
Final

**Recommendations for Investigating
Volatile Organic Compounds
Contamination in Soil Vapor**

San Gabriel Valley Area 3 Superfund Site

Prepared for
U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California 94105

August 2008

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Volatile Organic Compounds Contamination in Soil Vapor
San Gabriel Valley Area 3 Superfund Site**

San Gabriel Basin
Los Angeles County, California

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Nondisclosure Statement

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Acronyms and Abbreviations

Area 3	San Gabriel Valley Area 3 Superfund Site
bgs	below ground surface
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
LARWQCB	California Regional Water Quality Control Board-Los Angeles Region
µg/L	microgram(s) per liter
µg/L-v	microgram(s) per liter by volume
PCE	tetrachloroethene
TCE	trichloroethene
UST	underground storage tank
VOC	volatile organic compound
SVE	soil vapor extraction
RI	remedial investigation

Glossary

Clay: A very fine grained material, smaller than silt (clay has a diameter of less than 1/256 millimeter). Clay is formed by the weathering and breaking down of rocks and minerals.

Groundwater: Water occurring underground, in the zone of saturation in an aquifer.

Groundwater monitoring well: Special wells installed to sample groundwater at specific locations and at selected depths to determine direction of groundwater flow and the types and levels of contamination.

Groundwater table: The upper surface of the zone of saturation in an unconfined aquifer.

Lithology: The scientific study and description of sediments, rocks, or rock formations, especially at the macroscopic level, in terms of their color, texture, and composition.

Nested vapor monitoring probes: A boring consisting of multiple vapor probes at different depths.

Poorly-graded sand: Sand consisting of particles that are about the same size.

Silt: A rock fragment or mineral particle with a diameter of 1/16 millimeter to 1/256 millimeter, smaller than a very fine sand grain and larger than coarse clay.

Soil vapor: Elements and compounds in gaseous state in the small spaces between particles of soil. Such vapor can be moved or driven out under pressure.

Superfund Program: The program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act and the Superfund Amendments and Reauthorization Act to carry out solid waste emergency response actions and long-term removal and remedial actions.

Tetrachloroethene: A volatile organic compound primarily used for dry cleaning and in manufacturing processes as a solvent and metal degreaser.

Trichloroethene: A colorless or blue organic liquid volatile organic compound with a chloroform-like odor. TCE is used primarily in manufacturing processes as a solvent, metal degreaser, and textile degreaser.

Unified Soil Classification System: The classification system used in engineering and geology disciplines to describe the texture and grain size of a soil.

Vadose zone: The unsaturated zone between the land surface and the regional water table.

Vapor monitoring probe: Special wells installed to sample soil vapor at specific locations and at selected depths to determine types and levels of contamination.

Volatile organic compound: Organic (carbon-containing) compound that evaporates readily at room temperature. These compounds are toxic and often carcinogenic.

Weathering: Decomposition of rocks, soils, and their minerals through direct contact with the Earth's atmosphere.

Well-graded sand: Sand consisting of grains of diversified particle sizes.

Executive Summary

ES.1 Purpose of Evaluation

This evaluation analyzes the relative occurrence of *volatile organic compounds* (VOCs) with depth in *soil vapor* in the *vadose zone* at facilities within the San Gabriel Valley Area 3 *Superfund* Site (Area 3). The purpose of the evaluation is to provide recommendations, summarized below, for the approach used to conduct investigations of VOC contamination at facilities within Area 3. Terms in the glossary are presented in bold, italicized text.

ES.2 Conclusions

Data from 11 of the 12 facilities in Area 3 analyzed in this evaluation show that the concentrations of either *tetrachloroethene* (PCE), or *trichloroethene* (TCE), or both in soil vapor are greater in the intermediate and deep intervals of the vadose zone than in the shallow interval. As shown in Table ES-1, the intermediate interval (approximately 40 to 100 feet below ground surface [bgs]) at most facilities contained the highest PCE and TCE concentrations in soil vapor. Consequently, investigating VOC concentrations in the shallow interval alone would have inadequately characterized subsurface contamination.

In Area 3, the presence of maximum VOC concentrations at depth may reflect the relative age of contaminant releases coupled with contaminant migration processes over time. Because industrial operations at many facilities date to the 1920s, the release and migration of solvents from shallow soils downward might have occurred over decades. Appendix A provides a brief summary of soil vapor migration mechanisms for reference. Assessing the mechanisms that drive soil vapor migration is beyond the scope of this evaluation.

Table ES-1

Summary of Maximum PCE and TCE Soil Vapor Concentrations at Facilities in Area 3

Facility	Contaminant of Concern	Concentrations (µg/L-v)		
		Shallow Interval (0 to 40 feet bgs)	Intermediate Interval (40 to 100 feet bgs)	Deep Interval (> 100 feet bgs)
1	PCE**	3	ND	4
	TCE	180	1,500	1,100
3*	PCE	7,927	2,000	340
	TCE	216	100	160
4	PCE	2,310	3,593	2,165
	TCE	57	333	250
5	PCE	67	105	44
	TCE	87	224	191
6	PCE	4,006	3,921	1,414
	TCE	410	501	344

Table ES-1

Summary of Maximum PCE and TCE Soil Vapor Concentrations at Facilities in Area 3

Facility	Contaminant of Concern	Concentrations ($\mu\text{g/L-v}$)		
		Shallow Interval (0 to 40 feet bgs)	Intermediate Interval (40 to 100 feet bgs)	Deep Interval (> 100 feet bgs)
8	PCE	2,873	1,942	1,429
	TCE	71	247	234
10	PCE	440	960	200
	TCE	52	400	57
19	PCE	570	890	650
	TCE**	1.1	4.5 J	6.5
20	PCE**	5	ND	6.3
	TCE	408	1,870	1,500
21	PCE	836	1,760	1,650
	TCE**	ND	ND	ND
22	PCE	4,234	1569	1,081
	TCE	3.3	161	248
24	PCE	5.4	2.9	13
	TCE**	ND	ND	0.53

Orange shading = interval of vadose zone with maximum PCE or TCE concentration

* = Only facility where the maximum PCE and TCE concentrations occurred within the shallow interval.

** = PCE or TCE generally not detected or detected at very low concentrations only. Consequently, the evaluation for this facility omits the data from consideration.

ND = not detected at a concentration that exceeded the laboratory reporting limit

J = estimated value – detected at a concentration less than the laboratory reporting limit.

$\mu\text{g/L-v}$ = micrograms per liter by volume

ES.3 Recommendations

The conclusions of this evaluation provide a basis for potentially characterizing soil vapor in the intermediate and deep intervals of the vadose zone at all facilities in Area 3 with VOC contamination. Subsurface investigations at facilities in Area 3 should consider the recommendations provided below. Section 3.2 includes rationales for the recommendations. Appendix B provides a flowchart that depicts the subsurface investigative process of the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB).

- Assess soil vapor concentrations vertically beyond the shallow interval of the vadose zone to the *groundwater table*, if necessary. This evaluation shows that the maximum soil vapor concentrations at facilities in Area 3 frequently occur within the intermediate and deep intervals of the vadose zone rather than in the shallow interval.
- Place vapor monitoring probes at depth intervals (i.e., sample depths) in areas of known or suspected historic operations and based on current analytical data. Review excavation and grading records. Consider *lithology* per the State's guidance document (LARWQCB, 2003).

- Install *nested vapor monitoring probes* or, alternatively, install deep *vapor monitoring probes* near the existing shallow probes. Collect samples from all intervals in one event to minimize temporal variations.
- Install multiple vapor monitoring probes, if necessary, for adequate lateral characterization of the contamination based on the number and size of potential releases of contamination.
- Evaluate the potential for soil vapor intrusion at facilities with: 1) VOC concentrations that exceed the screening levels in the shallow interval of the vadose zone; and 2) commercial or industrial buildings or residences located nearby. Refer to the flowchart and check list in Appendix B for guidance in initiating assessments of potential soil vapor intrusion.

1.0 Introduction

1.1 Background

The United States Environmental Protection Agency (EPA) Region 9 is conducting a remedial investigation (RI) in Area 3, an approximate 19-square-mile area of *groundwater* contamination within the San Gabriel Basin in eastern Los Angeles County, California.

A fundamental goal of the RI is to identify the multiple sources of regional groundwater contamination within Area 3. The main contaminants of potential concern include *tetrachloroethene* (PCE) and *trichloroethene* (TCE). EPA, the California Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board-Los Angeles Region (LARWQCB) currently are screening facilities within Area 3 as potential sources of groundwater contamination. DTSC and LARWQCB are jointly referred to as “the State” in this document.

The source characterization of groundwater contamination in Area 3 focuses mainly on evaluating the concentrations of *volatile organic compounds* (VOCs) in *soil vapor* within the *vadose zone*. At individual facilities, contaminant investigations first assess soil vapor within the shallow interval of the vadose zone, and then progress to the intermediate and deep intervals, if VOC concentrations warrant further investigation. Appendix B provides a flowchart that depicts the subsurface investigative process of LARWQCB. Section 2.1 defines the shallow, intermediate and deep intervals of the vadose zone in more detail.

In general, contaminant releases tend to occur at the surface or in the shallow subsurface. VOC concentrations from a recent release are often higher in the shallow interval. However, over time, the physical and chemical properties of the contaminant, the subsurface conditions, and other factors can cause the contaminants to move into the intermediate and deep intervals of the vadose zone at concentrations that exceed the relative VOC concentrations in the shallow interval.

Soil vapor data collected at facilities in Area 3 show that, in some instances, VOC contaminant levels in the intermediate and deep intervals exceed contaminant levels in the shallow interval. Therefore, concluding that VOC concentrations are low in the intermediate and deep intervals is invalid.

This evaluation presents soil vapor data collected from facilities in Area 3 with suitable, comparable data sets. The evaluation also forms the basis for specific technical recommendations to help ensure that facility investigations within Area 3 incorporate an adequate approach for lateral and vertical soil vapor characterization.

1.2 Evaluation Objective and Organization

The overall objective of this evaluation is to provide recommendations for soil vapor investigations based on conditions observed at facilities within Area 3. This evaluation is organized as follows:

- Section 1 introduces the background and objective of the evaluation.
- Section 2 presents the soil vapor data used to evaluate the vertical distribution of contaminants in soil vapor at facilities within Area 3.
- Section 3 presents the conclusions and recommendations of the evaluation.

Appendix A briefly summarizes the mechanisms of soil vapor migration for reference. Assessing the mechanisms that drive soil vapor migration is beyond the scope of this evaluation. Appendix B provides the flowchart that depicts LARWQCB's process for conducting subsurface investigations.

2.0 Evaluation of Facility Data

This section describes the 12 facilities considered and the corresponding soil vapor data evaluated. The discussion identifies each facility by a unique identification number established for the forthcoming RI report. The evaluation focuses exclusively on data for PCE and TCE, the most prevalent VOC contaminants of concern detected in groundwater underlying Area 3.

2.1 Data Used in Evaluation

The data evaluation presented hereafter describes the depths within the vadose zone beneath facilities in Area 3 in terms of three relative intervals: shallow, intermediate, and deep as summarized below.

- Shallow interval – Interval of the vadose zone spanning depths to 40 feet bgs.
- Intermediate interval – Interval of the vadose zone spanning depths between the shallow and deep intervals (>40 to 100 feet bgs).
- Deep interval – Interval of the vadose zone spanning depths greater than 100 feet bgs to the groundwater table. The depth of the groundwater table varies across Area 3.

This evaluation focuses on 12 facilities within Area 3 with comparable data sets, that is, data sets that comprise data collected from all three intervals of the vadose zone described above. Figure 2-1 presents the locations of the 12 facilities, identified as Facilities 1, 3, 4, 5, 6, 8, 10, 19, 20, 21, 22, and 24. Nine of the facilities are located in southwestern Area 3, and three are located in northeastern Area 3.

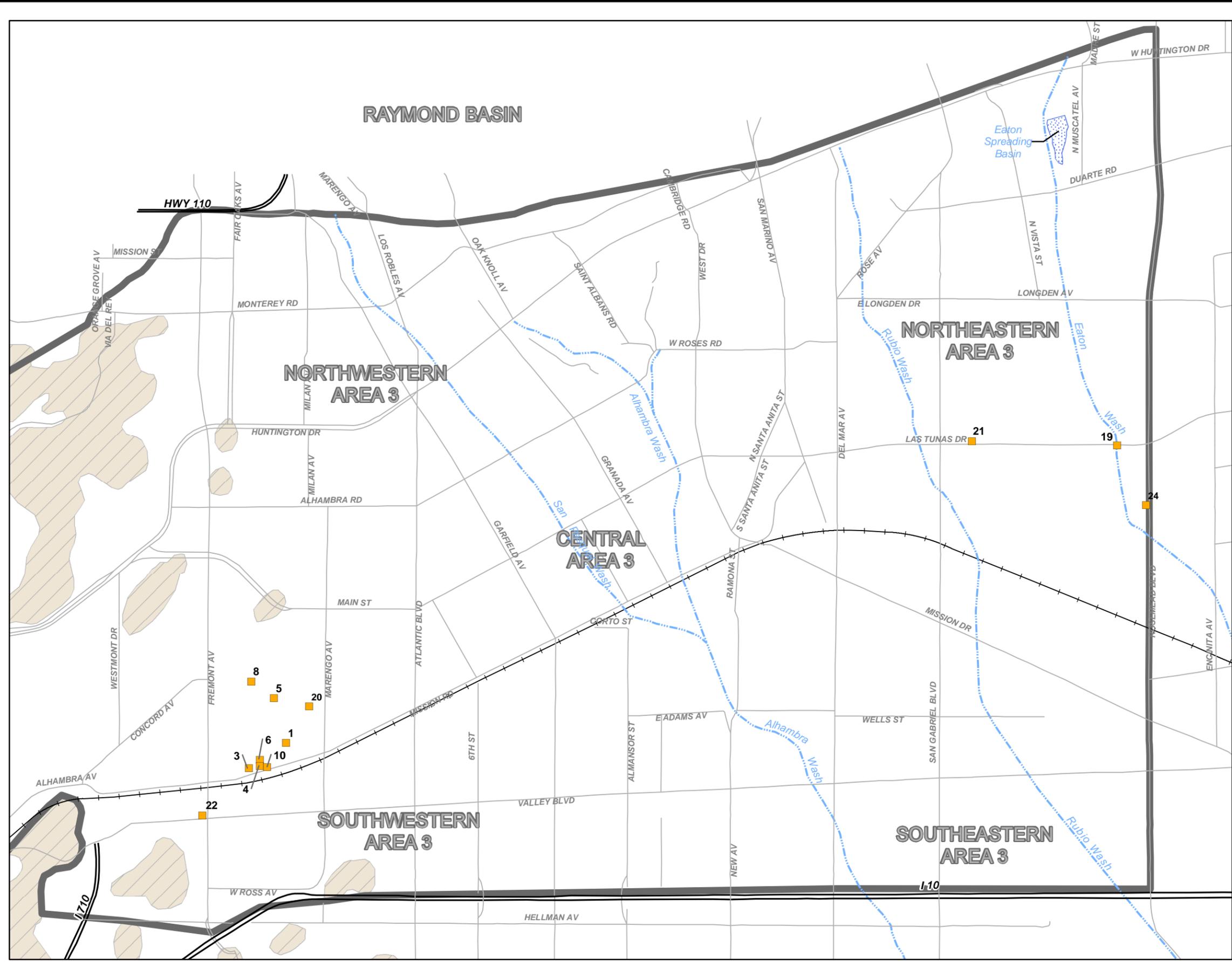
2.2 Data Evaluation Approach

EPA obtained all soil vapor data used in this evaluation from the State. The State directed all investigation work, including the collection of soil vapor data at each of the 12 facilities and the installation of *groundwater monitoring wells* at 10 of the 12 facilities.

Investigations directed by the State generally conform to the guidance outlined in the *Active Soil Gas Investigation Advisory* (LARWQCB, 2003) or the *Interim Guidance for Active Soil Gas Investigations* (LARWQCB, 1997). Appendix B provides a flow chart that depicts LARWQCB's process for conducting subsurface investigations.

The data met the specific requirements of the responsible agency at the time of data collection. EPA confirmed the usability of all data collected by the State prior to considering the data for comparison in this evaluation.

EPA determined the maximum concentrations of PCE and TCE reported in soil vapor by each facility using data collected from multiple soil vapor probes over time. Because the data was gathered from different investigations that were conducted during different months and years



LEGEND

- Facilities Evaluated for Case Study
- Highway
- Major Street
- Railway
- Streams
- ▭ Approximate Area 3 Boundary
- ▨ Spreading Ground
- ▨ Bedrock

Notes:
 1. Facility locations and identification numbers based on LARWQCB WIP database, March 2007.
 2. WIP = Well Investigation Program.

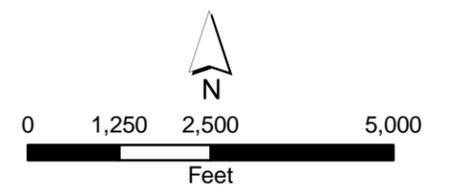


Figure 2-1
Facilities Evaluated
 Recommendations for Conducting
 Soil Vapor Investigations
 San Gabriel Valley Area 3

and at different times of the day, some inherent uncertainty exists in the data set for most facilities. Section 2.4 provides the uncertainty analysis for this evaluation.

The data evaluation showed the five of the 12 facilities, where PCE or TCE were generally not detected or detected at very low concentrations only. Therefore, for these facilities, the discussion will only focus on the one constituent that was detected.

The data evaluation simplifies lithology for Area 3 into two categories based on representative boring logs: sand/gravel and *silt/clay* as summarized below. The evaluation for each facility relies on lithology data obtained from a boring log for either an onsite deep soil vapor probe or groundwater monitoring well.

- Sand/Gravel – This category includes *well-graded and poorly-graded sands* and gravels along with silty and clayey sands and gravels. In terms of the **Unified Soil Classification System (USCS)** soil classification scheme, this category includes the following soil types: GW, GP, GM, GC, SW, SP, SM, and SC. This category represents relatively permeable lithologic units.
- Silt/Clay – This category includes silts and clays, as well as sandy and gravelly silts and clays. In terms of the USCS soil classification scheme, this category includes the following soil types: MH, ML, CH, and CL. This category represents less permeable lithologic units.

2.3 Discussion of Facility Specific Data

This section presents the soil vapor data evaluated for the 12 facilities. Separate subsections present the following data for each facility:

- Brief background of site investigation history
- Details regarding vapor probes and groundwater wells
- Soil vapor data
- Figure showing the site location
- PCE and TCE concentration data
- Representative boring log

2.3.1 Facility 1

Table 2-1 presents a summary of the site history and the sampling results for Facility 1.

TABLE 2-1
Facility 1 – Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>Prior to 1981 – Property used for electric motor and transformer manufacturing and machine shop operations. Degreaser area housed a 150-gallon solvent tank.</p> <p>1981-2007 – Property used for office space, warehousing, and manufacturing of laser optics equipment for telecommunications.</p> <p>1999 – LARWQCB inspected the site.</p> <p>2000 – Site investigation began with oversight by LARWQCB.</p>	<p>Twenty-five probes installed to 15 feet bgs.</p> <p>Six nested probes installed from 65 to 200 feet bgs.</p> <p>PCE or TCE was not detected in eleven probes.</p> <p>Distance between the evaluated probes range from 10 to 60 feet (Figure 2-2a).</p> <p>PCE concentrations ranged from nondetect (ND) to 4.1 µg/L-v (Table 2-2).</p> <p>TCE concentrations ranged from ND to 1,500 µg/L-v (Table 2-2).</p>	<p>Three groundwater wells installed (one onsite and two upgradient wells).</p> <p>Depth to groundwater – 185 feet bgs.</p> <p>TCE detected in groundwater at a maximum concentration of 2,300 µg/L.</p> <p>PCE detected in groundwater at a maximum concentration of 40 µg/L.</p>	<p>None.</p>

Figure 2-2a shows the site layout with the probe locations. Table 2-2 provides the soil vapor data collected from *nested vapor monitoring probes* used in the evaluation. PCE was generally not detected at this facility. Figure 2-2b shows the maximum TCE concentration in soil vapor (1,500 micrograms per liter by volume [µg/L-v]) occurs in the intermediate interval of the vadose zone at approximately 85 feet bgs within a relatively transmissive sand/gravel unit. Figure 2-2c presents a representative boring log from this facility.

