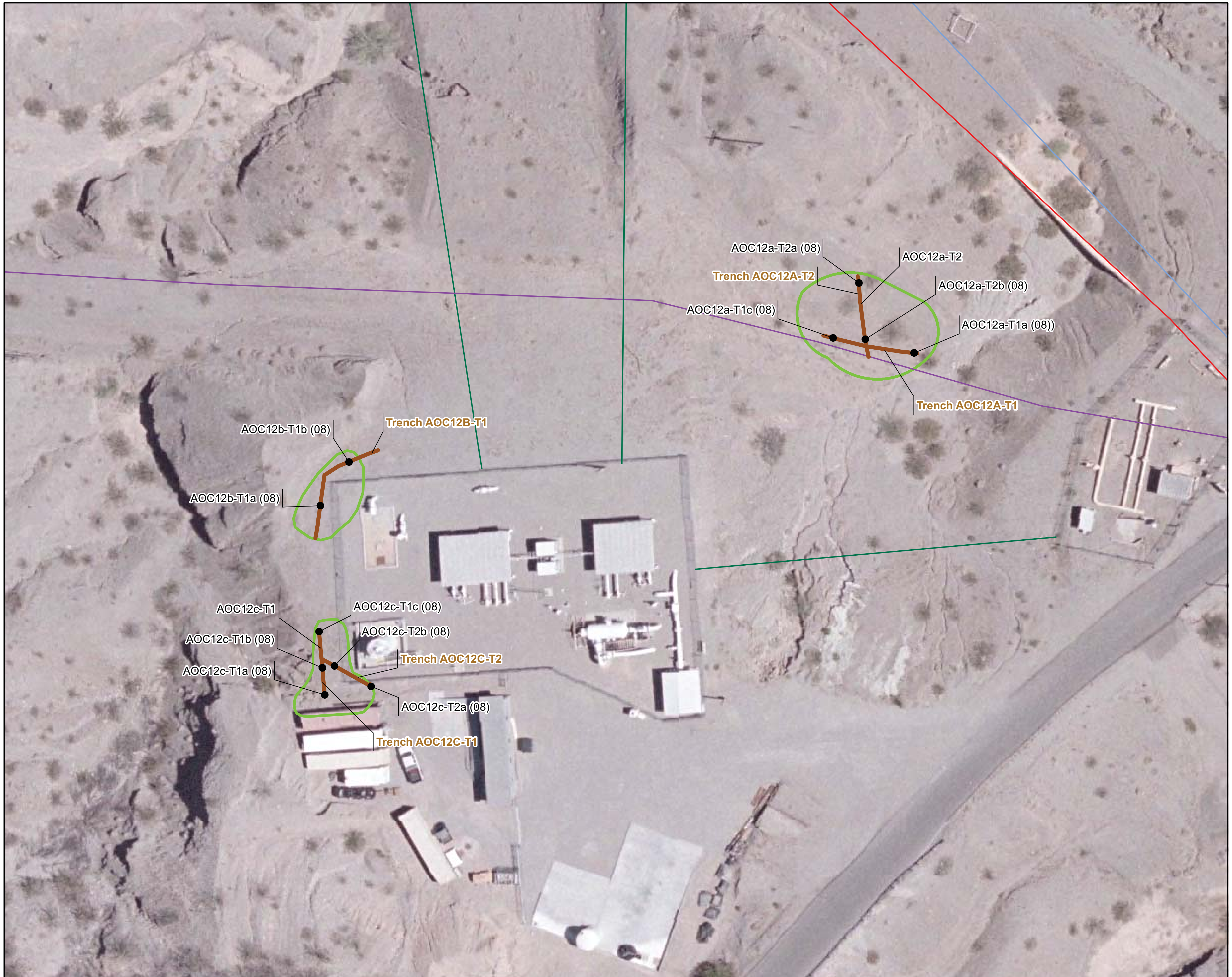
AOC	Area of Concern
CLP TAL	United States Environmental Protection Agency Contract Laboratory Program Target Analyte List
CLP TCL	United States Environmental Protection Agency Contract Laboratory Program Target Compound List
ft bgs	feet below ground surface
NA	not applicable
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
SPLP	synthetic precipitation leaching procedure
SVOC	semivolatile organic compounds

TABLE B-1
Field Activities Summary Table and Deviations from Draft Work Plan
RCRA Facility Investigation/Remedial Investigation Soil Investigation Part A, Phase I Data Gaps Evaluation Report
Pacific Gas and Electric, Topock Compressor Station, Needles, California

Sample Location	Sample Date	Sample Depth (ft bgs)	Analytical Suite[a]: Metals	Hexavalent Chromium	PAHs	PCBs	Pesticides	VOCs, SVOCs, TPH-purgable, and TPH-extractable	SVOCs and TPH-extractable	CLP TCL VOCs, SVOCs, TPH-purgable, and TPH-extractable	CLP TAL Metals, CLP TCL SVOCs and Pesticides, and TPH-extractable	Asbestos	pH	Collection Method	Deviation from Draft Work Plan and Notes

SWMU	solid waste management unit
TPH	total petroleum hydrocarbons
VOC	volatile organic compounds

Figures



VICINITY MAP

LEGEND

- Boring
- Trench
- Transwestern Pipeline
- Mojave Pipeline
- PG&E Pipeline
- SoCal Gas Pipeline
- Decontamination Pad & Equipment Storage Area
- AOC12 Boundary

AOC12a-T1a (08)
Year of Installation
Sample Location ID

N

0 25 50 100
Feet

FIGURE B-1
Sampling and Trench Locations for AOC12 - Fill Area
Soil Investigation Part A
Phase I Data Gaps Evaluation Report
PG&E Topock Compressor Station
Needles, California

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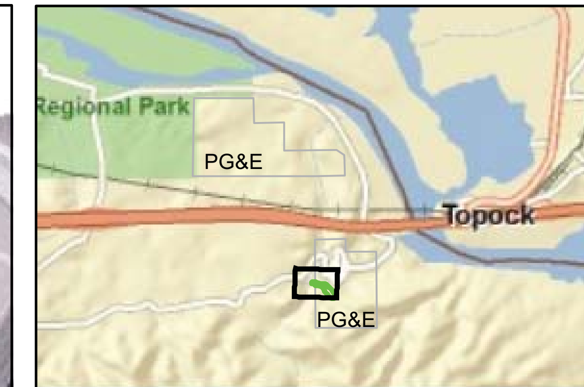
VICINITY MAP



LEGEND

- Soil Boring Location
- Wood Sample Location
- Sample Grid
- Trench
- AOC4 Boundary

AOC4-9 (08)
Year of Installation
Sample Location ID

N

0 25 50 100
Feet

FIGURE B-2
Debris Surface Mapping and Sampling/Trench Locations for AOC4 - Debris Ravine
Soil Investigation Part A,
Phase 1 Data Gaps Evaluation Report
PG&E Topock Compressor Station
Needles, California

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VICINITY MAP

PG&E

LEGEND

- AOC Boundary
- Debris Feature
- Stained Soil
- White Powder
- Property Boundary
- 2 Foot Contour
- Transwestern Pipeline
- Mojave Pipeline
- PG&E Pipeline
- SoCal Gas Pipeline
- Berm

Note:
Topographic contours shown are in 2 foot intervals.

N

0 200
Feet

FIGURE B-3
White Powder and Debris in AOC 10
Soil Investigation Part A
Phase 1 Data Gaps Evaluation Report
Pacific Gas and Electric Company Topock Compressor Station
Needles, California

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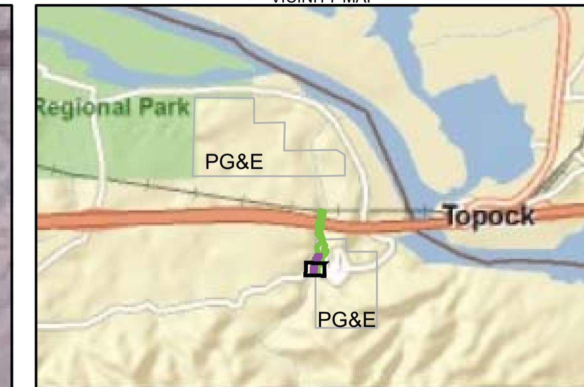
VICINITY MAP



LEGEND

- Boring
- Monitoring Well
- Approximate trench location and extent
- Approximate location of White Powder at ground surface before investigation (2008)
- SWMU 1 Boundary
- AOC 1 Boundary

SWMU1-6 (08)
Year of Installation
Sample Location ID

N

0 25 50
Feet

FIGURE B-4
White Powder Surface Mapping and Sampling/Trench Locations for SWMU1- Former Percolation Bed
Soil Investigation Part A
Phase 1 Data Gaps Evaluation Report
PG&E Topock Compressor Station
Needles, California

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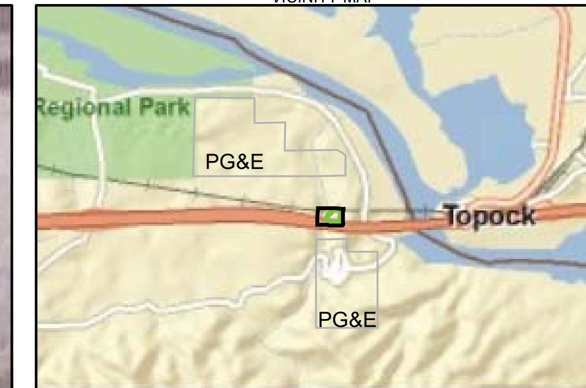
VICINITY MAP



LEGEND

- Boring
- Approximate AOC 14 Area
- Approximate location of White Powder Material and Debris at ground surface

AOC14-11 (08)
Year of Installation
Sample Location ID

N

0 25 50
Feet

FIGURE B-5
White Powder/Debris Surface Mapping and Sampling Locations for AOC14 - Railroad Debris Site
Soil Investigation Part A
Phase 1 Data Gaps Evaluation Report
PG&E Topock Compressor Station
Needles, California

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Figure B-6
New Areas of Debris, Potential White Powder Material, and Burning Areas

Soil Investigation Part A
Phase 1 Data Gaps Evaluation Report
PG&E Topock Compressor Station
Needles, California

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Attachment B1
Soil Boring and Trench Logs

CH2MHILL

PROJECT NUMBER: 354948.FP.08.FW.SC

BORING NUMBER: BKG-01

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103426.5 N, 7610224.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 2:40:00 PM 9/18/2008 END : 3:15:00 PM 9/18/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY SAND (SM) with gravel: yellowish brown (10YR 5/4), (15% gravel/50% sand/35% fines), poorly graded, predominantly fine-grained, highly angular, no dominant mineralogy, loosely consolidated, no apparent structure, dry, max clast size = 60mm.	Drill rate was steady and borehole was sound. Backfilled with hydrated medium bentonite chips.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-02

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2103261.6 N, 7611861.5 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A   START : 9:53:00 AM 9/18/2008   END : 10:00:00 AM 9/18/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (60% gravel/20% sand/20% fines), highly angular to angular, poorly graded, no dominant mineralogy, medium density, clast - supported, dry, max clast size = 60 mm.	Drill rate was steady and very quick. Borehole subject to slump. Backfilled with hydrated medium bentonite chips.
				SILTY SAND (SM): yellowish brown (10YR 5/6), (0% gravel/60% sand/40% fines), poorly graded, predominantly fine-grained sand, angular, predominantly quartz-based sand, loosely consolidated, no structure, dry, max clast size = 3 mm.	
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, angular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30 mm.	
5		10.0	X		
			X	SAND (SP) with gravel and silt: yellowish brown (10YR 5/4), (30% gravel/50% sand/20% fines), poorly graded, angular to subangular, predominantly coarse-grained quartz and feldspar sands, loosely consolidated, no apparent structure, dry, max clast size = 30 mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-03

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103774.2 N, 7611992.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 11:00:00 AM 9/18/2008 END : 11:45:00 AM 9/18/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (60% gravel/20% sand/20% fines), highly angular to angular, poorly graded, no dominant mineralogy, medium density, clast - supported, dry, max clast size = 60 mm.	Drill rate sporadic but relatively quick. Borehole structure was sound. Backfilled with hydrated medium bentonite chips.
			X	SILTY GRAVEL (GM) with sand: reddish brown (5YR 5/4), (40% gravel/30% sand/30% fines), angular, poorly graded, no dominant mineralogy, moderate density, matrix-supported, dry, max clast size=40mm.	
5		10.0	X		
				POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/4), (60% gravel/30% sand/10% fines), angular to subrounded, no dominant mineralogy, moderate density, clast - supported, predominantly fine gravel, dry, max clast size = 20 mm.	
			X	SANDY SILT (ML) with gravel: yellowish brown (10YR 5/4), (20% gravel/20% sand/60% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, sand predominantly fine-grained, matrix-supported, dry, max clast size=20mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC

BORING NUMBER: BKG-04

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station | LOCATION : (2102970.8 N, 7612655.0 E)

ELEVATION : ft. () | DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A | START : 1:40:00 PM 9/18/2008 | END : 2:10:00 PM 9/18/2008 | LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: reddish brown (5YR 5/4), (40% gravel/30% sand/30% fines), angular, poorly graded, no dominant mineralogy, moderate density, matrix-supported, dry, max clast size=40mm.	Drill rate constant; borehole structure was sound. Backfilled with hydrated medium bentonite chips.
			X	SILTY SAND (SM) with gravel: yellowish brown (10YR 5/4), (20% gravel/50% sand/30% fines), poorly graded, predominantly fine-grained sand, angular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30 mm.	
5		10.0	X		
			X	SANDY SILT (ML): yellowish brown (10YR 5/4), (10% gravel/30% sand/60% fines), poorly graded, angular to subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size=30mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-05

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2099655.6 N, 7611035.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 10:40:00 AM 9/19/2008 END : 11:30:00 AM 9/19/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	GRAVELLY SILT (ML) with sand: yellowish brown (10YR 5/4), (40% gravel/20% sand/40% fines), poorly graded, angular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size=30 mm.	Drill rate slow at 1.5-2 foot interval, then quick through remainder. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
				SANDY SILT (ML): yellowish brown (10YR 5/4), (0% gravel/40% sand/60% fines), poorly graded, subangular, predominantly quartz-based sand, fine-grained, loosely consolidated, no apparent structure, dry.	
		6.0	X	SANDY SILT (ML) with gravel: reddish brown (10YR 5/4), (30% gravel/30% sand/40% fines), poorly graded, angular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size=40mm.	
				POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), (5% gravel/95% sand/0% fines), poorly graded, subangular to subrounded, predominantly fine-grained quartz, loosely consolidated, no apparent structure, dry, max clast size = 10mm.	
5			X	SILTY SAND (SM): yellowish brown (10YR 5/4), (10% gravel/50% sand/40% fines), poorly graded, angular to subangular, predominantly quartz-based, loosely consolidated, no apparent structure, dry, max clast size = 20 mm.	
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	**BKG-06**

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100440.7 N, 7610913.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 9:40:00 AM 9/19/2008 END : 10:20:00 AM 9/19/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): yellowish brown (10YR 5/4), (10% gravel/50% sand/40% fines), poorly graded, subangular, predominantly fine-grained quartz sand, loose to medium density, no apparent structure, dry, max clast size = 30mm.	Drill rate slow to start, quickening over time. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-07

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station — LOCATION : (2099749.8 N, 7612009.7 E)

ELEVATION : ft. () — DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A — START : 1:15:00 PM 9/19/2008 — END : 1:57:00 PM 9/19/2008 — LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT (ML) with sand: yellowish brown (10YR 5/4), (10% gravel/20% sand/70% fines), poorly graded, angular to subangular, predominantly quartz (sand), loosely consolidated to moderate density, no apparent structure, dry, max clast size = 40 mm.	Drill rates increased in last 5 feet. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
5		10.0		At 5 ft bgs: color change to reddish brown (5YR 5/4)	
				At 7 ft bgs: color change to yellowish brown (10YR 5/4)	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	BKG-08

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2099328.2 N, 7614303.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 10:00:00 AM 8/23/2008 END : 10:05:00 AM 8/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): yellowish brown (10YR 5/6),(0% gravel/80% sand/20% fines), poorly graded, predominantly quartz sand, loosely consolidated, no structure, dry.	
		2.0		SILTY GRAVEL (GM) with sand, yellowish brown (10YR 5/8), (50% gravel/30% sand/20% fines), well-graded, angular, no dominant mineralogy, medium density, clast-supported, dry, max clast size=80 mm. gravel refusal below 2 ft bgs	
				Total Depth at 2 ft below ground surface	
5					
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	**BKG-09**

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2099663.2 N, 7614533.0 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A   START : 8:20:00 AM 8/23/2008   END : 8:30:00 AM 8/23/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.0		SILTY GRAVEL (GM) with sand, yellowish brown (10YR 5/6), (50% gravel/20% sand/30% fines), well-graded, angular to subangular, no dominant mineralogy, medium density, clast-supported, dry, max clast size=50 mm.	
				Total Depth at 1 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	BKG-10

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2099206.6 N, 7613954.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 3:20:00 PM 9/19/2008 END : 3:55:00 PM 9/19/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.0		SILTY SAND (SM): yellowish brown (10YR 5/4), (20% gravel/50% sand/30% fines), poorly graded, angular, no dominant mineralogy, loose to medium density, no apparent structure, dry, max clast size = 70 mm.	Location bored using hand tools as it was more efficient than mobilizing drill rig to remote location. Borehole integrity was sound. Backfilled with native soil per instruction.
				Total Depth at 2 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	BKG-11

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2098691.8 N, 7613892.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 2:30:00 PM 9/19/2008 END : 3:00:00 PM 9/19/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.0		SILTY SAND (SM): yellowish brown (10YR 5/4), (20% gravel/50% sand/30% fines), poorly graded, angular, no dominant mineralogy, loose to medium density, no apparent structure, dry, max clast size = 70mm.	Drill rate was moderately slow. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
				Total Depth at 2 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-12

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102754.8 N, 7613604.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 9:25:00 AM 8/23/2008 END : 9:52:00 AM 8/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): yellowish brown (10YR 5/6), (5% gravel/55% sand/40% fines), well graded, subangular to subrounded, predominantly quartz, loosely consolidated, no structure, dry, max clast size = 20mm.	
				SILTY GRAVEL (GM) with sand, brown (10YR 4/3), (60% gravel/20% sand/20% fines), well-graded, angular to subangular, no dominant mineralogy, medium density, clast-supported, dry, max clast size=60 mm.	
		6.0			
5				bedrock encountered at 6 ft bgs	
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	BKG-13

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102835.8 N, 7613187.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 10:00:00 AM 9/20/2008 END : 10:35:00 AM 9/19/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: reddish brown (5YR 5/4), (50% gravel/20% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 70mm.	Drill rate steady and quick. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose to medium density, matrix-supported, dry, max clast size = 40mm.	
5		10.0			
				SANDY SILT (ML) with gravel: yellowish brown (10YR 5/4), (20% gravel/20% sand/60% fines), poorly graded, subrounded, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-14

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103135.2 N, 7613297.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 8:45:00 AM 9/20/2008 END : 9:32:00 AM 9/20/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 50mm.	Drill rate was quick and steady. Borehole integrity was sound. Backfilled with medium bentonite chips.
			X	SANDY SILT (ML) with gravel: yellowish brown (10YR 5/4), (20% gravel/20% sand/60% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 20mm.	
5		10.0	X		
10			X		
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	**BKG-15**

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2103127.1 N, 7614414.2 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A   START : 2:10:00 PM 9/20/2008   END : 2:50:00 PM 9/20/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel: reddish brown (5YR 5/4), (15% gravel/25% sand/60% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 40mm.	Drill rate was constant but slow between 9-10' bgs region. Hole integrity was sound. Backfilled with hydrated medium bentonite chips.
				SILTY GRAVEL (GP) with sand: yellowish brown (10YR 5/4), (55% gravel/25% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size = 40mm.	
5		10.0		SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: BKG-16

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103220.8 N, 7614565.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 1:39:00 PM 9/23/2008 END : 2:00:00 PM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILT (ML) with sand: yellowish brown (10YR 5/4), (10% gravel/10% sand/80% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30mm.	Drill rate was quick and constant. Borehole integrity was sound. Backfilled with hydrated medium bentonite chips.
			X		
5		10.0	X		
			X		
10				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	BKG-17

