Appendix C
Perimeter Area Investigation Program

Contents

Acronyms and Abbreviations

AOC	Area of Concern
DOI	United States Department of the Interior
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
DQO	data quality objective
ng/kg	nanograms per kilogram
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TEQ	toxicity equivalent
TPH	total petroleum hydrocarbons
VOC	volatile organic compound
XRF	x-ray fluorescence

1.0 Perimeter Area Investigation Program

1.1 Perimeter Area Description and History

The Perimeter Area is defined as the area extending from the facility fence line to the toe of the slope outside of the fence line. In areas that are currently and/or were historically unbermed, the portions of the Perimeter Area that are topographically lower than the Topock Compressor Station (that is, downslope) could have received stormwater runoff as well as incidental spills from the compressor station. In areas where the ground slopes upward toward the fence line from the interior of the station or where the ground slopes up outside the station, deposition of chemicals through sheet flow would not have occurred. The perimeter does not include any areas that are currently defined as being part of an existing unit (that is, Areas of Concern [AOCs] 4, 9, 10, and 11 and Solid Waste Management Unit [SWMU] 1 are all located in part or in their entirety on the slope). The Perimeter Area has not been investigated previously.

The majority of the facility is currently bermed or curbed. Figure C-1 shows the current bermed and curbed areas, as well as the areas that have neither berms nor curbs. Some of the areas that are currently bermed with soil are known to be or were likely to have been unbermed in the past. In areas that are currently or may historically have been unbermed, perimeter samples will provide information on potential recent or historical discharges to the area outside the fence line.

Perimeter sampling locations were originally selected during a field walk with California Environmental Protection Agency, Department of Toxic Substances (DTSC) and the United States Department of the Interior (DOI) on October 18, 2007. The 2007 Perimeter Area site walk focused on potential concerns such as the appearance of the area (for example, dark material and red-colored soil to the east of the Cooling Tower B area) and in areas where there is current surface water runoff via sheet flow or storm drains.

Fifteen perimeter sampling locations were identified and proposed in the *Draft RCRA Facility Investigation Soil Investigation Work Plan Part B, PG&E Topock Compressor Station, Needles, California* (Draft Part B Work Plan) (CH2M HILL, 2007). The sample locations were included in AOC 13 (unpaved areas within the compressor station fence line) and were named proposed sample locations AOC13-36 through AOC13-50.

Two of the 15 locations identified during the October 2007 field walk are within the interior of station (AOC13-39 and AOC13-40) and were shifted from the perimeter investigation and assigned to AOC 13 (renumbered to AOC 13-33 and AOC 13-34) in the Draft Part B Work Plan, and one former perimeter sample (AOC13-47) was redundant with a proposed storm drain sample location (SD-3) so this sample was deleted. The Perimeter Area samples have been renamed to clearly identify them as perimeter sample locations. Twelve Perimeter Area samples (PA1 through PA12) were identified in the *RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Pacific Gas and Electric Company Topock Compressor Station Needles, California* (CH2M HILL, 2011a). A subsequent site walk with DTSC, DOI, and the Tribes on December 15, 2011 identified several locations where Perimeter Area and storm drain investigation sample locations could be combined and one location where sampling was no longer merited due to recent erosion and subsequent backfill of the area. Eight perimeter area sample locations (renumbered PA01 though PA08) were retained for the proposed investigation, as shown on Figure C-1. Perimeter samples PA01 through PA08 are located in areas with visible discoloration or other potential direct impacts and/or that may experience or have experienced surface water runoff through sheet flow.

1.2 Teapot Dome Oil Pit (AOC 31)

The location of the former Teapot Dome oil pit (AOC 31) overlaps with the Perimeter Area investigation. As described in Section 1.1.4 of the main body of this work plan, investigation of the former Teapot Dome oil pit has been incorporated into the Perimeter Area investigation. Proposed sample location PA08 is located at the tentatively identified location of the former Teapot Dome oil pit. This sample location is in an area identified as having a circular area of dark soil approximately 3 to 4 feet in diameter and is therefore the most likely potential location of the former oil pit. Prior to sampling in this area, a geophysical survey will be conducted to assess whether the location of the former oil pit can be located more precisely, as discussed in Section 2.2 of the main body of this work plan. Due to the presence of the fence, as well as overhead wires and potentially pipelines in the vicinity of this location, the geophysical survey may be limited by interference.

1.3 Summary of Past Soil Characterization

No prior sampling has been conducted specifically to evaluate the Perimeter Area. Several samples were collected at AOC 9 in the vicinity of the fence line. Samples were also collected on the slope at AOCs 4, 9, 10, and 11, and SWMU 1. As discussed above, these areas are already being investigated and are not considered part of the Perimeter Area investigation. However, one soil sample (BH-69, near southern fence line) was collected during monitoring well installation, and two opportunistic soil samples (PA-OS1, near northern fence line, and PA-OS2, near southern fence line) were collected in the vicinity of the perimeter area that are considered part of the Perimeter Area investigation. These samples were analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), and general chemistry; BH-69 was sampled for dioxins as well.

Forty eight constituents, including one calculated quantity (benzo(a)pyrene equivalents) were detected in the Perimeter Area. The detected constituents included:

- Eighteen metals (aluminum, arsenic, barium, calcium, hexavalent chromium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, sodium, vanadium, and zinc). Tables C-1 and C-2 contain the sampling results for metals and inorganics, respectively.
- Twelve PAHs (2-methyl naphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene). Table C-3 contains the sampling results for PAHs.

- Benzo(a)pyrene equivalents, as discussed in Table C-3.
- TPH as diesel and TPH as motor oil, as shown in Table C-4.
- One PCB (Aroclor 1254), as discussed in Table C-5.
- Fourteen dioxins (1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; 1,2,3,4,7,8-HxCDD; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 1,2,3,7,8,9-HxCDF; 1,2,3,7,8-PeCDD; 2,3,4,6,7,8-HxCDF; 2,3,4,7,8-PeCDF; 2,3,7,8-TCDF; OCDD; and OCDF), as shown in Table C-6.

None of the metals exceeded residential regional screening levels or residential California human health screening levels, although 11 metals (aluminum, calcium, total chromium, copper, lead, magnesium, manganese, nickel, potassium, vanadium, and zinc) returned concentrations that exceeded their respective background concentrations at sample location BH-69, and molybdenum exceeded background concentrations at sample PA-OS2.

None of the PAHs, benzo(a)pyrene equivalents, TPH, or PCBs exceeded their respective interim screening levels.

Dioxins and furans are compared to toxicity equivalents (TEQs), TEQ Avian, and TEQ Mammals. Pentadioxin (1,2,3,7,8-PeCDD) and 2,3,7,8 tetracholordibenzo (2,3,7,8-TCCD) are the only two dioxins with individual interim screening levels. Dioxins and furans were detected in all three samples collected from BH-69, as shown in Table C-6. Dioxin 1,2,3,7,8-PeCDD was detected at 6.6 nanograms per kilogram (ng/kg) at BH-69, which exceeded its residential California human health screening levels of 4.6 ng/kg. None of the samples was above the TEQ human interim screening level of 50 ng/kg (residential regional screening level). One sample was above the TEQ Avian interim screening level of 16 ng/kg (ecological comparison value) (maximum detected concentration of 26 ng/kg). Two samples were above the TEQ Mammals interim screening level of 1.6 ng/kg (ecological comparison value) (maximum detected concentration of 47 ng/kg).

1.4 Perimeter Area Proposed Sampling

Sampling is needed along the perimeter of the station to evaluate whether historical contaminant releases within the compressor station have migrated to the edge of the facility where they may pose a concern to areas and receptors outside the fence line. While berms and curbs are present along most of the compressor station fence line, historical sheet flow pathways may be different than current pathways along the perimeter. DTSC and DOI therefore directed Pacific Gas and Electric Company (PG&E) to collect perimeter samples along the entire perimeter regardless of the location of current or historic berms/curbs.

Sampling will be conducted in a phased manner, as directed by DTSC and DOI, and will be consistent with the phased sampling approach for the area within the fence line. To focus sampling at areas with the highest potential for contamination and to minimize the total number of samples, x-ray fluorescence (XRF) screening will first be performed every 50 feet in all areas along the perimeter except the following areas:

- Between PA01 and storm drain line 12 (because the spacing of sample locations PA01and PA02, in combination with sample locations AOC 13-20, AOC13-21 and AOC 13-23 adequately addresses that perimeter segment).
- Between XRF-17 and XRF-18 because sample locations AOC16-1 and AOC 16-2 adequately address that perimeter segment).
- Between PA03 and PA04 (because the spacing of these sample locations adequately addresses that perimeter segment).
- Along the northern, eastern, and southern boundaries near the main office because compressor station operations have not historically occurred and are not currently occurring in this area. This is also a topographic high area so surface water from the station does not flow in this area.
- Along the southern boundary of the site where topography slopes upward from the station.

XRF screening and evaluation of XRF data (comparison to offsite screening levels) will be conducted as described in Section 2.2 of the main text this work plan.

XRF screening will not be conducted at locations PA01 through PA08 because they were selected based on topographic considerations and/or due to association with staining/wastes. XRF screening at the remaining locations (XRF-1 through XRF-33 and XRF-39) will be used to determine where additional soil samples should be collected. XRF data from the Perimeter Area will be discussed with the DTSC and DOI to determine whether a conventional soil sample will be required for laboratory analysis. If screening values are not exceeded, per agency direction, a sample will still be collected at least every 100 feet along the perimeter. These new samples will be collected at the same depths and analyzed for the same suite of constituents as the other perimeter samples. Table C-7 discusses the proposed sampling plan.

When possible, PG&E will conduct the perimeter XRF and soil sampling after the nearest samples from other AOCs/SWMUs have been collected and the results are available. Perimeter sampling locations may then be adjusted based on these “neighboring” data, if appropriate. Additional constituents may also be included with certain perimeter samples based on the neighboring data.

Table C-7 summarizes the proposed Perimeter Area soil sample locations and the depths, description/rationale for each soil sample location (that is, the data gaps they would address), and analytes. It also provides the proposed XRF locations and description/rationale for each XRF location. Proposed soil sample and XRF locations are also shown in Figure C-1. The proposed Perimeter Area sample locations are based on collaborative discussions involving DTSC, DOI, the Tribes and PG&E.