Table 2-2
Facility 1: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Degreaser Area	VW-6	4/1/2005	160	ND	170
			180	3	200
			200	4	380
	VW-6	8/7/2001	120	3	1,100
			140	ND	910
			160	ND	910
			180	2	290
			200	ND	140
	VW-1B	10/10/2000	65	ND	440
			75	ND	200
			85	ND	1,500
			95	ND	320
			105	ND	530
	VW-1A	10/10/2000	5	ND	180
			11.5	ND	150
	SV-1	5/3/2000	5	ND	9
			15	ND	ND
		6/7/2000	5	ND	95
			15	3	140
		6/15/2000	5	ND	77
	15		ND	120	
SV-11	5/4/2000	5	2	31	
		15	2	25	
	6/7/2000	5	1	180	
		15	ND	150	
	6/15/2000	5	ND	110	
		15	ND	86	

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

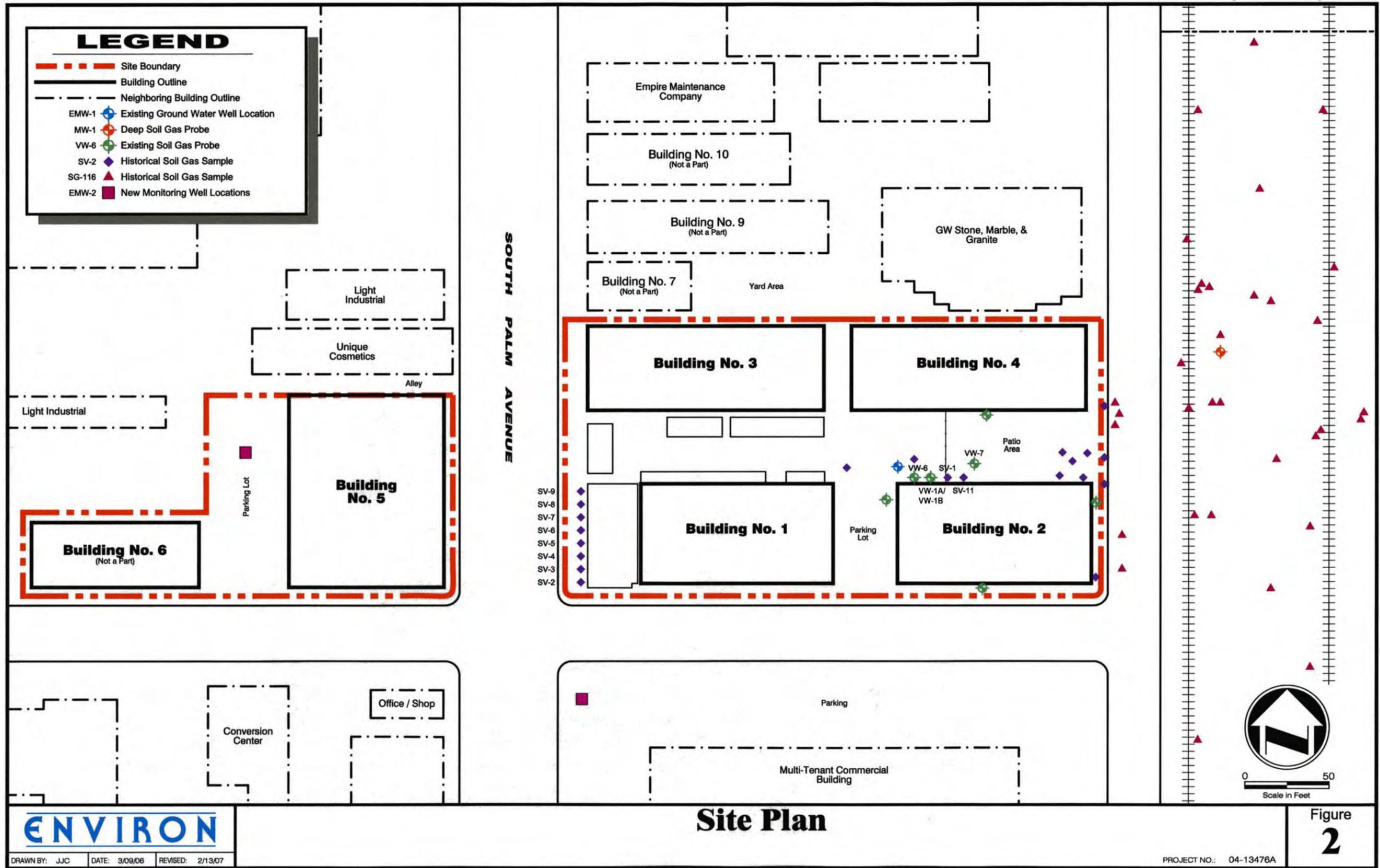
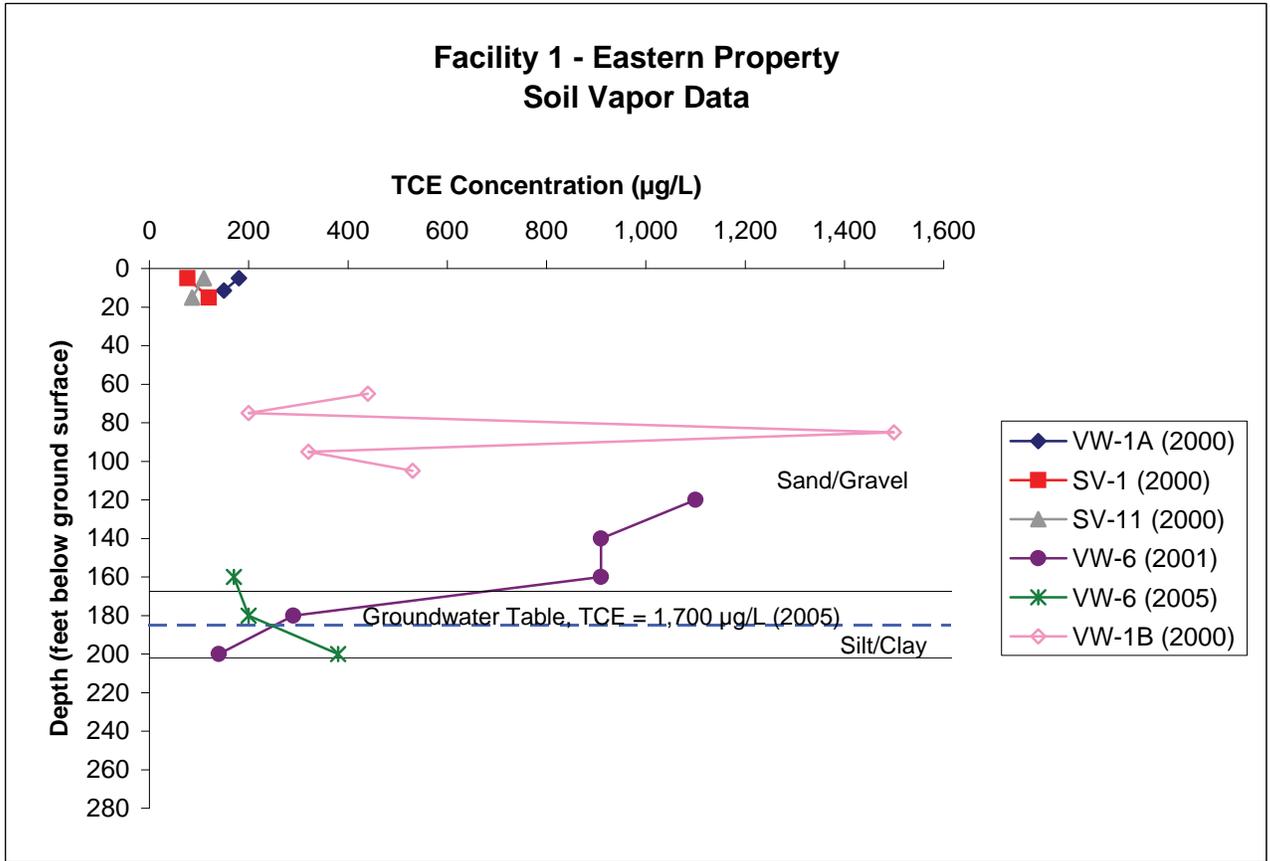


FIGURE 2-2a
 Facility 1 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3



Notes:

- PCE is generally not detected in soil gas at this facility.

FIGURE 2-2b
TCE Concentrations in Soil Vapor at Facility 1
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Location:	
Logged By: Alex Marr	Checked By:
Purpose: To install a ground water monitoring well	
Drilling Method: HSA/ Dual-Wall Percussion	GS Elevation:
Sampling Method: California Split-Spoon +/- brass sleeves; EnCore samplers for volatile sampling	TOC Elevation:
X Coordinate: 394320.890	Y Coordinate: 3771881.050
Borehole Dia.: 10" inches	Total Depth: 201.5 feet
Project Number: 04-13476A	
Project Name: Facility 1	
Remarks: Drilled in 2 phases: BC2 drilled to 173'- rig broke down; Layne completed hole using dual-wall percussion to 201.5' bgs	

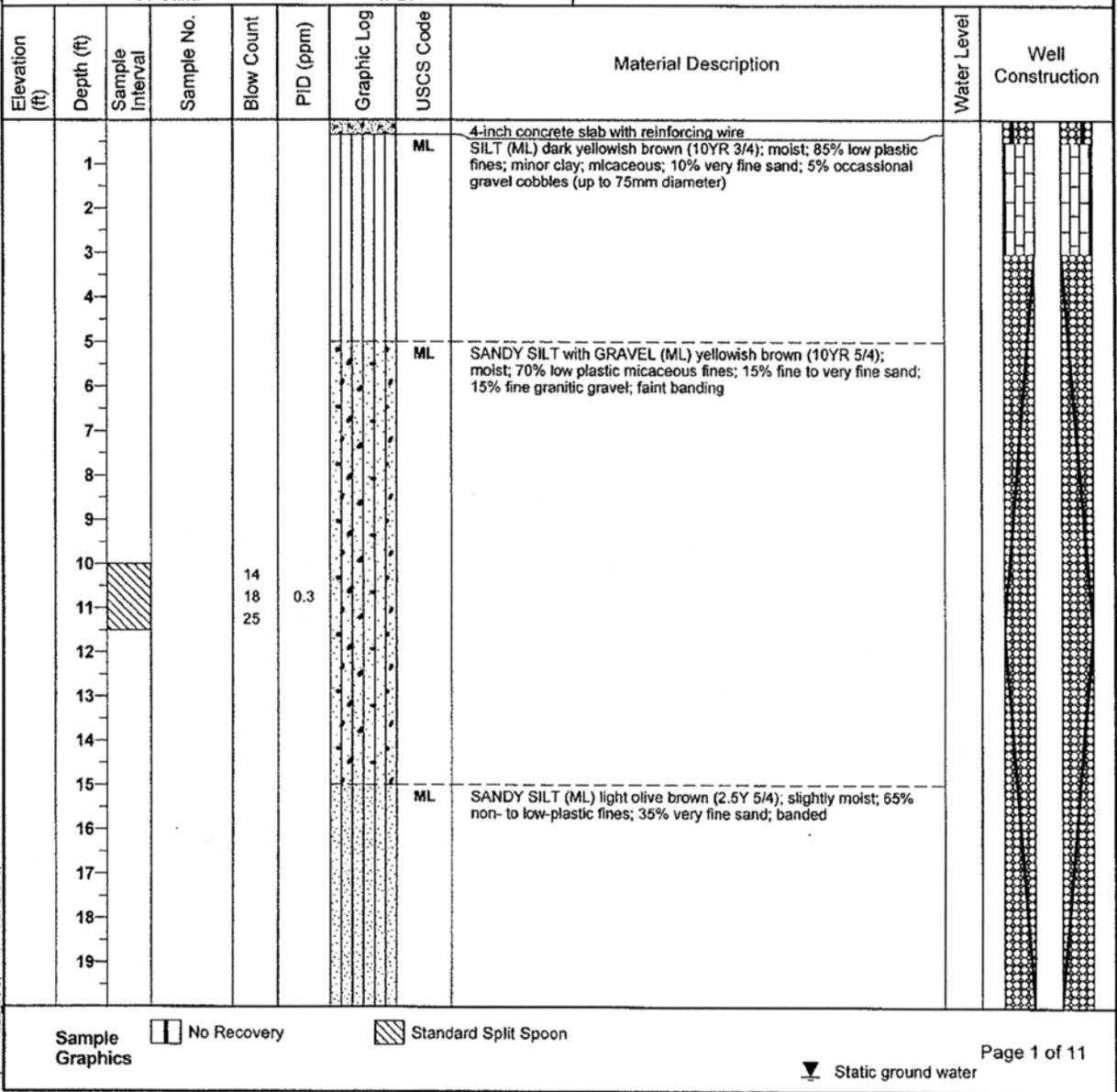


FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Project Number: 04-13476A	Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction		
21	21			12	0.6		ML	SILTY SAND (SM) light olive brown (2.5Y 5/4); dry SANDY SILT with GRAVEL (ML) light olive brown (2.5Y 5/4); 70% low plastic fines (some clay); 15% very fine sand; 15% fine gravel to very coarse sand				
22	22		15	SM								
23	23		18	ML								
24	24											
25	25											
26	26						SM	SILTY SAND (SM) light olive brown (2.5Y 5/4); dry to slightly moist; 60% very fine sand; 40% low plastic fines				
27	27											
28	28											
29	29											
30	30			10	1.3			SANDY SILT with GRAVEL (ML) yellowish brown (10YR 5/6); moist; 70% low to medium plastic fines- some clay; dense; 30% fine sand- some medium and coarse; 10% fine gravel				
31	31		13									
32	32		17	ML								
33	33											
34	34											
35	35											
36	36						ML	CLAYEY SILT (ML) yellowish brown (10YR 5/6); moist; 100% low to medium plastic fines; soft; faintly banded; micaceous				
37	37											
38	38											
39	39											

Report: WELL_LOG; File: AGERE.SP; 10/17/05

Sample Graphics No Recovery Standard Split Spoon

Static ground water Page 2 of 11

FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1

Date(s): 4/27/05-8/03/05

Project Number: 04-13476A

Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction
	41			9 13 10	0.3		ML	SILT (ML) yellowish brown (10YR 5/6); moist; 100% low- to non-plastic fines		
	42						ML			
	50			10 12 16	1.5		SM	-damp to moist; 90% low-plastic fines; friable; 10% very fine sand		
	55						SM	SILTY SAND (SM) yellowish brown (10YR 5/6); damp; 65% fine sand- some medium; 35% low plastic fines		

Report: WELL LOG: File: AGERE.GPJ; 10/17/05

No Recovery Standard Split Spoon

Sample Graphics

Static ground water

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FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1

Date(s): 4/27/05-8/03/05

Project Number: 04-13476A

Project Name: Facility 1

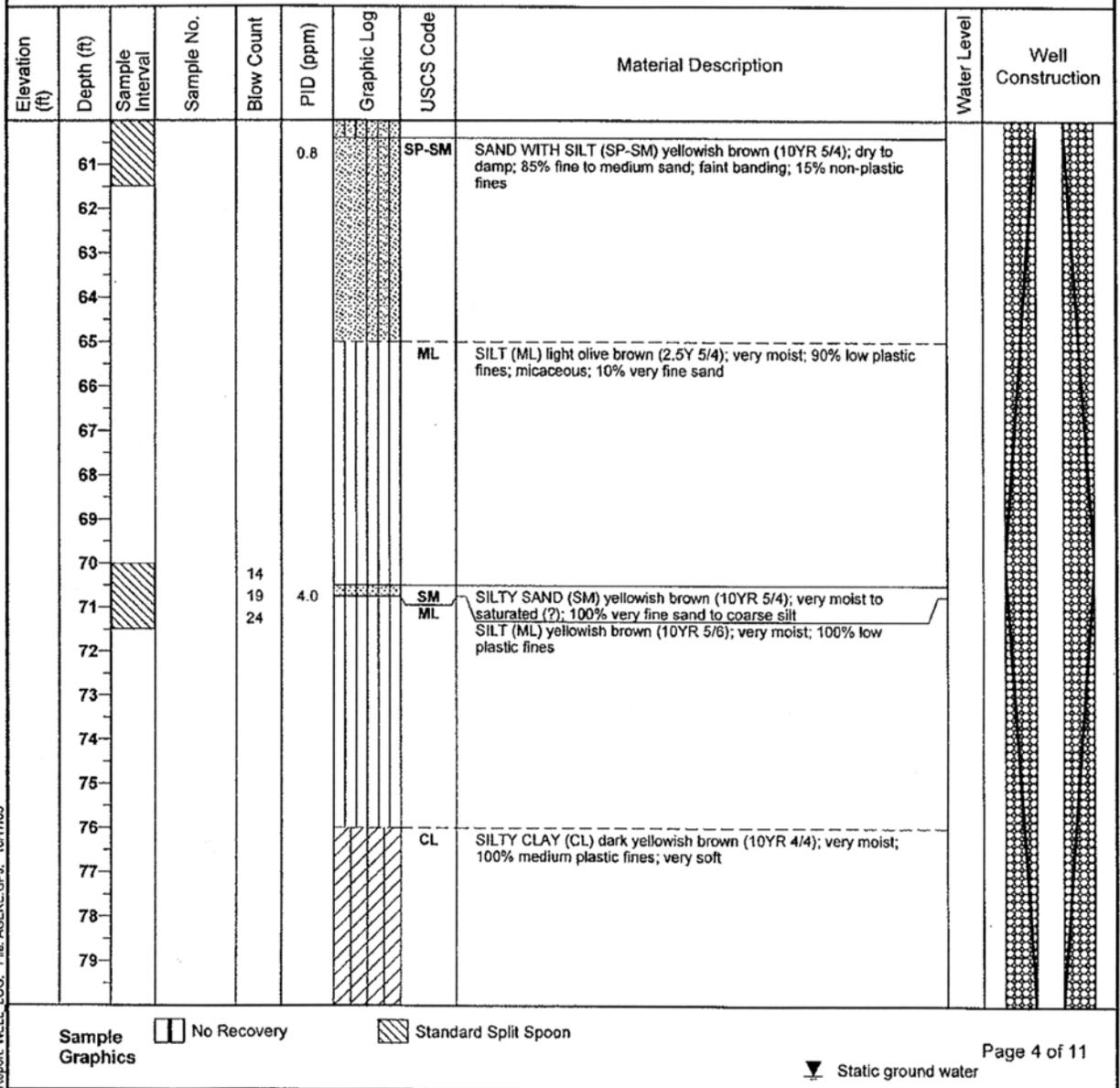


FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Project Number: 04-13476A	Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction
81	81		EMW-1-80.5-81	10 13 18	14.3		CL	SANDY CLAY (CL) brown (2.5Y 4/4); damp; 80% low-medium plastic fines; very stiff; 20% fine to medium sand		
82	82									
83	83									
84	84									
85	85									
86	86						CL	SILTY CLAY (CL) dark yellowish brown (10YR 5/4); very moist		
87	87									
88	88									
89	89									
90	90			7						
91	91			11 15	18.4		ML ML	SANDY SILT (ML); moist SILT (ML) dark yellowish brown (10YR 4/8); moist; 100% soft micaceous low-plastic fines		
92	92									
93	93									
94	94									
95	95									
96	96						ML	SANDY SILT with GRAVEL (ML); light olive brown (2.5Y 5/4); damp		
97	97									
98	98									
99	99									

Report: WELL LOG; File: AGERE.GPJ; 10/17/05

No Recovery
 Standard Split Spoon

Static ground water

FIGURE 2-2c
 Facility 1 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

ENVIRON

Site ID: EMW-1

Date(s): 4/27/05-8/03/05

Project Number: 04-13476A

Project Name: Facility 1

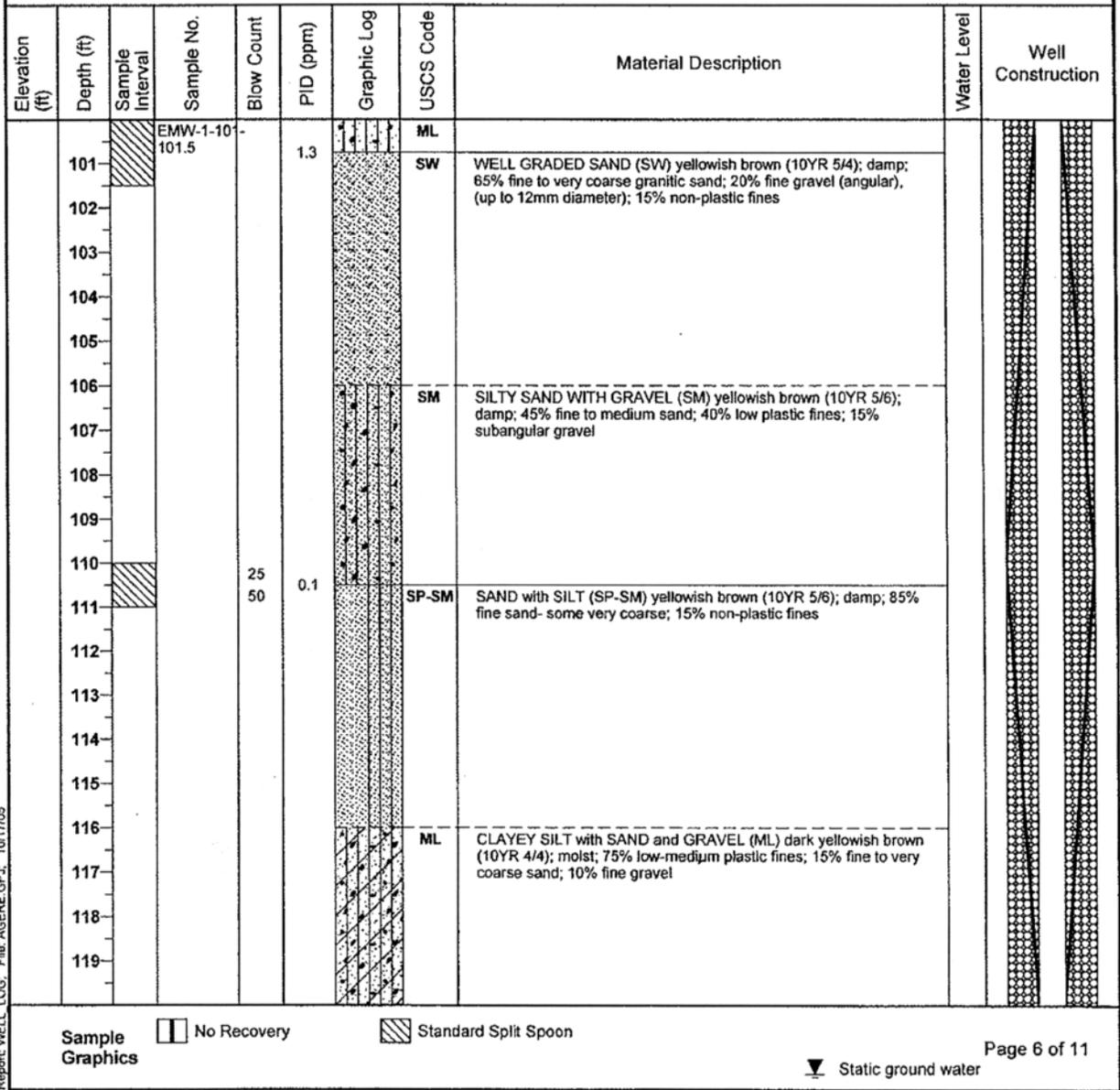


FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1

Date(s): 4/27/05-8/03/05

Project Number: 04-13476A

Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction
121	12			15	8.1		ML	SANDY SILT (ML) dark yellowish brown (10YR 4/6); moist; 80% low to medium plastic fines; 20% very fine sand		
122	15			18						
123										
124										
125										
126							GP	GRAVEL with SAND and SILT (GP) light yellowish brown (2.5Y 6/4); damp to moist; 40% medium to coarse weathered granite cobbles; 30% fine to coarse sand; 30% low plastic fines		
127										
128										
129										
130				50	1.3					
131										
132										
133										
134										
135										
136										
137										
138										
139										