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102777.3 N, 7613658.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 11:15:00 AM 9/20/2008 END : 12:14:00 PM 9/20/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: reddish brown (5YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loosely consolidated, matrix supported, dry, max clast size = 50mm.	Drill rates were steady. Borehole integrity was mostly sound; some slumps below 4.0 feet bgs. Borehole backfilled with hydrated medium bentonite chips.
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (60% gravel/20% sand/20% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size = 40mm.	
5		10.0		SANDY SILT (ML) with gravel: yellowish brown (10YR 5/4), (20% gravel/20% sand/60% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 20mm.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100919.3 N, 7614876.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 8:14:00 AM 10/16/2008 END : 8:25:00 AM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4) (40% gravel /40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
				Total Depth at 10 ft below ground surface	
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100875.9 N, 7614843.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 2:18:00 PM 10/15/2008 END : 2:30:00 PM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4) (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
			X		
5		10.0	X		
			X	Total Depth at 10 ft below ground surface	
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-3 SHEET 1 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs START : 10:24:00 AM 10/6/2008 END : 9:15:00 AM 10/7/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/3), (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast/matrix-supported, dry, max clast size =50mm.	Drill rate steady. Borehole integrity sound. Backfilled with slurry grout. Objective is to reach groundwater.
5		
10		
15		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-3 SHEET 2 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs START : 10:24:00 AM 10/6/2008 END : 9:15:00 AM 10/7/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
20					
				POORLY GRADED GRAVEL(GP) with sand: brown (10YR 5/4), (60% gravel/40% sand/0% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast-supported, dry, max clast size =40mm.	
25					
30					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-3 SHEET 3 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station　LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. ()　DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs　START : 10:24:00 AM 10/6/2008　END : 9:15:00 AM 10/7/2008　LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: brown (10YR 5/3), (40% gravel/20% sand/40% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =30mm.	
35				POORLY GRADED SAND (SP-SM) with silt and gravel: brown (10YR 5/3), (40% gravel/50% sand/10% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	
40		80.0	X		
				POORLY GRADED SAND (SP-SM) with silt: reddish brown (5YR 5/4), (10% gravel/80% sand/10% fines), poorly graded, subangular, no dominant mineralogy, predominantly fine grained sand, loose density, matrix-supported, dry, max clast size=10 mm.	
45					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-3 SHEET 4 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs START : 10:24:00 AM 10/6/2008 END : 9:15:00 AM 10/7/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SILTY SAND (ML) with gravel: brown (10YR 5/3), (30% gravel/30% sand/40% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20 mm.	
50	SILTY SAND (SM): reddish brown (5YR 4/4), (10% gravel/70% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20mm.	
55		
60		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-3 SHEET 5 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs START : 10:24:00 AM 10/6/2008 END : 9:15:00 AM 10/7/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
					Drilling stopped 10/6/08 at 16:30. Drilling resumed 10/7/08 at 08:05.
65					
70			X	SANDY SILT (ML): reddish brown (5YR 4/4)(10% gravel/20% sand/70% fines), poorly graded, subangular to subrounded, no dominant mineralogy but larger clay component, loose to medium density, matrix-supported, moist, max clast size=10mm. 70 ft bgs: weathered bedrock.	
75					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-3 SHEET 6 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100845.7 N, 7614831.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 77 ft bgs START : 10:24:00 AM 10/6/2008 END : 9:15:00 AM 10/7/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): dark reddish brown (5YR 3/3), (10% gravel/70% sand/20% fines), poorly graded, subangular to subrounded, no dominant mineralogy, predominantly medium-grained sand, loose density, matrix-supported, saturated, max clast size=10mm. 77 ft bgs: groundwater encountered.	
				Total Depth at 80 ft below ground surface	
80					
85					
90					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100786.2 N, 7614796.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 1:30:00 PM 10/15/2008 END : 1:56:00 PM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL(GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-5 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100808.4 N, 7614826.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:54:00 AM 10/15/2008 END : 10:35:00 AM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL(GM) with sand: yellowish brown (10YR 5/4), (40% gravel/40% sand/20% fines), poorly graded, no dominant mineralogy, subangular, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
10		20.0			
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-5 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100808.4 N, 7614826.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:54:00 AM 10/15/2008 END : 10:35:00 AM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X		
			X	Total Depth at 20 ft below ground surface	
20					
25					
30					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100747.0 N, 7614782.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 12:58:00 PM 10/15/2008 END : 1:10:00 PM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL(GM) with sand: yellowish brown (10YR 5/4), (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100742.0 N, 7614810.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 8:00:00 AM 10/15/2008 END : 8:18:00 AM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL(GM) with sand: yellowish brown (10YR 5/4), (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
			X		
5		10.0	X		
			X	Total Depth at 10 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100703.7 N, 7614783.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:16:00 AM 10/15/2008 END : 12:04:00 AM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
				Total Depth at 10 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2100683.9 N, 7614779.1 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A   START : 2:01:00 PM 10/14/2008   END : 2:19:00 PM 10/14/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
				Total Depth at 10 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100669.6 N, 7614740.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 1:32:00 PM 10/14/2008 END : 1:48:00 PM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size = 50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
				Total Depth at 10 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-11	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100695.9 N, 7614799.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 8:38:00 AM 10/15/2008 END : 8:54:00 AM 10/15/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand:yellowish brown (10YR 5/4), (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:	
354948.FP.08.FW.SC	SWMU1-12	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100634.7 N, 7614741.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:43:00 AM 10/14/2008 END : 10:02:00 AM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines),poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =50mm	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-13 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100628.6 N, 7614759.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 10:14:00 AM 10/14/2008 END : 10:29:00 AM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown, (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size = 50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-14 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100588.6 N, 7614750.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:04:00 AM 10/14/2008 END : 9:19:00 AM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size = 50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
			X		
5		10.0	X		
			X	Total Depth at 10 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-15 SHEET 1 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (50% gravel/10% sand/40% fines), poorly graded, subangular to angular, no dominant mineralogy, sand is fine-grained only, loose to medium density to five ft bgs, moderate to dense sand to 10 ft bgs, loose to medium density to 28 ft bgs, clast-or-matrix supported (varied), dry, max clast size =50mm.	Purpose of boring is to establish lithology to groundwater and/or to bedrock, not to exceed 100 ft bgs. Drill rates varied but met refusal at 90 feet bgs. Borehole integrity supplemented by 6" steel casing. Casing advanced to 70 ft bgs by end of 9/22/08 while boring advanced to 80 feet bgs by end of 9/22/08. Borehole caved in below 70 ft bgs by start of day 9/23/08. Water encountered at 80 ft bgs. Nearby well yielded groundwater level of 78 ft bgs. No presence of dark reddish-brown miocene conglomerate at this location. bedrock is granitic in nature.
5		
10		
15		

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-15 SHEET 2 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
20					
25					
				SILT (ML): reddish brown (5YR 5/4)(10% gravel/10% sand/80% fines), poorly graded, subangular, no dominant mineralogy, loose to medium density, matrix-supported, dry, max clast size=40mm.	
30					

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT (ML) with sand: yellowish brown (10YR 5/4)(10% gravel/10% sand/80% fines), poorly graded, subangular, no dominant mineralogy, loose to medium density, matrix-supported, dry, max clast size=80mm.	
35					
				SILTY GRAVEL (GM): reddish brown (5YR 5/4), (50% gravel/10% sand/40% fines), poorly graded, subangular to angular, no dominant mineralogy, loose to medium density, clast-or-matrix supported (varied), dry, max clast size =80mm.	
			X		
40					
45					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-15 SHEET 4 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		90.0			
			X	POORLY GRADED GRAVEL (GP-GM) with silt and sand: reddish brown (5YR 5/4)(50% gravel/40% sand/10% fines), poorly graded, angular to subangular, no dominant mineralogy, loose to medium density, clast-or-matrix supported (varied), dry, max clast size =40mm.	
50				SILT (ML) with sand: reddish brown (5YR 4/3), (0% gravel/25% sand/75% fines), poorly graded, angular to subangular, no dominant mineralogy, predominantly fine-grained sand, loose to medium density, matrix-supported, dry, max clast size =80 mm.	
55				SILTY GRAVEL (GM) with sand: reddish brown (5YR 5/4), (30% gravel/40% sand/30% fines), poorly graded, angular to subangular, no dominant mineralogy, fine-grained sand, loose to medium density, matrix-supported, dry, max clast size = 80 mm.	
			X		
60					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-15 SHEET 5 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
65					
				SILTY GRAVEL (GM) with sand: reddish brown (5YR 4/3), (30% gravel/40% sand/30% fines), poorly graded, subangular, no dominant mineralogy, fine-to medium grained sand, loose to medium density, matrix-supported, dry, max clast size = 50 mm.	
70					
				SILT (ML) with sand: brown (7.5YR 4/3), (10% gravel/10% sand/80% fines), higher content of clay, poorly graded, subangular to highly angular, no dominant mineralogy, soft clay and loose density, sand and silt, matrix-supported, moist, max clast size = 100 mm.	
75					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-15 SHEET 6 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100510.3 N, 7614763.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : 80 ft bgs START : 8:49:00 AM 9/22/2008 END : 9:44:00 AM 9/23/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
80					
				Bedrock (BR): granitic, fragments are highly angular; presence of rock dust, brittle from 81.0-85.0 feet bgs.	
85					
90				Total Depth at 90 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-16 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100448.0 N, 7614749.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 10:35:00 AM 9/21/2008 END : 11:36:00 AM 9/21/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		9.0		POORLY GRADED GRAVEL (GP-GM): with silt and sand: yellowish brown (10YR 5/4),(55% gravel/35% sand/10% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size= 80mm.	Drill rate quick up to 7 ft bgs zone where drill rig encountered a granite boulder. Moved rig approximately 2.0 feet due south and encountered granite boulder at 8.5 feet bgs. Borehole integrity was sound. Backfilled borehole with hydrated medium bentonite chips.
5					
				Total Depth at 9 ft below ground surface 8.5 feet bgs: granite boulder encountered, refusal at 9.0 feet bgs.	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-17 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100456.0 N, 7614782.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:23:00 AM 9/21/2008 END : 10:07:00 AM 9/21/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (50% gravel/15% sand/35% fines), poorly graded, subangular, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size=50 mm.	Drill rate slow at approx 1.5 bgs, otherwise quick. Borehole integrity was sound. Borehole backfilled with hydrated medium bentonite chips.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-WP-3a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100623.2 N, 7614784.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 10:50:00 AM 10/14/2008 END : 11:15:00 AM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size = 50 mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: SWMU1-WPt-3a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100548.3 N, 7614781.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 8:15:00 AM 10/5/2008 END : 8:45:00 AM 10/5/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): greyish brown (2.5Y 5/2), (30% gravel/10% sand/60% fines), poorly graded, subangular to subrounded, no dominant miineralogy, loose density 0-1 ft bgs, medium density 1- 5 ft bgs, loose density 5-14 ft bgs, matrix-supported, dry, max clast size= 50 mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-WP-5a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100598.6 N, 7614784.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 10:53:00 AM 10/5/2008 END : 11:22:00 AM 10/5/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): greyish brown (2.5Y 5/2), (30% gravel/10% sand/60% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density 0-1 ft bgs, medium density 1- 5 ft bgs, loose density 5-14 ft bgs, matrix-supported, dry, max clast size 50mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-WP-6a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100575.6 N, 7614783.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4" core barrel

WATER LEVELS : N/A START : 9:20:00 AM 10/5/2008 END : 10:20:00 AM 10/5/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): greyish brown (2.5Y 5/2), (30% gravel/10% sand/60% fines), poorly graded, subangular to subrounded, no dominant miineralogy, loose density 0-1 ft bgs, medium density 1- 5 ft bgs, loose density 5-14 ft bgs, matrix-supported, dry, max clast size =50mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	SWMU1-WP-09 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2100545.9 N, 7614753.1 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : ,

WATER LEVELS : N/A   START : 1:30:00 PM 9/21/2008   END : 2:20:00 PM 9/21/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM): with sand: yellowish brown (10YR 5/4),(50% gravel/25% sand/25% fines), poorly graded, angular to subangular, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size=50mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		14.0			
10					
				Total Depth at 14 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-BCW-01 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2103160.4 N, 7614783.6 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A   START : 3:40:00 PM 9/20/2008   END : 5:00:00 PM 9/20/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML) with sand: yellowish brown (10YR 5/4), (25% gravel/20% sand/55% fines), poorly graded, subrounded, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 20mm.	Drill rate quick in ML zone; met refusal at 5.5 bgs at original location. Relocated approx 2 feet due west and met refusal at 5.5 bgs. Recovered core from 5.5' bgs yielded solid granite core.
		5.5			
5				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4). (65% gravel/10% sand/25% fines), poorly graded, subrounded to rounded, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size = boulder.	
				Boring terminated at 5.5 feet bgs due to presence of granite boulder at 5.0 feet bgs. Total Depth at 5.5 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-BCW-02 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103958.3 N, 7614565.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 10:17:00 AM 10/4/2008 END : 10:37:00 AM 10/4/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10		10.0		POORLY GRADED SAND (SP) with gravel: yellowish brown (10YR 5/4), (25% gravel/70% sand/5% fines), subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, fining-upwards, dry 0-9 ft bgs, moist 9-10 ft bgs, max clast size=30 mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
10–15				Total Depth at 10 ft below ground surface	

5

10

15

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-BCW-03 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2104023.1 N, 7614559.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 11:09:00 AM 10/4/2008 END : 11:23:00 AM 10/4/2009 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				POORLY GRADED SAND (SP) with gravel: yellowish brown (10YR 5/4), (25% gravel/70% sand/5% fines), subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, fining-upwards, dry 0-9 ft bgs, moist 9-10 ft bgs, max clast size=30 mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	**AOC1-BCW-04** SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103860.8 N, 7614623.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 8:40:00 AM 10/4/2008 END : 9:00:00 AM 10/4/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0–10			POORLY GRADED SAND (SP) with gravel: yellowish brown (10YR 5/4), (25% gravel/70% sand/5% fines), subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, fining-upwards, dry 0-9 ft bgs, moist 9-10 ft bgs, max clast size=30 mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-BCW-05 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2103912.3 N, 7614606.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 9:20:00 AM 10/4/2008 END : 9:40:00 AM 10/4/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10		10.0		POORLY GRADED SAND (SP) with gravel: yellowish brown (10YR 5/4), (25% gravel/70% sand/5% fines), subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, fining-upwards, dry 0-9 ft bgs, moist 9-10 ft bgs, max clast size=30 mm.	Drill rate quick, constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-BCW-06 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2104445.4 N, 7615013.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT : hand auger, hand tools

WATER LEVELS : 1.8 ft bgs START : 2:00:00 PM 8/22/2008 END : 2:46:00 PM 8/22/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY SAND (SM): brown, (10YR 4/3), (0% gravel/80% sand/20% fines), poorly graded, medium density, finely laminated, moist, presence of plant roots.	
		4.2	X	SILTY SAND (SM): very dark gray, (10YR 3/1), (0% gravel/80% sand/20% fines), poorly graded, very loosely consolidated, no structure, saturated (underwater), presence of plant roots, soil is stained black with organics.	
				POORLY GRADED SAND (SP-SM) with silt and gravel: brown (10YR 4/3), (30% gravel, 60% sand, 10% fines), poorly graded, rounded to subrounded, no dominant mineralogy, loosely consolidated, no structure, saturated, max clast size =50 mm.	
				4.2 feet below ground surface: COBBLES, max clast size =190 mm, rounded to well-rounded.	
5					
				Total Depth at 4.2 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T1a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100989.8 N, 7614836.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 10:13:00 AM 10/16/2008 END : 10:47:00 AM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10	0–10	10.0	X (0–0.5), X (2–3), X (5–6), X (9–10)	SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4) (40% gravel /40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T1b SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100966.9 N, 7614885.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 10/16/2008 END : 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4) (40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
					Boulder encountered at 8.5 ft. bgs.
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T1c SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100944.8 N, 7614934.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 9:48:00 AM 10/16/2008 END : 9:58:00 AM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10		10.0		SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T2a	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101093.5 N, 7614885.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 11:08:00 AM 10/16/2008 END : 11:22:00 AM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T2b SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101106.8 N, 7614919.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 1:07:00 PM 10/16/2008 END : 1:20:00 PM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T2c SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101119.9 N, 7614969.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 11:16:00 AM 10/8/2008 END : 11:32:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10		10.0		SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/30% sand/30% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T2d SHEET 1 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs START : 1:05:00 PM 10/7/2008 END : 9:50:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	POORLY GRADED SAND (SP-SM) with silt: yellowish brown (10YR 5/4), (10% gravel/80% sand/10% fines), poorly graded, subangular to subrounded, no dominant mineralogy, predominantly fine-to-medium grained sand, loose density, matrix-supported, dry, max clast size=40 mm.	Drill rate steady. Borehole integrity sound. Backfilled with slurry grout. Objective is to reach groundwater.
5		
10		
15		

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T2d SHEET 2 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs START : 1:05:00 PM 10/7/2008 END : 9:50:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	16.0-25.0 feet bgs: color change to brown (7.5YR 5/3).	
20		
25	25.0-60.0 feet bgs: color change to yellowish brown (10YR 5/4).	
30		

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs START : 1:05:00 PM 10/7/2008 END : 9:50:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
35					
		75.0			
			X		
40					
45					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T2d	SHEET 4 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs START : 1:05:00 PM 10/7/2008 END : 9:50:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
50					Drilling stopped 10/7/08 at 16:10. Drilling resumed 10/8/08 at 07:40.
55					
60					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T2d SHEET 5 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs START : 1:05:00 PM 10/7/2008 END : 9:50:00 AM 10/8/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	60.0-70.0 feet bgs: color change to brown (7.5YR 5/2).	
65		
70	SANDY SILT (ML): brown (7.5YR 5/2), (10% gravel/25% sand/65% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose to medium density, matrix-supported, saturated/moist, max clast size=10 mm. 72.0 feet bgs: groundwater encountered.	
75		

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T2d	SHEET 6 OF 6

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101069.3 N, 7614920.3 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : 72 ft bgs   START : 1:05:00 PM 10/7/2008   END : 9:50:00 AM 10/8/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				Total Depth at 75 ft below ground surface	
80					
85					
90					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T2e	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101201.7 N, 7614932.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 1:45:00 PM 10/16/2008 END : 2:00:00 PM 10/16/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T3a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101328.9 N, 7614894.6 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A   START : 8:49:00 AM 10/17/2008   END : 9:00:00 AM 10/17/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10	0–10	10.0		SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
10–15				Total Depth at 10 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T3b-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101331.3 N, 7614924.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:00:00 AM 10/5/2008 END : 12:30:00 PM 10/5/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.5		GRAVELLY SILT with sand (ML) pale brown (7.5YR 6/3), dry, no odor, poorly sorted (30% gravel/20% sand/50% fines) max diameter=6 cm, angular to subangular, metamorphic.	Refusal at 10 ft. bgs. Will direct sonic rig to drill this location to collect entire sample set. Backfilled with hydrated bentonite chips.
		2.0			
5		1.8			
		1.8			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T3b-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101331.3 N, 7614924.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/4 core barrel