Soil sampling activities in the Perimeter Area will be phased, similar to the sampling plan for areas within the fence line. Initial soil sampling will be limited to a maximum depth of 3 feet, or the maximum depth that is safely achievable given the specific conditions at each sample location. Only hand sampling will be feasible for many perimeter sample locations given the narrow ledge around much of the perimeter area. As agreed in response to DTSC comments on the *Soil Part B Data Quality Objectives Technical Memorandum, PG&E Topock*

Compressor Station Needles, California (Soil Part B DQO Tech Memo) (CH2M HILL, 2011b), soil samples will be collected from the surface to 1 foot below ground surface. The surface sample interval is larger than for typical surface soil samples because of the potential for erosion at the perimeter. Deeper samples may be collected if warranted based on the initial sampling results and if the location is accessible by mechanical equipment (for example, at PA08 in the vicinity of the Teapot Dome oil pit). Perimeter sample locations requiring deeper sampling would first be excavated using a hydrovac; if still deeper samples are required, and the location is accessible and clear of utilities, a soil boring may be installed using a drill rig.

All samples will be analyzed for Title 22 metals, hexavalent chromium, semivolatile organic compounds (SVOCs), PAHs, TPH, and PCBs. Ten percent of the samples will be analyzed for the United States Environmental Protection Agency Contract Laboratory Program Target Analyte List and Target Compound List. The proposed sample locations are shown in Figure C-1.

2.0 Data Evaluation

2.1 Data Evaluation Overview

The primary purpose of the Perimeter Area investigation is to establish whether there are existing concentrations of constituents immediately outside the fence line of the facility that could serve as ongoing sources to areas outside the fence line. The data evaluation process for the Perimeter Area will determine the unit(s) to which any portions of the Perimeter Area with detected concentrations of constituents above screening level will be assigned.

2.2 Evaluation of Perimeter Area Investigation Data

The data evaluation for the Perimeter Area will follow the general process established for soil samples collected at the compressor station. Soil sampling will be phased as described Section1.4, above and in Section 2.2 of the main body of this work plan. All data will be validated as they are collected. After each phase of soil data collection, the validated data will first be compared to the interim screening levels previously developed for areas outside the fence line (that is, the same screening levels used for the Soil Part A Phase 1 investigation program, as discussed in the *Soil Part B Data Quality Objectives Technical Memorandum, PG&E Topock Compressor Station Needles, California* [Soil Part B DQO Tech Memo; CH2M HILL, 2011b]). PG&E will consult with the agencies after each phase of soil sampling to determine whether additional soil samples are required. The need for additional samples will be determined in conjunction with any other pertinent data from samples within the compressor station fence line and/or downslope of the given Perimeter Area sample.

Following soil sampling, if elevated levels of constituents are detected, a given Perimeter Area sample location or group of sample locations may be assigned to an existing Resource Conservation and Recovery Act unit (SWMU or AOC). This may occur following any of the potential phases of soil sampling, provided sufficient data are available. The following steps will be followed for assigning the data to an existing unit:

1. Assess data on a point-by-point basis and identify constituents detected at concentrations above screening levels.
2. Identify nearest upslope and downslope units, and compare data to assess if they are similar (that is, have similar types of constituents).
3. Determine, based on the site conceptual model for the Perimeter Area and the unit(s) in question, if it is logically reasonable that detected constituents could have migrated to or from the Perimeter Area to or from the unit in question. (This step will consider factors such as topography/flow paths, distance to closest unit, and possible earthmoving activities.)

If the site conceptual model supports a connection between the Perimeter Area and an existing unit, the sample location(s) will be assigned to the unit to which it is most similar, and consequently also will be evaluated as part of the risk assessment for that unit. If constituents detected in the Perimeter Area appear to be unrelated to any nearby units, the area may be treated as a hot spot. If a hot spot is identified, the same DQOs applicable to the area outside the fence line will apply; that is, Decisions 1 through 4 will be evaluated for the hot spot.

In the case of Decision 2, hot spots will be evaluated as discussed in the *Human Health and Ecological Risk Assessment Work Plan, Topock Compressor Station, Needles, California* (ARCADIS, 2008). That is, chemical-specific descriptive statistics for the exposure unit will be inspected, as well as the spatial distribution of the detected concentrations to identify hot spots. Spatial weighting techniques may then be employed to estimate an area-weighted exposure point concentration for the exposure unit. It should be noted that Perimeter Area data may be grouped differently in support of Decision 2, if appropriate, based on the risk assessment work plan. The data collected during the Perimeter Area investigation will be evaluated to determine the most appropriate exposure assessment process.

The Perimeter Area data will be further evaluated for the need for migration control based on the concentrations and types of constituents detected, the accessibility of the affected portion of the Perimeter Area, and the specific downslope area that may receive runoff from the affected portion of the Perimeter Area. Additionally, locations from within the fence line will be evaluated to assess if detected constituents around perimeter are likely to have originated from runoff within the fence line. If the detected constituents appear to have originated within the fence line of the compressor station, the apparent source will also be evaluated to assess any necessary steps to minimize the potential for further migration.

3.0 References

ARCADIS. 2008. *Human Health and Ecological Risk Assessment Work Plan, Topock Compressor Station, Needles, California.* August 25.

CH2M HILL. 2007. *Draft RCRA Facility Investigation Soil Investigation Work Plan Part B, PG&E Topock Compressor Station, Needles, California.* November.

__________. 2011a. *RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station Needles, California*. May.

__________. 2011b. *Soil Part B Data Quality Objectives Technical Memorandum, PG&E Topock Compressor Station Needles, California*. February.

Tables

Table C-1
Sample Results: Metals
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Metals (mg/kg)																	
Interim Screening Level[1]:				**0.285**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**0.0125**	**1.37**	**27.3**	**1.47**	**5.15**	**2.32**	**52.2**	**58**
Residential Regional Screening Levels[2]:				**31**	**0.062**	**15,000**	**160**	**70**	**0.29**	**280**	**23**	**3,100**	**150**	**5.6**	**390**	**1,500**	**390**	**390**	**5.1**	**390**	**23,000**
Residential DTSC CHHSL[3]:				**30**	**0.07**	**5,200**	**16**	**39**	**17**	**NE**	**660**	**3,000**	**80**	**18**	**380**	**1,600**	**380**	**380**	**5**	**530**	**23,000**
Ecological Comparison Values[4]:				**0.285**	**11.4**	**330**	**23.3**	**0.0151**	**139.6**	**36.3**	**13**	**20.6**	**0.0166**	**0.0125**	**2.25**	**0.607**	**0.177**	**5.15**	**2.32**	**13.9**	**0.164**
Background[5]:				**NE**	**11**	**410**	**0.672**	**1.1**	**0.83**	**39.8**	**12.7**	**16.8**	**8.39**	**NE**	**1.37**	**27.3**	**1.47**	**NE**	**NE**	**52.2**	**58**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium, Hexavalent**	**Chromium, total**	**Cobalt**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Vanadium**	**Zinc**
BH-69	03/18/11	0 - 0.5	N	ND (2.1) *	3.1	140	ND (1) *	ND (1)	0.72	58	12	20	9.6	ND (0.1) *	ND (1)	35	ND (1)	ND (1)	ND (2.1)	50	73
	03/18/11	2 - 3	N	ND (2.2) *	2.7	89	ND (1.1) *	ND (1.1) *	ND (0.45)	49	11	14	7.4	ND (0.11) *	ND (1.1)	33	ND (1.1)	ND (1.1)	ND (2.2)	45	61
	05/31/11	5 - 6	N	ND (2) *	1.7	250	ND (1) *	ND (1)	ND (0.41)	63	11	29	3.9	ND (0.1) *	1	46	ND (1)	ND (1)	ND (2)	55	49
	05/31/11	9 - 10	N	ND (2.1) *	2.2	150	ND (1) *	ND (1)	ND (0.42)	57	12	25	4.3	ND (0.1) *	ND (1)	45	ND (1)	ND (1)	ND (2.1)	59	53
	05/31/11	14 - 15	N	ND (2) *	1.9	170	ND (1) *	ND (1)	ND (0.41)	45	10	42	4	ND (0.1) *	ND (1)	42	ND (1)	ND (1)	ND (2)	58	48
	05/31/11	19 - 20	N	ND (2) *	1.6	280	ND (1) *	ND (1)	ND (0.41)	55	12	32	4.2	ND (0.1) *	ND (1)	43	ND (1)	ND (1)	ND (2)	57	49
	05/31/11	29 - 30	N	ND (2) *	1.9	120	ND (1) *	ND (1)	ND (0.4)	57	11	46	3.6	ND (0.1) *	ND (1)	50	ND (1)	ND (1)	ND (2)	74	50
	05/31/11	39 - 40	N	ND (2.1) *	2.8	170	ND (1.1) *	ND (1.1) *	ND (0.43)	48	8.4	21	4.1	ND (0.11) *	ND (1.1)	35	ND (1.1)	ND (1.1)	ND (2.1)	59	42
PA-OS1	04/06/11	9 - 9.5	N	ND (2) *	2.4	22	ND (1) *	ND (1)	ND (0.4) J	2.9	1.7	ND (2)	2.3	ND (0.1) J*	ND (1)	4.2	ND (1)	ND (1)	ND (2)	9.2	6.9
PA-OS2	04/06/11	0 - 0.5	N	ND (2) *	5.5	200	ND (1) *	ND (1)	ND (0.4) J	35	12	16	4.9	ND (0.1) J*	5.2	26	ND (1)	ND (1)	ND (2)	46	39
	04/06/11	11.5 - 12	N	ND (2) *	3.7	100	ND (1) *	ND (1)	ND (0.4) J	24	5.6	10	3.3	ND (0.1) J*	2.9	19	ND (1)	ND (1)	ND (2)	25	25

1 Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table C-2

Sample Results: Contract Laboratory Program Inorganics
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Contract Laboratory Program (CLP) Inorganics (mg/kg)							
			Interim Screening Level[1] :	16,400	66,500	55,000	12,100	402	4,400	2,070	0.9
			Residential Regional Screening Levels[2] :	77,000	NE	55,000	NE	1,800	NE	NE	1,600
			Residential DTSC CHHSL[3] :	NE	NE	NE	NE	NE	NE	NE	NE
			Ecological Comparison Values[4] :	NE	NE	NE	NE	220	NE	NE	0.9
			Background[5] :	16,400	66,500	NE	12,100	402	4,400	2,070	NE
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Manganese**	**Potassium**	**Sodium**	**Cyanide**
BH-69	03/18/11	2 - 3	N	17,000	28,000	23,000	12,000	360	3,800	1,700	---
	05/31/11	5 - 6	N	20,000	62,000	30,000	16,000	520	3,400	1,500	ND (0.26)
	05/31/11	9 - 10	N	20,000	40,000	31,000	16,000	420	4,000	1,700	ND (0.26)
	05/31/11	14 - 15	N	19,000	71,000	29,000	15,000	430	3,400	1,500	ND (0.26)
	05/31/11	19 - 20	N	20,000	67,000	31,000	15,000	440	3,600	1,500	ND (0.26)
	05/31/11	29 - 30	N	19,000	30,000	32,000	16,000	410	5,500	1,000	ND (0.25)
	05/31/11	39 - 40	N	16,000	34,000	26,000	13,000	320	4,500	1,100	ND (0.27)

Table C-2

Sample Results: Contract Laboratory Program Inorganics
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

[1] Interim screening level is background value. If background value is not available then the lesser of the DTSC residential CHHSL or the ecological comparison value is used. If CHHSL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

[2] USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

[3] California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil" November 2004 (January 2005 Revision). January.