Report: WELL LOG; File: AGERE.GPJ; 10/17/05

Sample Graphics No Recovery Standard Split Spoon

Static ground water

FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1

Date(s): 4/27/05-8/03/05

Project Number: 04-13476A

Project Name: Facility 1

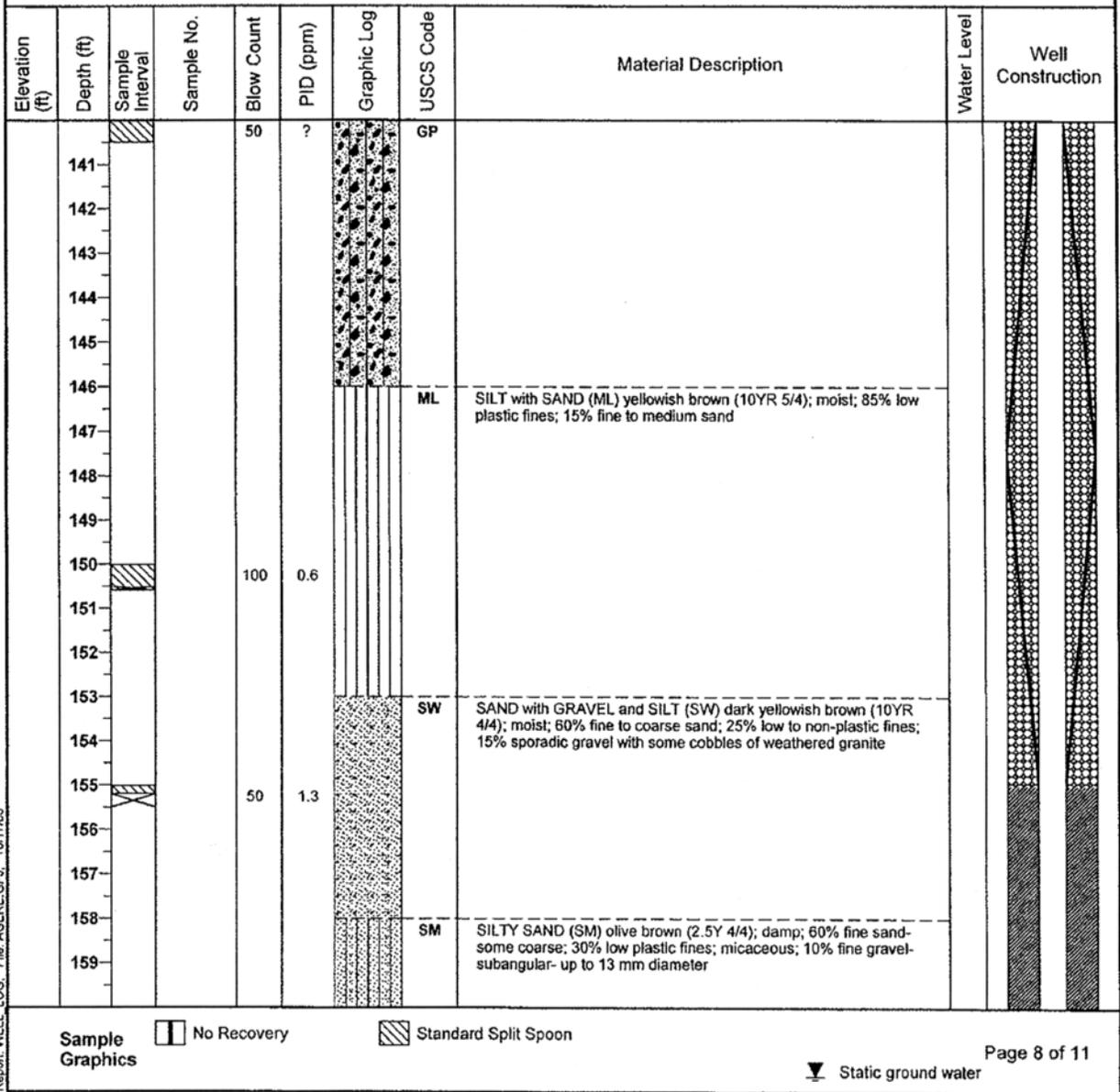


FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Project Number: 04-13476A	Project Name: Facility 1

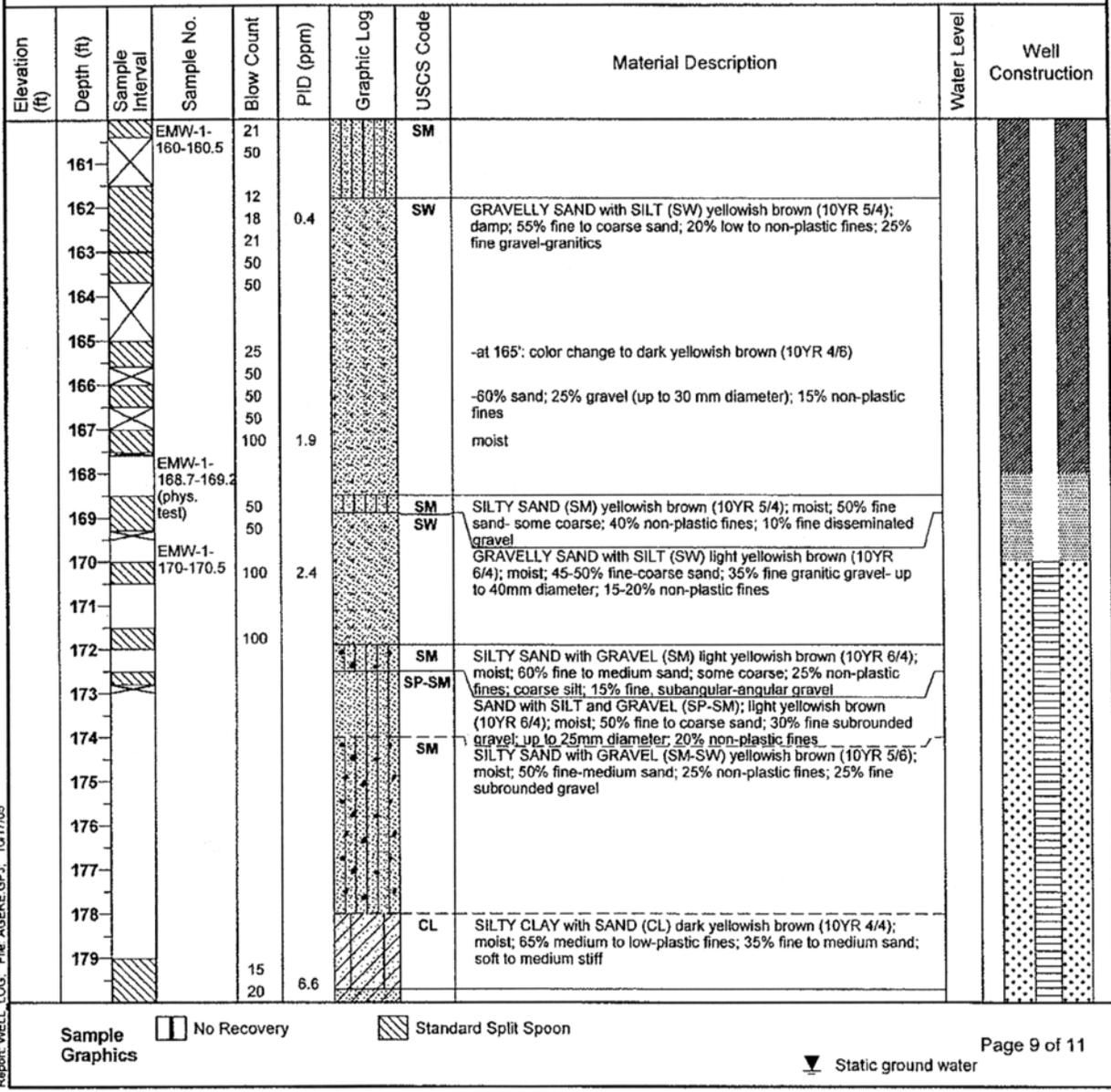


FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Project Number: 04-13476A	Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction
181	70		EMW-1-180.5-181	50			SC	CLAYEY SAND (SC) dark yellowish brown (10YR 4/6); moist; 65% fine to medium micaceous sand; 35% medium plastic fines	▼	
182	36			70	6.6		ML	SANDY SILT (ML) dark yellowish brown (10YR 4/6); very moist; 70% micaceous silt (non-plastic); 30% fine to coarse sand; soft; faintly banded; isolated gravel cobble		
183	69			36	3.9		CL	SANDY CLAY (CL) dark yellowish brown (10YR 4/4); moist; 60% medium plastic fines; 40% fine to very coarse sand; trace fine gravel; dense		
184	70			69						
185	50			70						
186	30			30	0.2		ML	SANDY SILT with CLAY (ML) dark yellowish brown (10YR 4/4); moist; 70% low to medium plastic fines; 30% fine to very coarse micaceous sand; trace to few % gravel clasts- subrounded		
187	60			60			GP	GRAVEL COBBLES- granitic		
188	50			33	0.2		ML	SANDY SILT (ML) dark yellowish brown (10YR 4/4); moist; 65% micaceous low-plastic fines; 35% fine to very coarse sand		
189	36			50						
190	44			50	1.8		CL	SANDY CLAY (CL) dark yellowish brown (10YR 4/4); moist; 75% silty clay (low to medium plastic fines); 25% fine to very coarse sand; banded; very stiff		
191	18		EMW-1-190.5-191	18	1.3		ML	SANDY SILT (ML) dark yellowish brown (10YR 4/4); moist; 65% low plastic fines- some clay; 35% fine to medium sand- some coarse; stiff		
192	27			27			ML	SILT (ML) dark yellowish brown (10YR 4/4); very moist to saturated; 90% low to non-plastic fines- some clay		
193	14			14	0.7		ML	SILT with GRAVEL (ML) dark yellowish brown (10YR 4/6); very moist to saturated; 80% low to non-plastic fines; 20% fine granitic gravel; rusty oxidized		
194	35			35	0.7		ML	CLAYEY SILT (ML) dark yellowish brown (10YR 4/4); very moist to saturated; 90% low plastic fines; 10% fine gravel to coarse sand		
195	15			15			SP	SAND with GRAVEL (SP-SW) dark yellowish brown (10YR 4/6); wet; 65% fine to coarse sand; 25% fine granitic gravel; 10% non-plastic fines		
196	21			21			ML	SILT (ML)- thin band		
197	50			50			ML	SAND with GRAVEL (SP) dark yellowish brown (10YR 4/6); wet; 65% fine to coarse sand; 25% fine granitic gravel; 10% non-plastic fines		
198	27			27			CL	CLAY SILT (ML)		
199	50			50			CL	CLAY (CL) dark yellowish brown (10YR 4/4); moist; 90% medium plastic fines; 10% fine sand; strong rusty mottling		
	17			17			CL	GRAVELLY CLAY (CL) olive (5Y 5/3); strong mottling		

Report: WELL LOG; File: AGERE.GPJ; 10/17/05

No Recovery
 Standard Split Spoon

Page 10 of 11
 ▼ Static ground water

FIGURE 2-2c
 Facility 1 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

ENVIRON

Site ID: EMW-1	Date(s): 4/27/05-8/03/05
Project Number: 04-13476A	Project Name: Facility 1

Elevation (ft)	Depth (ft)	Sample Interval	Sample No.	Blow Count	PID (ppm)	Graphic Log	USCS Code	Material Description	Water Level	Well Construction
	201			19 44 50			CL			
	202							Borehole was terminated at 201.5 feet below ground surface. Borehole was reamed and converted to a 4-inch PVC schedule-80 monitoring well screened from 170 -200 feet bgs. Ground water was measured at 182.3 feet bgs		
	203									
	204									
	205									
	206									
	207									
	208									
	209									
	210									
	211									
	212									
	213									
	214									
	215									
	216									
	217									
	218									
	219									

Report: WELL LOG; File: AGERE.GPJ; 10/17/05

No Recovery Standard Split Spoon
Sample Graphics

 Static ground water Page 11 of 11

FIGURE 2-2c
 Facility 1 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

2.3.2 Facility 3

Table 2-3 presents a summary of the site history and the sampling results for Facility 3.

TABLE 2-3
Facility 3 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1969-1984 – Property used by a manufacturing company.</p> <p>1984-1995 – Property used for furniture and electrical parts storage.</p> <p>1995-2001 – Property used by a communication company.</p> <p>2000 – Site inspected; investigation began with oversight by LARWQCB.</p> <p>Currently, property is used as a medical/dental assistance training office.</p>	<p>Twenty-three probes installed to 10 feet bgs and 4 probes installed to 30 feet.</p> <p>Two nested probes installed to 100 feet bgs in areas of highest PCE and TCE concentrations identified in the 30-foot probes.</p> <p>Three nested probes installed to 140 feet.</p> <p>Distance between the evaluated probes range from 1 to 132 feet (Figure 2-3a).</p> <p>PCE concentrations ranged from 1.9 to 7,927 µg/L-v (Table 2-4).</p> <p>TCE concentrations ranged from ND to 216 µg/L-v (Table 2-4).</p>	<p>Three groundwater wells installed.</p> <p>Depth to groundwater – 165 feet bgs.</p> <p>TCE detected in groundwater at a concentration of 250 µg/L.</p> <p>PCE detected in groundwater at a maximum concentration of 100 µg/L.</p>	<p>Five soil vapor extraction (SVE) wells installed.</p> <p>SVE system operated from 2003 through 2005. All data used for this evaluation predate the operation of the SVE system.</p>

Table 2-4 provides the soil vapor data used in the evaluation. Figure 2-3a shows the site layout. The maximum PCE concentration in soil vapor (7,927 µg/L-v) occurs in the shallow interval at approximately 30 feet bgs within a relatively transmissive sand/gravel unit. The maximum TCE concentration in soil vapor (216 µg/L-v) occurs in the shallow interval at approximately 10 feet bgs within a relatively transmissive sand/gravel unit. Figure 2-3a illustrates the maximum PCE and TCE concentrations occur in the shallow interval and is the only facility not to have a maximum PCE or TCE concentration within the intermediate or deep interval. Based on current information, the reason for the difference is unclear. Figure 2-3c presents a representative boring log from this facility.

Table 2-4
 Facility 3: PCE and TCE Soil Vapor Concentrations

Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
VMW-1	1/11/2002	15	1,000	36
		32	1,500	67
		44	1,700	72
		60	1,500	92
		80	680	64
		100	500	69
VMW-2	1/11/2002	15	1,600	63
		30	2,000	79
		44	1,900	88
		60	2,000	100
		80	260	20
		100	620	71
VMW-3	1/11/2002	120	340	33
		140	280	54
		160	45	160
VMW-4	6/25/2002	20	260	ND
		40	270	24
		100	89	13
		140	28	22
VMW-5	6/25/2002	20	30	ND
		40	76	4.6
		100	69	5.5
		140	1.9	ND
SG-13	5/10/2002	10	7,874	216
		20	2,250	ND
		30	5,271	108
SG-21	5/10/2002	10	5,460	ND
		20	5,108	104
		30	7,927	165

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

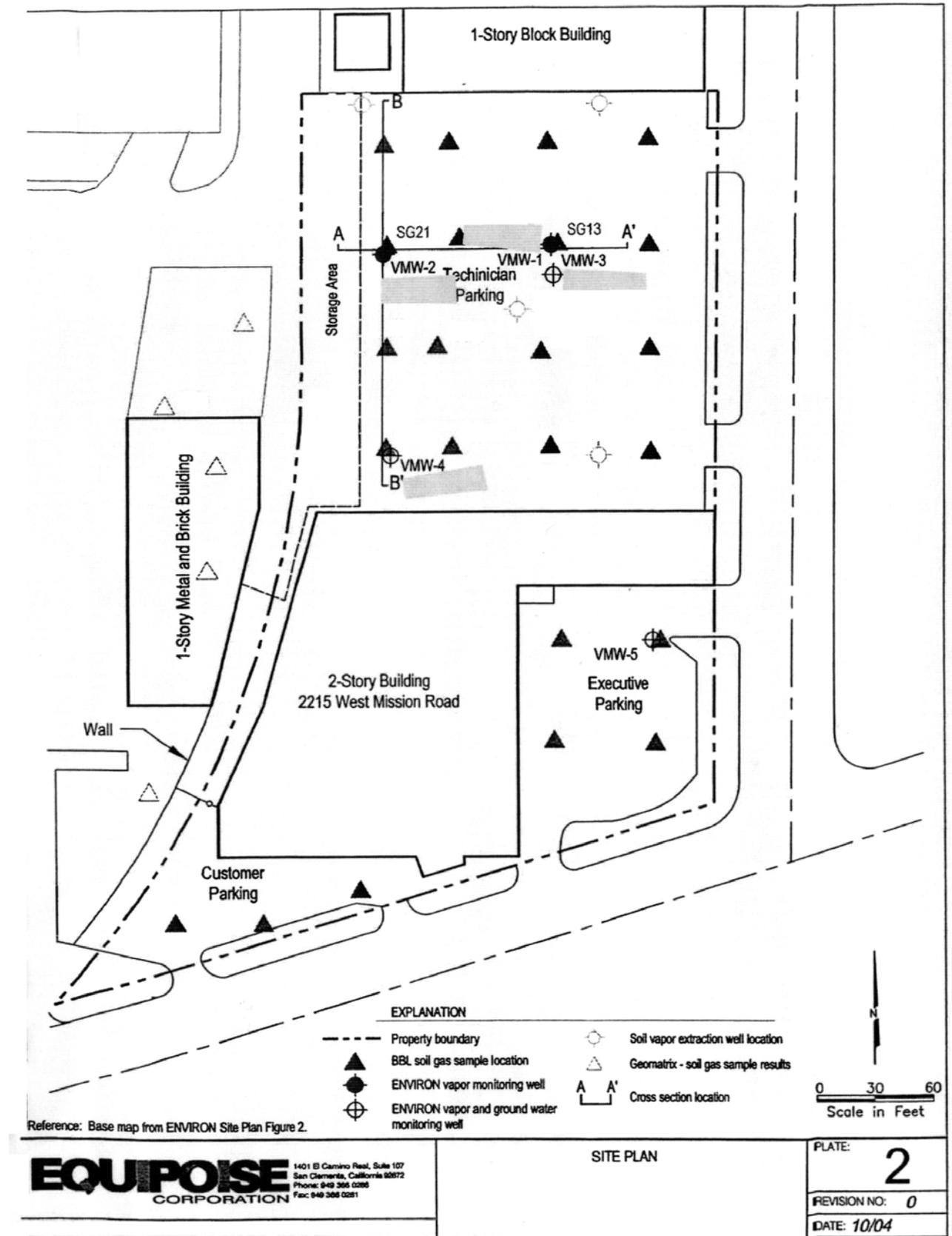


FIGURE 2-3a
 Facility 3 Site Map
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

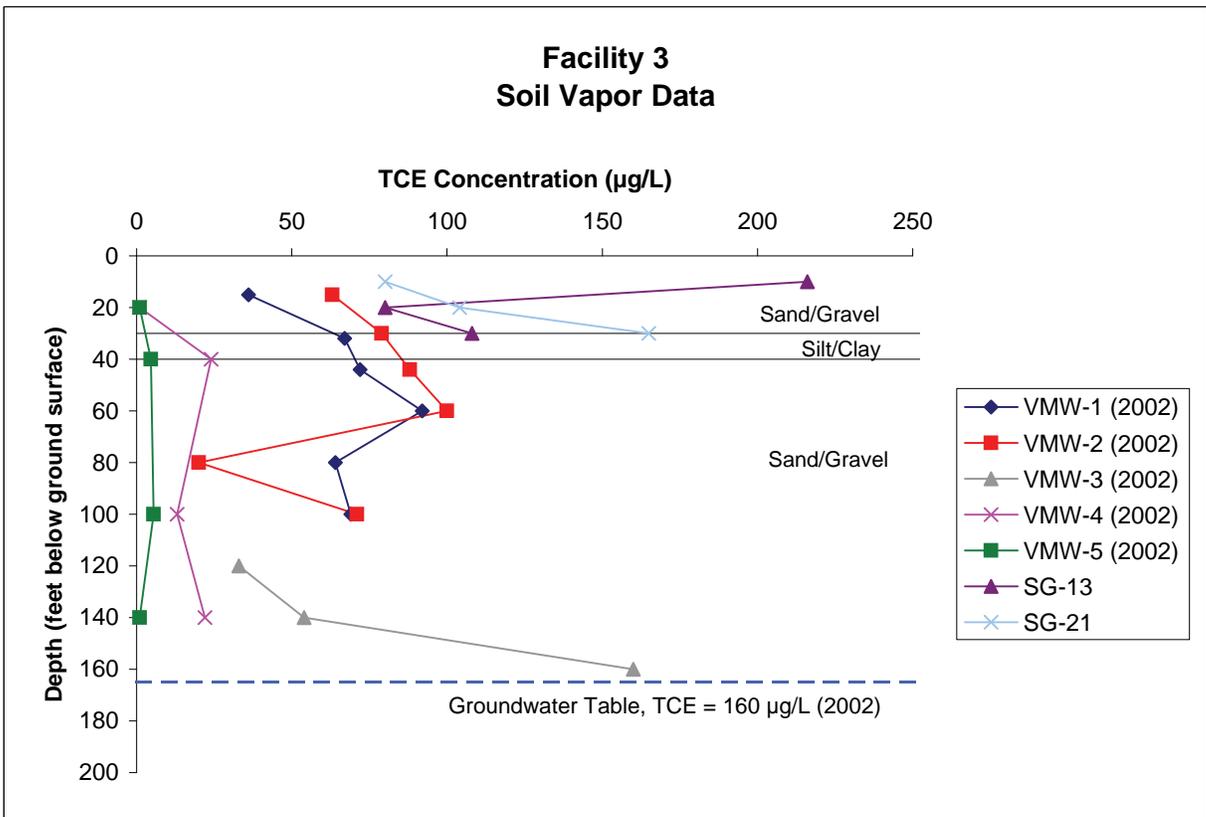
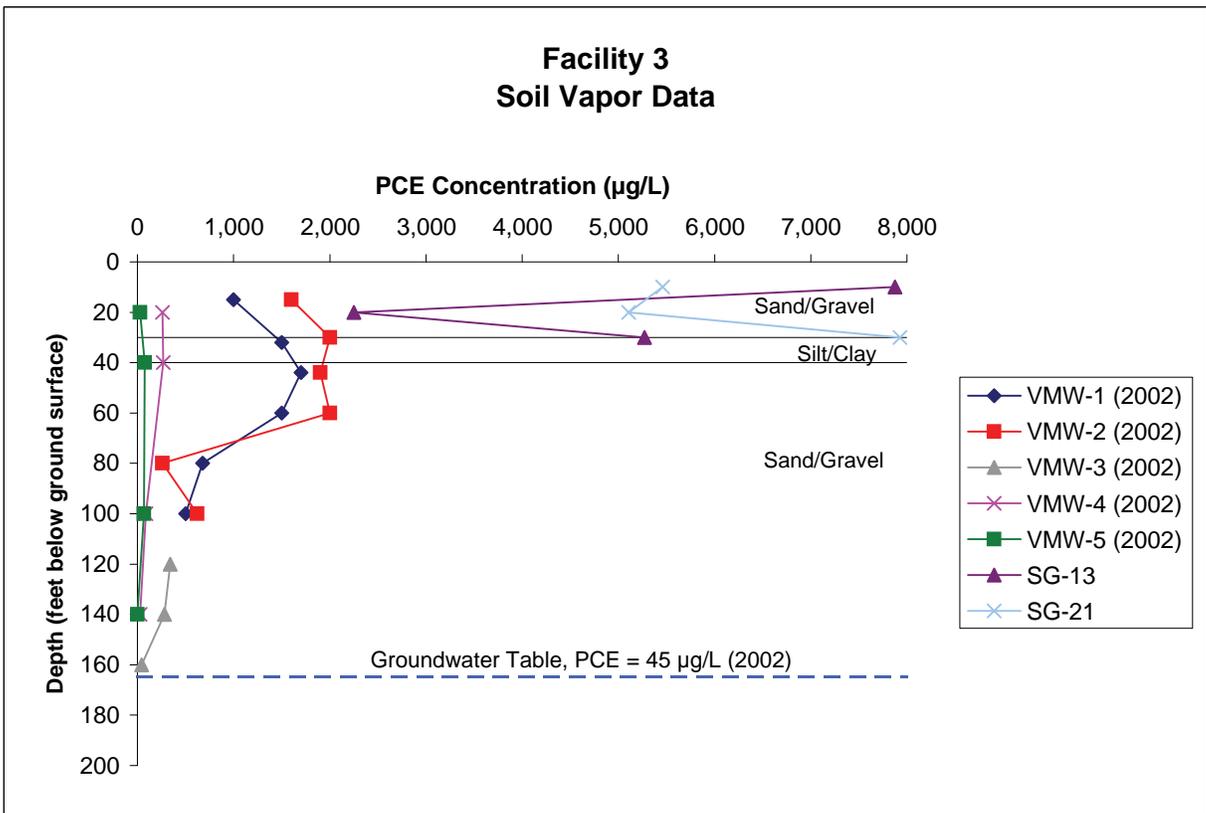
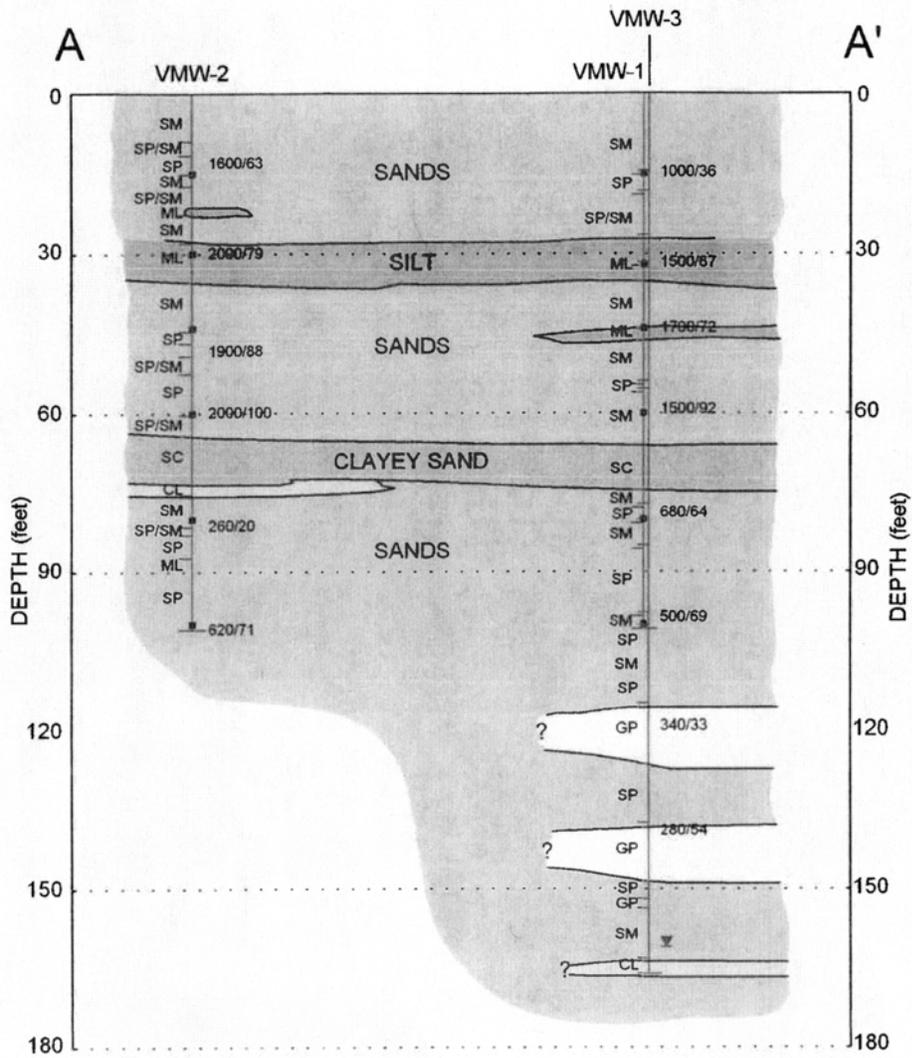