WATER LEVELS : N/A START : 7:56:00 AM 10/17/2008 END : 8:26:00 AM 10/17/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4)(40% gravel/40% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=40mm.	Drill rate constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T3c	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101338.1 N, 7614947.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 9:00:00 AM 10/5/2008 END : 10:55:00 AM 10/5/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT with gravel (ML): pale brown (7.5YR 6/3), dry, no odor, poorly sorted (15% gravel/30% sand/55% fines) max diameter =5cm, angular to subangular, metamorphic.	
		2.3			
				2.0-10.0 feet bgs: very gravelly and abundant cobbles.	Very difficult drilling from 2 to 10 ft bgs. Drilled 10 borings in attempt to collect sufficient soil volume for sample jars. Only advanced one boring to 10 ft bgs. Not enough soil volume for complete sample set. Backfilled with hydrated bentonite chips.
		2.0			
5					
		2.0			
		1.3			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T4a	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101472.0 N, 7614838.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 2:50:00 PM 10/3/2008 END : 4:10:00 PM 10/3/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.5		SANDY SILT(ML): light brown (7.5YR 6/4), dry, no odor,(5% gravel/40% sand/55% fines) max diameter =6 cm, angular to subangular, metamorphic.	Hand auger to 1 ft before refusal. Drilled two borings to collect sufficient soil volume to fill sample jars. Borings drilled approximately 1.5 ft apart. Had two other attempts that had refusal at 2 ft and 3 ft bgs. Backfilled with hydrated bentonite chips.
		2.0		4.0-7.0 feet bgs: becomes more coarse (15% gravel/30% sand/55% fines)	
5		2.5		7.0-8.0 feet bgs: more fine interval (5% gravel/30%sand/65% fines)	
		2.0		8.5-10.0 feet bgs: more coarse interval (10% gravel/30%sand/60% fines)	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T4b	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101478.3 N, 7614863.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:35:00 PM 10/2/2008 END : 3:00:00 PM 10/2/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.5		SANDY SILT (ML): light brown (7.5YR 6/4), dry, no odor,(10% gravel/30% sand/60% fines) max diameter =6 cm, angular to subangular, metamorphic.	Surface scattered with large boulders and cobble. Drilled 3 borings approx 1 ft apart each in order to collect sufficient soil volume for sample jars. Backfilled with hydrated bentonite chips.
		2.3		4.0 feet bgs: large rock encountered.	
5		2.5		5.5 feet bgs: soil becomes moist.	
				7.0 feet bgs: large rock encountered	
		2.3			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T4c	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101483.2 N, 7614878.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:45:00 AM 10/4/2008 END : 10:00:00 AM 10/4/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.5		SANDY SILT with gravel (ML): light brown (7.5YR 6/4), dry, no odor, poorly sorted, (15% gravel/30% sand/55% fines), angular to subangular, metamorphic.	Drilled two borings approximately 2 ft apart to collect sufficient soil volume for sample jars. Location was moved approximately 30 ft north to move out of area of abandoned underground natural gas pipeline. Boring backfilled with bentonite chips and hydrated.
		2.5			
5		1.5			
		2.5			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T5a	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101569.0 N, 7614855.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 12:45:00 PM 10/4/2008 END : 2:20:00 PM 2:20:00 PM LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0–2.5	2.5		GRAVELLY SILT with sand (ML) light brown (7.5YR 6/4), dry, no odor, poorly sorted (20% gravel/15% sand/65% fines) max diameter=12 cm, angular to subangular, metamorphic.	Drilled three borings approximately 1.5 ft. apart in order to collect sufficient soil volume for sample jars. Backfilled with bentonite chips and hydrated.
	2.5–5	2.5		SANDY SILT (ML): light brown (7.5YR 6/4), dry, no odor, poorly sorted, (10% gravel/30% sand/60% fines), max diameter = 5cm, angular to subangular, metamorphic.	
5	5–7.5	2.3			
	7.5–10	2.5			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T5b	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101614.0 N, 7614843.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 10:20:00 AM 10/4/2008 END : 11:30:00 AM 10/4/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.3		SANDY SILT (ML): light brown (7.5 YR 6/4), dry, no odor, poorly sorted (5% gravel/40% sand/55% fines), angular to subangular, metamorphic.	Drilled two borings approximately 2 ft apart to collect sufficient soil volume for sample jars. Boring backfilled with bentonite chips and hydrated.
		2.0		SANDY SILT with gravel (ML): light brown (7.5YR 6/4), dry, no odor, poorly sorted (15% gravel/30% sand/55% fines), max diameter = 7 cm, angular to subangular, metamorphic.	
5		2.0		6.0 feet bgs: encountered large rock.	
		2.5			
10				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T5c SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101602.9 N, 7614887.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 2:25:00 PM 10/4/2008 END : 3:30:00 PM 10/4/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.5		SANDY SILT (ML): light brown (7.5YR 6/4), dry, loose, no odor, poorly sorted (10% gravel/40% sand/50% fines), max diameter =7cm, angular to subangular, metamorphic.	Drilled two borings approximately 1.5 ft apart to collect sufficient soil sample. Boring backfilled with bentonite chips and hydrated.
5		2.5			
		2.5			
10		2.3			
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T6a SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102015.8 N, 7614878.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 10:30:00 AM 9/30/2008 END : 11:05:00 AM 9/30/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT (ML)- light brown surface layer	
				GRAVELLY SILT (ML) with sand: light brown, coarse fraction contains angular and rounded gravel to cobbles, poorly sorted, sidewalls remain in place, moisture increases with depth, many noticeable layers of poorly sorted gravel and cobbles, no distinct color changes, no odor.	Galvanized guy wire at 0.5 ft bgs. Tree roots at 0.0 - 1.5 ft bgs. Boring backfilled.
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC1-T6b SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102012.6 N, 7614899.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 10:45:00 AM 9/30/2008 END : 9/30/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SAND (ML) and silt: gravel light to dark grey, angular, fine fraction light brown, coarse fraction poorly graded, many layers with lenses of cobbles, competent sidewall, roots in top 1.5 ft.	Boring backfilled.
				GRAVELLY SANDY SILT (ML): coarse fraction poorly graded with cobbles and boulders.	
5		10.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC1-T6c SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2102008.9 N, 7614914.3 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A   START : 10:30:00 AM 9/30/2008   END : 3:35:00 PM 9/30/2008   LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT: crusty, with wind ripples visible on surface.	
				GRAVELLY SILT (ML) with sand: light brown, coarse fraction poorly sorted, cobbles, angular and rounded, very loose soil.	Boring backfilled.
		6.0			
5					
				6.0 feet bgs: large rock or hard pan, excavator refusal.	
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100224.5 N, 7614727.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4" core barrel

WATER LEVELS : N/A START : 8:20:00 AM 10/14/2008 END : 8:40:00 AM 10/14/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =80mm.	Drill rate constant. Borehole integrity sound. Backfilled with native.
5				Total Depth at 3 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100161.9 N, 7614860.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 8:20:00 AM 8/24/2008 END : 8:39:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.2		SILTY SAND (SM): yellowish brown (10YR 5/6), (0% gravel/80% sand/20% fines), poorly graded, subrounded to subangular, predominantly quartz, loosely consolidated, no structure, dry.	
				POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/6), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loosely consolidated, clast-supported, dry, max clast size=40mm. 1.2 ft bgs: gravel encountered, refusal.	
				Total Depth at 1.2 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100146.6 N, 7614860.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 8:30:00 AM 8/24/2008 END : 8:45:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: very dark greyish brown (10YR 3/2), (80% gravel/10% sand/10% fines), very well sorted/medium grained sand with no fines), but poorly graded(almost entirely gravel). Angular to subangular, no dominant mineralogy but notable lack of quartz sand, loosely consolidated, clast-supported, dry, max clast size=60mm. 0.5 ft. bgs: encountered bedrock, refusal. Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-5	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100134.8 N, 7614932.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 8:50:00 AM 8/24/2008 END : 9:30:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.5		POORLY GRADED GRAVEL (GP-GM) with silt: dark greyish brown (10YR 4/2), (80% gravel/10% sand/10% fines), angular, no dominant mineralogy, medium density, clast-supported, dry, max clast size=40mm.	
				1.5 ft. bgs: gravel, refusal. Total Depth at 1.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100152.5 N, 7614943.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 9:35:00 AM 8/24/2008 END : 10:25:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.2		SILTY SAND (SM): yellowish brown (10YR 5/3), (5% gravel/70% sand/25% fines), well-graded, subangular to subrounded, predominantly quartz, loosely consolidated, no structure, dry, max clast size= 40 mm	
				POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), subangular to angular, no dominant mineralogy, medium density, clast-supported, dry, max clast size=70mm	
				1.2 ft. bgs: gravel refusal.	
				Total Depth at 1.2 ft below ground surface	
5					
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100103.5 N, 7614968.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 10:10:00 AM 8/24/2008 END : 10:15:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100099.5 N, 7615002.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 11:10:00 AM 8/24/2008 END : 11:15:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100072.7 N, 7614998.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 11:10:00 AM 8/24/2008 END : 11:15:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-11 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100036.2 N, 7615016.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 1:10:00 PM 8/24/2008 END : 1:15:00 PM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM): yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-12	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100006.7 N, 7615021.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 1:05:00 PM 8/24/2008 END : 12:55:00 AM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-13 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2099979.6 N, 7615042.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 1:00:00 PM 8/24/2008 END : 1:10:00 PM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-14 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2099966.3 N, 7615137.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 12:55:00 PM 8/24/2008 END : 1:10:00 PM 8/24/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		POORLY GRADED GRAVEL (GP-GM) with silt: yellowish brown (10YR 5/3), (80% gravel/10% sand/10% fines), angular to subangular, no dominant mineralogy, loose to medium density, clast-supported, dry, max clast size=40mm.	
				0.5 ft. bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC4-15 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100015.5 N, 7615135.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 12:10:00 PM 9/19/2008 END : 1:00:00 PM 9/19/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM) with debris: light brown, includes glass, plastic, ammunition shells, fill material, low moisture, no odor	
		3.0		SILT (ML): light brown, compacted with lenses of lighter silty material	
5				Total Depth at 3 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC4-15-ss SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (N, E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand tools,

WATER LEVELS : N/A START : 1:10:00 PM 9/19/2008 END : 1:20:00 PM 9/19/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		0.5		SILT (ML): light brown, reddish brown, yellow brown surface stained, dry crusty debris (glass, plastic, hose, wood), no odor, low moisture.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC9-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100374.8 N, 7615472.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 10:10:00 AM 10/1/2008 END : 10:40:00 AM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	GRAVELLY SILT (ML) with sand: light brown, loose consistency, dry, no odor, coarse fraction rounded and angular.	Pothole terminated at 3 ft and backfilled.
		3.0			
			X	WELL-GRADED SAND (SW) with gravel: light brown sand: well-graded, gravel with 90% angular, 10% rounded, few cobbles.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100366.7 N, 7615484.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 2:10:00 PM 10/1/2008 END : 2:25:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY SAND (SM) with gravel: light brown, poorly graded, dry, no odor. Surface is crusty cemented sand/gravel layer, easily disrupted, 15% gravel.	Excavation terminated at 3 ft. Pothole backfilled.
				SILTY SAND (SM) with gravel: light brown, poorly graded, dry, no odor, 5% gravel.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100353.7 N, 7615484.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 1:45:00 PM 9/18/2008 END : 2:00:00 PM 9/18/2009 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY SAND (SM) with gravel: light brown, poorly graded, dry, no odor, loose consistency, 15% gravel.	PG&E concerned about location of buried storm water pipe- pothole moved slightly to miss drain. Excavation terminated at 3 ft. Pothole backfilled.
		3.0	X	SILTY SAND (SM) with gravel: light brown, poorly graded, loose consistency, 5% gravel.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC

BORING NUMBER: AOC9-4

SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station

LOCATION : (2100354.9 N, 7615501.2 E)

ELEVATION : ft. ()

DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A

START : 3:30:00 PM 9/18/2008

END : 3:45:00 PM 9/18/2008

LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–3		3.0		SANDY SILT (ML) with gravel to cobbles: light brown, rounded and angular, matted organic material on surface with roots extending to approx 18".	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-5 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100337.9 N, 7615454.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 2:20:00 PM 10/1/2008 END : 2:40:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY SAND (SM) with gravel and cobbles: light brown, poorly graded, concrete debris at surface and throughout pothole.	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100338.3 N, 7615478.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 4:10:00 PM 9/18/2008 END : 4:30:00 PM 9/18/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SANDY SILT (ML) with gravel and cobbles: light brown,top 18" cemented, easily disrupted, dry, no odor.	Pothole terminated at 3 ft and backfilled.
		3.0			
			X	POORLY-GRADED SAND (SP): light brown, poorly graded, rounded and angular.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC9-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100341.6 N, 7615499.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 1:00:00 PM 9/18/2008 END : 1:15:00 PM 9/18/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY SAND (SM) with gravel: light brown, poorly graded, dry, no odor, loose consistency.	Pothole terminated at 3 ft and backfilled.
		3.0			
			X	SILTY SAND (SM) with gravel: light brown, poorly graded, dry, no odor, loose consistency.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100360.1 N, 7615461.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 11:50:00 AM 10/1/2009 END : 12:30:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		6.0		SANDY SILT (ML) with gravel: light brown, cobbles and debris, coarse fraction angular and rounded, large chunks of concrete throughout pothole.	Pothole terminated at 6 ft and backfilled.
5					
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100353.7 N, 7615472.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 10:45:00 AM 10/1/2008 END : 11:30:00 AM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		6.0		GRAVELLY SILT (ML) with sand: light brown, concrete rubble.	Pothole terminated at 6 ft and backfilled.
5					
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC9-10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100328.7 N, 7615447.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 4:30:00 PM 10/1/2008 END : 4:41:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY SAND (SM) with gravel and cobbles: light brown, poorly graded, concrete debris.	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-11 SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100324.9 N, 7615464.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 4:40:00 PM 10/1/2008 END : 5:00:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SANDY SILT (ML) with gravel and cobbles: light brown,very loose, dry, angular, no odor.	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100308.9 N, 7615436.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 3:05:00 PM 10/1/2008 END : 3:51:00 PM 10/1/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SILTY SAND (ML): with gravel and cobbles: light brown, poorly graded, concrete debris throughout	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-13 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100304.5 N, 7615455.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 9:00:00 AM 9/19/2008 END : 9:10:00 AM 9/19/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		POORLY-GRADED SAND (SW) with gravel: light brown, poorly graded, vegetation roots from 0.0 to 2.5 ft. 20% gravel. Small pieces of wood and metal at 2.5 ft bgs.	Pothole terminated at 3 ft and backfilled.
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC9-14 SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (N, E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Long Reach Excavator

WATER LEVELS : N/A START : 8:35:00 AM 10/2/2008 END : 8:50:00 AM 10/2/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				Surface sample of white accreted gravelly material. One sample contained white fibrous gravel size piece.	Pothole terminated at 3 ft and backfilled.
		3.0		SILTY SAND (SM) with gravel: light brown, concrete rubble.	
				Total Depth at 3 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100649.0 N, 7615911.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : excavation, long reach excavator

WATER LEVELS : N/A START : 2:20:00 PM 10/2/2008 END : 3:15:00 PM 10/2/2008 LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel and cobbles: light brown, loose consistency, dry, no odor, no hard layer.	Pothole terminated at 10 ft bgs. Backfilled.
5					
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2100625.9 N, 7616007.0 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : excavation, long reach excavator

WATER LEVELS : N/A   START : 11:10:00 AM 10/2/2008   END : 12:05:00 PM 10/2/2008   LOGGER : T. Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML) with sand and cobbles: poorly sorted, coarse fraction grey, fine fraction light to medium brown. Coarse fraction angular to rounded.	Pothole terminated at 8 ft bgs- hardpan. Backfilled.
5					
				8.0 feet bgs: hard pan backfill encountered.	
10				Total Depth at 8 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100714.1 N, 7616222.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 9/19/2008 END : 9/19/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), poorly sorted, dry, no odor, (20% gravel/25% sand/55% fines), gravel max diameter=5cm. Angular to subangular metamorphic.	Drilled two borings to collect the required amount of soil from each sample depth interval.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100679.5 N, 7616288.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:30:00 AM 9/19/2008 END : 10:50:00 AM 9/19/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–2.5	SANDY SILT (ML): light brown (7.5YR 6/3)(10% gravel/30% sand/60% fines), poorly sorted, dry, no odor, gravel max diameter =5cm. Angular to subangular, metamorphic.	Completed two borings to collect enough soil sample. Second boring approximately 2 feet away from stake.
2.5–10 (5, 10)	SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), poorly sorted, dry, no odor, (20% gravel/25% sand/55% fines), gravel max diameter=5cm. Angular to subangular metamorphic.	
10–15 (15)	Total Depth at 10 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC10-5 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100967.0 N, 7616410.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:45:00 PM 9/19/2008 END : 3:00:00 PM 9/19/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), (5% gravel/20% sand/75% fines), max diameter gravel =4cm, angular to subangular, metamorphic, miocene conglomerate fragments.	
5					
				8.2 feet bgs: bedrock encountered.	
10				Total Depth at 8.2 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC10-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101013.3 N, 7616416.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 7:00:00 AM 9/20/2008 END : 8:10:00 AM 9/20/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), poorly to moderately sorted, dry, no odor (5% gravel/20% sand/75% fines), gravel max diameter is 4 cm, angular to subangular, metamorphic.	Drilled two borings to collect the required soil sample volume.
				3.0 feet bgs: encountered bedrock.	
5				Total Depth at 3 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100989.7 N, 7616503.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:15:00 AM 9/20/2008 END : 9:20:00 AM 9/20/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), poorly to moderately sorted, dry, no odor (5% gravel/20% sand/75% fines), gravel max diameter is 4 cm, angular to subangular, metamorphic.	Drilled two borings to collect required soil volume for samples.
5					
				8.0 feet bgs: bedrock encountered.	
10				Total Depth at 8 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101122.1 N, 7616635.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : N/A

DRILLING METHOD AND EQUIPMENT : Hand auger, Hand tools

WATER LEVELS : N/A START : 10:30:00 AM 8/22/2008 END : 11:02:00 AM 8/22/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/6), (50% gravel/25% sand/25% fines), well-graded, angular to subrounded, no dominant mineralogy, loosely consolidated, matrix-supported, dry, max clast size = 30 mm.	
				0.5 feet bgs: bedrock encountered.	
				Total Depth at 0.5 ft below ground surface	
5					
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10b-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100512.7 N, 7615850.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 10:30:00 AM 9/30/2008 END : 11:50:00 AM 9/30/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SILTY SAND (SM) with gravel: light brown, (7.5YR 6/3), loose, dry, no odor, (30% gravel/50% sand/20% fines), max diameter gravel=10cm, angular to subangular, metamorphic.	Hand auger to 1 ft before refusal. Drilled three borings approximately 1 foot apart. Required to collect sufficient soil volume for samples. Backfilled with bentonite pellets and hydrated.
5	At 4 ft bgs: becomes more fine grained (10% gravel/60% sand/30% fines).	
	SILTY SAND (SM) : light brown (7.5YR 6/3), loose, dry, no odor, (5% gravel/70% sand/25% fines), max gravel diameter =2cm, angular to subangular, metamorphic.	
10	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10b-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100520.3 N, 7615904.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:55:00 AM 9/30/2008 END : 12:55:00 PM 9/30/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0 – 6.5	SILTY SAND (SM) with gravel: light brown, (7.5YR 6/3), loose, dry, no odor, (25% gravel/60% sand/15% fines), max diameter gravel=8cm, angular to subangular, metamorphic.	Drilled two borings approximately one foot apart. Required to collect sufficient soil volume for samples. Backfilled with bentonite pellets and hydrated.
5		
6.5 – 10	SILTY SAND (SM): light brown (7.5YR 6/3), loose, dry, no odor, (5% gravel/70% sand/25% fines), max gravel diameter =2.5cm, angular to subangular, metamorphic.	
10		
	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC10b-3	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2100478.7 N, 7615986.1 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 2:00:00 PM 9/30/2008   END : 8:40:00 AM 10/1/2008   LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0	SILTY SAND (SM) with gravel: light brown (7.5YR 6/3), dry, loose, no odor, moderately well sorted (30% gravel/50% sand/20% fines), max diameter=5cm, angular to subangular, metamorphic.	Stopped drilling at 14:00 9/30/08 and resumed work at 0710 on 10/1/08. Hand auger to 1 ft before refusal. Drilled three borings approximately 1 to 1.5 ft apart. Required to collect sufficient soil volume for sample jars. Backfilled with bentonite pellets and hydrated.
5	At 5.5 ft bgs: increased gravel and silt content (30% gravel/45% sand/25% fines).	
10	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10b-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100545.1 N, 7615940.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:30:00 PM 9/30/2008 END : 3:20:00 PM 9/30/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM) with gravel: light brown (7.5YR 6/3), dry, loose, no odor, (15% gravel/70%sand/15% fines), max gravel diameter=7cm, angular to subangular, metamorphic.	Drilled two borings approximately one foot apart. Required to collect sufficient soil volume for samples. Backfilled with bentonite pellets and hydrated.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10c-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100554.0 N, 7616077.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:50:00 AM 10/1/2008 END : 9:55:00 AM 10/1/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), dry, no odor, (15% gravel/30% sand/55% fines), max gravel diameter =8cm, angular to subangular, metamorphic.	Drilled two borings approximately 1.5 feet. Required to collect sufficient soil volume for samples. Backfilled with bentonite pellets and hydrated.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10c-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100586.7 N, 7616088.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 7:20:00 AM 10/1/2008 END : 11:15:00 AM 10/1/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10	SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), dry, no odor, (15% gravel/30% sand/55% fines), max gravel diameter =9cm, angular to subangular, metamorphic.	Hand auger to 1 ft before refusal. Drilled three borings approximately 2 ft apart. Required so as to collect sufficient soil volume for samples. Backfilled with bentonite chips and hydrated.
5		
10	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10c-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100636.7 N, 7616126.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:30:00 AM 10/2/2008 END : 10:30:00 AM 10/2/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), dry, no odor, (10% gravel/40% sand/50% fines), max gravel diameter =5cm, angular to subangular, metamorphic.	Drilled three borings approximately 1.5 ft apart in order to collect sufficient soil volume. Backfilled with bentonite chips and hydrated.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC10c-4	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2100603.8 N, 7616145.6 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 1:15:00 PM 10/1/2008   END : 3:00:00 PM 10/1/2008   LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), dry, no odor, (15% gravel/30% sand/55% fines), max gravel diameter =10cm, angular to subangular, metamorphic.	Hand auger to 1 ft before refusal. Drilled two borings approximately 1 ft apart to collect sufficient soil volume. Backfilled with bentonite pellets and hydrated.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC10c-5 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100633.8 N, 7616083.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:05:00 PM 10/1/2008 END : 2:00:00 PM 10/1/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), dry, no odor, (10% gravel/30% sand/60% fines), max gravel diameter =7cm, angular to subangular, metamorphic.	Drilled two borings approximately 1 ft apart to collect sufficient soil volume. Backfilled with bentonite pellets and hydrated.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: **354948.FP.08.FW.SC**

BORING NUMBER: **AOC10d-1**

SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station

LOCATION : (2100715.3 N, 7616294.6 E)

ELEVATION : ft. ()

DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A

START : 3:40:00 PM 9/18/2008

END : 9/18/2008

LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML): light brown (7.5YR 6/3), poorly sorted, dry, no odor, (10% gravel/30% sand/60% fines), max diameter =6cm, angular to subangular, metamorphic.	Hand augered to 2 ft after collecting surface sample. Drilled 2 borings to collect sufficient soil volume.
5					
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10d-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100854.4 N, 7616314.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:10:00 AM 9/17/2008 END : 1:40:00 PM 9/17/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), poorly sorted, dry, no odor, (20% gravel/20% sand/60% fines), max gravel diameter =5cm, angular to subangular, metamorphic.	Drilled two holes to 10 feet within 1 foot of each other. Needed to collect enough soil for sampling.
5		
10	At 9.25 ft bgs: thin white lens, approximately 1/4 cm thick.	
	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER:	BORING NUMBER:	
354948.FP.08.FW.SC	AOC10d-3	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100868.0 N, 7616332.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 4:00:00 PM 9/18/2008 END : 9/18/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SANDY SILT (ML) with gravel: light brown (7.5YR 6/3), poorly sorted, dry, no odor, (15% gravel/20% sand/65% fines), max gravel diameter =4cm, angular to subangular, metamorphic.	Stopped drilling at 16:00 9/17/08 and resumed work at 10:00 on 9/18/08. Hand auger to 2 ft bgs. Drilled three locations to collect sufficient soil volume for sample jars, all within 2 feet of stake. Backfilled with bentonite pellets and hydrated.
5				At 5 ft bgs: gravel content varies between 10-20%. Gravel pulverized in spots due to drilling process. Causes whitish powder to be present.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC10d-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100873.6 N, 7616374.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing, Inc.