[4] ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil". May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

[5] CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled; however, if the interim screening level is equal to the background value, only results greater than the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table C-3

Sample Results: Polycyclic Aromatic Hydrocarbons
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Polycyclic Aromatic Hydrocarbons (µg/kg)																				
Interim Screening Level[1] :				**22,000**	**310,000**	**3,400,000**	**1,700,000**	**17,000,000**	**380**	**38**	**380**	**1,700,000**	**380**	**3,800**	**110**	**2,300,000**	**2,300,000**	**380**	**3,600**	**1,700,000**	**1,700,000**	**10,000**	**1,160**	**38**
Residential Regional Screening Levels[2] :				**22,000**	**310,000**	**3,400,000**	**1,700,000**	**17,000,000**	**380**	**15**	**380**	**1,700,000**	**380**	**3,800**	**110**	**2,300,000**	**2,300,000**	**380**	**3,600**	**1,700,000**	**1,700,000**	**NE**	**NE**	**15**
Residential DTSC CHHSL[3] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**38**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**38**
Ecological Comparison Values[4] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**10,000**	**1,160**	**NE**
Background[5] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**1-Methyl naphthalene**	**2-Methyl naphthalene**	**Acenaphthene**	**Acenaphthylene**	**Anthracene**	**Benzo (a) anthracene**	**Benzo (a) pyrene**	**Benzo (b) fluoranthene**	**Benzo (ghi) perylene**	**Benzo (k) fluoranthene**	**Chrysene**	**Dibenzo (a,h) anthracene**	**Fluoranthene**	**Fluorene**	**Indeno (1,2,3-cd) pyrene**	**Naphthalene**	**Phenanthrene**	**Pyrene**	**PAH Low molecular weight**	**PAH High molecular weight**	**B(a)P Equivalent**
BH-69	03/18/11	0 - 0.5	N	ND (5.2)	6.3 J	ND (5.2)	ND (5.2)	ND (5.2)	12	17	29	17	10	19	ND (5.2)	350	ND (5.2)	15	ND (5.2)	9.4	28	16	500	25
	03/18/11	2 - 3	N	ND (5.6)	10 J	ND (5.6)	ND (5.6)	ND (5.6)	7.4	10	20	12	7.4	12	ND (5.6)	20	ND (5.6)	10	5.6	6.3	18	22	120	16
	05/31/11	5 - 6	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.5)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	05/31/11	9 - 10	N	ND (5.3)	ND (53)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.4)	ND (5.3)	ND (5.3)	ND	ND	ND (4.6)
	05/31/11	14 - 15	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.3)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	05/31/11	19 - 20	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	05/31/11	29 - 30	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (6.4)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	05/31/11	39 - 40	N	ND (5.3)	ND (53)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (5.3)	ND (6)	ND (5.3)	ND (5.3)	ND	ND	ND (4.6)
PA-OS1	04/06/11	0 - 0.5	N	ND (5)	ND (50)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (50)	ND (5)	ND	ND	ND (4.4)
	04/06/11	2.5 - 3	N	ND (5)	ND (50)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5.5)	ND (5)	ND (5)	ND	ND	ND (4.4)
	04/06/11	5.5 - 6	N	ND (5)	ND (50)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5.7)	ND (5)	ND (5)	ND	ND	ND (4.4)
	04/06/11	9 - 9.5	N	ND (5)	5	ND (50)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (6.1)	ND (5)	ND (5)	5	ND	4.4
PA-OS2	04/06/11	0 - 0.5	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	04/06/11	2.5 - 3	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	04/06/11	5.5 - 6	N	ND (5)	ND (50)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (50)	ND (5)	ND (5)	ND	ND	ND (4.4)
	04/06/11	9.5 - 10	N	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)	ND (51)	ND (5.1)	ND (5.1)	ND	ND	ND (4.5)
	04/06/11	11.5 - 12	N	ND (5)	ND (50)	ND (5)	ND (5)	ND (5)	5	ND (5)	ND (5)	ND (5)	ND (5)	20	ND (5)	ND (5)	ND (5)	ND (5)	ND (50)	ND (5)	10	ND	35	4.8

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 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
µg/kg	micrograms per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table C-4

Sample Results: Total Petroleum Hydrocarbons and General Chemistry
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Total Petroleum Hydrocarbons (mg/kg)			General Chemistry (mg/kg)	
			Interim Screening Level[1] :	**540**	**540**	**1,800**	**NE**	**NE**
			Residential Regional Screening Levels[2] :	**NE**	**NE**	**NE**	**NE**	**NE**
			Residential DTSC CHHSL[3] :	**NE**	**NE**	**NE**	**NE**	**NE**
			RWQCB Environmental Screening Levels [4] :	**540**	**540**	**1,800**	**NE**	**NE**
			Ecological Comparison Values[5] :	**NE**	**NE**	**NE**	**NE**	**NE**
			Background[6] :	**NE**	**NE**	**NE**	**0**	**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**TPH as gasoline**	**TPH as diesel**	**TPH as motor oil**	**pH**	**Total organic carbon**
BH-69	03/18/11	0 - 0.5	N	ND (1)	83	150	9	7,700
	03/18/11	2 - 3	N	ND (1)	14	33	9.1	4,900
	05/31/11	5 - 6	N	ND (1)	ND (10)	ND (10)	9.7	18,000
	05/31/11	9 - 10	N	ND (1.1)	ND (10)	ND (10)	9.6	10,000
	05/31/11	14 - 15	N	ND (1.1)	ND (10)	ND (10)	9.6	8,300
	05/31/11	19 - 20	N	ND (0.91)	ND (10)	ND (10)	9.4	6,600
	05/31/11	29 - 30	N	ND (1)	ND (10)	ND (10)	9.7	6,700
	05/31/11	39 - 40	N	ND (0.9)	ND (11)	ND (11)	9.8	7,900
PA-OS1	04/06/11	0 - 0.5	N	---	15	ND (10)	7.8	---
	04/06/11	2.5 - 3	N	ND (1.7)	14	ND (10)	7.9	---
	04/06/11	5.5 - 6	N	ND (1.4)	ND (10)	ND (10)	8.2	---
	04/06/11	9 - 9.5	N	ND (1.1)	ND (10)	ND (10)	8.7	---
PA-OS2	04/06/11	0 - 0.5	N	---	---	---	8.3	---
	04/06/11	2.5 - 3	N	---	---	---	7.9	---
	04/06/11	5.5 - 6	N	---	---	---	8	---
	04/06/11	9.5 - 10	N	---	---	---	8.8	---
	04/06/11	11.5 - 12	N	---	---	---	8.1	---

1 For SVOCs, 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. For TPHs, interim screening level is the Regional Water Quality Control Board environmental screening level.

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites". http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil, November 2004 (January 2005 Revision)". January.

4 Water Board. 2008. "Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater" (Table K-1). May 27.

5 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil. May 28 and ARCADIS. 2009. Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil". July 1.

6 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California". May.

Results greater than the interim screening level are circled.

Only detected VOCs and SVOCs are presented.

SVOCs	semivolatile organic compounds
TPH	total petroleum hydrocarbon
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
Water Board	Regional Water Quality Control Board
NE	not established
mg/kg	milligrams per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table C-5

Sample Results: PCBs
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Polychlorinated biphenyls (µg/kg)								
Interim Screening Level[1] :				**3,900**	**140**	**140**	**220**	**220**	**220**	**220**	**220**	**220**
Residential Regional Screening Levels[2] :				**3,900**	**140**	**140**	**220**	**220**	**220**	**220**	**220**	**220**
Residential DTSC CHHSL[3] :				**89**	**89**	**89**	**89**	**89**	**89**	**89**	**89**	**89**
Ecological Comparison Values[4] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Background[5] :				**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**Aroclor 1016**	**Aroclor 1221**	**Aroclor 1232**	**Aroclor 1242**	**Aroclor 1248**	**Aroclor 1254**	**Aroclor 1260**	**Aroclor 1262**	**Aroclor 1268**
BH-69	03/18/11	0 - 0.5	N	ND (17)	ND (34)	ND (17)	ND (17)	ND (17)	67	ND (17)	ND (17)	ND (17)
	03/18/11	2 - 3	N	ND (18)	ND (37)	ND (18)	ND (18)	ND (18)	51	ND (18)	ND (18)	ND (18)
	05/31/11	5 - 6	N	ND (17)	ND (34)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
	05/31/11	9 - 10	N	ND (17)	ND (35)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
	05/31/11	14 - 15	N	ND (17)	ND (34)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
	05/31/11	19 - 20	N	ND (17)	ND (34)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
	05/31/11	29 - 30	N	ND (17)	ND (34)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)
	05/31/11	39 - 40	N	ND (18)	ND (35)	ND (18)	ND (18)	ND (18)	ND (18)	ND (18)	ND (18)	ND (18)
PA-OS1	04/06/11	0 - 0.5	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	2.5 - 3	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	5.5 - 6	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	9 - 9.5	N	ND (16)	ND (33)	ND (16)	ND (16)	ND (16)	ND (16)	ND (16)	---	---
PA-OS2	04/06/11	0 - 0.5	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	2.5 - 3	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	18	ND (17)	---	---
	04/06/11	5.5 - 6	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	9.5 - 10	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	ND (17)	ND (17)	---	---
	04/06/11	11.5 - 12	N	ND (17)	ND (33)	ND (17)	ND (17)	ND (17)	48	ND (17)	---	---

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

2 USEPA. 2009. "Regional Screening Levels for Chemical Contaminants at Superfund Sites." http://epaprgs.ornl.govchemicals/index.shtml. December.

3 California EPA, Office of Environmental Health Hazard Assessment. 2005. "Human Exposure Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil." November 2004 (January 2005 Revision). January.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Dectected Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Table C-5

Sample Results: PCBs

Perimeter Area Investigation

Soil RCRA Facility Investigation/Remedial Investigation Work Plan

Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Results greater than or equal to the interim screening level are circled.