FIGURE 2-3b
PCE and TCE Concentrations in Soil Vapor at Facility 3
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*



EXPLANATION

280/54 PCE/TCE soil vapor concentration ug/L
on January 11, 2002

• Vapor probe depth

0 15 30
Scale in Feet

Facility 3

EQUIPOISE
CORPORATION
1401 El Camino Real, Suite 107
San Clemente, California 92672
Phone: 949 366 0266
Fax: 949 365 0261

MISSION ROAD ALHAMBRA SECTIONS.DWG

CROSS SECTION A-A' WITH
PCE/TCE SOIL VAPOR CONCENTRATIONS
2215 West Mission Road
Alhambra, California

PLATE: **7**
REVISION NO: 0
DATE: 01/06/02

FIGURE 2-3c
Facility 3 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

2.3.3 Facility 4

Table 2-5 presents a summary of the site history and the sampling results for Facility 4.

TABLE 2-5
Facility 4 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1969-1984 – Property used by a metals manufacturer.</p> <p>1994-2007 – Property used for newspaper printing operations.</p> <p>1999 – Site inspected by LARWQCB.</p> <p>2000 – Site investigation began. Oversight by LARWQCB.</p>	<p>Six nested probes installed from 8 to 16 feet bgs and 8 probes installed to 10 feet bgs in the parking lot and driveway.</p> <p>One probe installed from 30 to 70 feet bgs in the parking lot and driveway.</p> <p>Two probes installed from 50 to 150 feet in the parking lot and driveway.</p> <p>Distance between the evaluated probes range from 20 to 120 feet (Figure 2-4a).</p> <p>PCE concentrations ranged from ND to 3,593 µg/L-v (Table 2-6).</p> <p>TCE concentrations ranged from ND to 333 µg/L-v (Table 2-6).</p>	<p>One groundwater well installed.</p> <p>Depth to groundwater – 178 feet bgs.</p> <p>PCE detected in groundwater at a concentration of 39.7 µg/L.</p> <p>TCE detected in groundwater at a concentration of 93.5 µg/L.</p>	<p>None.</p>

Table 2-6 provides the soil vapor data used in the evaluation of Facility 4. Figure 2-4a shows the site layout. The maximum PCE concentration in soil vapor (3,593 µg/L-v) occurs in the intermediate interval at approximately 60 feet bgs within a silt/clay unit. The maximum TCE concentration in soil vapor (333 µg/L-v) occurs in the intermediate interval at approximately 50 feet bgs within a silt/clay unit. Figure 2-4b shows that the maximum PCE and TCE concentrations in both the parking lot and driveway portions of the site occur below 40 feet bgs. Figure 2-4c presents a representative boring log from this facility.

Table 2-6
Facility 4: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Parking Lot	SG-8	7/26/2000	10	1,680	55
Parking Lot	SG-9	7/26/2000	10	2,150	ND
Parking Lot	SG-10	7/26/2000	10	2,310	57
Parking Lot	SV-109	10/15/2002	8	321	18
			16	469	28
Parking Lot	SV-110	10/15/2002	8	377	29
			16	779	66
Driveway	SV-111	10/15/2002	8	492	23
			16	601	30
Parking Lot	SV-101	10/15/2002	8	412	11
			16	747	19
Parking Lot	SV-102	10/15/2002	8	370	12
			16	476	19
Driveway	SV-103	10/15/2002	8	298	8
			16	422	15
Parking Lot	SV-201	10/16/2003	50	1,853	180
			75	1,638	188
			100	1,686	245
			125	1,980	249
			150	2,165	250
Parking Lot	SV-202	10/16/2003	50	2,012	333
			75	1,749	299
			100	1,479	240
Driveway	SV-203	10/16/2003	30	1,072	48
			45	1,693	131
			60	3,593	219
			70	2,800	225

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

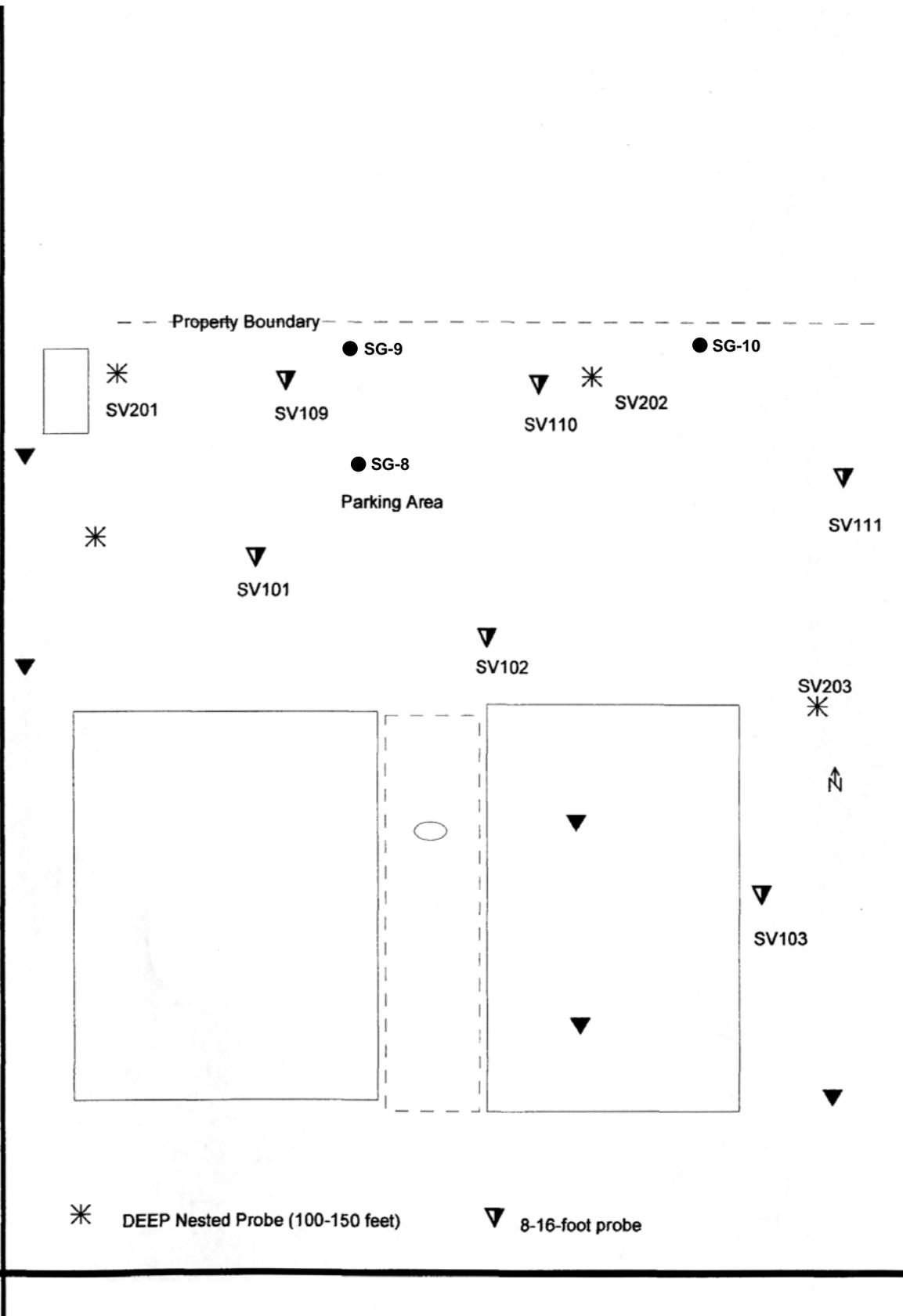


FIGURE 2-4a
 Facility 4 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

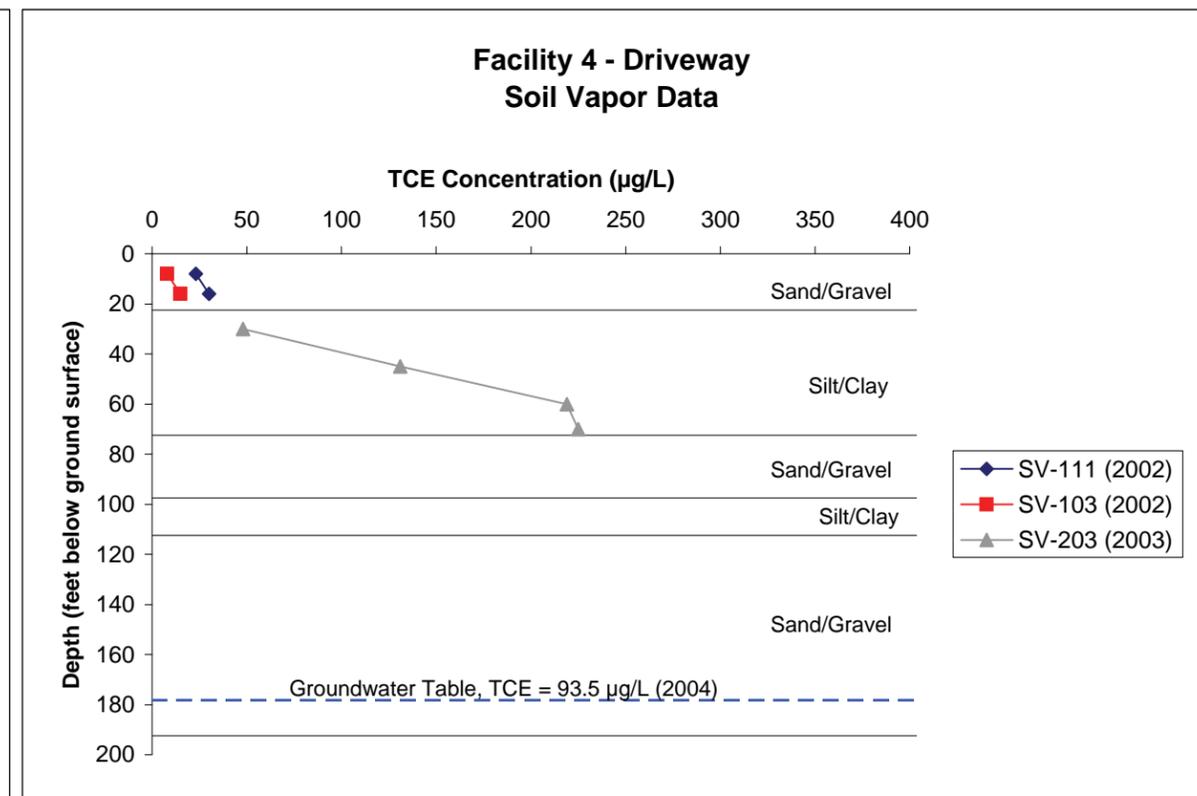
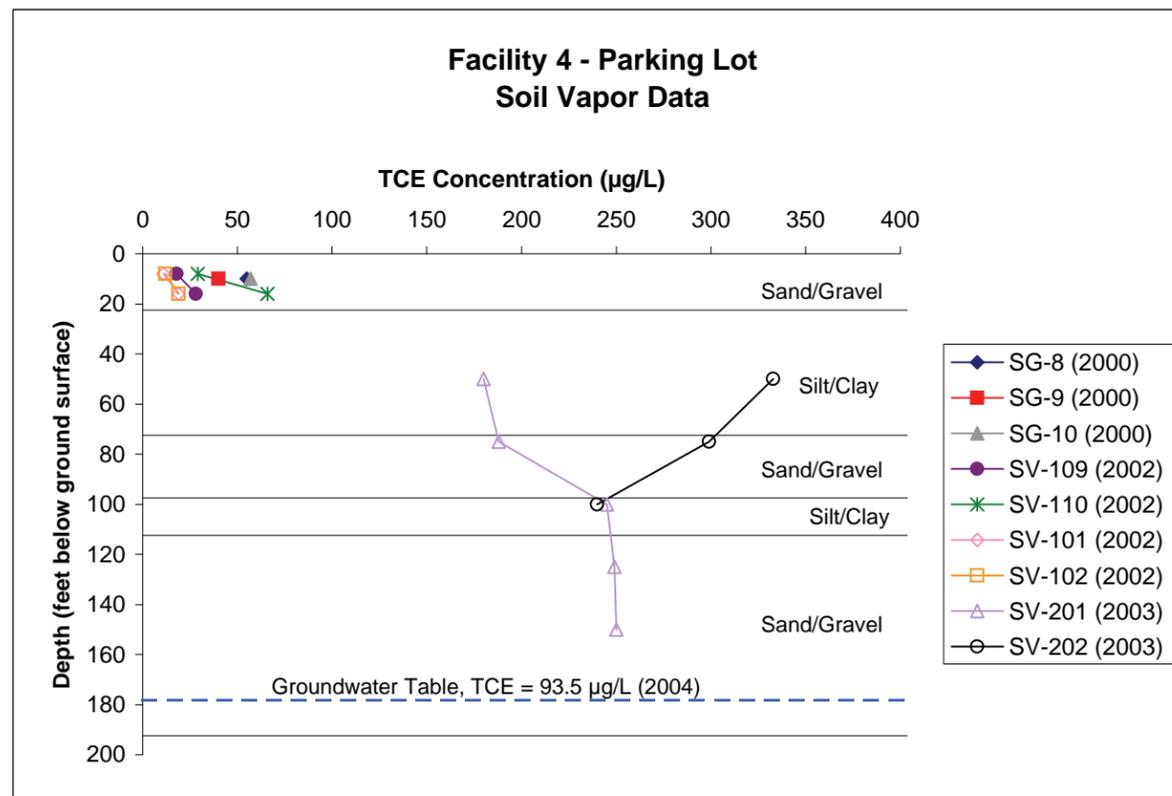
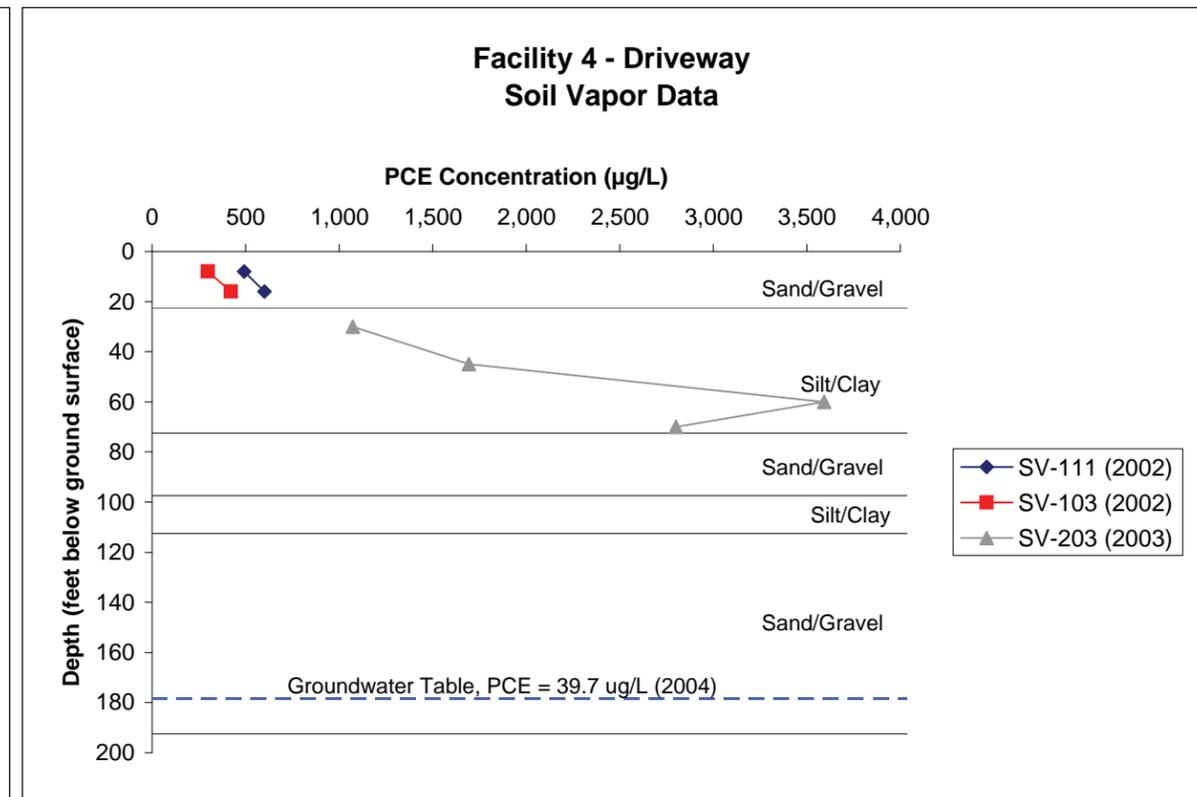
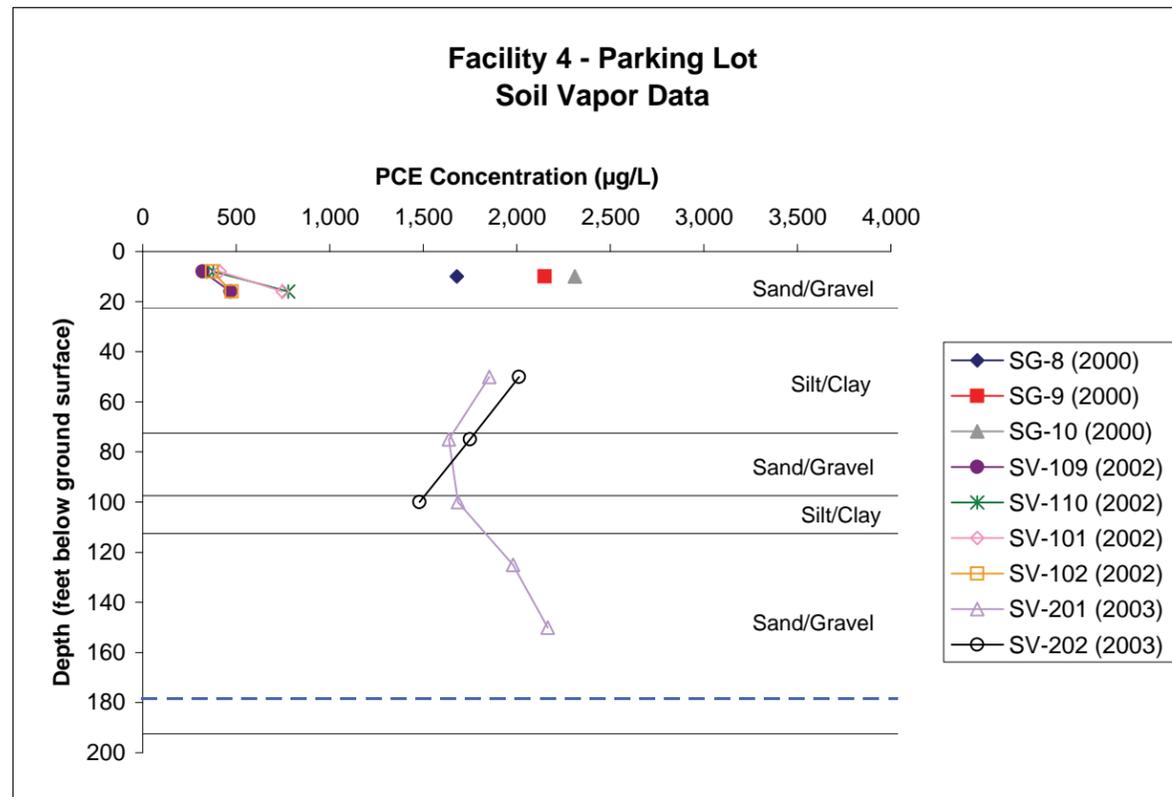


FIGURE 2-4b
PCE and TCE Concentrations in Soil Vapor at Facility 4
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