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:00:00 PM 9/18/2008 END : 2:45:00 PM 9/18/2008 LOGGER : R. Tweidt

DEPTH BELOW GROUND SURFACE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	SILT (ML): light brown (7.5YR 6/3), dry, no odor, minor fine sand (<5%). At 2 ft bgs: thin lens of white material (GLEY 8/10Y). At 3 ft bgs: appearance of fine gravel (<10%) max diameter =2 cm. Angular to subangular, metamorphic.	Hand auger to 2 ft bgs after collecting surface sample. Drilled two borings to collect sufficient soil for samples. Second boring located approximately one foot south of stake and original boring.
5	SILT (ML) with gravel: light brown (7.5YR 6/3), poorly to moderately sorted, dry, no odor, (5% gravel/20% sand/75% fines), max gravel diameter =4cm, angular to subangular, metamorphic. At 5.5 ft bgs: thin lens of white material (GLEY 8/10Y). At 7.5 ft bgs: increase in gravel content to approx 10-15%.	
10	Total Depth at 10 ft below ground surface	
15		

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11a-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101415.5 N, 7615940.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 7:05:00 AM 9/21/2008 END : 1:25:00 PM 9/21/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0-2.5	1.3	X	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Hand auger to 1 foot until refusal. Drilled two borings to collect sufficient soil volume for samples. Backfilled with bentonite chips and hydrated.
				SANDY SILT (ML) with gravel: light brown (7.5YR 6/4), dry, no odor, (20% gravel/20% sand/ 60% fines), max diameter gravel = 4 cm, angular to subangular, metamorphic.	
			X		
	2.5-5	1.8			
5	5-7.5	2.5	X		
	7.5-10	2.3		8 feet bgs: pieces of old asphalt present from approximately 8-8.25 ft.	
10			X		
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11a-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101399.0 N, 7616032.2 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 7:40:00 AM 9/21/2008   END : 9/21/2008   LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Hand auger to 1.5 ft before refusal. Drilled two borings. Boring terminated at 10 ft bgs.
		1.8		SANDY SILT (ML) with gravel: light brown (7.5YR 6/4), dry, no odor, (15% gravel/25% sand/ 60% fines), max diameter gravel = 4 cm, angular to subangular, metamorphic.	
		2.5			
5					
		2.3			
		2.5			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11a-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101425.1 N, 7615995.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 2:30:00 PM 9/20/2008 END : 4:15:00 PM 9/20/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.5		SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Hand auger to 1.5 ft. Boring terminated at 10 feet.
				SANDY SILT (ML): light brown (7.5YR 6/4), dry, no odor, (10% gravel/30% sand/60% fines), gravel max diameter 5 cm, angular to subangular, metamorphic.	
		2.5			
5		2.3			
		2.5			
10					
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11a-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101426.1 N, 7616048.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:00:00 PM 9/20/2008 END : 2:20:00 PM 9/20/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0–2.5	1.3	X	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Drilled two borings to collect sufficient soil sample volume. Boring terminated at 10 feet.
			X	SANDY SILT (ML) with gravel: light brown (7.5YR 6/4), dry, no odor, (15% gravel/ 25% sand/ 60% fines), gravel max diameter=4 cm, angular to subangular, metamorphic.	
	2.5–5	2.3			
5	5–7.5	2.5	X		
	7.5–10	2.3	X		
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11a-5	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101378.2 N, 7616022.2 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 9/21/2008   END : 9:50:00 AM 9/21/2008   LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0–2.5	1.5	X	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel. SANDY SILT (ML) with gravel: light brown (7.5YR 6/4), dry, no odor, (15% gravel/ 25% sand/ 60% fines), gravel max diameter=5 cm, angular to subangular, metamorphic.	Drilled two borings one foot apart to collect sufficient volume of soil. Boring terminated at 10 feet.
	2.5–5	2.3	X		
5	5–7.5	2.5	X		
	7.5–10	2.5	X		
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11a-ss1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101483.0 N, 7615916.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 1:40:00 PM 9/21/2008 END : 3:10:00 PM 9/21/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	
		1.0		GRAVELLY SILT with sand (ML): light brown (7.5YR 6/4), dry, no odor, (25% gravel/20% sand/55% fines), gravel max diameter=4 cm, angular to subangular, metamorphic.	Drilled two borings to collect sufficient soil volume for samples. Two borings are approximately one foot apart. Boring terminated at 10 ft bgs. Backfilled with bentonite chips and hydrated.
		1.8			
5					
		2.0			
		2.0			
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11a-ss2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101576.0 N, 7615873.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 3:20:00 PM 9/21/2008 END : 3:40:00 PM 9/21/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.5		GRAVELLY SILT with sand (ML): light brown (7.5YR 6/4), dry, no odor, gravel max diameter=9 cm, angular to subangular, predominantly metamorphic with some sedimentary.	Location located within a narrow wash. Bottom of wash is three feet deep. The surface sample was collected in sidewall of wash. Collected 3 ft sample from several inches below bottom of ravine floor. Refusal at 3.5 ft.
				3.5 feet bgs: refusal.	
5				Total Depth at 3.5 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11a-ss3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101382.1 N, 7616115.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:00:00 AM 9/20/2008 END : 12:20:00 PM 9/20/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0-2.5	1.8	0-0.5	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel. SANDY SILT (ML): light brown (7.5YR 6/4), dry, no odor, (10% gravel/ 20% sand/ 70% fines), gravel max diameter=3 cm, angular to very angular, metamorphic.	Hand auger to 1 ft before refusal. Drilled two borings to collect sufficient soil sample volume. Boring terminated at 10 ft bgs.
			2-3		
5	2.5-5	2.3			
	5-7.5	2.5	5-6		
10	7.5-10	2.5	9-10		
15				Total Depth at 10 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11b-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101349.9 N, 7616265.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 1:00:00 PM 9/17/2008 END : 2:45:00 PM 9/17/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML) with sand: light brown, well-graded, dry, no odor, approximately 50% fines, non-fines are rounded and angular gravel to cobble.	Debris removed from 3-6 ft containing metal signs, ceramic plates and glass resistors. Lightning terminated location before photograph could be taken. Excavation terminated at 10 ft bgs. Pothole filled.
5		10.0			
10				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11b-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101318.4 N, 7616304.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 8:30:00 AM 9/17/2008 END : 11:45:00 AM 9/17/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
0–10		10.0		GRAVELLY SILT (ML) with sand: light brown, well-graded, dry, no odor, approximately 50% fines, non-fines are rounded, angular, gravel to cobble.	Split sampling of cemented material with black and red specks requested. Excavation terminated at 10 ft bgs, pothole backfilled
10–15				Total Depth at 10 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11c-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101278.0 N, 7615864.5 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 3:50:00 PM 9/21/2008   END : 2:05:00 PM 9/22/2008   LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.0		SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Stopped work for the day on 9/21/08 at 3:50 pm and resumed on 9/22/08. Drilled three borings to collect sufficient soil volume. Borings are approximately within a 2- foot radius. Boring terminated at 10 ft bgs. Backfilled with bentonite chips and hydrated.
		2.0		GRAVELLY SILT (ML) with sand: light brown, (7.5YR 6/4), dry, no odor, (20% gravel/15% sand/65% fines), max diameter size = 4 cm, angular to subangular, metamorphic.	
5		1.5			
		2.5			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11c-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101258.0 N, 7615857.4 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A   START : 3:40:00 PM 9/21/2008   END : 10:05:00 AM 9/22/2008   LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0-2.5	2.0	X	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Stopped work on 9/21 and resumed on 9/22/08 after surface sampling. Drilled two borings to collect sufficient soil volume for samples. Borings are approximately 1 foot apart. Boring terminated at 10 ft bgs and backfilled with bentonite chips.
	2.5-5	1.5	X		
5	5-7.5	1.5	X		
	7.5-10	1.8	X	GRAVELLY SILT (ML) with sand: light brown, (7.5YR 6/4), dry, no odor, (25% gravel/20% sand/55% fines), max diameter size = 3.5 cm, angular to subangular, metamorphic.	
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11c-ss1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101242.5 N, 7615783.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 4:20:00 PM 9/21/2008 END : 3:30:00 PM 9/22/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	0–2.5	1.3	0–0.5	SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	
				SANDY SILT (ML): light brown, (7.5YR 6/4), dry, no odor, (10% gravel/20% sand/70% fines), max gravel diameter size = 4 cm, angular to subangular, metamorphic.	Collected surface sample on 9/21/08 and resumed drilling on 9/22/08. Drilled two borings to collect sufficient soil volume. Borings are approximately 2 ft apart. Boring terminated at 10 ft bgs, backfilled with bentonite chips and hydrated.
	2.5–5	1.8	2–3		
5	5–7.5	2.3	5–6		
10	7.5–10	2.5	9–10		
15				Total Depth at 10 ft below ground surface	

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11c-ss2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101242.5 N, 7615790.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 9:50:00 AM 9/22/2008 END : 11:40:00 AM 9/22/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		1.5		SILT (ML): light brown (7.5YR 6/4), dry, no odor, minor sand and gravel.	Hand augered to three feet. Drilled two borings to collect sufficient soil volume. Borings are approximately 1.5 ft apart. Boring terminated at 10 ft bgs. Backfilled with bentonite chips and hydrated.
		2.0		GRAVELLY SILT (ML) with sand: light brown, (7.5YR 6/4), dry, no odor, (30% gravel/20% sand/50% fines), max gravel diameter size = 4 cm, angular to subangular, metamorphic.	
5		1.8		CLAY (CL) with silt: brown, (7.5YR 5/4), soft, moist to very moist, no odor.	
				SANDY SILT (ML) with gravel: light brown, (7.5YR 5/4),moist, no odor, (25% gravel/25% sand/50% fines), max gravel diameter size = 4 cm, angular to subangular, metamorphic.	
		2.0			
10				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11d-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101119.4 N, 7615798.7 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 11:00:00 AM 9/23/2008 END : 11:55:00 AM 9/23/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILT (ML): light brown, dry, crusty, no odor	Pothole terminated at 10 ft and backfilled.
			X	SANDY SILT (ML) with gravel: light brown, angular and rounded gravel to cobbles.	
5		10.0			
			X		
				8 feet bgs: gravel.	
			X		
10				Hard pan.	
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11e-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101127.3 N, 7615559.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 2:22:00 PM 9/23/2008 END : 5:30:00 PM 9/23/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): light brown with crust, very few gravel.	Pothole terminated at 10 ft and backfilled.
				SANDY SILT (ML) with gravel: angular and rounded gravel to cobbles. Reddish layer on sidewall at 2.5 ft.	
5		10.0			
				Hard layer with large angular slab-like cobbles to boulders.	
10					
				Total Depth at 10 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11e-2	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101125.0 N, 7615580.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 8:30:00 AM 9/24/2008 END : 9:30:00 AM 9/24/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY SAND (SM) and vegetation from 0-10". Thin white layer at 12". Homogenous silty sand from 12" to 2.5 ft.	Pothole terminated at 10 ft and backfilled.
			X	2.5 to 4.0 feet bgs: light brown layers	
				4.0 to 4.5 feet bgs: layer of large cobbles	
5		10.0			
			X	5 to 10 feet bgs: large rocks and cobbles, moisture increasing with depth.	
			X		
10				10 feet bgs: very coarse sand, moist, cobbles and gravel.	
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC11e-ss1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101153.8 N, 7615538.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A START : 2:25:00 PM 9/23/2008 END : 5:00:00 PM 9/23/2008 LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILTY SAND (SM): light brown with crust, very little gravel.	Pothole terminated at 10 ft and backfilled.
			X	SANDY SILT (ML): native soil, angular and rounded gravel to cobbles.	
5		10.0			
			X	Hard layer: large piece of concrete at 6'. Sample collected just below concrete.	
10			X		
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC11e-ss2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101123.6 N, 7615532.9 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Turnkey Construction

DRILLING METHOD AND EQUIPMENT : Excavation, Excavator

WATER LEVELS : N/A   START : 2:20:00 PM 9/23/2008   END : 5:30:00 PM 9/23/2008   LOGGER : T.Frank

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM): very little gravel, loose consistency, dry.	Pothole terminated at 10 ft and backfilled.
				SANDY SILT (ML): native soil, angular and rounded gravel to cobbles.	
5		10.0			
				Hard pan from 7-10 ft.	
10					
				Total Depth at 10 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC14-1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101843.8 N, 7615079.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 11:56:00 AM 9/30/2008 END : 12:35:00 PM 9/30/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): yellowish brown (10YR 5/4), (30% gravel/10% sand/60% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =40mm.	Drill rate quick and constant, borehole structure was sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (50% gravel/10% sand/40% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-or matrix-supported, dry, max clast size=20mm.	
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-2	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2101850.0 N, 7615062.5 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A   START : 1:36:00 PM 9/30/2008   END : 2:02:00 PM 9/30/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): yellowish brown (10YR 5/4), (20% gravel/10% sand/70% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =100mm.	Drill rate quick and constant, borehole integrity sound. Backfilled with hydrated medium bentonite chips.
				2-3 ft bgs: white powder mixed with existing silt matrix	
				3-3.25 ft bgs: solid layer of white powder	
5					
		15.0			
10					
				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (50% gravel/10% sand/40% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-or matrix-supported, dry, max clast size=20mm.	
				Total Depth at 15 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101967.5 N, 7615011.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 7:05:00 AM 10/1/2008 END : 7:28:00 AM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (65% gravel/10% sand/25% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast-supported, dry, max clast size=40mm.	Drill rate quick and constant, borehole structure was sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:	
354948.FP.08.FW.SC	AOC14-4	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102008.8 N, 7615113.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 8:33:00 AM 10/1/2008 END : 9:11:00 AM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SILT (ML): yellowish brown (10YR 5/4), (5% gravel/5% sand/90% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =10mm.	Drill rate quick and constant, borehole integrity sound. Backfilled with hydrated medium bentonite chips.
			X	SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (40% gravel, 10% sand, 50% fines), poorly graded, subangular, no dominant mineralogy, loose density, no structure, dry, max clast size=20mm.	
				SILT (ML): yellowish brown (10YR 5/4), (5% gravel/5% sand/90% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size =10mm.	
5			X	SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (40% gravel, 10% sand, 50% fines), poorly graded, subangular, no dominant mineralogy, loose density, no structure, dry, max clast size=20mm.	
		15.0		SILT (ML): yellowish brown, (10YR 5/4), (5% gravel/5% sand/90% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=10mm.	
10			X		
				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (40% gravel, 10% sand, 50% fines), poorly graded, subangular, no dominant mineralogy, loose density, no structure, dry, max clast size=20mm.	
15			X	Total Depth at 15 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:	
354948.FP.08.FW.SC	AOC14-5	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station   LOCATION : (2102083.1 N, 7615100.7 E)

ELEVATION : ft. ()   DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A   START : 8:40:00 AM 10/2/2008   END : 9:15:00 AM 10/2/2008   LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM) with gravel: reddish brown (5YR 5/4), (25% gravel/55% sand/20% fines), poorly graded, angular to subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20mm.	Drill rate quick and constant, borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
				POORLY GRADED GRAVEL (GP-GM) with silt and sand: yellowish brown, (10YR5/4), (60% gravel/20% sand/10% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-supported, dry, max clast size= 30 mm.	
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-6	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102038.7 N, 7615140.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 12:20:00 PM 10/2/2008 END : 1:06:00 PM 10/2/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: reddish brown, (5YR5/4), 0-1 ft bgs, yellowish brown (10YR 5/4), 1-15 ft bgs: (60% gravel/25% sand/15% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-supported, dry, max clast size= 50 mm.	Drill rate quick and constant, borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC14-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102083.2 N, 7615244.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 7:25:00 AM 10/2/2008 END : 7:56:00 AM 10/2/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM) with gravel: reddish brown (5YR 5/4), (25% gravel/55% sand/20% fines), poorly graded, angular to subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20mm.	Drill rate quick and constant, borehole integrity sound. Difficulty recovering last five feet of sediment. Backfilled with hydrated medium bentonite chips.
5					
				POORLY GRADED GRAVEL (GP-GM) with silt and sand: yellowish brown, (10YR5/4), (60% gravel/20% sand/10% fines), poorly graded, subangular to subrounded, no dominant mineralogy, very loose density, clast-supported, dry, max clast size= 30 mm.	
		15.0			
10					
				Total Depth at 15 ft below ground surface	
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102036.7 N, 7615236.2 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 2:32:00 PM 10/2/2008 END : 3:05:00 PM 10/2/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			X	SANDY SILT (ML) with gravel and sand: reddish brown (5YR5/4), (20% gravel/20% sand/60% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size= 20mm.	Drill rate quick and constant. Borehole integrity sound. Recovery difficult in 13-15' bgs zone. Backfilled with hydrated medium bentonite chips.
			X		
				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (70% gravel/10% sand/20% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-supported, dry, max clast size =40mm.	
5			X		
		15.0			
10			X		
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel, 30% sand, 30% fines), poorly graded, subangular to subrounded, no dominant mineralogy, very loose density, matrix-supported, dry, max clast size=30mm.	
15			X	Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101941.5 N, 7615263.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 10:35:00 AM 10/1/2008 END : 11:12:00 AM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): yellowish brown (10YR 5/4), (40% gravel, 10% sand, 50% fines), poorly graded, subangular, no dominant mineralogy, loose density, no structure, dry, max clast size=30mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (60% gravel/10% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast-supported, dry, max clast size =40mm.	
		15.0		GRAVELLY SILT (ML): yellowish brown (10YR5/4), (20% gravel/10% sand/70% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size= 20mm.	
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101839.8 N, 7615271.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 12:50:00 PM 10/1/2008 END : 1:19:00 PM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): yellowish brown (10YR 5/4). (40% gravel/10% sand/50% fines), poorly graded, subangular, no dominant mineralogy, loose density, no structure, dry, max clast size=30mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-11 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101910.4 N, 7615174.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 12:04:00 AM 10/1/2008 END : 10:08:00 AM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel, 30% sand, 30% fines), poorly graded, subangular, no dominant mineralogy but primarily quartz, fine-grained sand, loose density, matrix-supported, dry, max clast size=30mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
				GRAVELLY SILT (ML): yellowish brown (10YR5/4), (20% gravel/10% sand/70% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size= 30mm.	
				Total Depth at 15 ft below ground surface	
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC14-12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101870.6 N, 7615042.9 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 2:21:00 PM 9/30/2008 END : 2:57:00 PM 9/30/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): reddish brown (5YR 5/4), (35% gravel/10% sand/55% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=40mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5			X		
		15.0		At 7.5 feet bgs: color change to yellowish brown (10YR 5/4).	
10			X		
15			X	Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-13	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101909.3 N, 7615068.4 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 3:25:00 PM 9/30/2008 END : 3:47:00 PM 9/30/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				GRAVELLY SILT (ML): yellowish brown (10YR 5/4), (30% gravel/5% sand/65% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20 mm. 0.5 -1.5 ft bgs: presence of asbestos fibers.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC14-ss1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101920.5 N, 7614987.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 7:43:00 AM 10/1/2008 END : 8:13:00 AM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM): yellowish brown (10YR 5/4), (80% gravel/0% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast-supported, dry, max clast size=40 mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0		GRAVELLY SILT (ML): yellowish brown (10 YR 5/4), (40% gravel/0% sand/60% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size= 20mm.	
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: AOC14-ss2	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2101995.9 N, 7615272.0 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 1:42:00 PM 10/1/2008 END : 2:10:00 PM 10/1/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown (10YR 5/4), (40% gravel/30% sand/30% fines), poorly graded, subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=40mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
				Total Depth at 15 ft below ground surface	
15					