*	Reporting limits greater than or equal to the interim screening level.
USEPA	United States Environmental Protection Agency
DTSC	California Department of Toxic Substances Control
CHHSL	California human health screening levels
NE	not established
µg/kg	micrograms per kilogram
ft bgs	feet below ground surface
N	primary sample
FD	field duplicate
---	not analyzed
ND	not detected at the listed reporting limit
J	concentration or reporting limit estimated by laboratory or data validation

Table C-6

Sample Results: Dioxins
Perimeter Area Investigation
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

				Dioxin/Furans (ng/kg)																			
Interim Screening Level[1] :				NE	NE	NE	NE	NE	NE	NE	NE	NE	4.6	NE	NE	NE	4.6	NE	NE	NE	16	50	1.6
Residential Regional Screening Levels[2] :				NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Residential DTSC CHHSL[3] :				NE	NE	NE	NE	NE	NE	NE	NE	NE	4.6	NE	NE	NE	4.6	NE	NE	NE	NE	4.6	NE
Ecological Comparison Values[4] :				NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	16	NE	1.6
Background[5] :				NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Location	**Date**	**Depth (ft bgs)**	**Sample Type**	**1,2,3,4,6,7,8-HpCDD**	**1,2,3,4,6,7,8-HpCDF**	**1,2,3,4,7,8,9-HpCDF**	**1,2,3,4,7,8-HxCDD**	**1,2,3,4,7,8-HxCDF**	**1,2,3,6,7,8-HxCDD**	**1,2,3,6,7,8-HxCDF**	**1,2,3,7,8,9-HxCDD**	**1,2,3,7,8,9-HxCDF**	**1,2,3,7,8-PeCDD**	**1,2,3,7,8-PeCDF**	**2,3,4,6,7,8-HxCDF**	**2,3,4,7,8-PeCDF**	**2,3,7,8-TCDD**	**2,3,7,8-TCDF**	**OCDD**	**OCDF**	**TEQ Avian**	**TEQ Human**	**TEQ Mammals**
BH-69	03/18/11	0 - 0.5	N	1,900	ND (300)	12 J	16	12 J	55	ND (17)	27	2.7 J	6.6 J	ND (0.12)	12 J	3.8 J	ND (0.78)	2.4 J	16,000	270	26	47	47
	03/18/11	2 - 3	N	930	ND (140)	5.2 J	8.2 J	6.8 J	28	ND (9.4)	14	1.9 J	3.9 J	ND (0.053)	6.7 J	2.8 J	ND (0.34)	ND (1.4)	8,200	94	14	25	25
	05/31/11	5 - 6	N	1.5 J	1.3 J	ND (0.64)	ND (0.45)	ND (0.37)	ND (0.61)	ND (0.34)	ND (0.58)	0.88 J	ND (0.16)	ND (0.36)	0.59 J	ND (0.11)	ND (0.13)	ND (0.59)	ND (6.3) J	4.4 J	0.76	0.49	0.49

1 Interim screening level is equal to the appropriate background value, if a background value is not available then the lesser of the soil ecological comparison values and DTSC CHHSL is used, if the DTSC CHHSL is not available, the USEPA regional screening level is used.

2 Residential screening level - residential DTSC CHHSL. If the residential DTSC CHHSL is not established, the USEPA regional screening level is used.

3 Commercial screening level - commercial DTSC CHHSL. If the commercial DTSC CHHSL is not established, the USEPA regional screening level is used.

4 ARCADIS. 2008. "Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil." May 28. ARCADIS. 2009. "Topock Compression Station - Final Technical Memorandum 4: Ecological Comparison Values for Additional Detected Chemicals in Soil." July 1.

5 CH2M HILL. 2009. "Final Soil Background Technical Memorandum at Pacific Gas and Electric Company Topock Compressor Station, Needles, California." May.

Results greater than or equal to the Interim Screening Level are circled.

NE = not established

NA = not applicable

USEPA = United States Environmental Protection Agency

DTSC = California Department of Toxic Substances Control

CHHSL = California human health screening levels

Calculations:

Teq = Sum of Result x TEF, 1/2 reporting limit used for nondetects. If all Dioxins and Furans are nondetect, the final qualifier code is U.

TeqBird = Sum of Result x TEF, 1/2 reporting limit used for nondetects. If all Dioxins and Furans are nondetect, the final qualifier code is U.

TeqMammals = Sum of Result x TEF, 1/2 reporting limit used for nondetects. If all Dioxins and Furans are nondetect, the final qualifier code is U.

-- = not analyzed

FD = Field Dupliicate

ft bgs = feet below ground surface

J = concentration or reporting limit estimated by laboratory or data validation

N = Primary Sample

ND = not detected at the listed reporting limit

ng/kg = nanograms per kilogram

R = rejected by laboratory or data validation

TABLE C-7
Proposed Sampling Plan
Perimeter Area Investigation Program
Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Depths (feet)	Description/Rationale	Analytes
PA01	0-1	Northwest of Cooling Tower B/surface sample in vegetated area (formerly AOC13-38)	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA02 (formerly AOC13-41)	0-1	West of Cooling Tower B and near storm drain catchment basin	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA03 (formerly AOC13-44 [2007] and PA05 [2011])	0-1	Assess potential runoff from lower yard	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA04 (formerly AOC13-45 [2007] and PA06 [2011])	0-1	Assess potential runoff from lower yard and storm drain catchment basin	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA05 (formerly AOC13-46 [2007] and PA07 [2011])	0-1	At discharge pipe from Maintenance Shop evaporate cooler	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA06 (formerly AOC13-47 [2007] and PA08)	0-1	Downslope of visitor's parking lot and steam cleaning area	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA07 (formerly AOC13-36 [2007] and PA11 [2011])	0-1	East of Cooling Tower B/surface sample of red-stain material, and underlying soil	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
PA08(AOC 31) (formerly AOC13-37 [2007] and PA12 [2011])	0-1, 3, 5, and 10	To assess offsite migration and nature and extent of impacts related to Teapot Dome former oil pit	Title 22 metals, hexavalent chromium, TPH, volatile organic compounds, SVOCs, PAHs, and PCBs
XRF-1	Surface	North of station garage, Perimeter Area general coverage	XRF suite of metals
XRF-2	Surface	North of station fuel tanks, Perimeter Area general coverage	XRF suite of metals
XRF-3	Surface	Northwest of station fuel tanks, Perimeter Area general coverage	XRF suite of metals
XRF-4	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-5	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-6	Surface	Southeast of Cooling Tower B, Perimeter Area general coverage	XRF suite of metals
XRF-7	Surface	East of Cooling Tower B, Perimeter Area general coverage	XRF suite of metals
XRF-8	Surface	East of Cooling Tower B, Perimeter Area general coverage	XRF suite of metals

TABLE C-7
Proposed Sampling Plan
Perimeter Area Investigation Program
Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Depths (feet)	Description/Rationale	Analytes
XRF-9	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-10	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-11	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-12	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-13	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-14	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-15	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-16	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-17 (formerly PA04)	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-18	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-19	Surface	West of Sludge Drying Beds (SWMU 5), Perimeter Area general coverage	XRF suite of metals
XRF-20	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-21	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-22	Surface	East of Hazardous Materials Storage Area (AOC 7), Perimeter Area general coverage	XRF suite of metals
XRF-23	Surface	Perimeter Area general coverage	XRF suite of metals
XRF-24	Surface	East of former Three-Sided Structure in Upper Yard (AOC 22), Perimeter Area general coverage	XRF suite of metals
XRF-25	Surface	East of Station Septic System and Leach Lines (AOC 17), Perimeter Area general coverage	XRF suite of metals
XRF-26	Surface	East of Station Septic System and Leach Lines (AOC 17), East of Steam Cleaning Area, Perimeter Area general coverage	XRF suite of metals
XRF-27	Surface	East of Steam Cleaning Area, Perimeter Area general coverage	XRF suite of metals
XRF-28	Surface	East of Visitor Parking Lot/evaluate dark soil area in 1955 aerial photo, Perimeter Area general coverage	XRF suite of metals

TABLE C-7
Proposed Sampling Plan
Perimeter Area Investigation Program
Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Depths (feet)	Description/Rationale	Analytes
XRF-29	Surface	East of Visitor Parking Lot/evaluate dark soil area in 1955 aerial photo, Perimeter Area general coverage	XRF suite of metals
XRF-30	Surface	East of Visitor Parking Lot/evaluate dark soil area in 1955 aerial photo, Perimeter Area general coverage	XRF suite of metals
XRF-31	Surface	South of station Warehouse, Perimeter Area general coverage	XRF suite of metals
XRF-32	Surface	South of station Warehouse, Perimeter Area general coverage	XRF suite of metals
XRF-33	Surface	South of station Warehouse, Perimeter Area general coverage	XRF suite of metals
XRF-39	Surface	South of station Warehouse, Perimeter Area general coverage	XRF suite of metals

Notes:

Ten percent of soil samples will be analyzed for Target Analyte List/Target Compound List parameters.

The XRF suite of metals consists of antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury molybdenum, nickel, selenium, vanadium, and zinc.