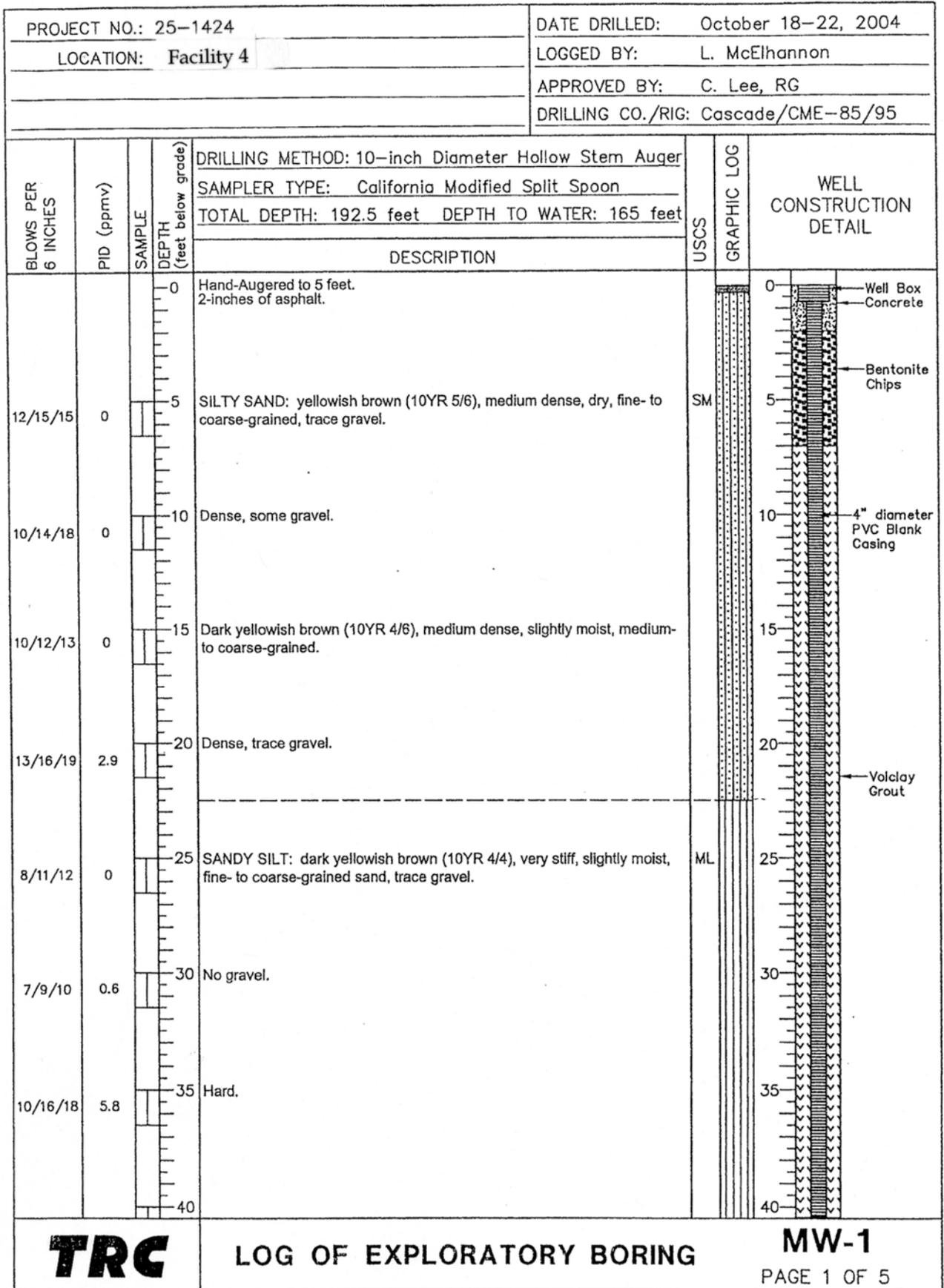
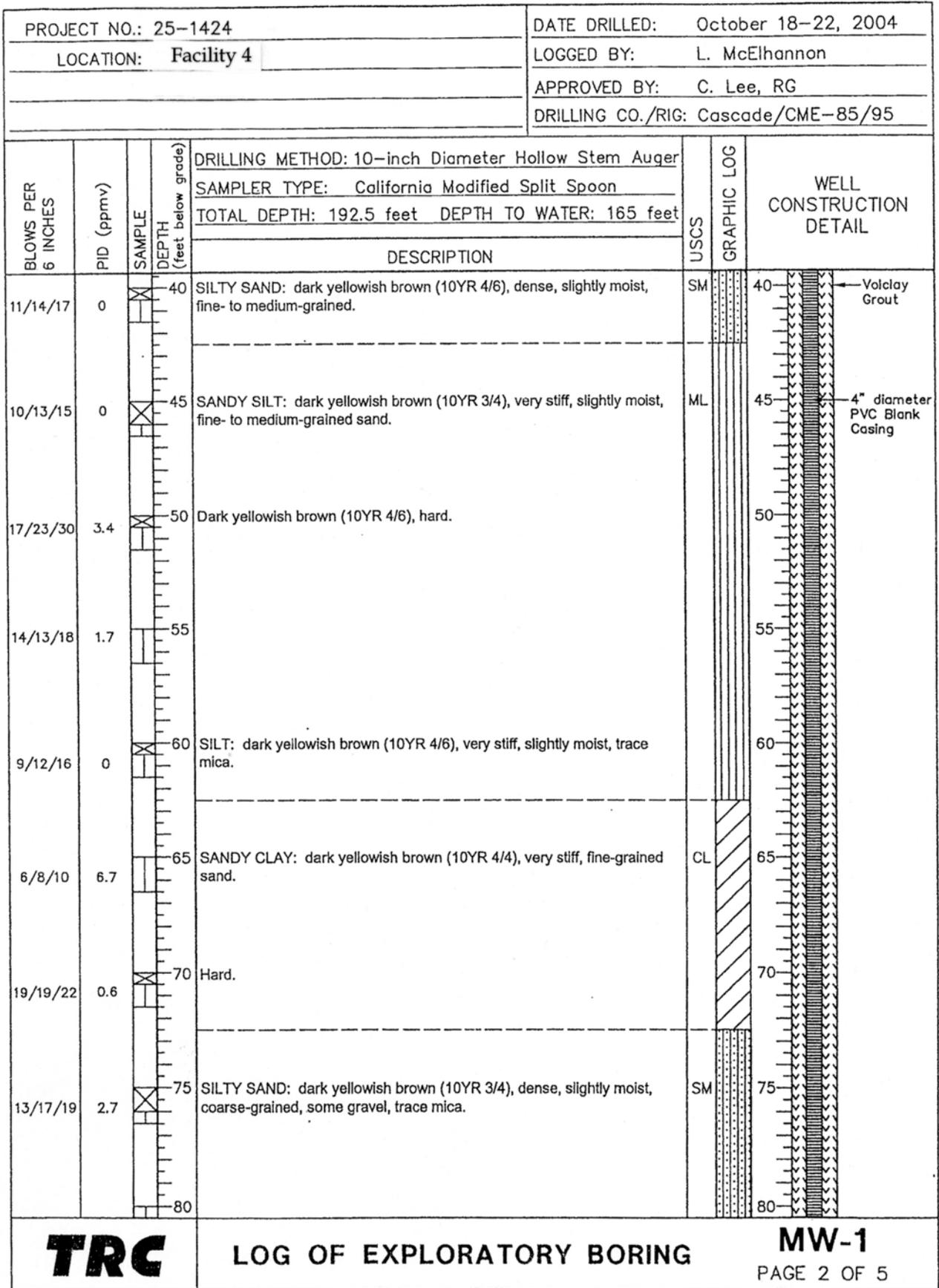


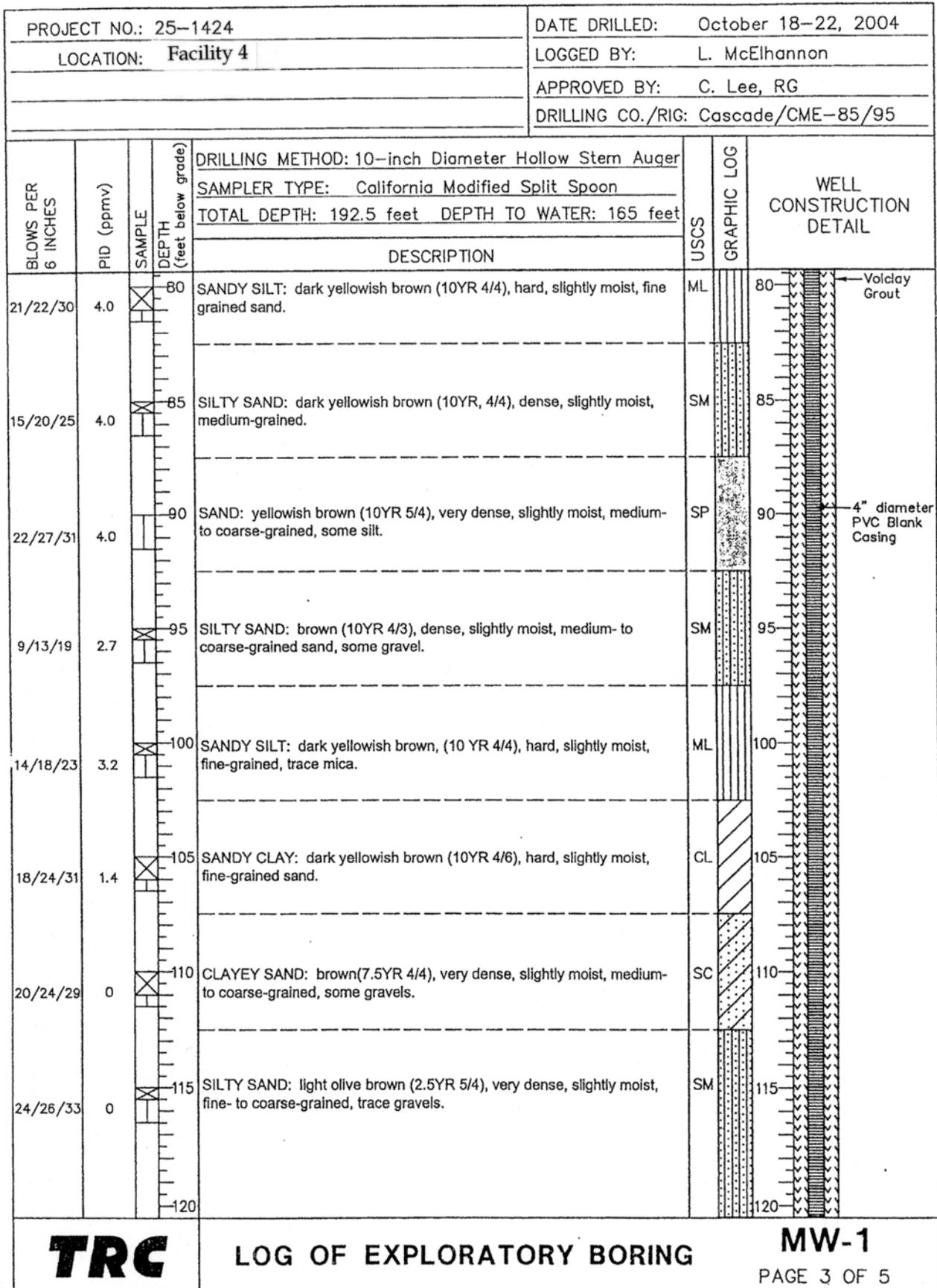
FIGURE 2-4c
 Facility 4 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

25-1424 Boring Logs 10/26/04 p.jg



25-1424 Boring Logs 10/26/04 .pjt

FIGURE 2-4c
 Facility 4 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3



TRC

LOG OF EXPLORATORY BORING

MW-1

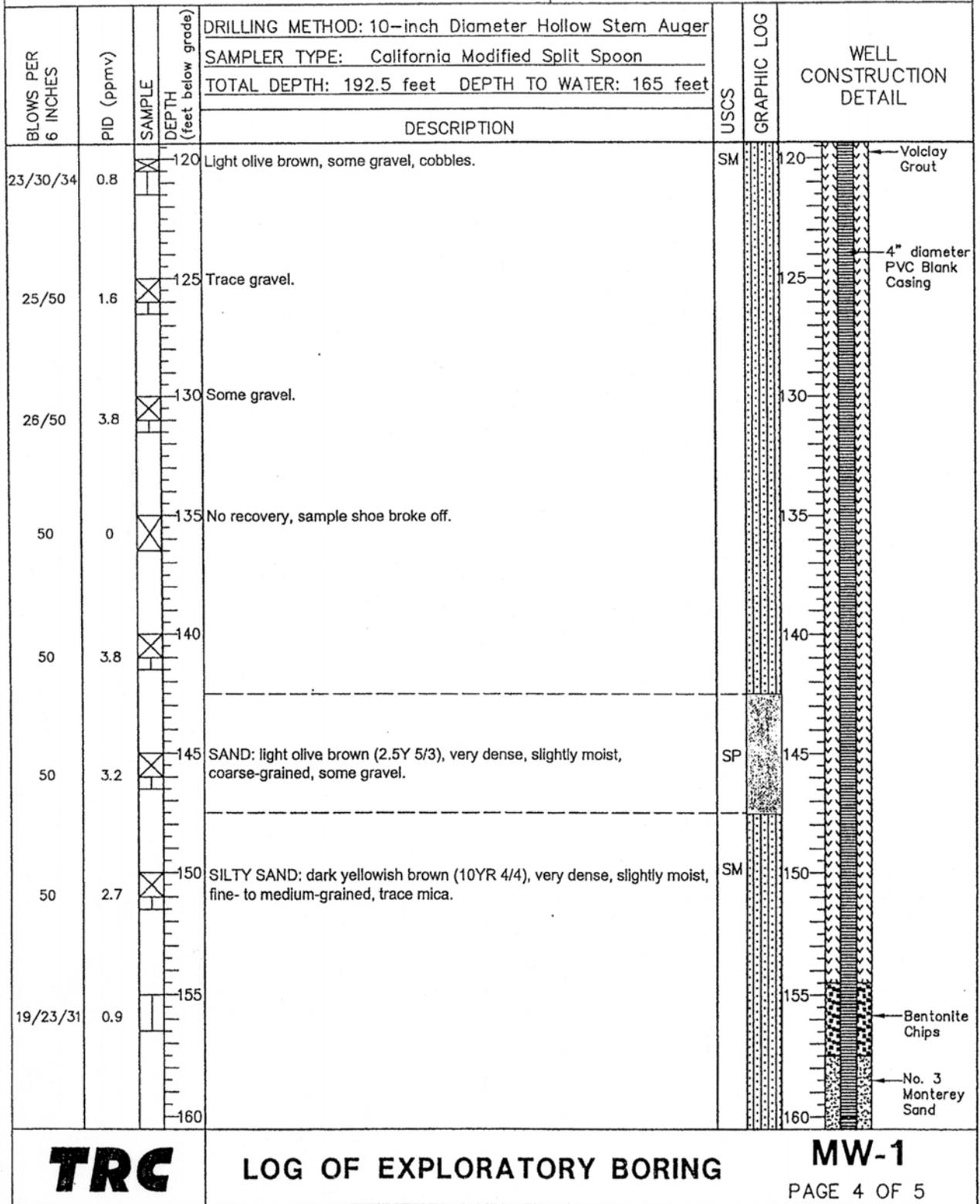
PAGE 3 OF 5

25-1424 Boring Logs 10/26/04 pjg

FIGURE 2-4c
 Facility 4 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

CH2MHILL

PROJECT NO.: 25-1424	DATE DRILLED: October 18-22, 2004
LOCATION: Facility 4	LOGGED BY: L. McElhannon
	APPROVED BY: C. Lee, RG
	DRILLING CO./RIG: Cascade/CME-85/95



LOG OF EXPLORATORY BORING

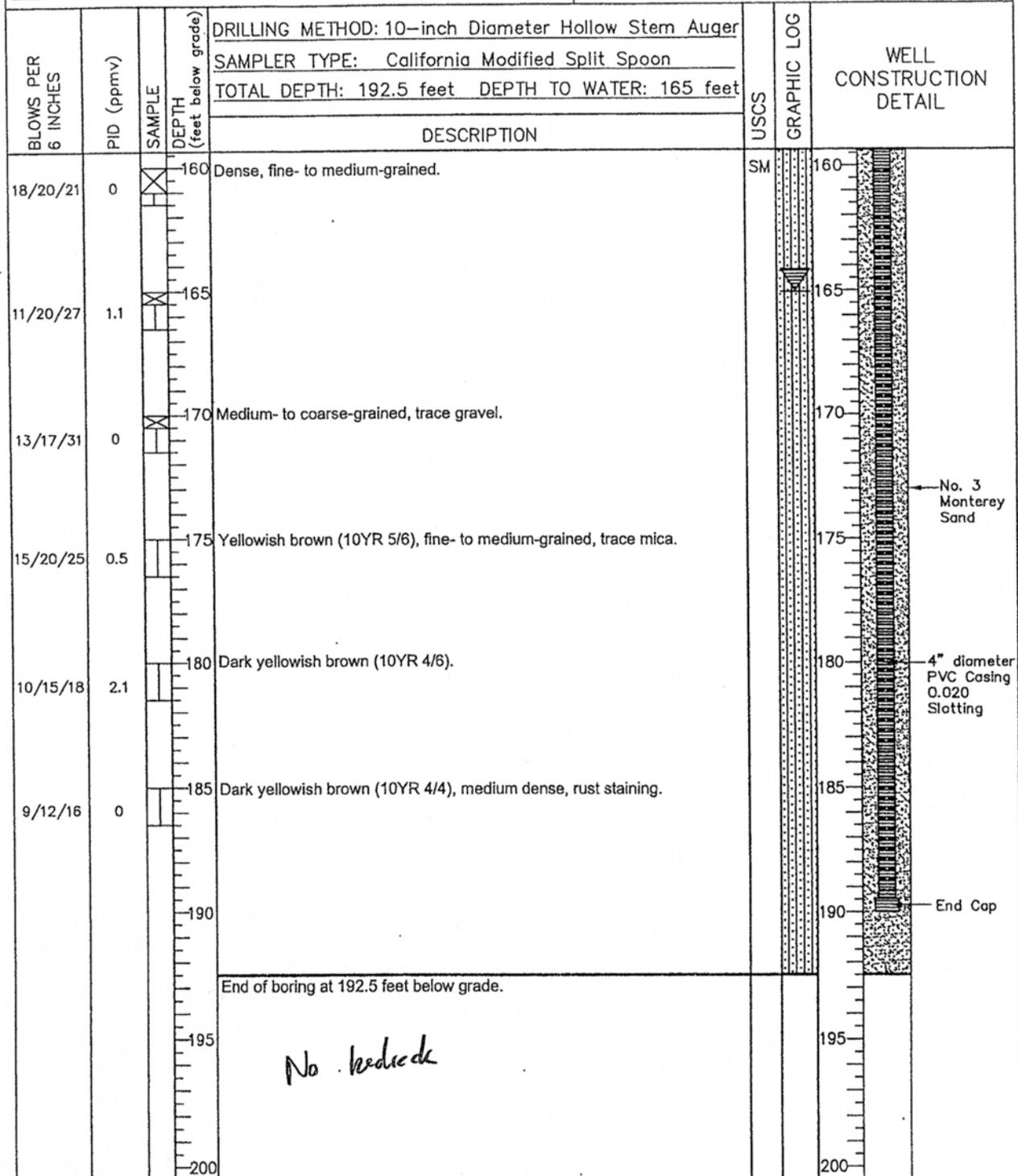
MW-1

PAGE 4 OF 5

25-1424 Boring Logs 10/26/04 p.jg

FIGURE 2-4c
 Facility 4 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

PROJECT NO.: 25-1424	DATE DRILLED: October 18-22, 2004
LOCATION: Facility 4	LOGGED BY: L. McElhannon
	APPROVED BY: C. Lee, RG
	DRILLING CO./RIG: Cascade/CME-85/95



TRC

LOG OF EXPLORATORY BORING

MW-1

PAGE 5 OF 5

FIGURE 2-4c 25-1424 Boring Logs 10/26/04 p.jg
 Facility 4 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

2.3.4 Facility 5

Table 2-7 presents a summary of the site history and the sampling results for Facility 5.

TABLE 2-7
Facility 5 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
1953-1971 – Property used by machine shop. 1972-2007 – Property for lithography services. Drums of solvent have been stored on the property. 1999 – Site inspected by LARWQCB. 2001 – Site investigation oversight by LARWQCB.	Two probes installed to 15 feet bgs in the parking lot. Nine probes installed to 36 feet bgs inside the building. Three nested probes installed from 10 to 170 feet bgs in the loading dock area. Evaluated probes are in the loading dock area (50 x 200 feet) (Figure 2-5a). PCE concentrations ranged from ND to 105 µg/L-v (Table 2-8). TCE concentrations ranged from ND to 224 µg/L-v (Table 2-8).	One groundwater well installed. Depth to groundwater – 184 feet bgs. TCE detected in groundwater at a maximum concentration of 16.2 µg/L. PCE detected in groundwater at a maximum concentration of 5.2 µg/L.	None.

Table 2-8 provides the soil vapor data used in the evaluation of Facility 5. Figure 2-5a shows the site layout. The maximum PCE concentration in soil vapor (105 µg/L-v) occurs in the intermediate interval at approximately 80 feet bgs within a silt/clay unit. The maximum TCE concentration in soil vapor (224 µg/L-v) occurs in the intermediate interval at approximately 100 feet bgs within a silt/clay unit. Figure 2-5b shows that PCE and TCE concentrations in the loading dock area in the intermediate interval exceed concentrations in the shallow interval. Figure 2-5c presents a representative boring log from this facility.