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	AOC14-ss3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102033.1 N, 7615063.5 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 10:53:00 AM 10/2/2008 END : 11:51:00 AM 10/2/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY GRAVEL (GM) with sand: yellowish brown, (10YR 5/4), (60% gravel/25% sand/15% fines), poorly graded, subangular to subrounded, no dominant mineralogy, loose density, clast-supported, dry, max clast size=50mm	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5					
		15.0			
10					
15				Total Depth at 15 ft below ground surface	

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:	
354948.FP.08.FW.SC	AOC14-ss4	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2102037.4 N, 7614997.3 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Boart Longyear

DRILLING METHOD AND EQUIPMENT : Rotosonic, Spider w/ 4core barrel

WATER LEVELS : N/A START : 9:45:00 AM 10/2/2008 END : 10:18:00 AM 10/2/2008 LOGGER : A. Brewster

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
				SILTY SAND (SM) with gravel: yellowish brown (10YR 5/4), (25% gravel/55% sand/20% fines), poorly graded, angular to subangular, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=20mm.	Drill rate quick and constant. Borehole integrity sound. Backfilled with hydrated medium bentonite chips.
5				GRAVELLY SILT (ML) with sand: yellowish brown (10YR 5/4), (25% gravel/15% sand/60% fines), poorly graded, angular to subrounded, no dominant mineralogy, loose density, matrix-supported, dry, max clast size=30 mm.	
		15.0		SILTY GRAVEL (GM) with sand: yellowish brown, (10YR 5/4), (60% gravel/20% sand/20% fines), poorly graded, subangular, no dominant mineralogy, loose density, clast-supported, dry, max clast size=40mm	
10					
15				Total Depth at 15 ft below ground surface	

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	300B-2 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100969.7 N, 7616611.1 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:55:00 AM 10/3/2008 END : 12:40:00 PM 9/21/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.3		SANDY SILT (ML): brown (7.5YR 5/3), dry, no odor, poorly sorted (10% gravel/30% sand/ 60% fines), max gravel diameter =8cm, angular to subangular, metamorphic.	Hand auger to 1 ft before encountering refusal. Drilled two borings in unsuccessful effort to drill down to 6 ft bgs. Encountered drilling refusal at 5 ft bgs in first drilling attempt. Encountered drilling refusal at 3 ft refusal in second drilling attempt. Backfilled with bentonite chips and hydrated.
		1.8			
5				5.0 feet bgs: refusal	
				Total Depth at 5 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: 300B-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100961.1 N, 7616598.6 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 11:00:00 AM 10/3/2008 END : 11:50:00 AM 10/3/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		3.0		SANDY SILT (ML): brown (7.5YR 5/3), dry, no odor, poorly sorted (10% gravel/30% sand/ 60% fines), max gravel diameter =8cm, angular to subangular, metamorphic.	Hand auger to 1 ft before refusal. Drilled three borings approximately 1 ft apart to collect sufficient soil volume. Boring terminated at 6 ft bgs. Backfilled with bentonite chips and hydrated.
5		2.7			
				Total Depth at 6 ft below ground surface	
10					
15					

PROJECT NUMBER:	BORING NUMBER:
354948.FP.08.FW.SC	300B-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100958.4 N, 7616609.8 E)

ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 9:40:00 AM 10/3/2008 END : 10:55:00 AM 10/3/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.3		SANDY SILT (ML): brown (7.5YR 5/3), dry, no odor, poorly sorted (10% gravel/30% sand/ 60% fines), max gravel diameter =6cm, angular to subangular, metamorphic.	Hand auger to .5 ft before refusal. Hit refusal in first boring at 4.5 bgs. Hit refusal in 2nd boring at 5 ft bgs. Hit refusal at 2.5 ft in 3rd boring. Drilled three borings in attempt to get to 6 ft bgs.
		1.5			
5				5.0 feet bgs: refusal	
				Total Depth at 5 ft below ground surface	
10					
15					

PROJECT NUMBER: 354948.FP.08.FW.SC	BORING NUMBER: 300B-5	SHEET 1 OF 1

SOIL BORING LOG

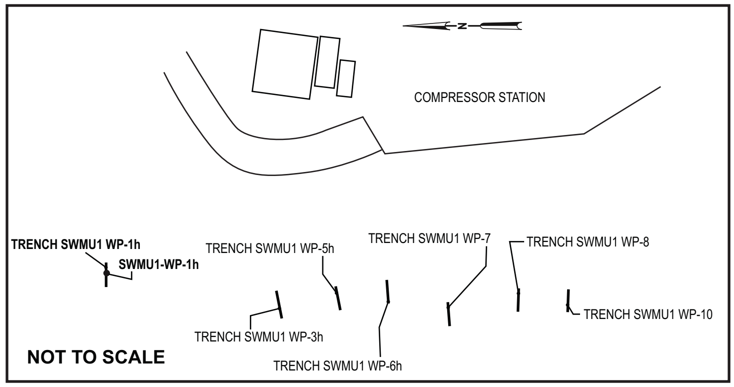
PROJECT : TOPOCK - SOIL PART A, PHASE 1, PG&E Compressor Station LOCATION : (2100969.7 N, 7616620.9 E)

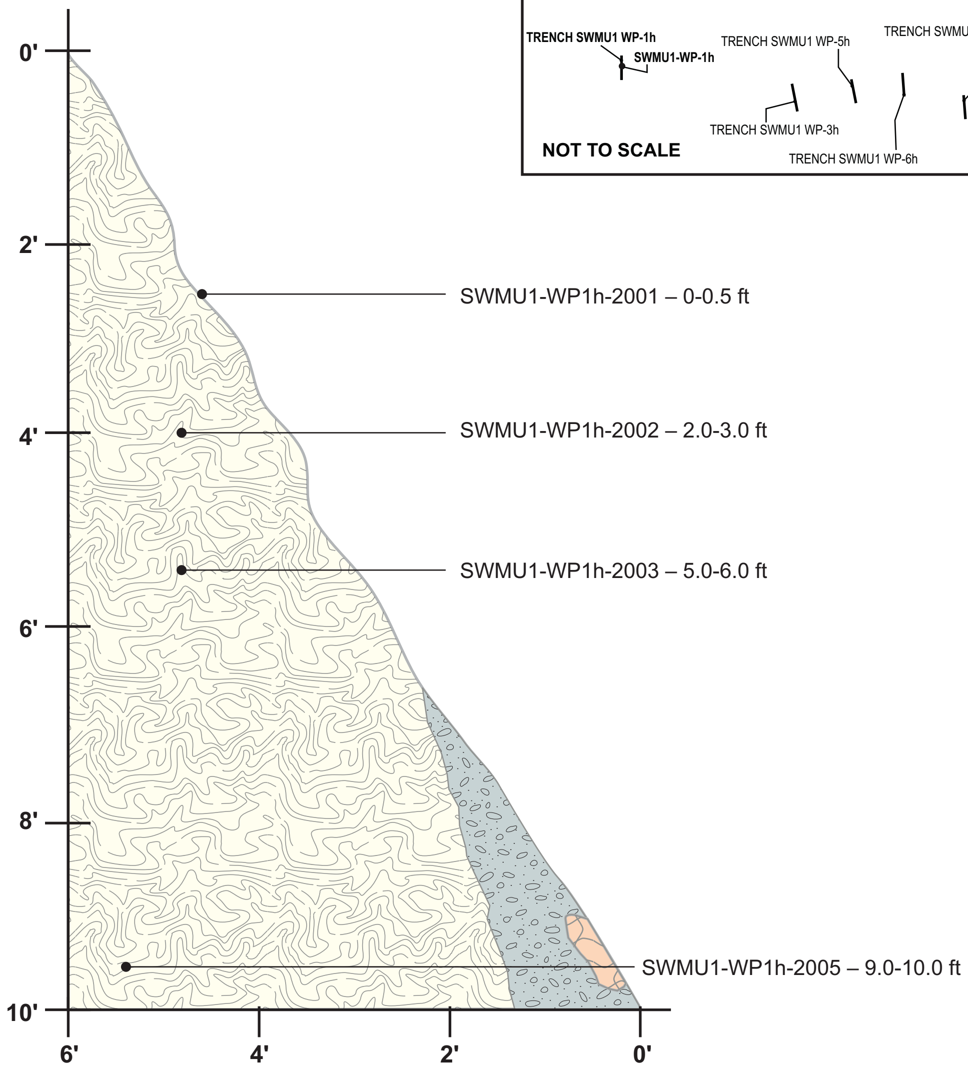
ELEVATION : ft. () DRILLING CONTRACTOR : Gregg Drilling and Testing

DRILLING METHOD AND EQUIPMENT : Geoprobe, Rhino Rig

WATER LEVELS : N/A START : 8:30:00 AM 10/3/2008 END : 9:40:00 AM 10/3/2008 LOGGER : R.Tweidt

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
		2.3		SANDY SILT (ML): brown (7.5YR 5/3), dry, no odor, poorly sorted (10% gravel/40% sand/ 50% fines), max gravel diameter =7cm, angular to subangular, metamorphic.	First boring terminated at 5.5 ft bgs. Second boring terminated at 2.5 ft bgs. Third boring terminated at 3 ft bgs. Attempted three times to drill to 6 ft bgs. Locations drilled within 2 ft radius of stake location. Boring backfilled with bentonite chips and hydrated.
5		2.1		5.5 feet bgs: refusal.	
10				Total Depth at 5.5 ft below ground surface	
15					





SCALE: 1" = 2'

LEGEND

- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL AND COBBLES
- ROCKY RUBBLE
- GREEN STAINED ROCKY RUBBLE AND DEBRIS
- ● SAMPLE LOCATION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH DATE: 10/7/08

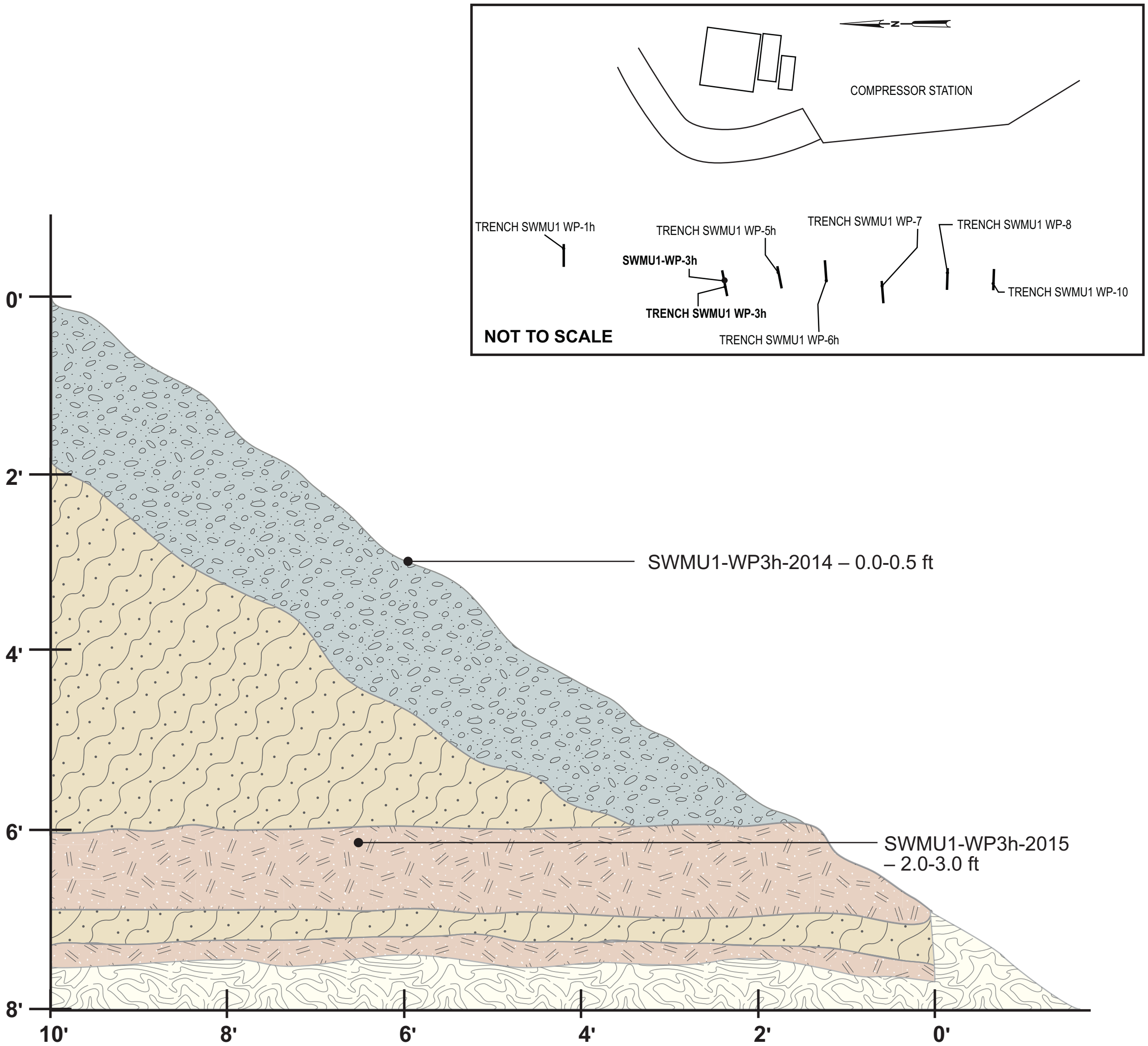
NOTES:

1. EXCAVATION TRENCH TO INVESTIGATE EXTENT OF WHITE MATERIAL TO SOUTH OF SITE
2. SAMPLES COLLECTED FROM EXCAVATOR BUCKET

FIGURE B-1
TRENCH SWMU1 WP-1h

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



SCALE: 1" = 2'

LEGEND

- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL AND COBBLES
- LIGHT BROWN SANDY SILT (ML) WITH WHITE POWDER MATERIAL
- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL
- ROCKY RUBBLE
- • SAMPLE LOCATION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH DATE: 10/7/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 10' INTO SLOPE
3. SIDE WALL COMPETENT
4. ROCKY RUBBLE FROM ROCK FALLS ON SURFACE, LIGHT BROWN SANDY SILT BELOW RUBBLE
5. LAYER OF CONSOLIDATED WHITE POWDERY MATERIAL JUST BELOW SURFACE AT TOE OF SLOPE, 10"-12" THICK
6. NO GROUNDWATER OR ODORS ENCOUNTERED, TRENCH BACKFILLED

FIGURE B-2
TRENCH SWMU1 WP-3h
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PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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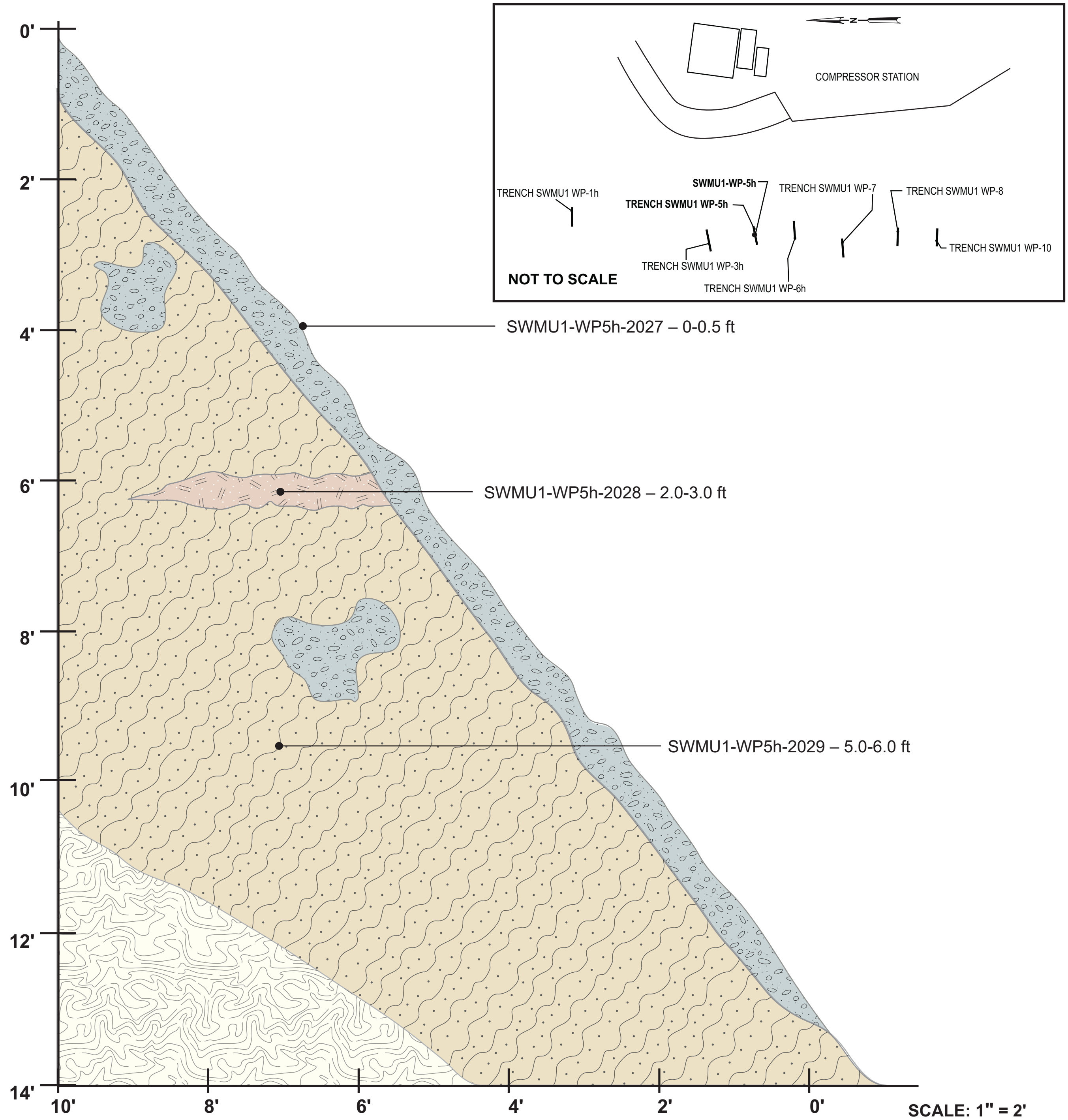

LEGEND

- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL AND COBBLES
- LIGHT BROWN SANDY SILT (ML) WITH WHITE POWDER MATERIAL
- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL
- ROCKY RUBBLE
- • SAMPLE LOCATION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH DATE: 10/7/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 10' INTO SLOPE
3. SIDE WALL COMPETENT, SURFACE LAYER ROCKY RUBBLE OVER HETEROGENEOUS LIGHT BROWN SILTY SAND WITH ONE LENSE OF WHITE POWDER AND POCKETS OF ROCKY RUBBLE
4. NO GROUNDWATER OR ODORS ENCOUNTERD, TRENCH BACKFILLED

FIGURE B-3
TRENCH SWMU1 WP-5h

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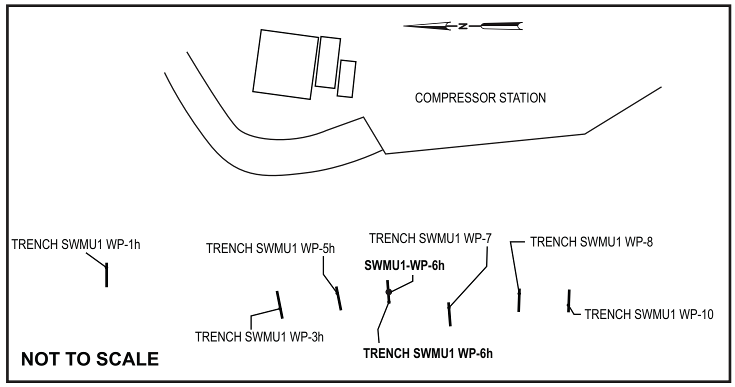