Figures

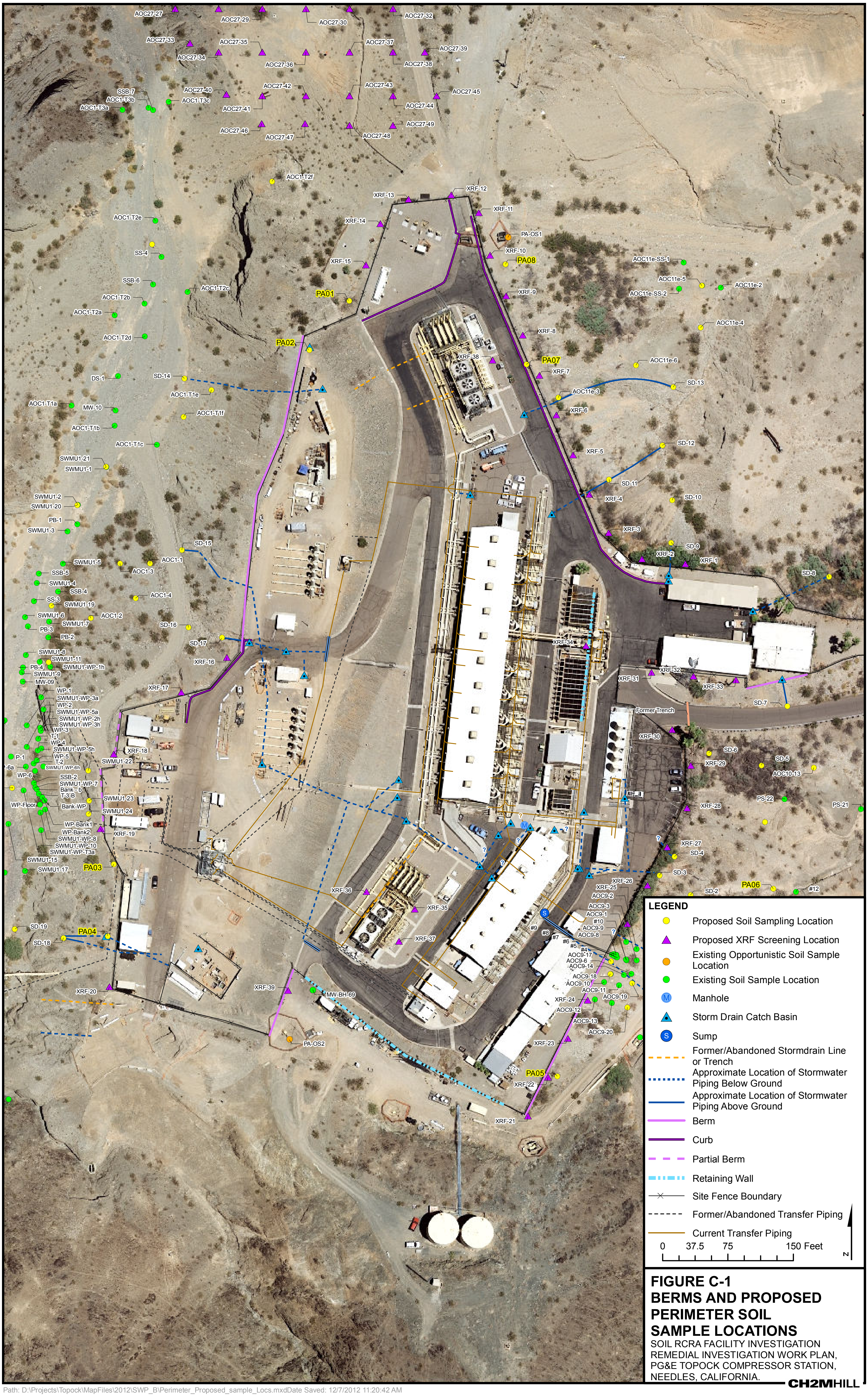

FIGURE C-1
BERMS AND PROPOSED PERIMETER SOIL SAMPLE LOCATIONS

SOIL RCRA FACILITY INVESTIGATION
REMEDIAL INVESTIGATION WORK PLAN,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA.

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2012\SWP_B\Perimeter_Proposed_sample_Locs.mxdDate Saved: 12/7/2012 11:20:42 AM

Appendix D
Storm Drain System Investigation Program

Contents

Acronyms and Abbreviations

AOC	Area of Concern
bgs	below ground surface
CCTV	closed-circuit television
COPC	chemical of potential concern
DQO	data quality objective
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
TAL	Target Analyte List
TCL	Target Compound List
TPH	total petroleum hydrocarbons

1.0 Storm Drain System Investigation Program

In addition to the hazardous waste treatment system piping (Area of Concern [AOC] 18) and industrial floor drain piping (AOC 20) described in Appendices B15 and B17, storm drain lines are present throughout the compressor station. This appendix describes the proposed investigation program for the storm drain system at the Topock Compressor Station.

1.1 Storm Drain Description and History

Storm drain lines are both potential sources and potential pathways for contaminant migration. The conceptual site model for the storm drain system includes releases of hazardous constituents into the storm drains as a result of contaminated soil carried in surface water runoff and/or liquid spills. Contaminants released to storm drains could then be released to surface soils via direct discharge at an outfall, or to the subsurface if the piping is degraded. Hazardous constituents may also be present in soil accumulated in the storm drains during station operations.

Only limited information is available regarding the locations of storm drain lines at the Topock Compressor Station. Sixteen active and inactive storm drain lines have been visually identified outside the fence line; the catch basin associated with inactive Storm Drain Line 15 was removed during the AOC 4 time-critical removal action. Some portions of storm drain lines leading to these lines are also visible outside the fence line. Catch basins are visible within the compressor station. Written records (that is, engineering drawings and updates to drawings) are limited. Available written information is summarized in Table D-1. Available written information was supplemented with employee interviews and on-the-ground surveys of outfalls and catch basins. Figure D-1 shows the 16 identified storm drain outfalls, as well as known and inferred storm drain alignments associated with these outfalls. It is not known whether any of these alignments are inactive.

Employee interviews indicate that historically, storm drain lines were added when needed, (for example, when a storm drain line stopped draining and could not be unplugged). Similar to other abandoned underground utilities within the compressor station, abandoned storm drains were commonly abandoned in place rather than risk the additional dangers associated with removal (CH2M HILL, 2011a).

Some storm drain lines outside the compressor station were buried for their entire run (to the bottom of the slope); others were buried only to the edge of the top slope and are exposed for the remaining run. Exposed drain lines were repaired when they corroded; covered lines were often repaired or replaced when it became apparent that a leak had developed (this would typically be due to erosion along the line).

1.2 Summary of Past Storm Drain Characterization

No physical investigation has been conducted to specifically target the storm drains. A records review was conducted for the *Revised Final RCRA Investigation/Remedial Investigation Report, Volume 1 - Site Background and History, PG&E Topock Compressor Station, Needles, California* (CH2M HILL, 2007) and during subsequent phases of soil investigation work plan preparation. Some soil samples have been collected in the vicinity of or downslope from storm drain outfalls. The pertinent sample areas near various storm drain lines have been evaluated, and data gaps have been addressed in Appendices A and B to the main work plan.

1.3 Storm Drain System Data Needs

Two types of information will be generated by the storm drain investigation: information on the alignments of various storm drain lines, and soil sample information outside the fence line. Information on storm drain line alignments is required to satisfy Decision 4 of the Part B data quality objectives (DQOs) (CH2M HILL, 2011b). Because storm drains provide a potential transport pathway for constituents released within the fence line to areas outside fence lines, the potential for constituents in soil and spilled liquids to migrate to areas outside the fence line is dependent upon which catch basins discharge to the various outfalls.

In addition, to satisfy Part A and Part B DQO Decision 1, data are needed to characterize potential discharges from storm drains to soil. Finally, both types of information are required to satisfy Part A and Part B Decision 4, and Part B DQO Decision 5 (that is, to ensure that there is sufficient information to proceed with the development of the corrective measures study/feasibility study, remedial design, and/or interim measures). The primary transport pathway associated with the storm drain system would be discharge of contaminants into the storm drains, followed by runoff from the storm drains to areas outside the fence line. It is possible that constituents were released to soil within the fence line at poor joints or breaks in the storm drain lines. These constituents in soil could be leached to groundwater more quickly than at other areas of the facility to due to periodic flushing events with rain or facility generated fluids. Consequently, an important consideration in the storm drain alignment investigation is not only the physical location of the storm drains but the drainage pathways (that is, assessing which storm drains discharge to specific outfalls).

While it is also possible that constituents were released to soil within the fence line from poor joints or breaks in the pipelines no intrusive sampling is planned alongside or underneath storm drains within the compressor station at this time. Releases to storm drains would have been driven by the highly episodic, limited rainfall events at Topock Compressor Station, and the preferred discharge pathway would have been to the outfall. The episodic nature of flow events would minimize the likelihood of lateral migration along the storm drain bedding material because, as it would be atypical for runoff to be present in the lines. In addition, the Topock Compressor Station maintains an active Spill Prevention, Control, and Countermeasure Plan and Hazardous Materials Business Plan to minimize the risk of releases of hazardous constituents to the storm drains. For these reasons, intrusive investigation along the storm drain lines is not planned at this time. The need for intrusive investigation will be reevaluated after the storm drain investigation outlined below has been completed. Unless the investigation effort proposed in this appendix indicates that substantial releases of contaminants have occurred from the storm drain system, the potential risk associated with intrusive investigation along the storm drain lines within the fence line is not justified by the value of the information that would be obtained from the information.

1.4 Storm Drain Alignment Investigation

1.4.1 Storm Drain Alignment Investigation Scope

As noted above, storm drains have been identified as potential sources as well as potential transport pathways. To assess whether a potential storm drain line may act as a transport pathway, it is valuable to understand which storm drain catch basins are currently connected to the various identified outfalls.

1.4.2 Storm Drain Alignment Investigation Process

The storm drain investigation process will consist of five steps:

1. Verification and expansion of the previous record search
2. Visual field verification of the record search results (as feasible)
3. Geophysical investigation
4. Flow testing
5. Video camera tracing(as feasible)

No intrusive investigation (that is, uncovering of lines to trace them) to identify storm drain alignments is planned. Intrusive investigation of storm drains would pose the same concerns as intrusive soil investigation.

The five steps will be performed in sequence so that each step benefits from the information collected during the previous steps. The output from this task will be a map showing all information collected during the alignment investigation. The map will show catch basins and visible pipes/outfalls. Connections between catch basins and outfalls will also be provided; some of the connections between outfalls and catch basins will most likely continue to be inferred. The storm drain alignment investigation will include all storm drain lines at the within and outside the compressor station; however, accurately locating subsurface storm drain lines outside the compressor station is likely to be infeasible in most instances given their location on steep slopes.

Because the tasks must be performed in sequence to maximize the value of the storm drain alignment investigation, the storm drain alignment investigation will span several months. Intrusive sampling (see Section 1.4.3) will be conducted after the alignment investigation has been completed, to verify that appropriate sample locations and analytical parameters have been selected. Each of the tasks is described in more detail below.

1.4.2.1 Record Search

Existing information regarding storm drain alignments available at the time the Draft Soil Work Plan was submitted was taken from available documentation pertaining to storm drains, past employee interviews, and visual observations at the station. This information consisted primarily of one as-built drawing of the original system with very limited annotations regarding subsequent modifications. The most recent modifications on this drawing were dated 1993. Subsequently, Pacific Gas and Electric Company (PG&E) reviewed the engineering drawings on file at the Topock Compressor Station. Over 1,500 drawings were reviewed to identify drawings that would provide additional information about the storm drain system. Nine drawings provide additional information on the storm drain system. Of these nine drawings, three are various revisions (Revisions 22, 27, and 29) of the most important drawing (481785; Sewers and Drains, Topock Compressor Station). The original Drawing 481785 appears to have been released February 5, 1951 (although the date is smudged and difficult to read in all copies of the drawing). The earliest version of the drawing found was Revision 22 (dated May 24, 1971); the latest revision (Revision 29) was dated September 7, 1993. This latest drawing was used to form the basis for the storm drain alignments presented in the Draft Soil Work Plan). Revisions 1 through 18 were completed during the early years of the station; Revision 22 show a revision date for revision 19 of June 23, 1957. Revisions 20 was completed in 1959, and Revisions 21through 25 were dated from 1966 to 1971. Revisions 26, 27, and through 28 were dated 1988, 1991, and 1992 respectively. Drawing 481785 show alignments of storm drains within the compressor station, but does not provide information on the alignment of outfalls.