Table 2-8
Facility 5: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Loading Dock	SV-202	7/27/2006	80	29	106
			100	48	127
			120	31	158
			140	26	84
			160	28	120
			170	44	191
Loading Dock	SV-201	2/2/2006	10	40	80
			40	67	87
			60	74	116
			80	59	123
			100	53	224
			80	105	109
Loading Dock	SV-101	3/27/2001	10	35	12
			20	25	5
			30	40	19
Parking Lot	SV-102	3/27/2001	5	3.8	11
			15	2.1	3.3
Parking Lot	SV-103	5/7/2001	15	4.3	9.4

Shaded box with bold text indicates maximum concentration

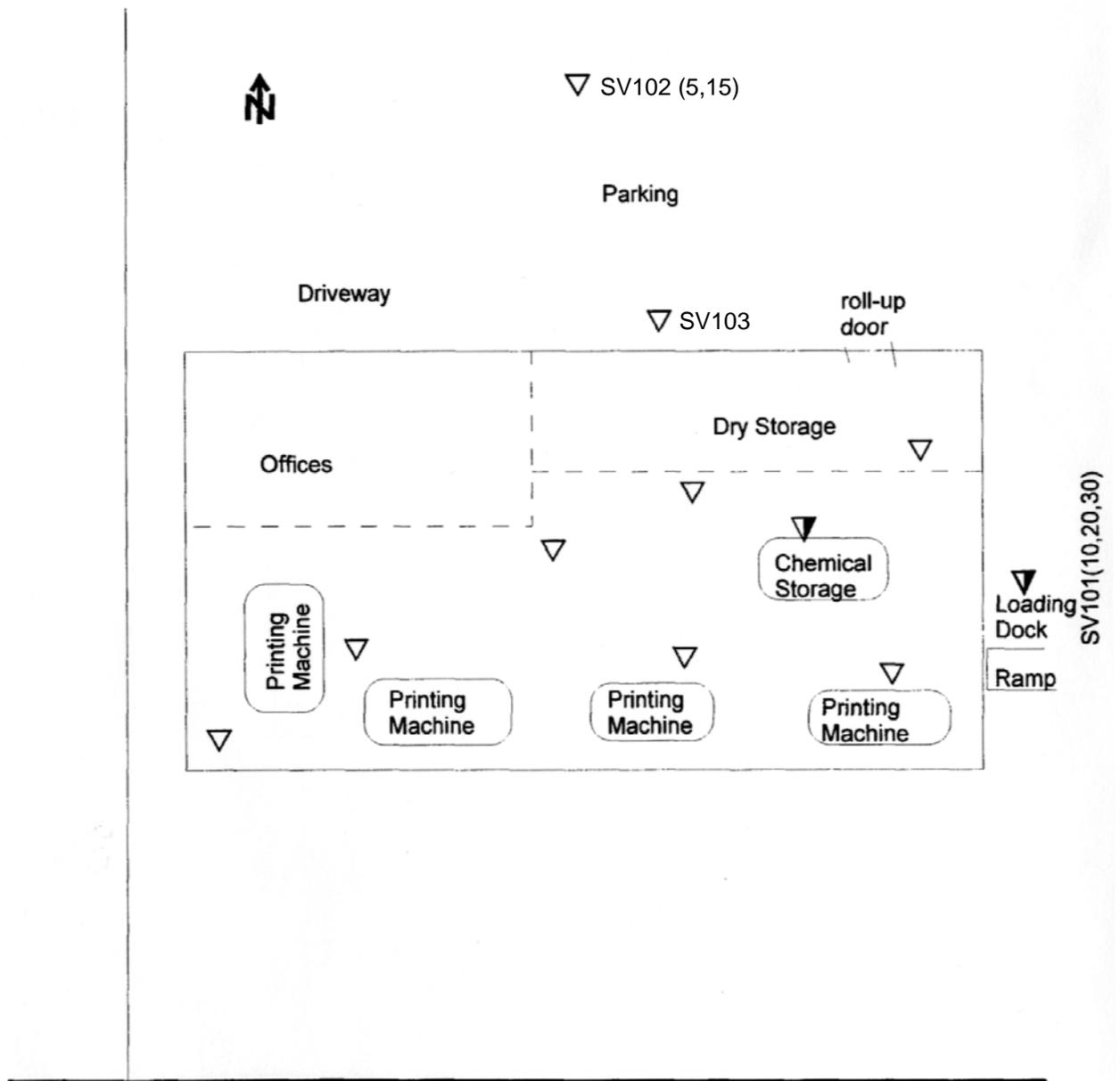
ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

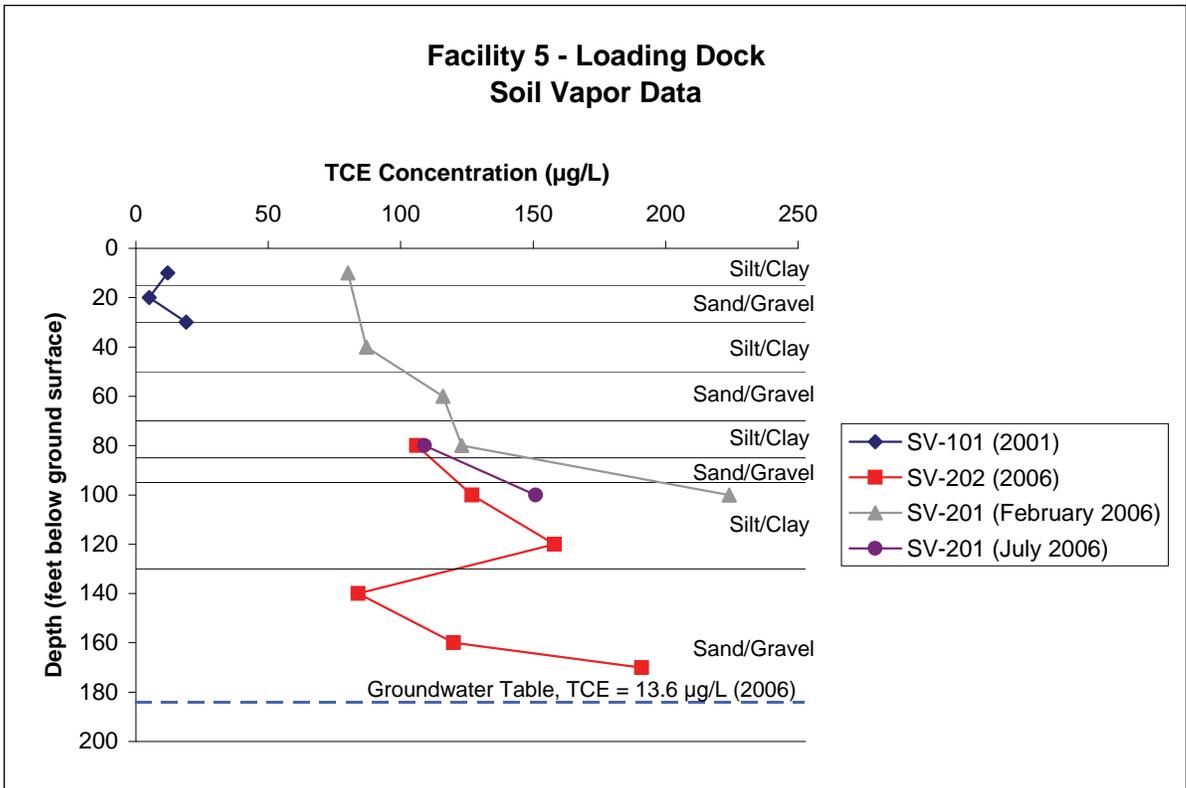
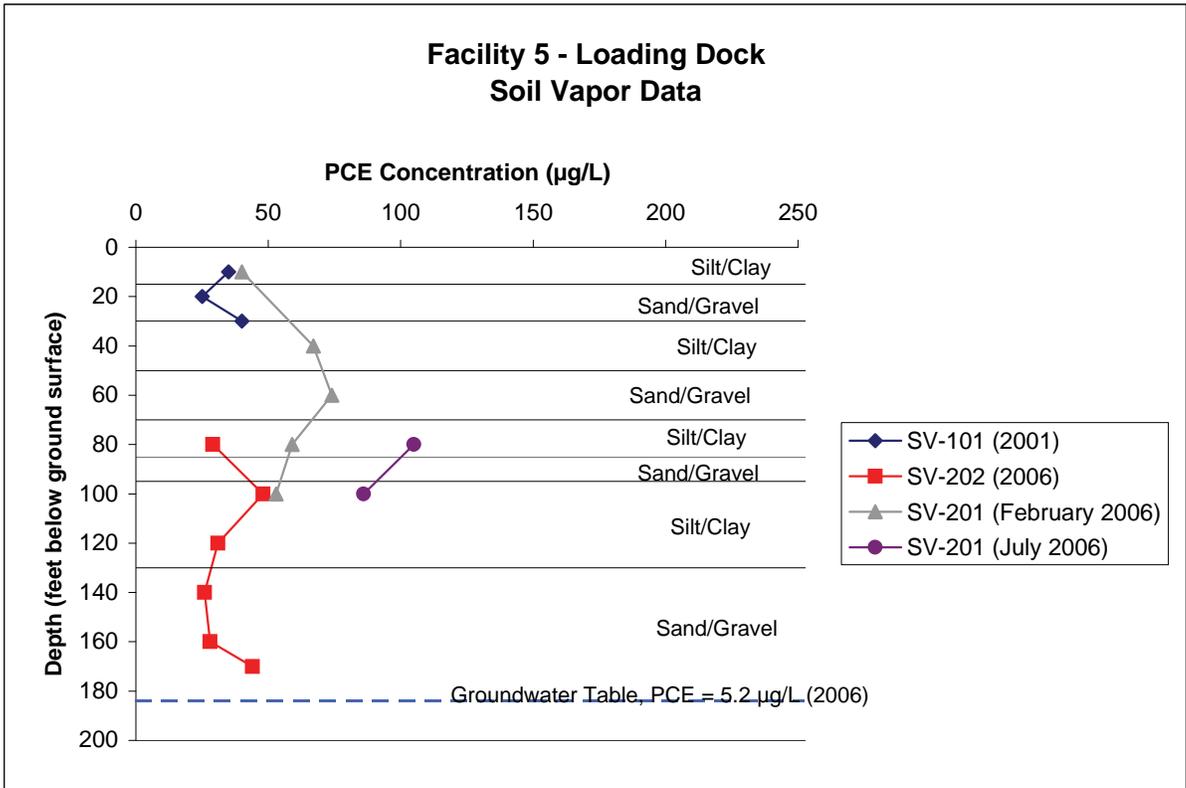
Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit



*SV-201 and SV202 are not identified in the Site Map

FIGURE 2-5a
 Facility 5 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

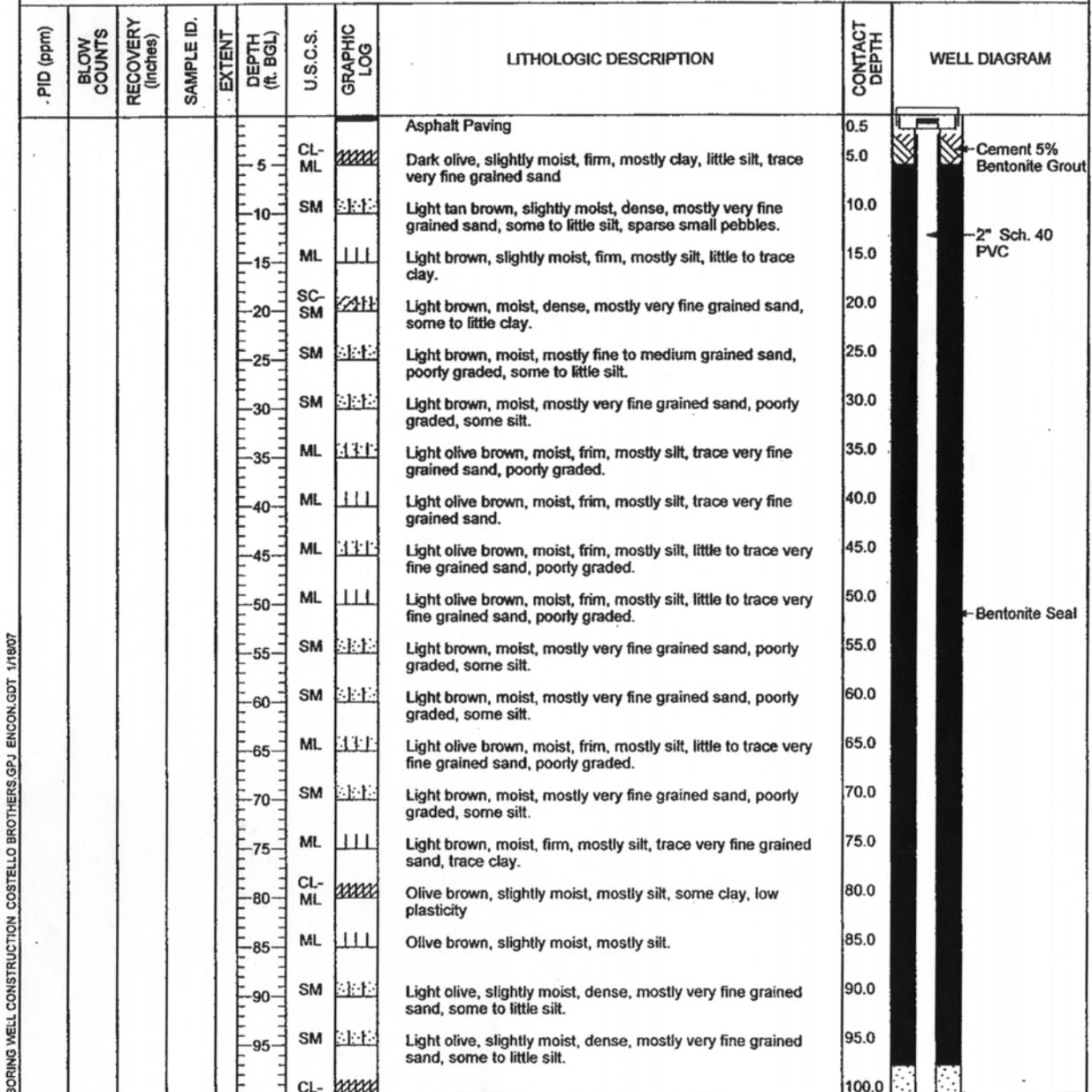


Soil vapor probes located in the loading dock area are contained within a area approximately 200 ft by 50 ft.

FIGURE 2-5b
PCE and TCE Concentrations in Soil Vapor at Facility 5
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Telephone: (949) 338-4557
 Fax: (949) 498-3561
 Facility 5

PROJECT NAME	Facility 5	DATE DRILLED	6/19/06 - 6/20/06
LOCATION		CASING TYPE/DIAMETER	SCH 40 PVC / 2" I.D.
DRILLING METHOD	CME - 95 Hollow Stem Auger	SCREEN TYPE/SLOT	SCH 40 PVC / 0.020
SAMPLING METHOD	Split Spoon	GRAVEL PACK TYPE	#3 Mont. Sand
GROUND ELEVATION	480.86	GROUT TYPE/QUANTITY	3/8 Bentonite Chip
TOP OF CASING	481.29	STATIC GROUNDWATER DEPTH	184.0
LOGGED BY	A.Schmitt	STATIC GROUND WATER ELEVATION	296.8
REMARKS	Probes installed: Clear = 100', Blue = 120', Green = 140', Yellow = 160', and Red = 170'.		



BORING WELL CONSTRUCTION COSTELLO BROTHERS.GPJ ENCON.GDT 1/18/07

FIGURE 2-5c
 Facility 5 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

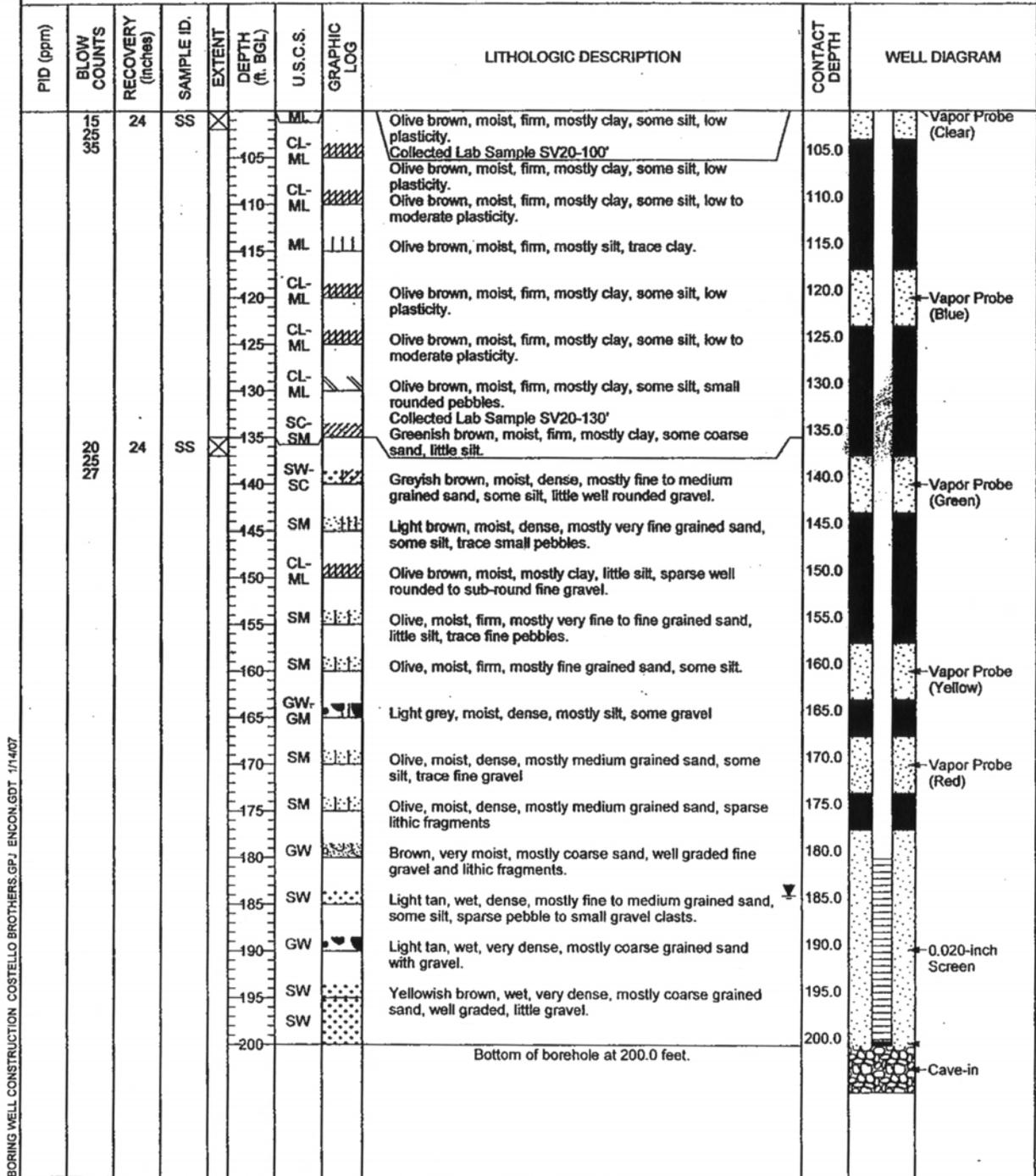
Telephone: (949) 338-4557
 Fax: (949) 488-3561

PROJECT NAME Facility 5

DATE DRILLED 6/19/06 - 6/20/06

LOCATION

Continued from Previous Page



BORING WELL CONSTRUCTION COSTELLO BROTHERS.GPJ ENCON.GDT 1/14/07

FIGURE 2-5c
 Facility 5 Boring Logs
 Area 3 Soil Vapor Case Study

2.3.5 Facility 6

Table 2-9 presents a summary of the site history and the sampling results for Facility 6.

TABLE 2-9
Facility 6 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1947-2007 – Property used for metals tube fabrication, bending, and cutting.</p> <p>1999 – Site inspected by LARWQCB.</p> <p>2000 – Site investigation began. Oversight by LARWQCB.</p>	<p>Three probes installed to 24 feet bgs and one probe installed to 150 feet bgs in the storage area.</p> <p>Three probes installed to 24 feet bgs and one probe installed to 100 feet bgs in the driveway.</p> <p>Five probes installed to 24 feet bgs and one probe to 70 feet in the parking lot (Figure 2-6a).</p> <p>PCE concentrations ranged from 1 to 1,624 µg/L-v and TCE concentrations ranged from 23 to 501 µg/L-v in the storage area (Table 2-10).</p> <p>PCE concentrations ranged from 124 to 4,006 µg/L-v and TCE concentrations ranged from 8 to 361 µg/L-v in the driveway (Table 2-10).</p> <p>PCE concentrations ranged from 7 to 628 µg/L-v and TCE concentrations ranged from ND to 240 µg/L-v in the parking lot (Table 2-10).</p>	<p>One groundwater well installed.</p> <p>Depth to groundwater – 183 feet bgs.</p> <p>TCE detected in groundwater at a maximum concentration of 160 µg/L.</p> <p>PCE detected in groundwater at a maximum concentration of 96 µg/L.</p>	<p>None.</p>

Table 2-10 provides the soil vapor data used in the evaluation for Facility 6. Figure 2-6a shows the site layout. The maximum PCE concentration in soil vapor (4,006 µg/L-v) occurs in the shallow interval at approximately 40 feet bgs within a silt/clay unit. The maximum TCE concentration in soil vapor (501 µg/L-v) occurs within the intermediate interval at approximately 50 feet bgs within a silt/clay unit. Figure 2-6b shows the maximum PCE and TCE concentrations in the storage area, the driveway and parking lot. Figure 2-6c presents a representative boring log from this facility.

TABLE 2-10
Facility 6: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Storage	SV-1	3/10/2000	8	230	23
			16	848	101
			24	974	152
Storage	SV-2	3/10/2000	8	1	NA
			16	692	94
Storage	SV-3	3/10/2000	8	323	46
			16	846	94
Driveway	SV-4	3/10/2000	8	124	10
			16	345	33
Driveway	SV-5	3/10/2000	8	470	43
			16	715	61
Driveway	SV-6	3/10/2000	8	182	8
			16	272	12
			24	410	20
Parking Lot	SV-7	3/10/2000	8	174	21
			16	199	28
Parking Lot	SV-8	3/10/2000	8	126	18
			16	180	23
Parking Lot	SV-9	3/10/2000	8	59	6
			16	42	5
Parking Lot	SV-10	3/10/2000	8	7	ND
			16	11	1
Parking Lot	SV-11	3/10/2000	8	23	2
			24	21	2
Storage	SV-201	6/19/2003	30	1,624	410
			50	1,486	501
			70	1,446	432
			90	1,082	362
			110	1,359	344
			130	1,414	287
			150	1,262	232
Driveway	SV-202	6/19/2003	20	2,840	219
			40	4,006	361
			60	3,921	262
			80	2,587	231
			100	1,025	184
Parking Lot	SV-203	6/19/2003	30	379	67
			50	628	240
			70	592	228

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

NA = data not available.