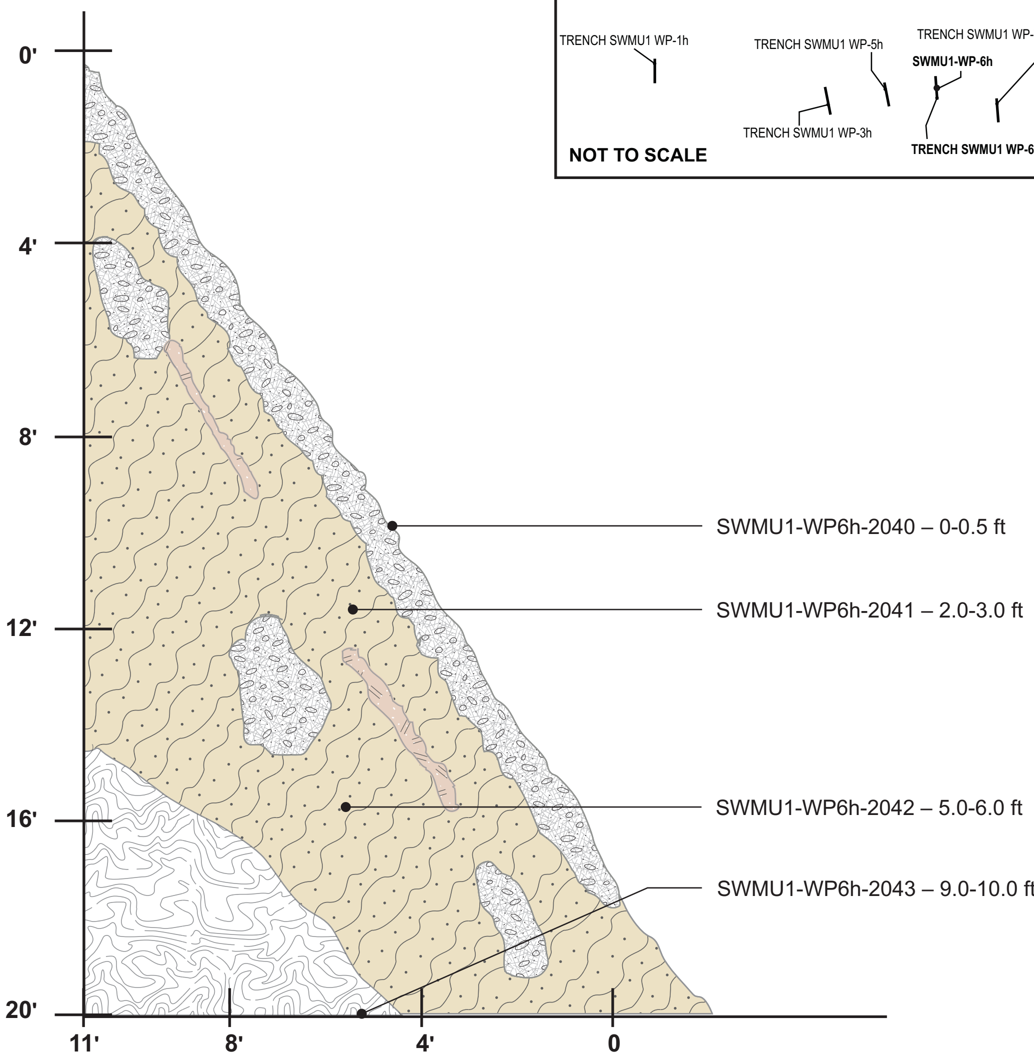

SCALE: 1" = 4'

LEGEND

- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL AND COBBLES
- LIGHT BROWN SANDY SILT (ML) WITH WHITE POWDER MATERIAL
- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL
- ROCKY RUBBLE AND DEBRIS
- • SAMPLE LOCATION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH   DATE: 10/6/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 11' INTO SLOPE
3. SIDE WALL COMPETENT
4. SURFACE LAYER CONTAINS ROCKS, GRAVEL, COBBLES AND DEBRIS INCLUDING WIRE, GLASS, ETC., CONTAINING SOME LENSES OF WHITE POWDERY MATERIAL
5. TRENCH MAINLY LIGHT BROWN SANDY SILT WITH GRAVEL CONTAINING THIN LENSES OF WHITE POWDERY MATERIAL. SOME POCKETS OF COARSER GROUND GRAVEL
6. NO GROUNDWATER OR ODORS ENCOUNTERED, TRENCH BACKFILLED

FIGURE B-4
TRENCH SWMU1 WP-6h

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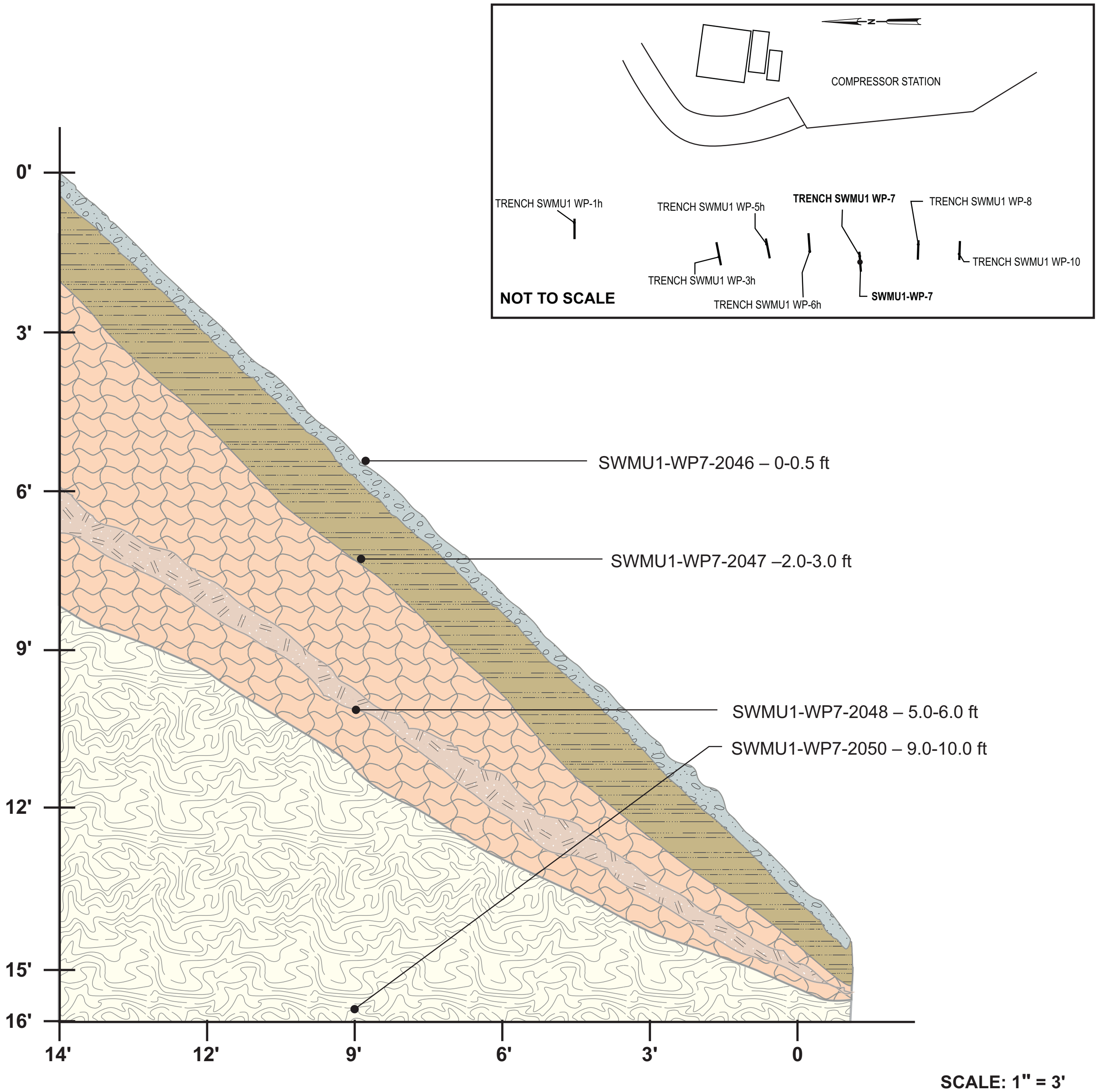

LEGEND

- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL, AND COBBLES
- GREEN STAINED LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- LIGHT BROWN SANDY SILT (ML) WITH WHITE POWDER MATERIAL
- CONSOLIDATED WHITE CHALKY MATERIAL STAINED IN SOME PLACES 2 RED STREAKS
- ROCKY RUBBLE
- • SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING SOUTH DATE: 10/6/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 14' INTO SLOPE
3. SIDE WALL COMPETENT, SURFACE LAYER OF ROCKY RUBBLE
4. OVER 2' THICK LAYER OF CONSOLIDATED WHITE MATERIAL STAINED 2 RED STREAKS
5. OVER LENSES OF WHITE MATERIAL MIXED IN NATIVE LIGHT BROWN SANDY SILT AND MOST GREENISH SAND
6. NO GROUNDWATER OR ODORS ENCOUNTERED, TRENCH BACKFILLED

FIGURE B-5
TRENCH SWMU1 WP-7
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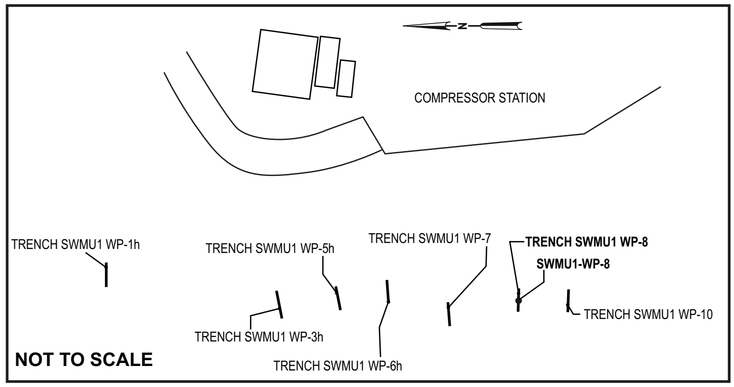

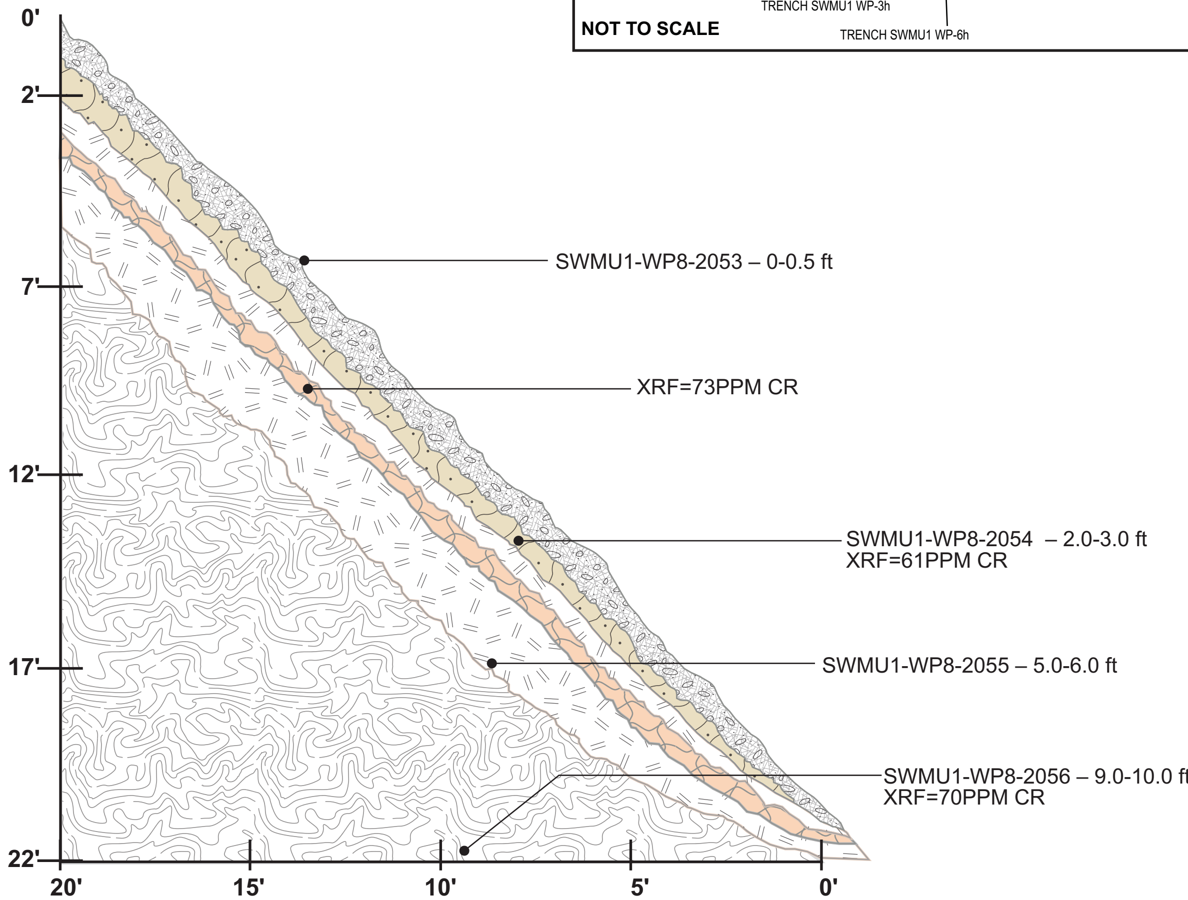

SCALE: 1" = 5'

LEGEND

- GREEN STAINED LIGHT BROWN SILTYSAND (SM) WITH GRAVEL
- WHITE POWDER MATERIAL WITH LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- RUBBLE & DEBRIS
- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL, AND COBBLES
- ● SAMPLE LOCATION
- PPM = PARTS PER MILLION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH DATE: 10/6/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 20' INTO SLOPE
3. SIDE WALLS COMPETENT, LAYERS OF RUBBLE AT SURFACE CONTAINING DEBRIS INCLUDING CHICKEN WIRE, A ROAD SIGN, REDDISH GRITTY MATERIAL, POORLY SORTED GRAVEL AND COBBLES
4. NO GROUNDWATER OR ODOR ENCOUNTERED, TRENCH BACKFILLED

FIGURE B-6
TRENCH SWMU1 WP-8

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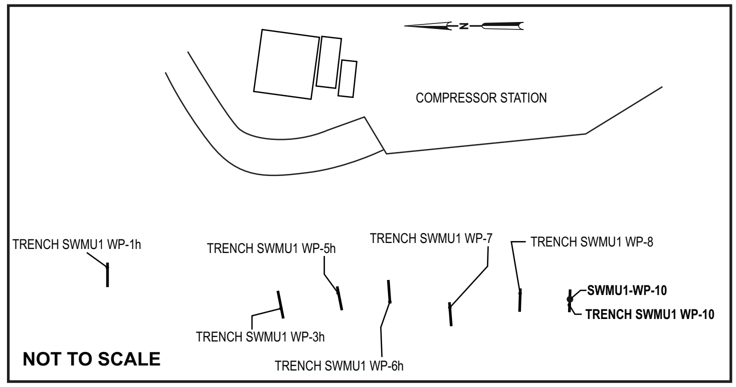

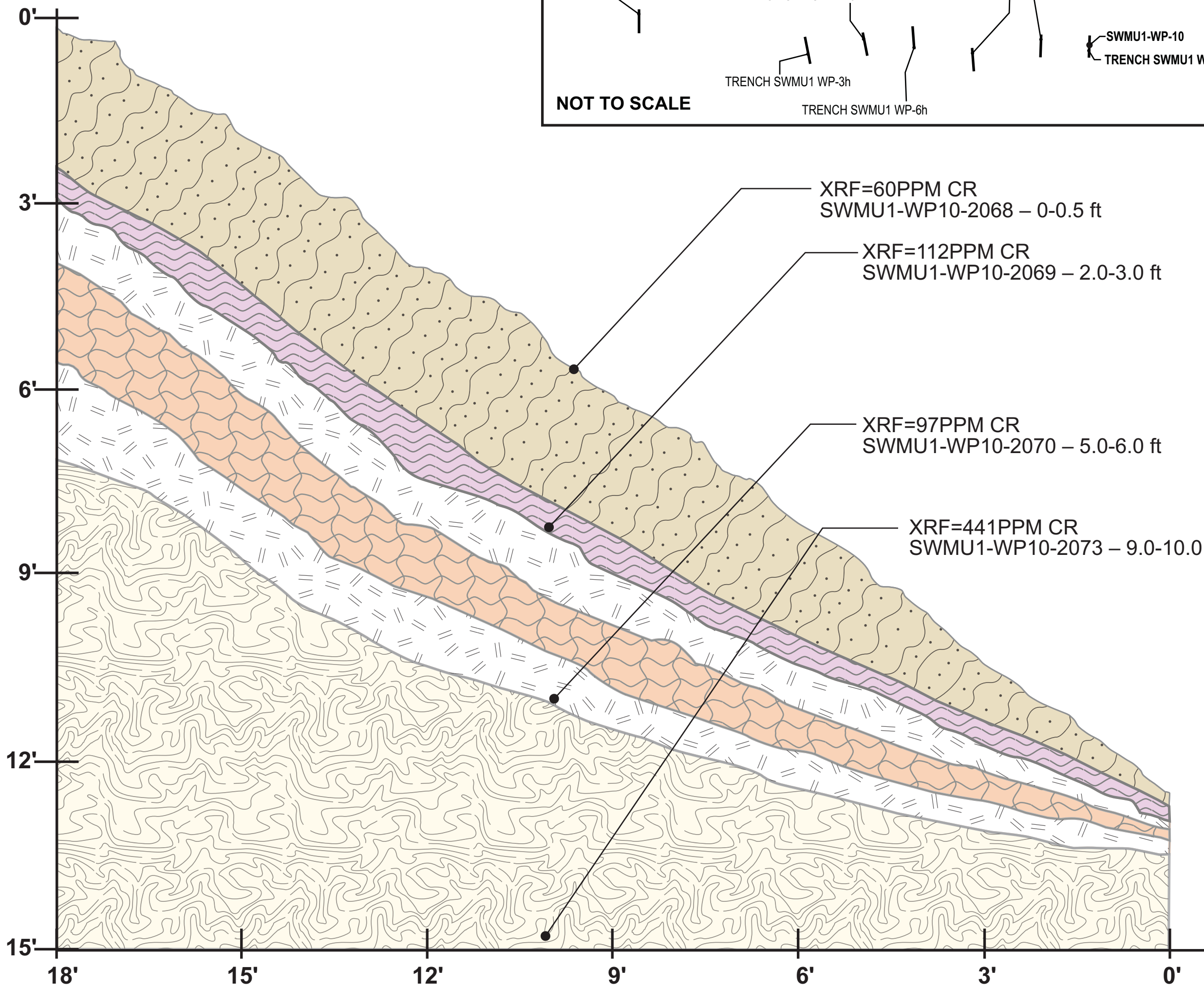

SCALE: 1" = 3'

LEGEND

- GREEN STAINED LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- WHITE POWDER MATERIAL WITH LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- LIGHT BROWN SILTY SAND (SM) WITH GRAVEL
- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL WITH WHITE POWDER MATERIAL
- HARDPAN: NATIVE HIGHLY CONSOLIDATED SILTY SAND (SM) WITH GRAVEL, AND COBBLES
- • SAMPLE LOCATION

PPM = PARTS PER MILLION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH DATE: 10/5/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. TRENCH EXTENDS 18' INTO SLOPE
3. SIDE WALLS COMPETENT, SOME SMALL AREAS OF SLIDING. LAYERS OF WHITE POWDER AND GREEN STAINED SOIL UNCOVERED, WATER USED LIBERALLY TO CONTAIN DUST
4. NO GROUNDWATER OR ODORS ENCOUNTERED, TRENCH BACKFILLED