Four other drawings (Drawing 282653, Drawing 482629, and two sketches) also show storm drain alignments or connections; the remaining drawings show elements of the storm drain system such as the control system and configuration of a typical catch basin. Drawing 482629 provides similar information to Drawing 481785. Drawing 282653 shows the alignments of storm drains outside the compressor station, as well as connections to catch basins and trench drains. However, because Drawing 282653 does not have a revision number, and there is no note indicating it was released for construction, it is uncertain whether all the storm drain lines and catch basins shown in the drawing were installed. These drawings were used to revise and update the storm drain location map (Figure D-1); it is not known whether any of these alignments shown are inactive.

In addition, Figure D-1 was checked against the most recent Hazardous Materials Business Plan (HMBP) available for the station (PG&E, 2011).

1.4.2.2 Visual Field Verification

Any new information uncovered during the record search will be visually verified in the field to the degree feasible. This step will include consultation with knowledgeable employees currently employed at the station, as applicable. Items that cannot be verified visually will be further evaluated in subsequent phases of the storm drain alignment investigation, if feasible. The visual field verification may be an iterative process if additional information is located.

The updated storm drain map included as Figure D-1 with to this Final Soil Work Plan shows all known catch basins. A preliminary field review of catch basins was performed to verify the locations and number of catch basins shown on the previous drawing, and the drawing was corrected as needed. Twenty-nine catch basins and three trench drains were located during the initial review. Trench drains are either purpose-built trenches designed only to catch run-off from a specific area, or may consist of pipe trenches with a stormwater outlet. Where accumulated soil material is encountered in any catch basin or trench drain during the full visual field verification, a sample will be collected and analyzed for Title 22 metals, hexavalent chromium, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). During the preliminary review, the catch basins were probed where feasible to evaluate whether accumulated soil material was present within the basin, assess the estimated thickness of the accumulated soil material, where applicable, and determine if the catch basin had a hard bottom or not. Twenty catch basins could be probed. All of these had a hard bottoms. The trench drains have hard bottoms as well. The initial field review indicated that accumulated soil material appeared to be present in 8 to 10 catch basins, and ranged from less than one1 inch to more than 4 inches thick. A detailed assessment of the catch basins, including inspection of the pipes leading into the basins to assess the sizes and materials relative to the information provided on the drawings, where applicable, will be performed as part of the implementation of the alignment investigation.

Fifty percent of the samples collected from catch basins will be analyzed for the full suite of Target Analyte List/Target Compound List (TAL/TCL) constituents, if sufficient material is present. For locations with insufficient accumulated material to run the desired suite of chemical analyses, preferred analytical parameters will be determined based on available information regarding historical activities in the vicinity of the specific catch basin.

1.4.2.3 Geophysical Investigation

PG&E anticipates that there will still be various gaps in the information regarding the location of storm drain lines following the records review and visual verification. The next step in the storm drain alignment investigation will be a geophysical survey. The survey will attempt to trace lines between catch basins and outfall pipes for those areas where written records are incomplete. Due to the extensive presence of metallic equipment, buildings, and underground lines, there is a high likelihood of interference with geophysical methods causing uncertainty in the line tracing effort. For example, while it may be possible to trace a storm drain line for a certain distance, other lines may cross and/or join the line being traced, and it may be impossible to determine which direction the storm drain line takes at that point. In addition, tracing lines composed of a variety of pipe materials, both metallic and non-metallic, may also be necessary. Finally, as described earlier, because the historical practice at the station was to simply abandon blocked storm drain lines in place, distinguishing between active and inactive lines may not be feasible.

PG&E will attempt the geophysical survey; however, if the contractor and/or PG&E determine that the survey is yielding little or no usable information, the survey will be terminated after consultation with and approval from the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and the United States Department of Interior, and PG&E will proceed with the flow testing described in Section 1.4.2.4.

Currently, some of the visible storm drain outfall pipes are constructed of galvanized steel; however, subsurface portions of the storm drain lines may also be constructed of other materials. The specific materials of construction for each underground storm drain line segment are unknown, although the engineering drawings indicate that the majority were constructed of vitrified clay piping, with a few segments being constructed of transite. More recent pipelines may be constructed of synthetic materials. As a basis of comparison, available information indicates that underground piping associated with AOCs 18 and 20 may have been constructed from some of the following materials: polyethylene, polyvinyl chloride, aluminum, carbon steel, cast iron, vitrified clay, reinforced fiberglass, and acrylonitrile-butadiene-styrene. Consequently, various non-intrusive methods may be used as applicable. These include ground-penetrating radar, electromagnetic induction, and vertical magnetic gradient scans. There are likely to be some surface obstructions to the geophysical survey. The survey will avoid areas where access or other conditions (for example, sparks) could create a hazard. The ground surface will be hand-graded following the ground-penetrating radar survey.

A survey grid will first be established to provide horizontal control for data acquisition. The grid size will be determined based on the size of the area being surveyed, presence of surface obstructions, and expected density of all subsurface utilities. Potential storm drain pipes will first be identified using vertical magnetic gradient and electromagnetic induction scans and may then be confirmed using ground-penetrating radar.

An attempt will be made to locate subsurface storm drain lines outside the fence line using geophysical survey methods; however, due to the topography, locating subsurface storm drain lines outside the compressor station using geophysical methods is likely to be largely infeasible. Equipment that has to be moved over the ground surface and/or bulky hand-carried equipment will not be usable on the steep slopes outside the station.

Geophysical instruments must be field tested frequently to ensure that they are operating properly. The field tests may include equipment warm-up, positioning systems accuracy, personnel test, vibration test (Cable Shake), static background and static spike, Azimuthal test (magnetometer only), and Octant test (heading error test) (magnetometer only).

1.4.2.4 Flow Testing

The most direct method for establishing which catch basins are connected to specific outfalls is to discharge water to individual catch basins and determine where the water exits. In addition, by selecting the most "upstream" catch basin as the location to receive the test water and watching nearby catch basins, the investigation will be able to confirm that various catch basins are in fact located on the same line. In addition to verifying flow paths, the investigation will also identify drain lines that are blocked because, as water will not discharge and will eventually fill up the storm drain line being tested. The amount of water to be discharged to specific catch basins will be determined based on available information regarding the size(s) of the pipeline and the length of the pipeline run to the outfall. Discharge of test water will be discontinued once the applicable outfall location has been verified.

Based on the preliminary review of catch basins, it appears that some storm drain lines may be blocked by accumulated soil material in the catch basins. After the accumulated soil material has been sampled, the remainder will be removed from the catch basins and containerized pending analysis of the sample (see Section 2.2 of the main body of this work plan for management of investigation-derived waste). Once the sediment has been removed, the catch basin will be flow tested if possible. If the storm drain appears to be blocked, PG&E will attempt to flow test a catch basin closer to the discharge location "downstream." In some cases, PG&E may attempt to pressure wash specific storm drain line segments to remove accumulated soil material. It should be noted that storm drain lines may also be blocked due to collapse or other reasons. If pressure washing is not successful in restoring flow to a specific segment, the segment will not be flow tested further.

Some catch basins are known or suspected to have multiple pipes entering them. To allow effective flow testing of each line entering the catch basin, the remaining lines will be blocked off temporarily. Storm drain lines will be blocked off using a temporary packer or similar method.

The majority of the flow testing is expected to be performed using Topock Compressor Station water. It is possible, however, that it would be beneficial to conduct dye testing to enable PG&E to more completely understand the storm drain connections. Dye testing, if needed, would be performed using non-toxic dyes that are approved for discharge into sensitive aquatic environments. PG&E will consult with the agencies and the Tribes to ensure that any dye chosen for this work is acceptable.

Water from the flow testing will be allowed to flow as though it were rainwater, with special provisions for collecting dye- test water, if needed. Samples of discharge water will be collected from accessible outfalls, and will be analyzed for Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs. Prior to flow- testing activities, PG&E will collect a source- water sample from the water pipeline or truck providing the flow test water. The source- water sample(s) will also be analyzed for Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs to determine chemicals of potential concern concentrations in the source water, if any, and to allow comparison between source-water and discharge- water samples. If elevated concentrations of chemicals of potential concern are present in the discharge water, some contamination can be presumed to be present in the storm drain line.

1.4.2.5 Video Camera Tracing

The final step in the storm drain alignment investigation will consist of confirming pipeline runs, and locating breaks, obstacles and known and unknown service connections using closed- circuit television (CCTV) inspection techniques, if feasible. Each accessible segment of the storm drain lines will be viewed by panning and tilting a CCTV camera so that sags, connections, breaks, and potential accumulated soil material are clearly shown. To optimize the usefulness of the inspection, it will be conducted during dry weather only. The self-propelled camera will not be able to operate on the extremely steep slopes outside the fence line, so the self-propelled camera will not be used to complete the CCTV investigation for storm drain lines on the slopes outside the compressor station. Instead, the camera will be attached to a draw wire that will be strung through the storm drain lines located on steep slopes. This method will be limited to those storm drain lines free of obstructions.

The inspection will be completed on one storm drain pipe section at a time (that is, catch basin to catch basin). The camera will travel through the line in either direction at a slow and uniform rate, stopping when necessary to ensure proper documentation of the storm drain pipe condition. The maximum speed of camera travel will be no greater than 30 feet per minute. It is likely that the CCTV camera will encounter obstructions that will interfere with the completion of the CCTV log. If obstructions are encountered, the survey crew will relocate to a catch basin downstream and attempt to survey the storm drain pipe from the opposite direction.

The location of defects, sags with or without soil accumulation, laterals, and physical location of the storm drain pipe will be marked above ground with a meter device capable of communicating with and locating the camera. If the video survey of the line shows no defects and no accumulation of soil material within a specific pipe segment, no additional evaluation will be required during the current investigation. Information on identified defects will be retained by PG&E to assist with future maintenance and engineering activities as well as remediation to be conducted following closure of the compressor station. Depending on the outcome of the storm drain investigation, DTSC may request action by PG&E prior to closure of the site.

PG&E will attempt the video surveys; however, if the contractor and/or PG&E determine that the survey is yielding little or no usable information, PG&E will propose to terminate the survey. The survey will not be terminated without prior United States Department of Interior and DTSC consultation and concurrence. PG&E will then proceed with producing the storm drain alignment maps based on available data.

Field observations may be recorded in up to three formats, as outlined below. A comprehensive summary of the relevant inspection results will be included with the investigation report.

Television Inspection Logs: Each segment inspection will have a separate inspection report, describing the direction of view, direction of flow relative to direction of view, pipe section length, pipe size, pipe material, lateral connections, and a detailed logging of defects encountered. The inspection report will clearly show the location of defects, in relation to adjacent catch basins. In addition, other data of significance including joints, unusual condition, cracked or collapsed sections, presence of scale and corrosion, presence of accumulate soil material, and any pipe sections that the camera failed to pass through and reasons for failure will be included in the report.