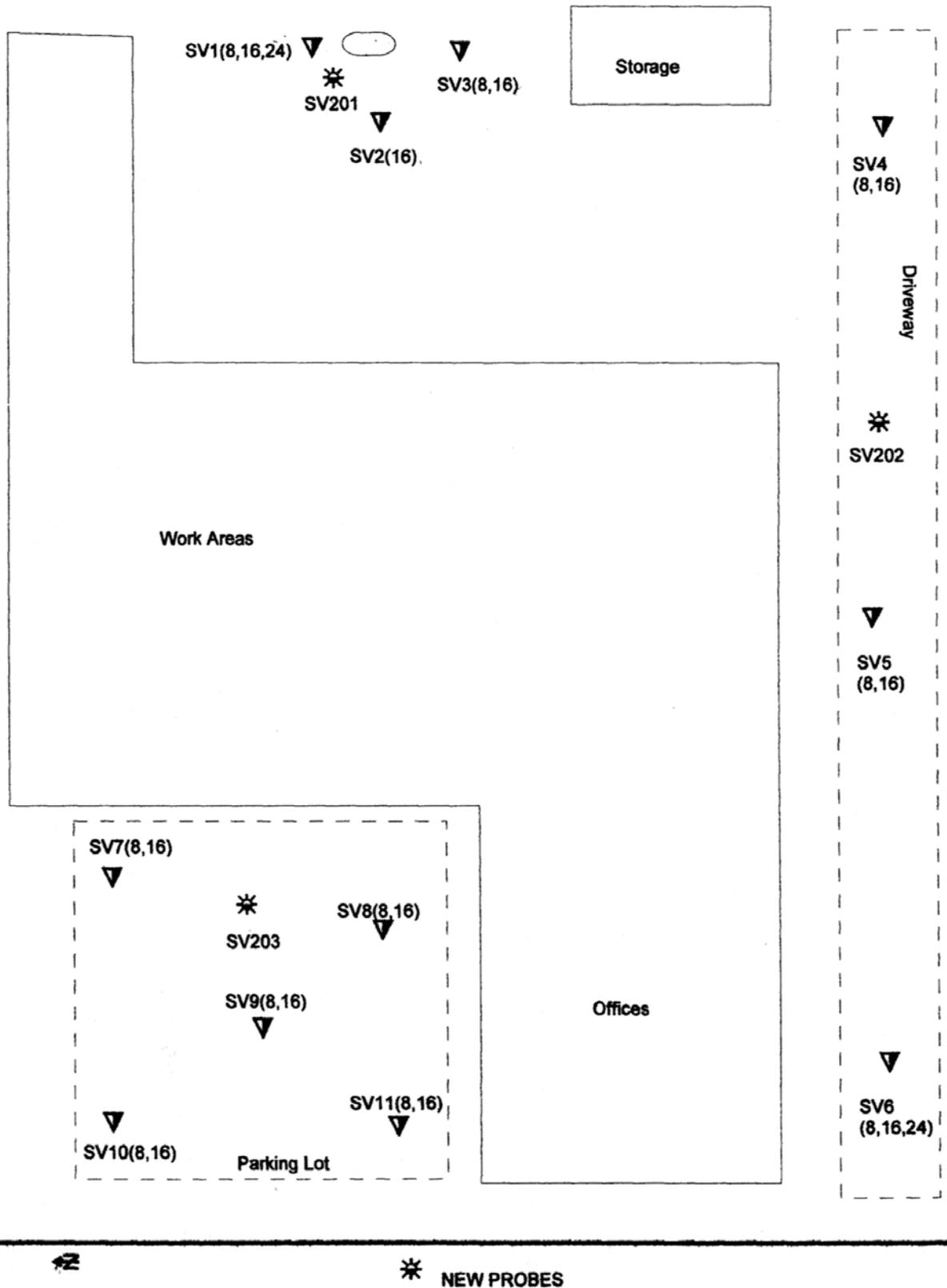


FIGURE 2-6a
 Facility 6 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

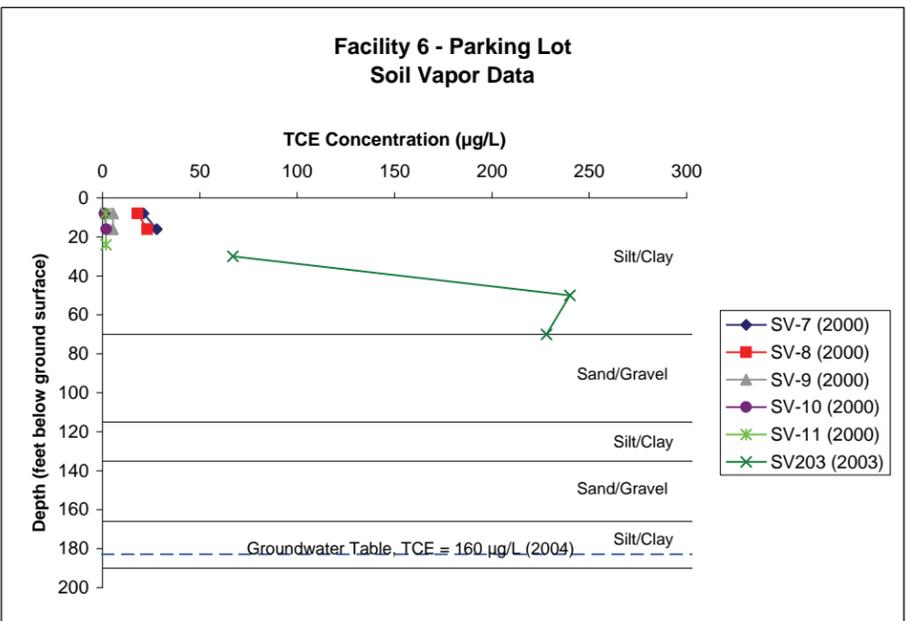
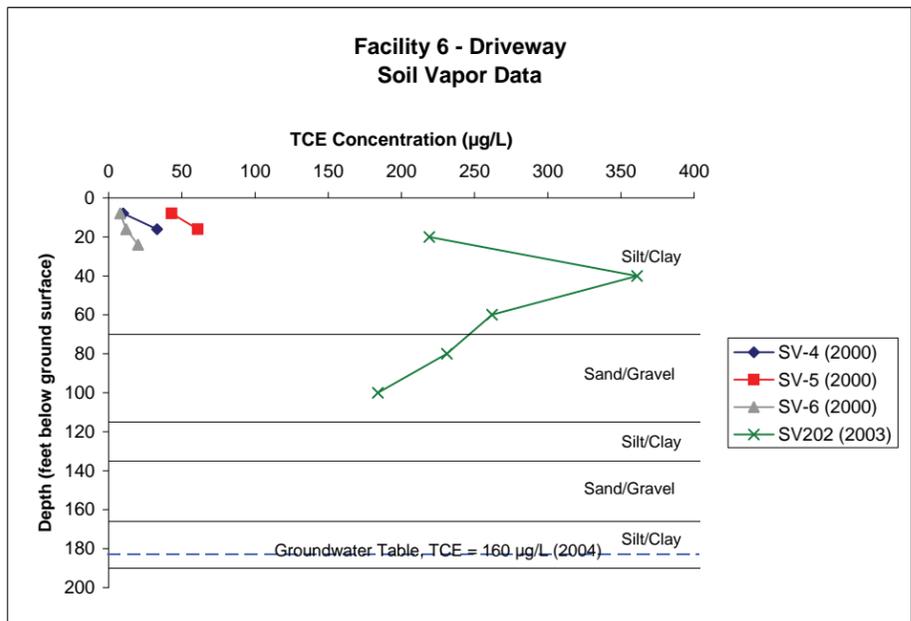
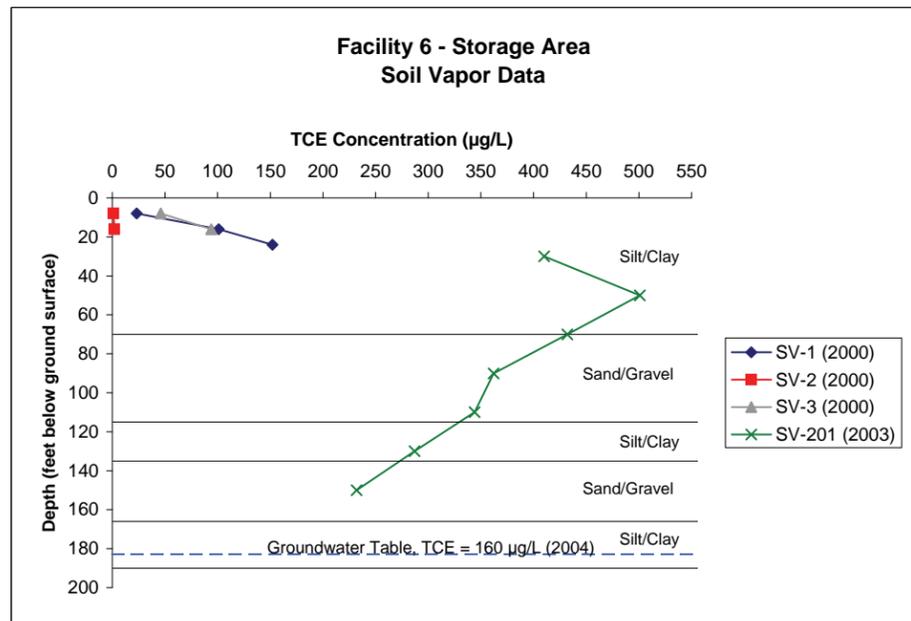
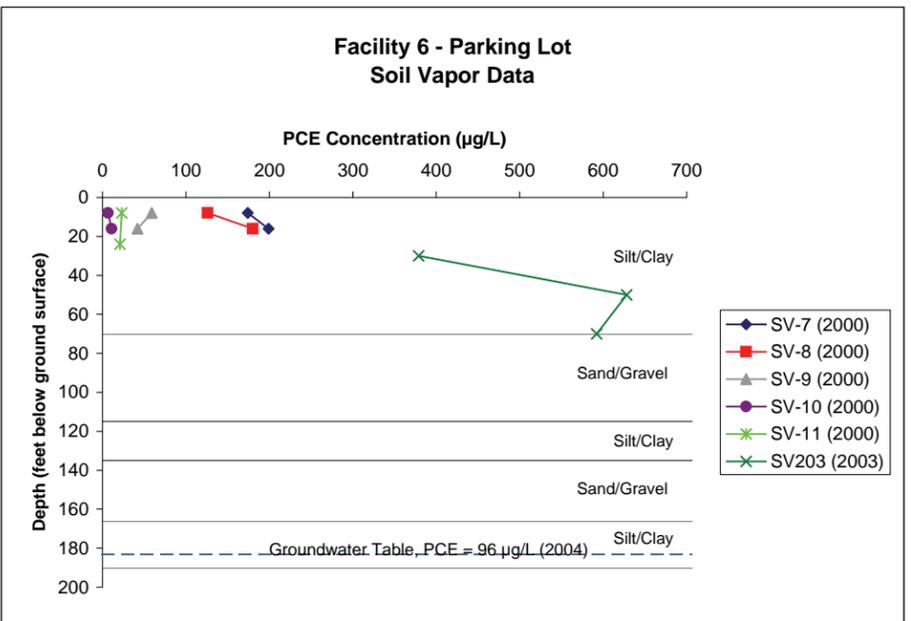
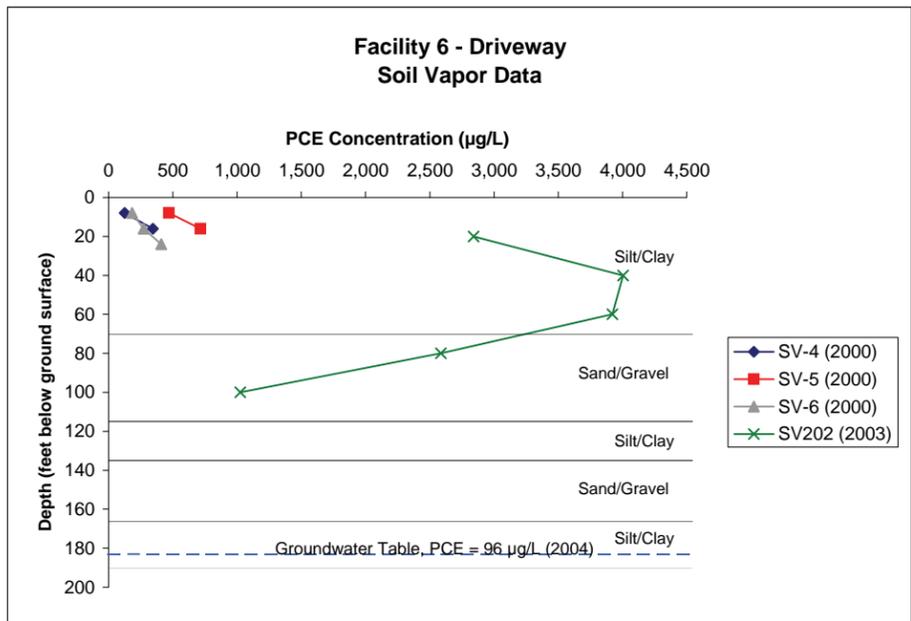
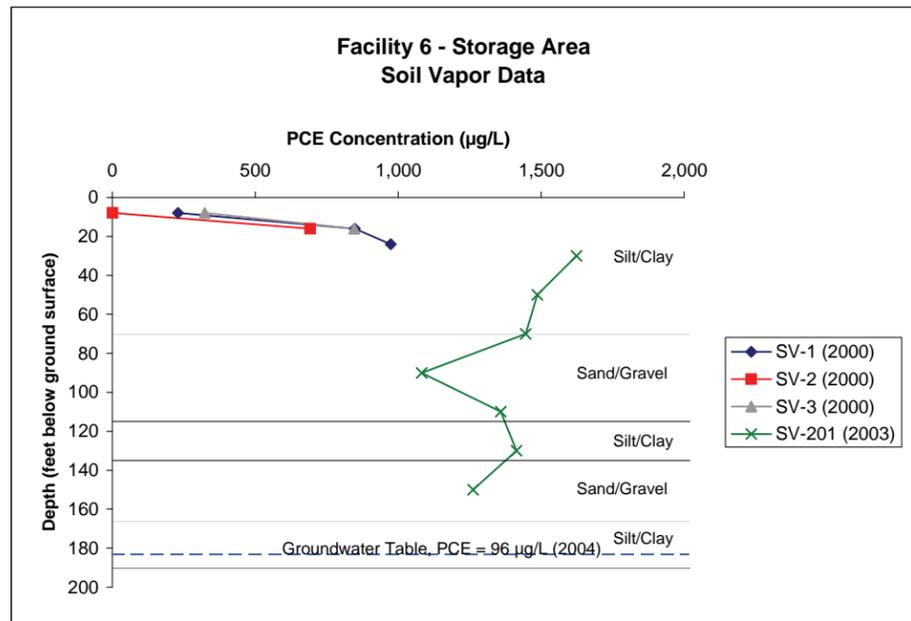


FIGURE 2-6b
PCE and TCE Concentrations in Soil Vapor at Facility 6
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

SOIL BORING LOG - FIELD READINGS				
EBI Project # 24-8103				
Project NAME: Facility 6				
BORING METHOD: HSA DATE: August 16, 17, 2004				
Sample #	Depth (Ft)	Moisture (H-M-L)	PID Reading	Soil Description
Cuttings	10-20	M	+/- 1	Clayey SILT (ML-CL) with sand and some fine-medium gravel, brown, soft, no odor
Cuttings	20-40	M	+/- 1	Clayey SILT (ML-CL) with sand and some fine-medium gravel, brown, soft, no odor
Cuttings	50-70	M	+/- 1	Clayey SILT (ML-CL) with sand and some fine-medium gravel, brown, soft, no odor
Cuttings	70-90	M	+/- 1	SAND (SP) with silt and clay, very fine/fine sand, orange brown, no odor
Cuttings	90-115	M	+/- 1	SAND (SP) with silt, clay, some coarse gravel, very fine/fine sand, brown, soft, no odor
Cuttings	115-135	M	+/- 1	Clayey SILT (ML-CL) with sand and some coarse gravel (GW), brown, no odor
MW1-150 (split spoon)	149-151	M	+/- 1	GRAVEL (GW) with sand (SW), some silt and clay, soft, no odor
MW1-165 (split spoon)	164-166	H	+/- 1	SAND (SW) with gravel, fine to coarse sand, fine to medium gravel, moist, no odor
Cuttings	170-180	M-H	+/- 1	Clayey SILT (ML-CL) with sand and some coarse gravel (GW), brown, no odor
Cuttings	180-190	M-H	+/- 1	Clayey SILT (ML-CL) with sand and some coarse gravel (GW), brown, no odor
Bottom of Boring at 190', groundwater depth appeared to be ~171.5 ft, however dry on 8-17, drill ahead to 190'				

FIGURE 2-6c
 Facility 6 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

2.3.6 Facility 8

Table 2-11 presents a summary of the site history and the sampling results for Facility 8.

TABLE 2-11
Facility 8 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
1946-2007 – Property used for metal finishing, polishing and electroplating. Property has 3 underground storage tanks and 22 aboveground storage tanks for solvents and other chemicals.	Twenty-seven probes installed down to 7 feet bgs and seven probes installed to 21 feet bgs.	One groundwater well installed. Depth to groundwater – 186 feet bgs.	None.
1999 – Site inspected by LARWQCB.	One probe installed to 150 feet bgs near the former solvent aboveground storage tank.	TCE detected in groundwater at a maximum concentration of 110 µg/L.	
2000 – Site investigation began with oversight by LARWQCB.	PCE concentrations ranged from 712 to 2,873 µg/L-v and TCE concentrations ranged from 11 to 247 µg/L-v near the former solvent AST (Table 2-12).	PCE detected in groundwater at a maximum concentration of 192 µg/L.	

Table 2-12 provides the soil vapor data used in the evaluation for Facility 8. Figure 2-7a shows the site layout. The maximum PCE concentration in soil vapor (2,873 µg/L-v) occurs in the shallow interval at approximately 30 feet bgs within a relatively transmissive sand/gravel unit. The maximum TCE concentration in soil vapor (247 µg/L-v) occurs in the intermediate interval at approximately 90 feet bgs within a relatively transmissive sand/gravel unit. Figure 2-7b shows that TCE concentrations are generally higher below 40 feet bgs. Figure 2-7c presents a representative boring log from this facility.

TABLE 2-12
Facility 8: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
Former Solvent AST	SV-110	3/27/2002	30	2,873	71
			50	712	18
			70	1,942	115
			90	1,599	247
			110	1,178	234
			130	1,429	206
			150	1,394	195
	SV-5	3/3/2002	5.5	1,167	11.2
	SV-105	3/27/2002	7	898	13