FIGURE B-7
TRENCH SWMU1 WP-10

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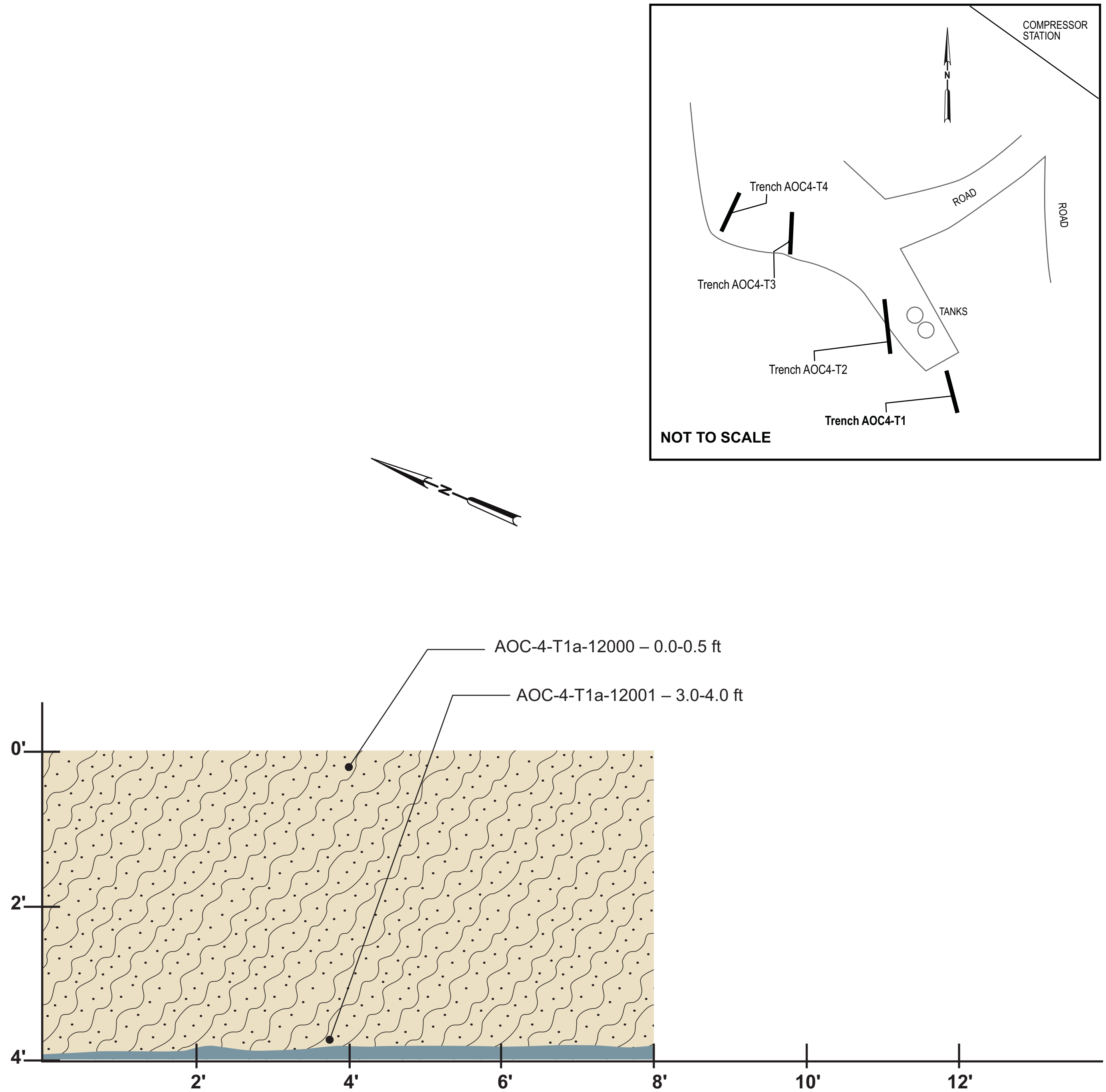

SCALE: 1" = 2'

LEGEND

LIGHT BROWN SANDY SILT (ML) WITH GRAVEL - FILL MATERIAL

• SAMPLE LOCATION

BEDROCK

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING EAST DATE: 10/22/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-8
TRENCH AOC4-T1
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE I DATA GAPS EVALUATION REPORT
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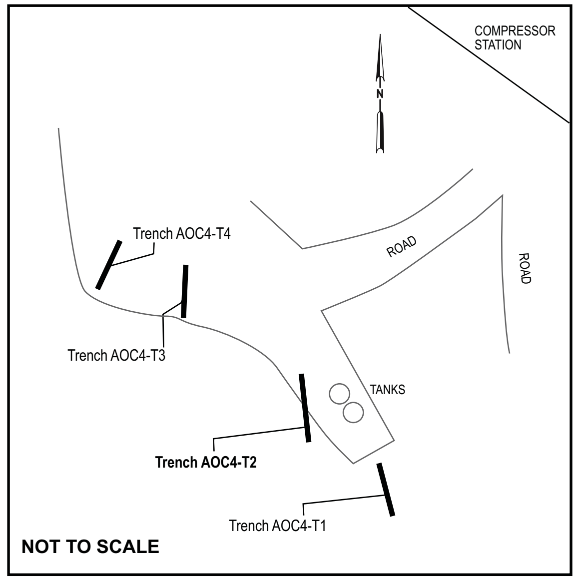

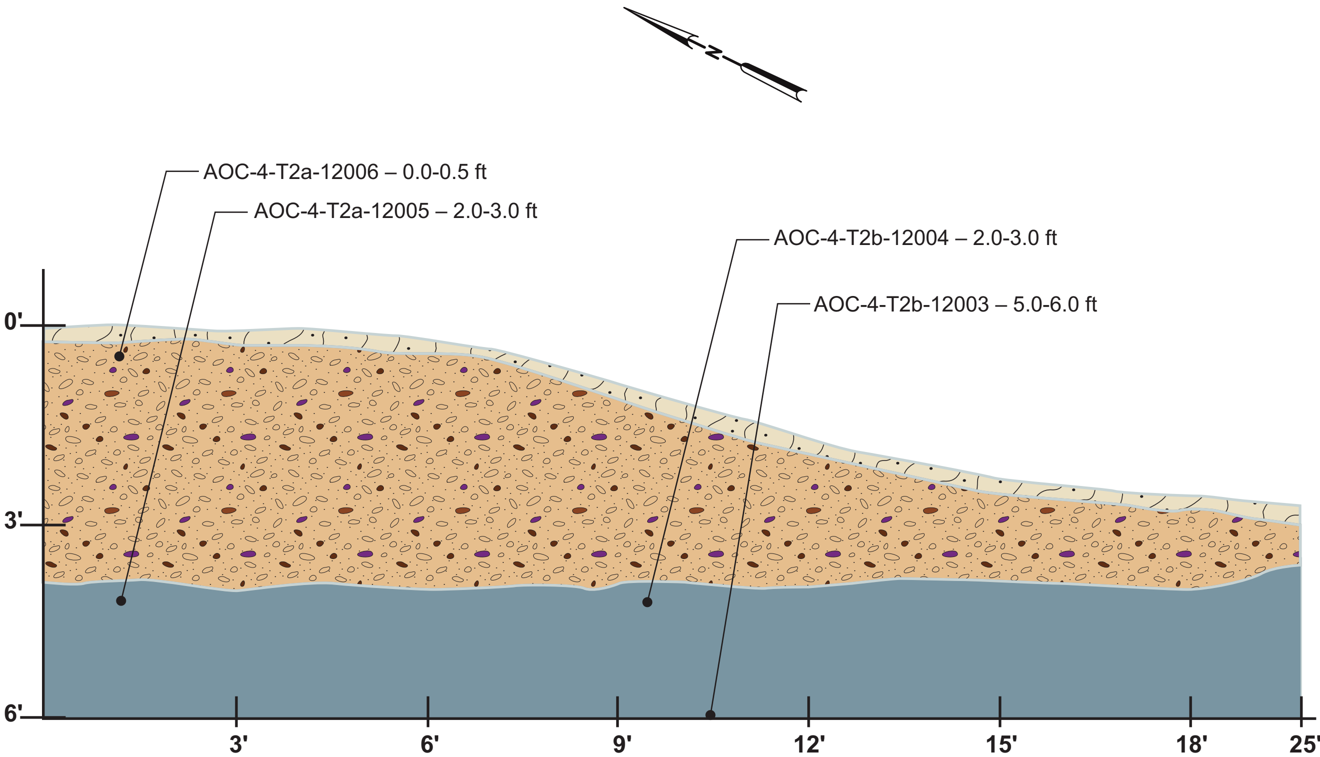

SCALE: 1" = 3'

LEGEND

- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL
- FILL MATERIAL - TRASH, INCLUDING HOUSEHOLD TRASH, BURNED TRASH, GLA SSWARE, TILES, ROPE, PLASTIC, ETC.
- BEDROCK
- SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING EAST   DATE: 10/22/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-9
TRENCH AOC4-T2
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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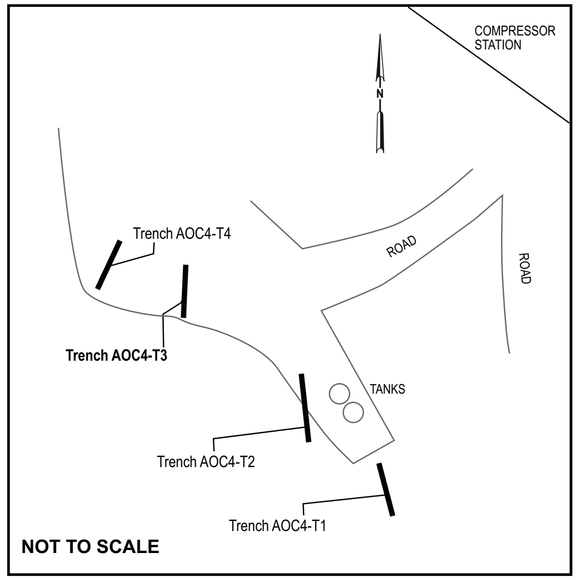

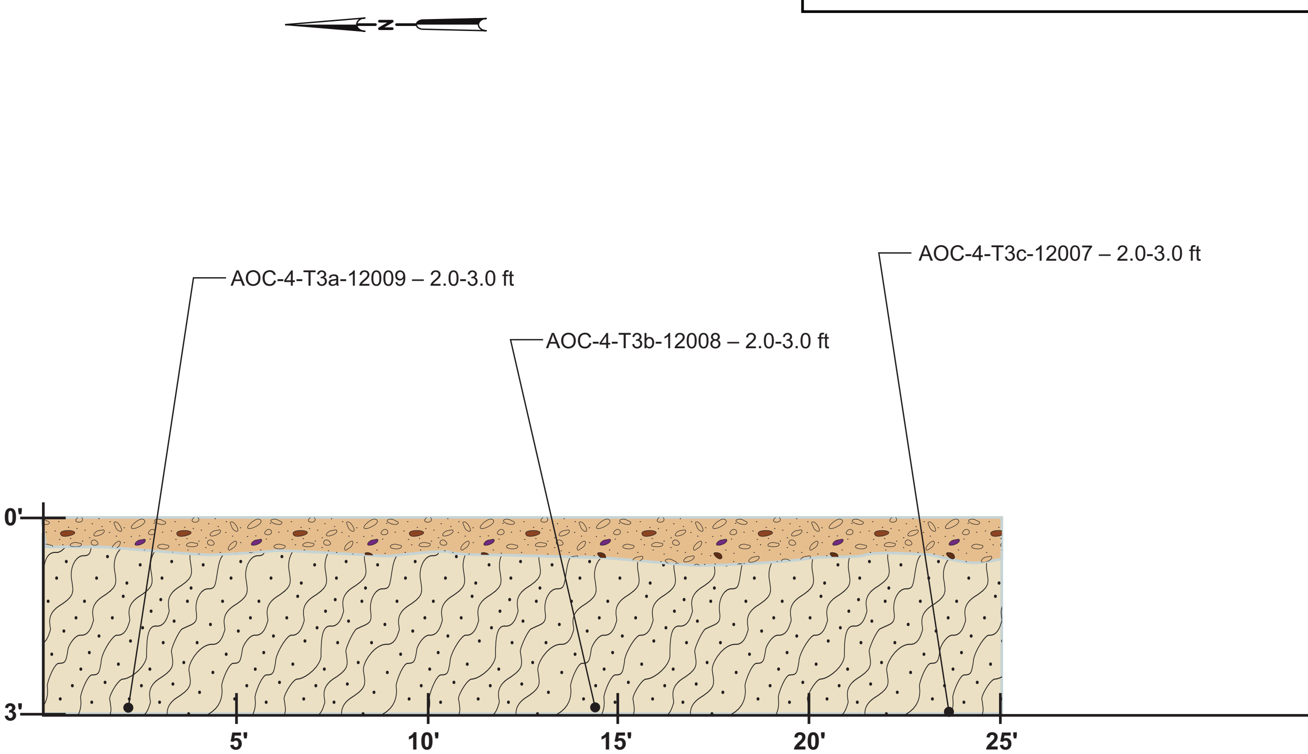

VERTICAL SCALE: 1" = 3'
HORIZONTAL SCALE: 1" = 5'

LEGEND

- LIGHT BROWN SANDY SILT (ML) WITH GRAVEL - FILL MATERIAL
- FILL MATERIAL - TRASH, INCLUDING HOUSEHOLD TRASH, BURNED TRASH, GLASSWARE, TILES, ROPE, PLASTIC, ETC.
- ● SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING NORTH DATE: 10/24/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-10
TRENCH AOC4-T3
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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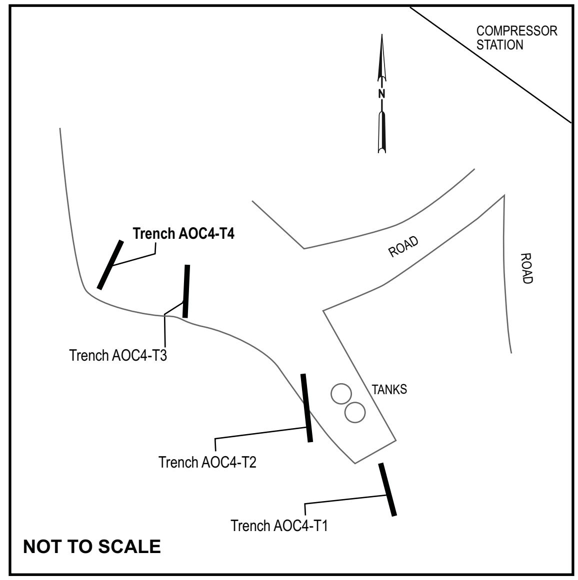

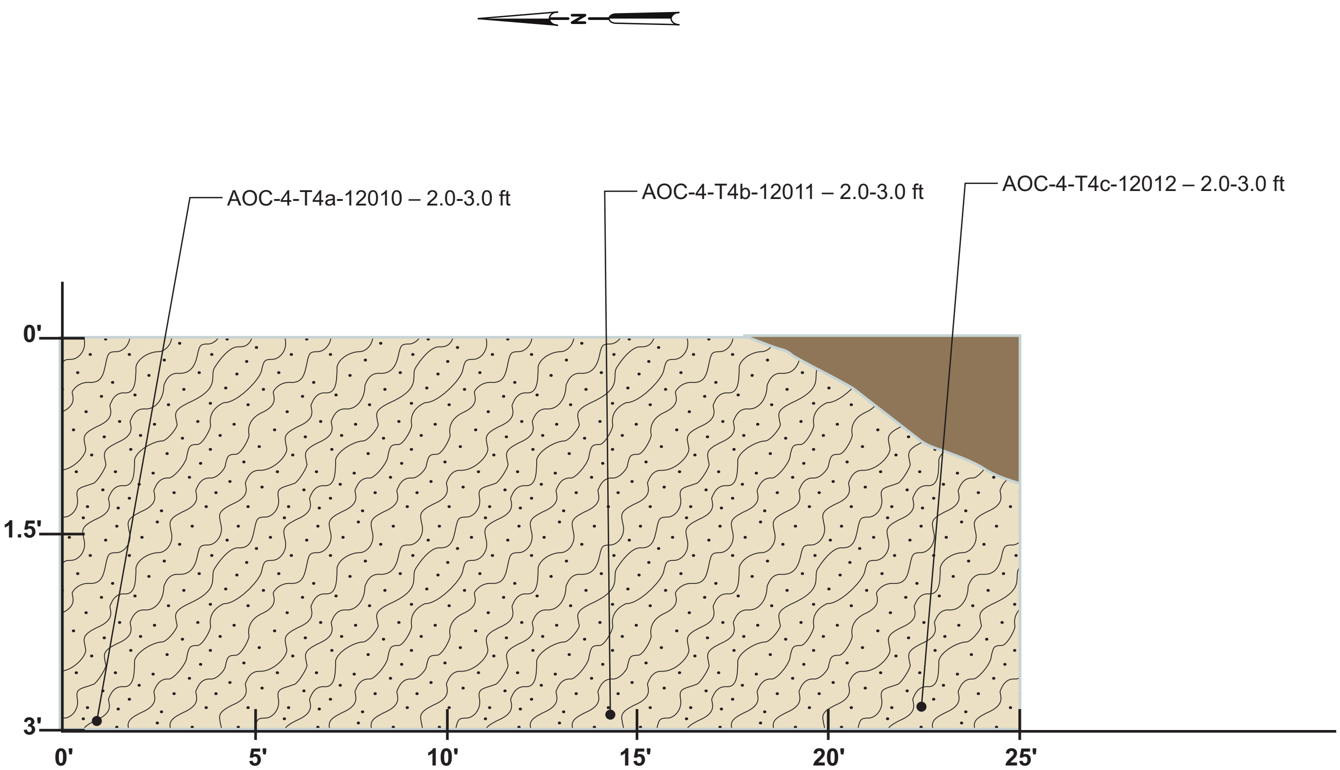

VERTICAL SCALE: 1" = 1.5'
HORIZONTAL SCALE: 1" = 5'

LEGEND

LIGHT BROWN SANDY SILT (ML) WITH GRAVEL

FILL MATERIAL

• SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING NORTH DATE: 10/24/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-11
TRENCH AOC4-T4
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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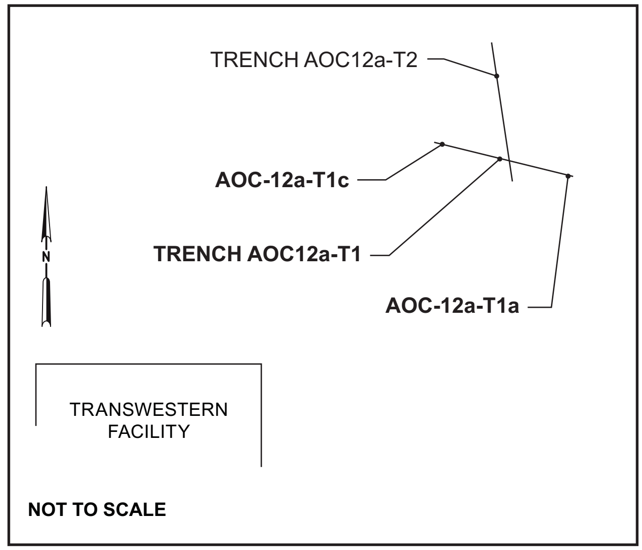

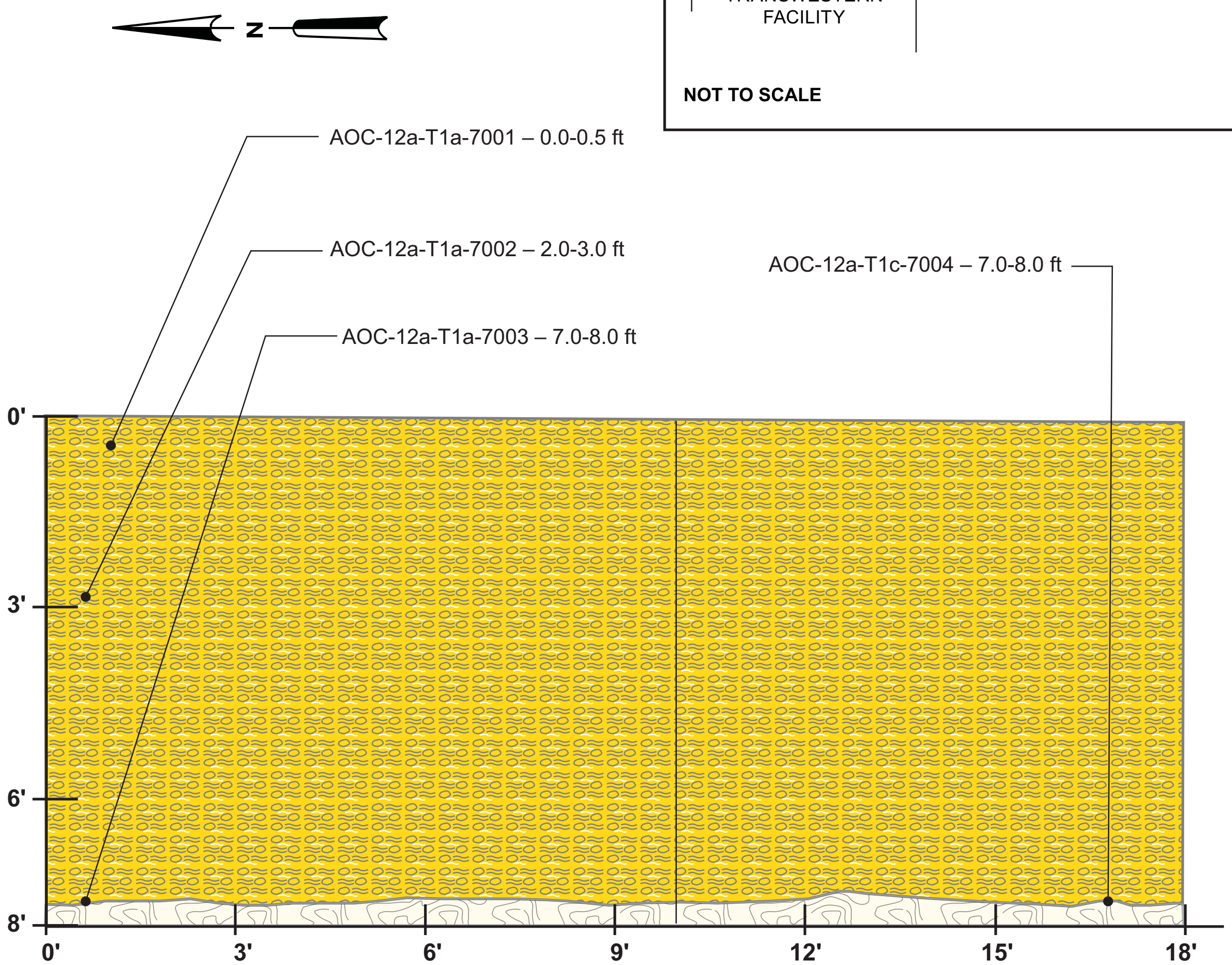

SCALE: 1" = 3'