Photographs: During the CCTV inspection, the camera will stop at all significant observations to provide a clear and focused view of the pipe condition. These photographs will be made available to stakeholders electronically.

DVD Recordings: The DVD recordings will supply a complete visual and audio record of the entire video survey, as well as an edited recording of the problem areas of the storm drain pipes in color.

Complete, unedited television inspection logs, photographs, and DVD recordings will be made available electronically to the agencies and other stakeholders who may wish to review the entire set of information, and will be included in the Volume 3 RFI/RI Report.

1.4.2.6 Storm Drain Alignment Map

The information collected from the five steps described above will be used to compile a comprehensive map showing the known storm drain system on the compressor station and the locations of known outfalls. Abandoned storm drain alignments will be shown to the degree they can be identified from the records search. PG&E anticipates that the precise configuration of some storm drain lines cannot be determined (for example, lines that are blocked and cannot be traced using geophysical methods); however, the discharge point(s) for each catch basin should be able to be identified using the flow test. Knowing the discharge location of each storm drain is adequate to determine whether the line poses a potential pathway for off-site migration. If uncertainties remain with regard to the precise alignment of any storm drains, the uncertainties will be documented in the storm drain investigation summary. No intrusive investigation (that is, uncovering of lines to trace them) to identify storm drain alignments is planned. Intrusive investigation of storm drains would pose the same concerns as intrusive soil investigations.

1.4.3 Storm Drain Soil Investigation

Soil sampling along storm drains will be limited to areas outside the fence line. Samples will be collected at the storm drain outfalls and along visible storm drain lines. Sample locations shown on Figures D-1 and D-2 are approximate and will be verified in the field, depending on the results of the storm drain alignment investigation.

Sampling below each storm drain outfall will consist of one sample location immediately below (downslope of) the outfall and lateral/downslope samples. The lateral/downslope sample locations are designed to evaluate soil conditions in the expected flow path from the storm drain to the bottom of the slope. Where pipes have broken off due to degradation, a sample will be collected at the end of the existing pipe, and an effort will be made to evaluate where the outfall may have been located historically, and a sample will be collected in that area. Lateral/downslope samples will be collected between the outfall and the bottom of the slope or the closest downslope sample locations (that is, there are existing soil sample data downslope of storm drain locations in AOCs 1, 10, and 11). In some areas, adequate lateral/downslope samples may already have been collected during the Part A Phase 1 investigation; these areas will not be resampled. There are 19 (SD-1 through SD-19) proposed soil sample locations associated with the storm drain investigation. Samples will be collected at 0.0 to 0.5 foot below ground surface (bgs) unless it is apparent that erosion has occurred in the vicinity of the outfall, in which case, a sample will be collected from 0.0 to 1 foot bgs to capture a larger potential interval of affected soil. Where feasible, based on the subsurface conditions and topography at the outfall (and downslope location, if applicable) samples will also be collected at 2 to 3, 5 to 6, and 9 to 10 feet bgs.

In addition to samples collected at and downslope of the outfalls, samples will be collected along the alignment of each visible storm drain line outside the fence line, where feasible. Samples will be collected at 0.0 to 0.5, 2 to 3, 5 to 6, and 9 to 10 feet bgs, if possible. If pipeline bedding material is encountered that is obviously different from the surrounding native soil, the bedding material will be sampled as well. Samples will be collected at the edge of the slope (that is, where the line bends), and every 50 feet, or at obvious breaks or other bends in the pipeline, if any bends or breaks were identified during the storm drain alignment investigation. The visible portion of Storm Drain Lines 5, 10, and 11 is less than 25 feet; therefore, no samples will be collected along the storm drain line in this area (a sample will be collected at the edge of the slope). Samples along the storm drain lines will be collected from alternating sides of the pipe unless topographical or other considerations indicate that sampling only along one side is more appropriate. All sample locations will be recorded using a global positioning system.

Sampling within the fence line will be limited to any accumulated material encountered in catch basins. No intrusive investigation (that is, uncovering of lines to trace them) to identify storm drain alignments is planned. Intrusive investigation of storm drains would pose the same concerns as intrusive soil investigation.

All soil samples will be analyzed for Title 22 metals, hexavalent chromium, PAHs, TPH, and PCBs. Ten percent of all samples collected along the storm drains and below the storm drain outfalls will be analyzed for the full suite of TAL/TCL constituents. Samples of accumulated soil material collected from catch basins within the compressor station will be analyzed as described in Section 1.4.2.2 of this appendix. Soil sample locations SD-18 and SD-19 may extent to 50 feet bgs, if feasible to collect soil samples at 30 and 50 feet bgs to support the groundwater remedy design. These soil samples will be analyzed the geophysical parameters listed in Table D-2. The proposed sample locations are shown on Figures D-1 and D-2, and the sample ID, rationale, analytical suite, and sampling method are shown in Table D-2 and Appendix F of this work plan.

Sampling, sample analysis, data validation, and data management will follow standard operating procedures for this work plan, and investigation-derived waste associated with the storm drain soil sampling program will be managed in the same manner as for all other soil sampling efforts to be conducted pursuant to this work plan. The data evaluation process is described in Section 2.0.

2.0 Sample Data Evaluation

The sample data evaluation process for the storm drain lines will follow the general process established for soil samples collected at the compressor station. Once all samples have been analyzed, the data will be validated. The validated data will be compared to the interim screening levels previously developed for areas outside the fence line (see Appendix A of this work plan). The three types of data that may be collected include data at and below the outfalls (including lateral/downslope samples), data along the storm drain lines outside the compressor station, and data for accumulated soil material (if any accumulated material is encountered in the catch basins).

2.1 Samples at Outfalls and Associated Lateral/Downslope Samples

If chemical constituents above interim screening levels are detected in samples from the outfalls and/or associated lateral/downslope samples, the sample data will be combined with the data from the closest downslope AOC (that is, the AOC that would have received the discharge from the outfall). As shown in Figure D-1, Storm Drain Outfall 9, for example, is located above AOC 11. As for the Perimeter Area data, storm drain investigation data will be assigned to the appropriate unit following data evaluation and in consultation with the stakeholders.

The potential sources for constituents to the outfall will be assessed by determining the types of activities that have occurred in the vicinity of the catch basins associated with the specific storm drain line.

2.2 Samples along Visible Storm Drain Lines

Detected chemicals along storm drain lines outside the compressor station could be due either to releases from the storm drain line or from surface water flow from the compressor station. Data for samples with constituents above interim screening levels will be compared to the closest available outfall and perimeter sample data, to evaluate whether there is an apparent source for the constituents present above interim screening levels. The sample data will be then be combined with the appropriate data set (AOC receiving the storm drain runoff or perimeter samples).

2.3 Accumulated Soil Material Samples

If accumulated material is encountered in any storm drain catch basins, and any of these samples contains constituents above interim screening levels, the data will be compared with data from the outfall associated with that catch basin. Depending on the concentrations of chemicals in the outfall area (that is, i.e., if the chemical concentrations in accumulated soil material are greater than the Part A interim screening levels), it may be necessary to remove accumulated soil material from the storm drain line in question.

In addition, the video survey information will be evaluated in combination with the data from any accumulated soil material samples and other soil data collected within the fence line to assess whether samples along the storm drain alignments will be required within the fence line. The need for samples along the storm drain alignments within the fence line, if any, will be determined in consultation with the agencies. Soil sampling along storm drain lines within the compressor station fence line will be subject to the same concerns and requirements as all other intrusive sampling within the fence line, and safety consideration will be an important factor in determining the need for any such sampling. Any soil investigation of storm drain lines within the fence would be phased as described in Appendix B Section 4.0; however, the initial sampling depth will extend below 3 feet bgs if the bottom of the storm drain line in question is deeper than 3 feet bgs.

3.0 References

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

__________. 2007. *Revised Final RCRA Investigation/Remedial Investigation Report, Volume 1 - Site Background and History, PG&E Topock Compressor Station, Needles, California*. August 10.

__________. 2011a. Email from Curt Russel to Susanne von Rosenberg/Jamie Eby. " Re: Storm drain/utility abandonment (typical)." March 28.

__________. 2011b. *RCRA Facility Investigation/Remedial Investigation Soil Investigation Draft Work Plan Part B PG&E Topock Compressor Station.* May.

Pacific Gas and Electric Company (PG&E).PG&E. 2011. *Hazardous Materials Business Plan for Topock Compressor Station, Interstate 40 and Park Moabi Road, 14 Miles East of Needles, Needles, CA 92363*. March.

Tables

TABLE D-1
Available Written Records of Compressor Station Storm Drain Alignments and Construction Details
Soil RCRA Facility Investigation/Remedial Investigation Work Plan,
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Author	Drawing No.	Date	Notes
Bechtel	181280, Revision 0	3/9/1951	Water Drawoff Basin,[a1] Topock Compressor Station
Bechtel	181317	04/23/1951	Detail of Floor Drains Compressor Building
Unknown	282653, No Revision no.	February 1957	Control Surface Ground Erosion, Topock Compressor Station
PG&E (Base map from 1951 likely by Bechtel)	481785, Revision 22	12/11/67	Sewers and Drains Topock Compressor Station
PG&E (Base map from 1951 likely by Bechtel)	481785, Revision 27	3/29/91	Sewers and Drains Topock Compressor Station
PG&E (Base map from 1951 likely by Bechtel)	481785, Revision 29	9/17/93	Sewers and Drains Topock Compressor Station
PG&E (Base map from 1951 likely by Bechtel)	482629, Revision 5	Revision 5 undated; previous revision 8/18/88	Sewers, Domestic, Utility &and Fire Water System, Topock Compressor Station
TA Engineering Co. Inc.	387706, Revision 3	3/29/91	Elementary-Mechanical Drain & and Sewer Systems Topock Compressor Station Gas Operations

[a]Catch basin

[1] Catch basin

TABLE D-2
Proposed Sampling Plan, Storm Drain Investigation Program
Soil RCRA Facility Investigation/Remedial Investigation Work Plan,
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Depths (feet)	Description/Rationale	Analytes[b]
SD-1	0-0.5[a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-2	0-0.5, 3, 5, and 10	To assess soil along degraded storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-3	0-0.5, 3, 5, and 10	To assess soil along degraded storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-4	0-0.5, 3, 5, and 10	To assess soil along degraded storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-5 (formerly PA-09)	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall (formerly PA-09)	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-6 (formerly PA-10)	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall (formerly PA-10)	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-7	0-0.5, 3, 5, and 10	To assess soil along storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-8	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-9	0-0.5, 3, 5, and 10	To assess soil along storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-10	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-11	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-12	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-13	0-0.5 [a]*, 3, 5, and 10	To assess storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-14 (formerly SD-15)	0-0.5, 3, 5, and 10	To assess along storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-15 (formerly SD-16)	0-0.5, 3, 5, and 10	To assess soil storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-16 (formerly SD-17)	0-0.5 [a]*, 3, 5, and 10	To assess lateral/downslope of storm drain outfall	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs

TABLE D-2
Proposed Sampling Plan, Storm Drain Investigation Program
Soil RCRA Facility Investigation/Remedial Investigation Work Plan,
Pacific Gas and Electric Company Topock Compressor Station, Needles, California

Location	Depths (feet)	Description/Rationale	Analytes[b]
SD-17 (formerly SD-16)	0-0.5, 3, 5, and 10	To assess along storm drain	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs
SD-18 (formerly SD-17)	0-0.5, 3, 5, and 10; extend boring to 50 to support Groundwater Remedy Design, if feasible.	To assess soil storm drain outfall and collect geotechnical data to support the Topock Groundwater Remedy Design from two depth intervals 30 feet bgs and 50 feet bgs.	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs and geotechnical analysis (Moisture Density relationship, Unconfined compression tests, Atterberg Limits, Gradation, pH, red-ox, sulfate, sulfide, total salts, chloride, resistivity) from two depth intervals 30 feet
SD-19 (formerly SD-18)	0-0.5, 3, 5, and 10 extend boring to 50 to support Groundwater Remedy Design, if feasible.	To assess lateral/downslope of storm drain outfall and collect geotechnical data to support the Topock Groundwater Remedy Design from two depth intervals 30 feet bgs and 50 feet bgs	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs and geotechnical analysis (Moisture Density relationship, Unconfined compression tests, Atterberg Limits, Gradation, pH, red-ox, sulfate, sulfide, total salts, chloride, resistivity) from two depth intervals 30 feet bgs and 50 feet bgs

Notes:

[a]* Samples will be collected at 0 to 0.5 feet bgs unless it is apparent that erosion has occurred in the vicinity of the outfall, in which case, a sample will be collected from 0 to 1 foot bgs.

[b] Ten percent of samples collected along the storm drains and below storm drain outfalls will be analyzed for the full suite of TAL/TCL parameters. Fifty percent of any accumulated soil material samples collected from catch basins within the compressor station will also be analyzed for the full suite of TAL/TCL parameters.

VOC analysis will not be conducted on surface soil samples (0 to 0.5 feet bgs).

Figures

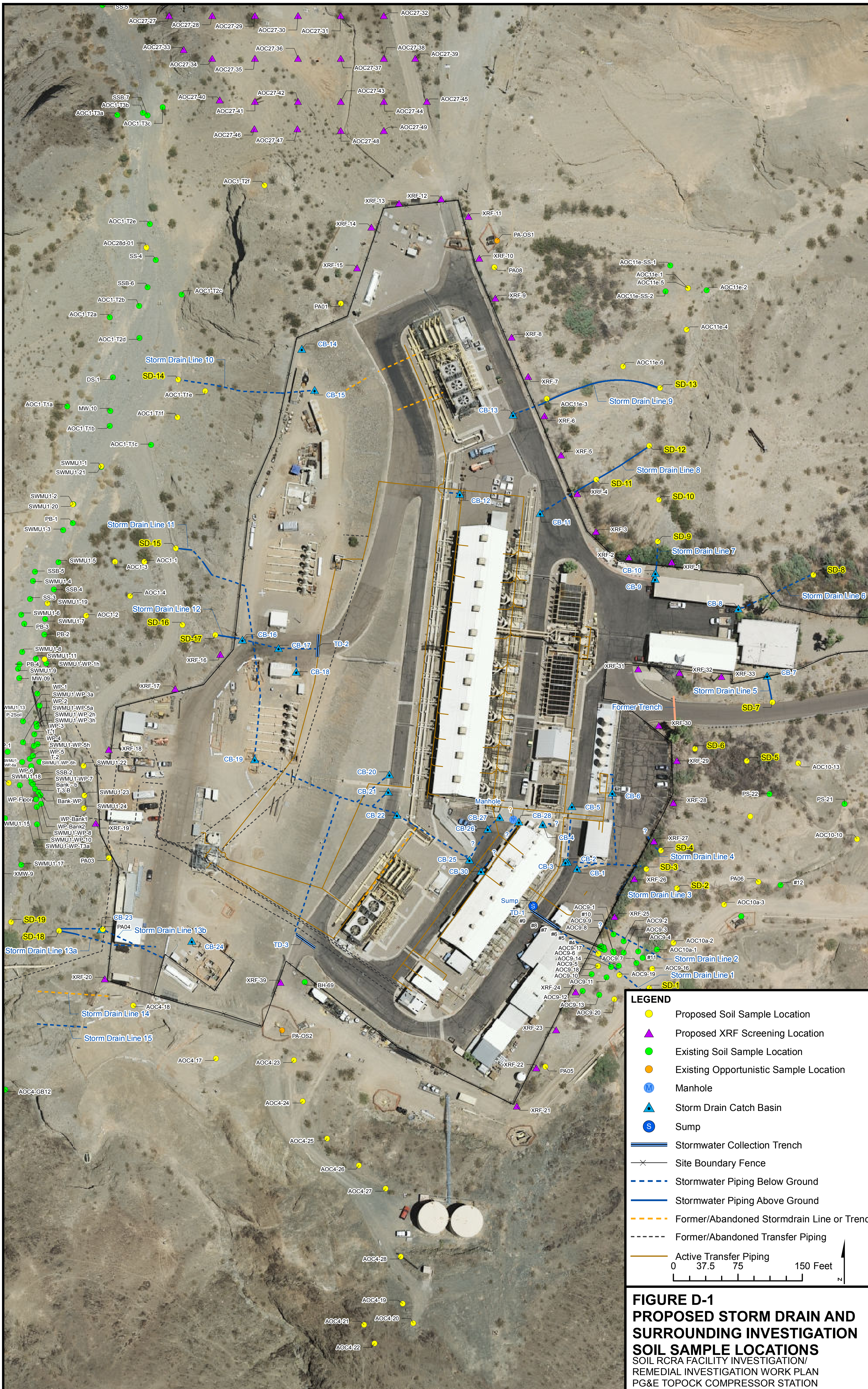

FIGURE D-1
PROPOSED STORM DRAIN AND SURROUNDING INVESTIGATION SOIL SAMPLE LOCATIONS
SOIL RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2012\SWP_B\Storm_Proposed_sample_LocsV2.mxdDate Saved: 12/6/2012 4:07:11 PM

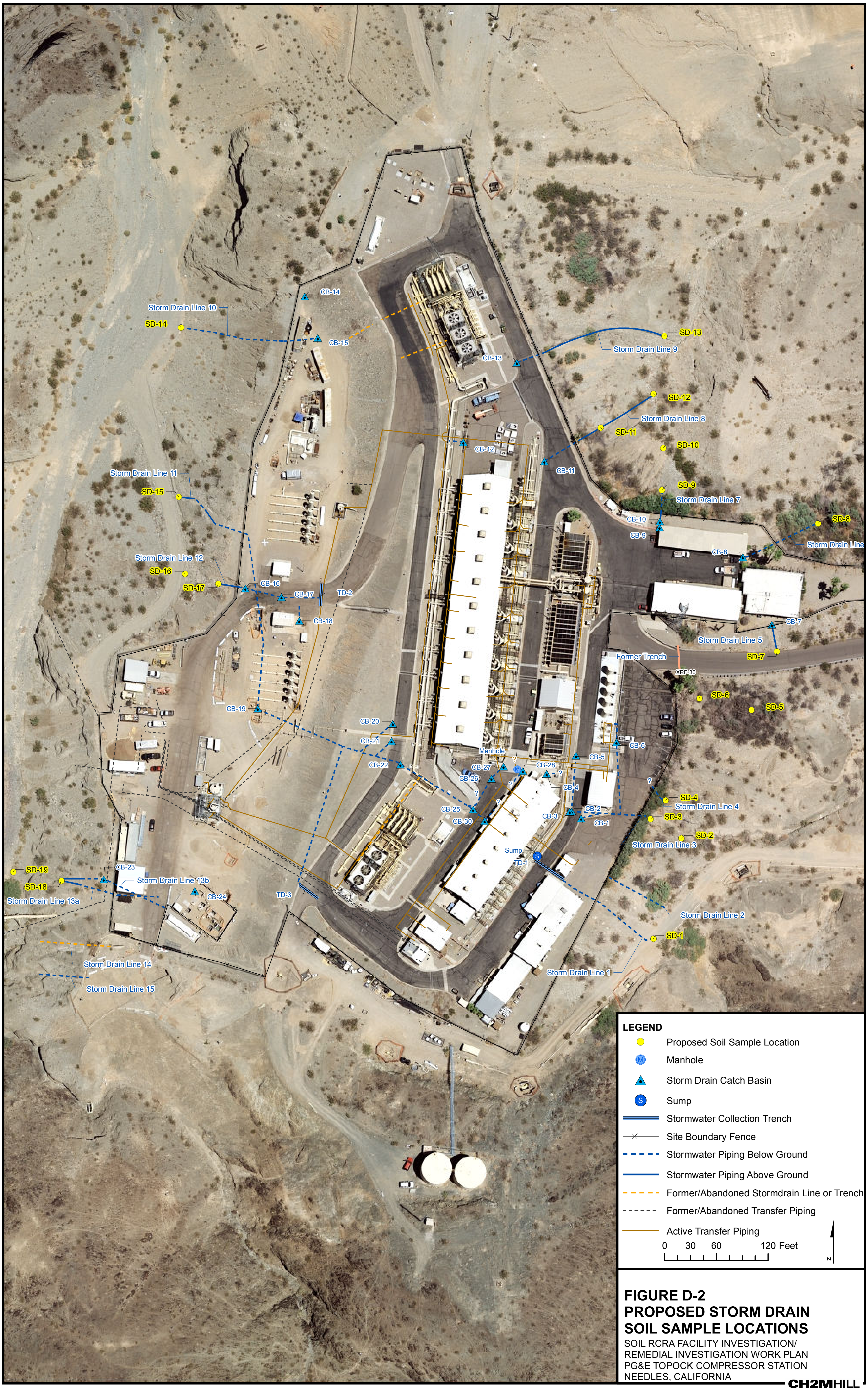

FIGURE D-2
PROPOSED STORM DRAIN SOIL SAMPLE LOCATIONS
SOIL RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Path: D:\Projects\Topock\MapFiles\2012\SWP_B\Storm_Proposed_sampleONLY_Locs.mxdDate Saved: 12/7/2012 11:29:48 AM