LEGEND

HARDPAN

LIGHT BROWN SAND (SP) WITH WELL ROUNDED COBBLES - LOOSE CONSISTENCY - FINES INCREASING WITH DEPTH TO ~10%

● SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING EAST DATE: 9/22/08

NOTES:
1. AOC 12 -T1 RUNS PARALLEL TO PIPELINE
2. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
3. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-12
TRENCH AOC12a-T1
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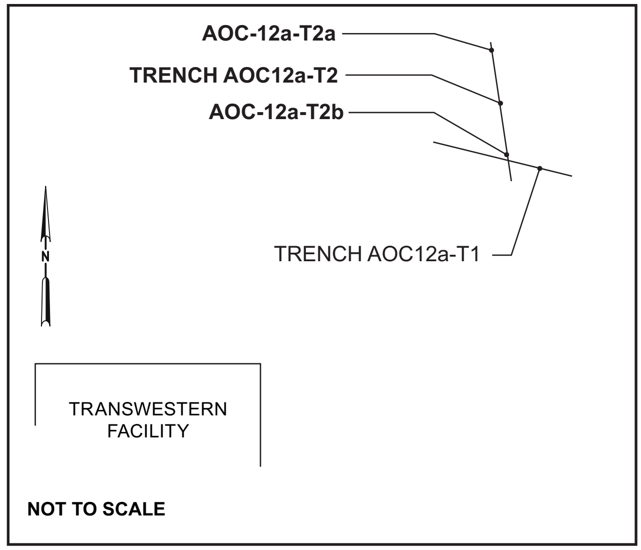

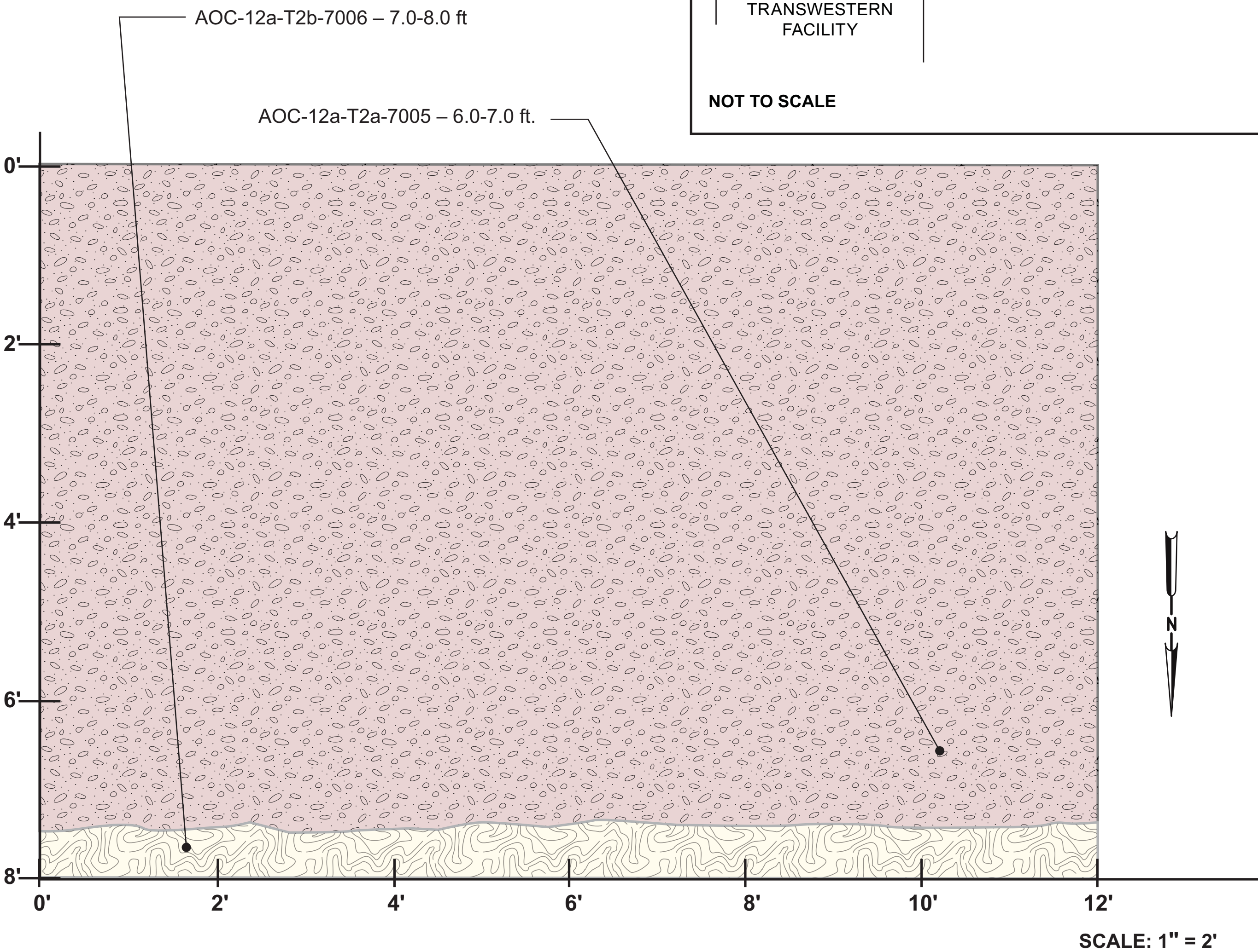

LEGEND

LIGHT BROWN SAND (SP) WITH WELL-ROUNDED COBBLES
LOOSE CONSISTENCY FINES INCREASING WITH DEPTH ~10%

HARDPAN

● SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING NORTH DATE: 9/22/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-13
TRENCH AOC12a-T2
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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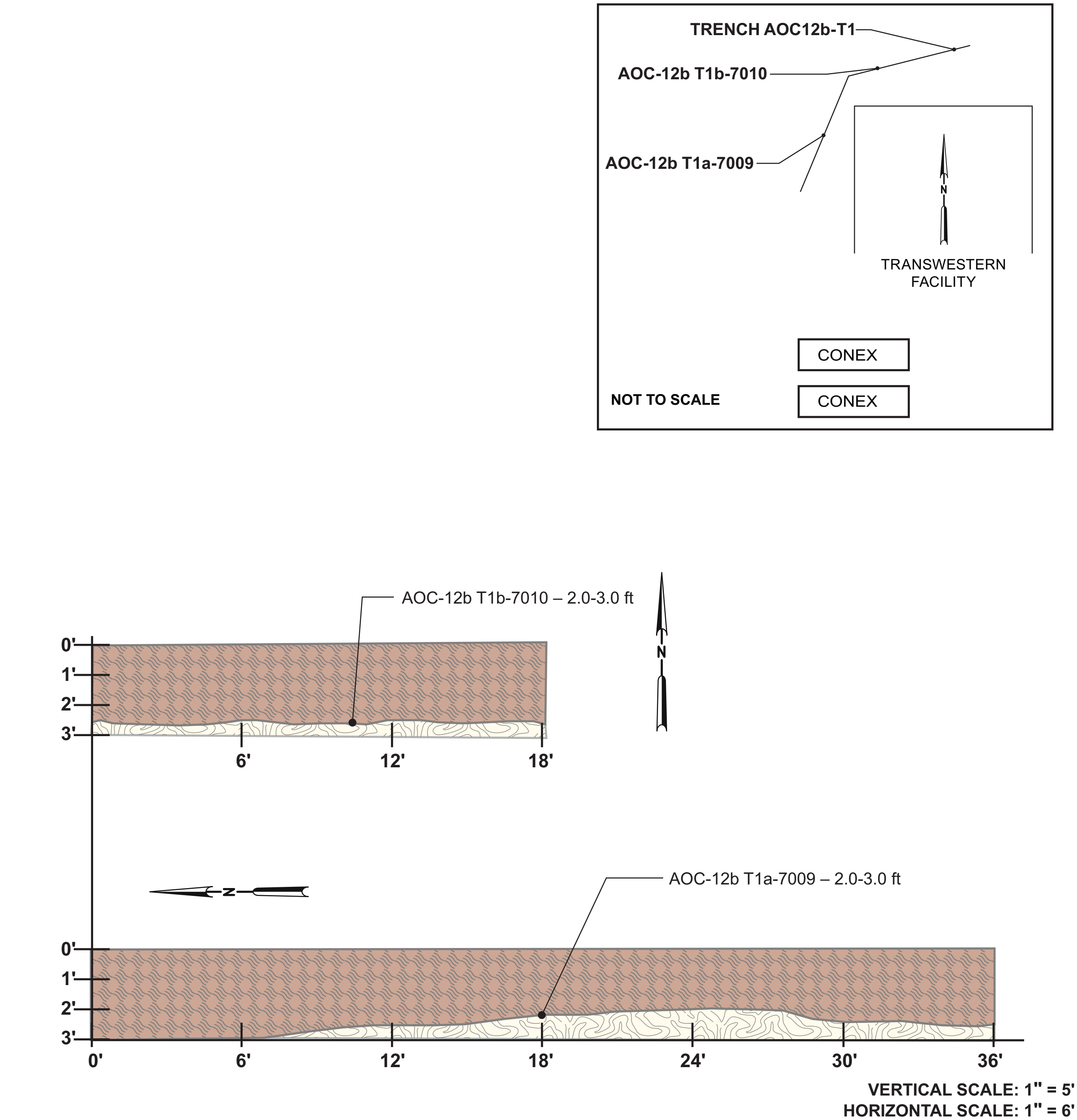

LEGEND

HARDPAN

● SAMPLE LOCATION

LIGHT BROWN POORLY GRADED SAND (SP) WITH GRAVEL FILL MATERIAL

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING NORTH   DATE: 9/20/08

NOTES:

1. AOC 12b-T1 RUNS ALONG THE NORTH SIDE OF THE GRAVEL LOT-LOOKING NORTH ALONG THE WEST SIDE OF THE GRAVEL LOT-LOOKING EAST
2. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
3. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-14
TRENCH AOC12b–T1

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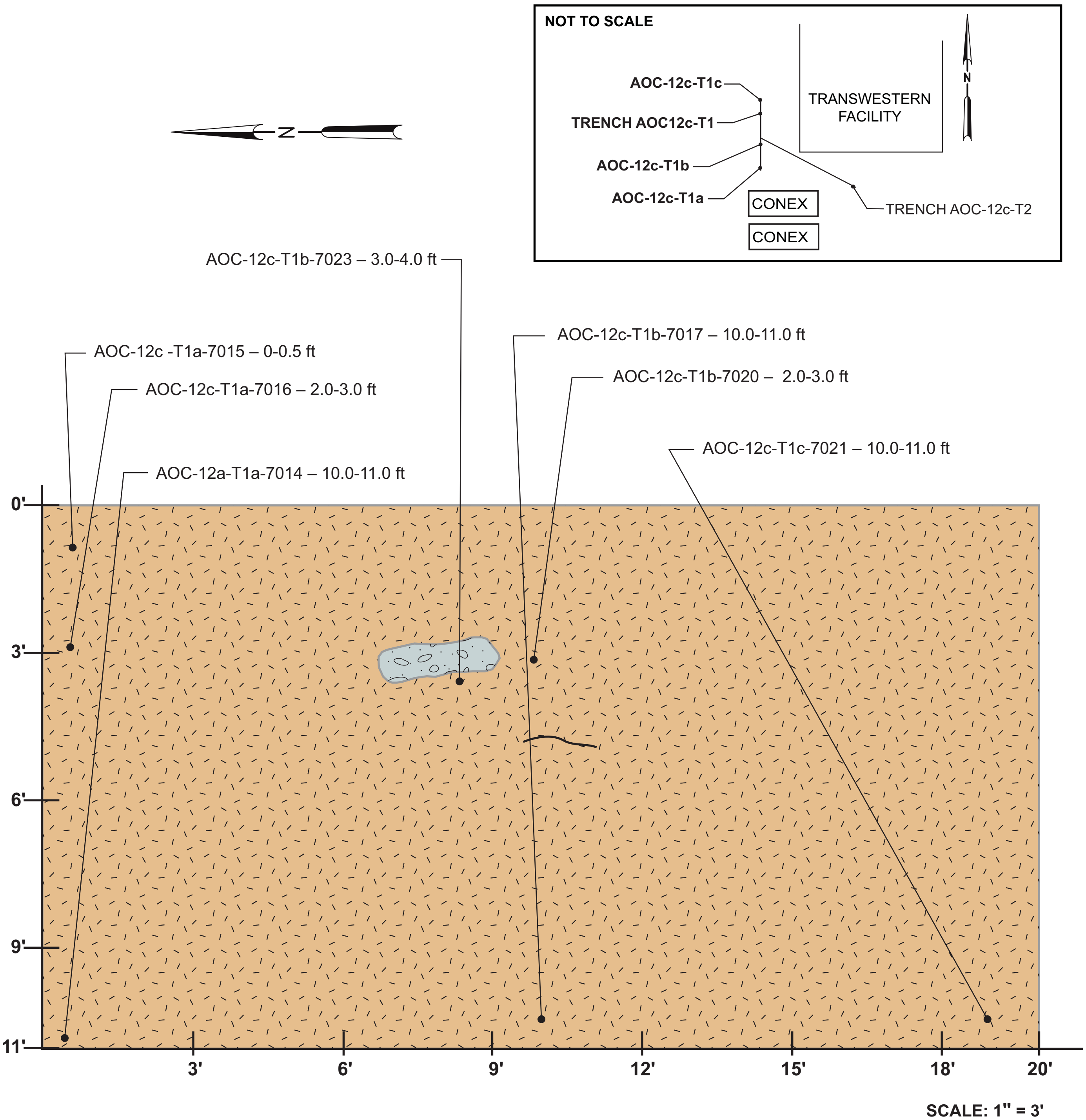

LEGEND

- MEDIUM BROWN SANDY SILT (ML) WITH GRAVEL- FILL MATERIAL
- DEBRIS: BURNED SLATS OF WOOD, CONCRETE, ROCK, PLASTIC SHEETING, CAULKING TUBE, SAFETY GOGGLE CONTAINER
- SMALL GAUGE WIRE
- SAMPLE LOCATION

TRENCH SIDEWALL RECORD

TRENCH VIEW: LOOKING SOUTH   DATE: 9/20/08

NOTES:

1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-15
TRENCH AOC12c-T1

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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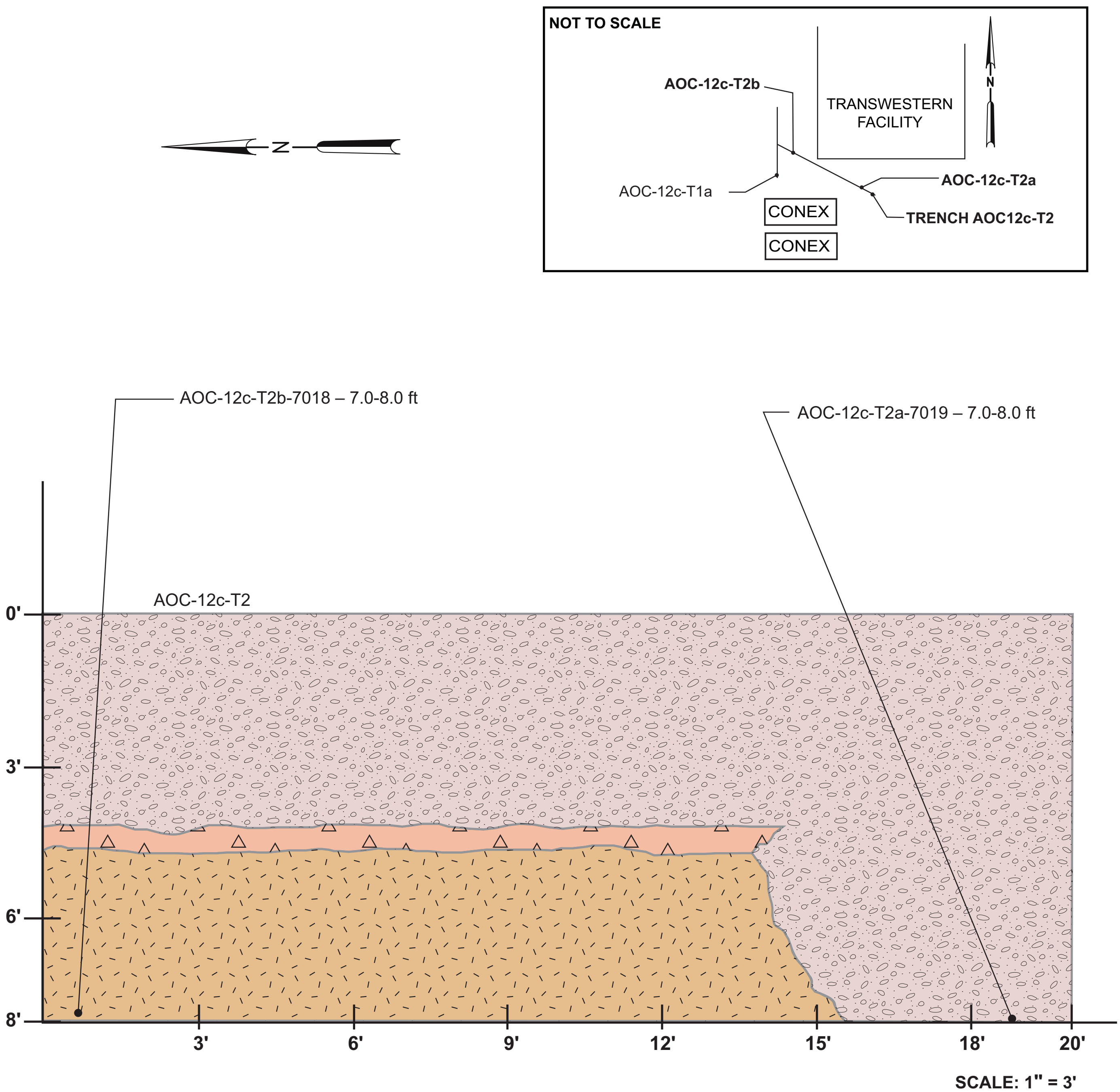

LEGEND

MEDIUM BROWN COMPACTED IN THE FIELD HARDPAN AND REGULAR COBBLES	VERY HARD LAYER
LIGHT BROWN SANDY SILT (ML) WITH GRAVEL TO COBBLES FILL MATERIAL - SIDEWALL EXPOSURE SHOWS FILLED CHANNELS OF MEDIUM BROWN SANDY SILT (ML) WITH GRAVEL	SAMPLE LOCATION

TRENCH SIDEWALL RECORD
TRENCH VIEW: LOOKING EAST DATE: 9/20/08

NOTES:
1. SAMPLES COLLECTED FROM EXCAVATOR BUCKET
2. NO GROUNDWATER OR ODORS ENCOUNTERED; TRENCH BACKFILLED

FIGURE B-16
TRENCH AOC12c-T2
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SOIL INVESTIGATION PART A, PHASE 1 DATA GAPS EVALUATION REPORT
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