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

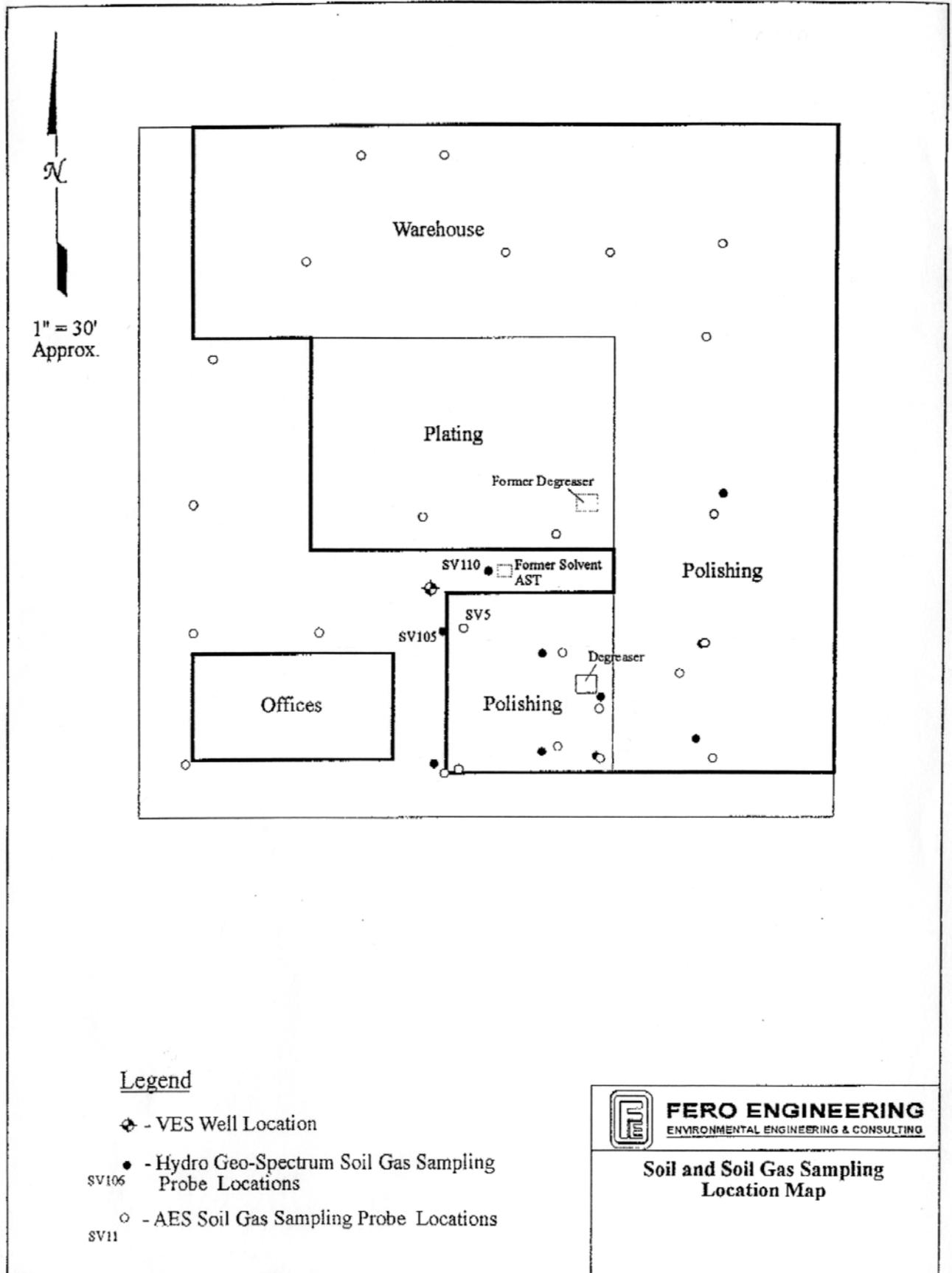


FIGURE 2-7a
 Facility 8 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

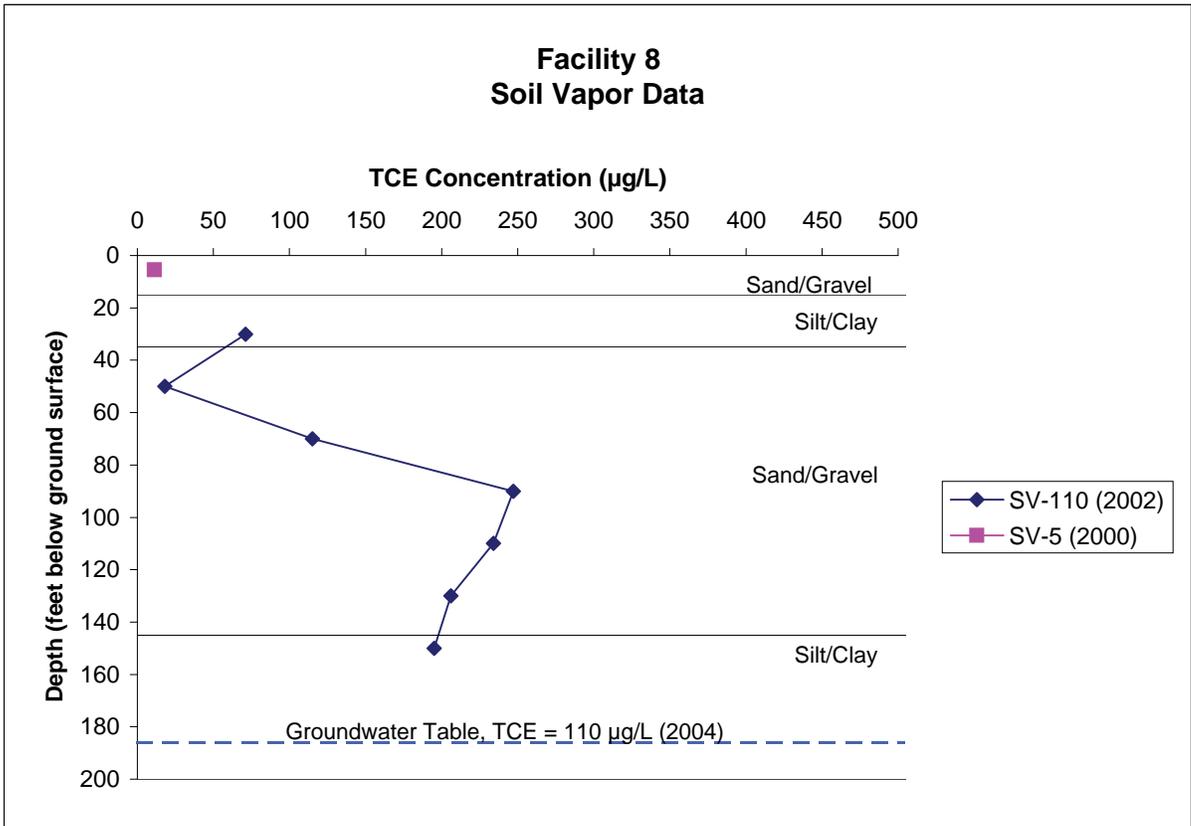
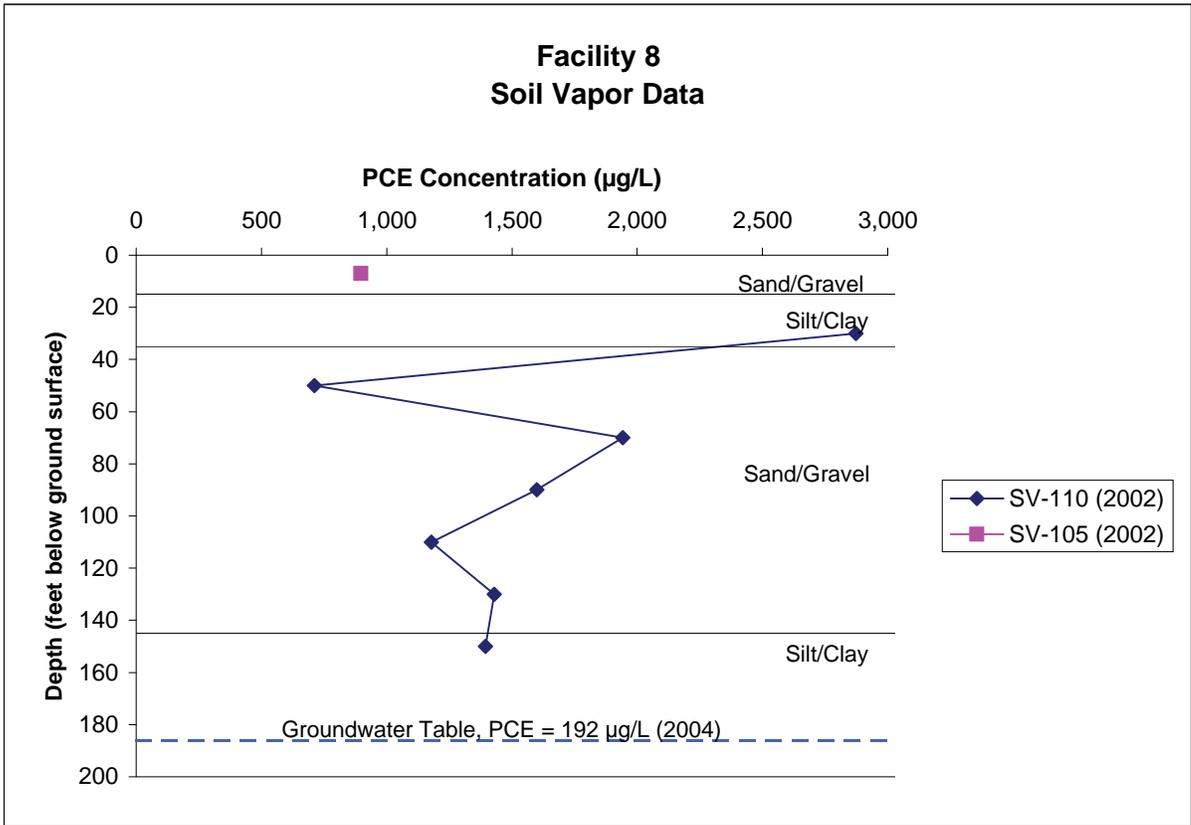


FIGURE 2-7b
PCE and TCE Concentrations in Soil Vapor at Facility 8
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 1 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building **SAMPLE METHOD** Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
					ppm	4" Concrete
5'		X		SM		Medium brown silty fine to medium sand (fill) some debris, brick, concrete, etc., loose, slightly moist, no odor
10'		X		SP		Rusty tan fine to medium sand, medium dense, slightly moist, no odor
15'		X		ML		Rusty light brown fine sandy silt, medium dense, slightly moist, no odor
20'		X		ML		Rusty light brown fine sandy silt, medium dense, slightly moist, no odor
25'		X		SM		Rusty tan silty fine sand, medium dense, slightly moist, no odor

- Concrete
- Bentonite Seal
- No. 3 Sand

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 2 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building

SAMPLE METHOD Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
30'		X		SM	ppm	Rusty tan silty fine to medium sand with some coarse sand, medium dense, slightly moist, no odor
35'		X		ML		Light brown silt, medium dense, slightly moist, no odor
40'		X		SM		Light brown silty fine sand, medium dense, slightly moist, no odor
45'		X		SP		Rusty tan fine to medium sand with some coarse sand, medium dense, trace moist, no odor
50'		X		SP		Rusty tan fine to medium with some coarse sand and small gravel, medium dense, no odor

- Concrete
- Bentonite Seal
- No. 3 Sand

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 3 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building

SAMPLE METHOD Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
55'		X		SP	ppm	Rusty tan fine to medium sand with minor coarse sand and gravel, medium dense, no odor
60'		X		SP		Rusty tan fine to medium sand with some coarse sand and small gravel, medium dense, trace moist, no odor
65'		X		SP		Rusty tan fine to medium sand with minor coarse sand, medium dense, trace moist, no odor
70'		X		SC		Light brown clayey sand, dense, slightly moist, no odor
75'		X		SM		Light brown silty fine to medium sand, medium dense, sl. moist, no odor

-  - Concrete
-  - Bentonite Seal
-  - No. 3 Sand

Casing: 4" PVC flush thread, w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8 _____

JOB NO. 02-437 _____

SITE:

BORING MW1 **SHEET** 4 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building **SAMPLE METHOD** Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
80'		X		SM	ppm	Rusty tan silty fine sand, medium dense, slightly moist , no odor
85'		X		ML		Light brown clayey silt, stiff, slightly moist, no odor
90'		X		ML		Light brown fine sandy silt, stiff slightly moist , no odor
95'		X		SP		Rusty tan fine sand, medium dense slightly moist, no odor
100'		X		SP		Rusty tan fine sand, medium dense, slightly moist, no odor

- Concrete
- Bentonite Seal
- No. 3 Sand

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 5 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building

SAMPLE METHOD Drive/Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
105'		X		SP	ppm	Rusty tan fine to medium sand, medium dense, slightly moist, no odor
110'		X		SM		Rusty tan silty fine to medium sand, medium dense, slightly moist, no odor
115'		X		SM		Rusty tan silty fine sand, medium dense, slightly moist, no odor
120'		X		SM		Rusty tan silty fine sand, medium dense, slightly moist, no odor
125'		X		ML		Light brown silt, medium dense, slightly moist, no odor

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

- Concrete
- Bentonite Seal
- No. 3 Sand

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 6 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building

SAMPLE METHOD Drive/Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
130'		X		SW	ppm	Tan fine to coarse sand, medium dense, slightly moist, no odor
135'		X		SC		Reddish brown clayey fine to medium sand, stiff, slightly moist, no odor
140'		X		SM		Light brown silty fine sand, medium dense, slightly moist, no odor
145'		X		ML		Yellowish brown silt, medium dense, slightly moist, no odor
150'		X		ML		Yellowish brown silt, dense, trace moist, no odor

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

- Concrete
- Bentonite Seal
- No. 3 Sand

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

FERO ENGINEERING
ENVIRONMENTAL ENGINEERING & CONSULTING

PROJECT: Facility 8 _____

JOB NO. 02-437 _____

SITE: _____

BORING MW1 SHEET 7 of 8

DATE 3/18/03 BY J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building **SAMPLE METHOD** Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
155'		X		SP	ppm	Gravel, cobble and some fine to coarse sand , very dense, saturated, no odor
		X		SM		Light brown silty fine to medium sand, dense, slightly moist, no odor
160'		X		ML		Light brown silt, slightly moist, dense, no odor
		X		ML		Medium brown sandy silt, trace moist, stiff, no odor
165'		X		ML		Medium brown clayey silt, stiff , slightly moist, no odor
		X		ML		Medium brown clayey silt, interbedded with thin (1") sity sand layer, dense, slightly moist, no odor
170'		X		ML		Medium brown fine sandy silt, dense, slightly moist, no odor
		X		SP		Rusty tan fine to coarse sand, medium dense, slightly moist, no odor
175'		X		SP		Tan fine to coarse sand , med. dense, slightly moist, no odor

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

-  - Concrete
-  - Bentonite Seal
-  - No. 3 Sand

FIGURE 2-7c
Facility 8 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3



BORING LOG

FERO ENGINEERING
ENVIRONMENTAL ENGINEERING & CONSULTING

PROJECT: Facility 8

JOB NO. 02-437

SITE:

BORING MW1 SHEET 8 of 8

DATE 3/18/03 **BY** J. Petersen

BORING LOCATION/CONDITIONS: 3' west of the NW corner of the original shop building **SAMPLE METHOD** Drive/ Undisturbed

OBSERVERS/SAMPLERS: JBP

DRILLERS: BC2 Environmental

EQUIPMENT: PID for H&S monitoring

EQUIPMENT: CME 95 Drill Rig with Split Spoon Sampler

DEPTH (FT.)	SAMPLE			USCS CLASSIFICATION	MONITORING BACKGROUND/ SAMPLE	DESCRIPTION
	BULK	UNDISTURBED	BLOWS/ FT			
					ppm	
		X		CH		Olive brown clay, stiff, dry, no odor
180'		X		CH		Olive brown clay, stiff, dry, no odor
		X		CH		Olive brown clay, stiff, dry, no odor
185'		X		CH		Olive brown clay, stiff, dry, no odor
		X		CH		Olive brown clay, stiff, dry, no odor
190'		X		CH		Olive brown clay, stiff, dry, no odor
		X		CH		Olive brown clay, stiff, dry, no odor
195'		X		CH		Yellowish olive brown clay, stiff, dry, no odor
		X		CH		Yellowish olive brown clay, stiff, dry, no odor
200'		X		CH		Yellowish olive brown clay, stiff, dry, no odor

- Concrete
- Bentonite Seal
- No. 3 Sand

Casing: 4" PVC flush thread w/ .02" slots
Vault: 12" traffic rated, water tight, bolt

DESCRIPTION

FIGURE 2-7c

Facility 8 Boring Log

Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

2.3.7 Facility 10

Table 2-13 presents a summary of the site history and the sampling results for Facility 10.

TABLE 2-13
Facility 10 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1922-1981 – Property was occupied by a lumber company and a furniture manufacturing company.</p> <p>2008 – Property consists of a self-storage unit business.</p> <p>2001-2005 – Previous investigations occurred.</p> <p>2005 – LARWQCB began oversight.</p>	<p>Eleven probes installed to 25 feet bgs and one probe installed down to 40 feet bgs.</p> <p>Three probes installed to 90 feet bgs and three probes installed to 120 feet.</p> <p>Chlorinated solvents were found in three areas of the property; northwestern, southwestern, and northern areas.</p> <p>Distance between the evaluated probes varied by area: northwest probes were 20 feet apart; southwestern probes were 20 to 100 feet apart; and northern probes were 40 to 120 feet apart (Figure 2-8a).</p> <p>PCE concentrations ranged from 4 to 960 µg/L-v and TCE concentrations ranged from ND to 400 µg/L-v in the northwest area of the site (Table 2-14).</p> <p>PCE concentrations ranged from 1 to 330 µg/L-v and TCE concentrations ranged from ND to 98 µg/L-v in the southwest area of the site (Table 2-14).</p> <p>PCE concentrations ranged from 10 to 440 µg/L-v and TCE concentrations ranged from 2.4 to 160 µg/L-v in the northern area of the site (Table 2-14).</p>	<p>One groundwater well installed.</p> <p>Depth to groundwater – 169 feet bgs.</p> <p>TCE detected in groundwater at a concentration of 109 µg/L.</p> <p>PCE detected in groundwater at a concentration of 38 µg/L.</p>	<p>None.</p>

Table 2-14 provides the soil vapor data used in the evaluation. Figure 2-8a shows the site layout. Figure 2-8b shows the maximum PCE concentration (960 µg/L-v) and the maximum TCE concentration (400 µg/L-v) occur in the intermediate interval at approximately 51 feet bgs within a silt/clay unit. Figure 2-8c provides a representative boring log for the facility.

Table 2-14
 Facility 10: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
Southwest Property	B-1	10/21/2004	5	3.9	ND
			15	1.8	ND
			25	37	8.2
Southwest Property	B-2	10/21/2004	5	1	ND
			15	2.7	ND
			25	18	ND
Northwest Property	B-3	10/21/2004	5	4.3	ND
			15	16	2.7
			25	230	39
Northern Property	B-4	10/21/2004	5	16	2.4
			15	31	5.8
			25	240	37
Northern Property	B-5	10/21/2004	5	10	2.4
			15	19	5.6
			25	75	24
Northwest Property	SB-1	11/9/2004	30	39	19
			40	25	16
			50	55	21
			70	130	59
			90	9.8	6.5
Northwest Property	SB-2	11/9/2004	20	2.7	ND
			30	2.2	ND
			40	29	23
			50	35	18
			60	46	35
			70	190	94
Southwest Property	SB-3	11/9/2004	90	4	5.2
			20	ND	ND
			30	ND	ND
			40	100	28
			50	51	10
			60	82	17
Northwest Property	VP-1	9/28/2005	70	290	74
			90	130	23
			5	7.6	2.7
			15	9.6	4.7
			25	13	6.8
			51	960	400
90	690	270			
			120	200	57

Table 2-14
 Facility 10: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Southwest Property	VP-2	9/28/2005	5	4.3	1.1
			15	8.9	3.2
			25	9.8	3.6
			51	310	98
			90	330	93
			120	190	45
Northern Property	VP-3	9/23/2005	5	27	4.3
			15	79	12
			25	190	52
			51	310	160
			90	180	100
			120	110	57
Northern Property	SG-4	9/26/2005	5	120	8.8
			15	280	19
			25	440	35
Southwest Property	SG-5	9/27/2005	5	3	ND
			15	3.6	ND
			25	8.6	2
Southwest Property	SG-6	9/27/2005	5	3.6	ND
			15	3.9	ND
			25	8.8	1.3

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

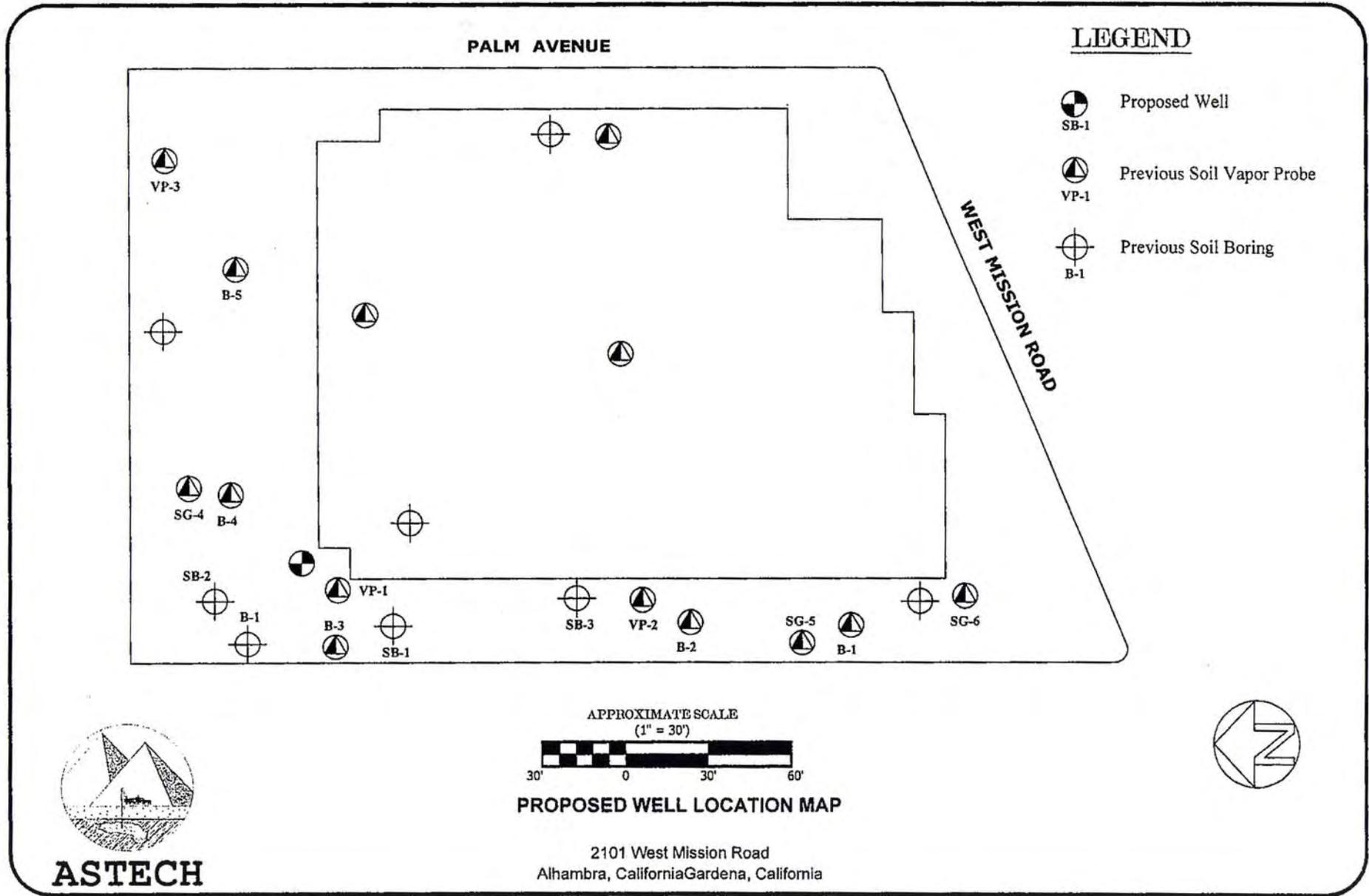


FIGURE 2-8a
 Facility 10 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

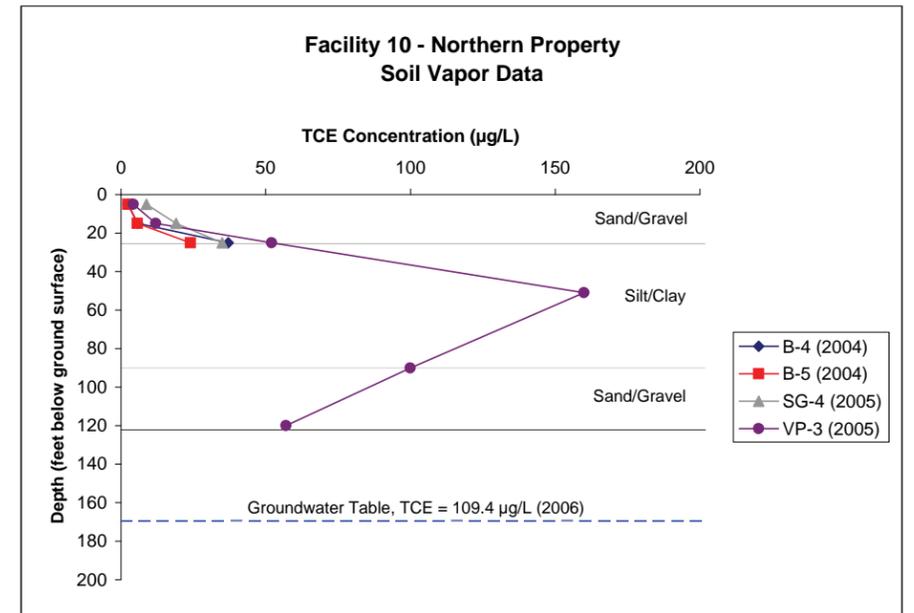
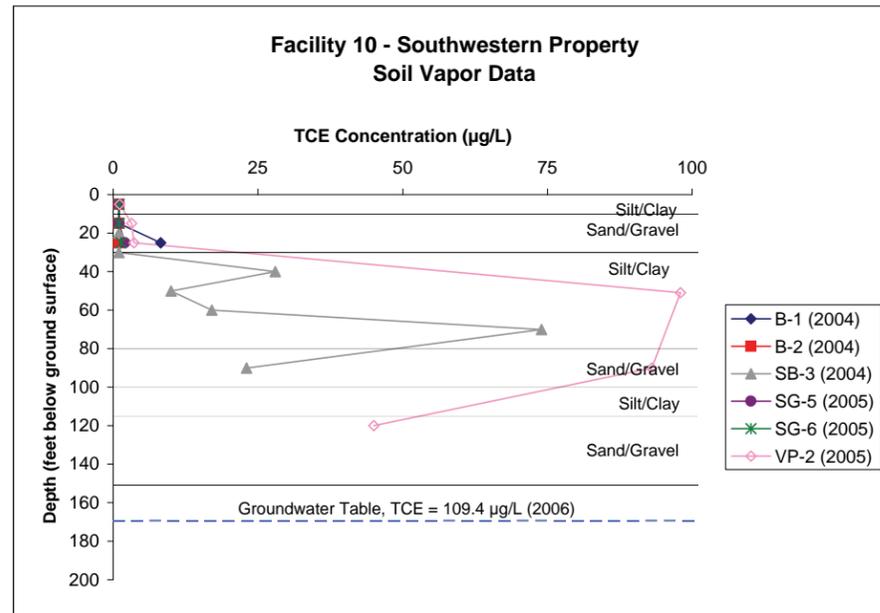
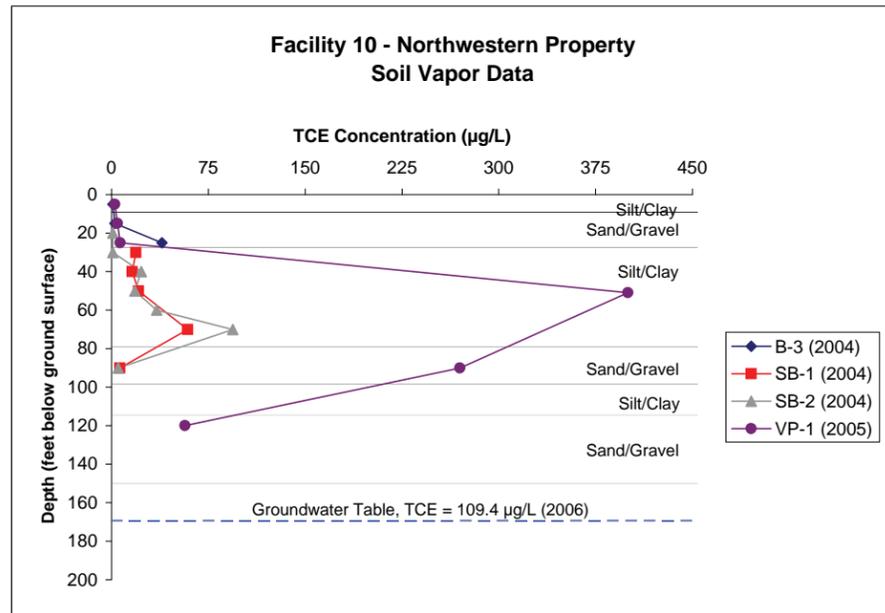
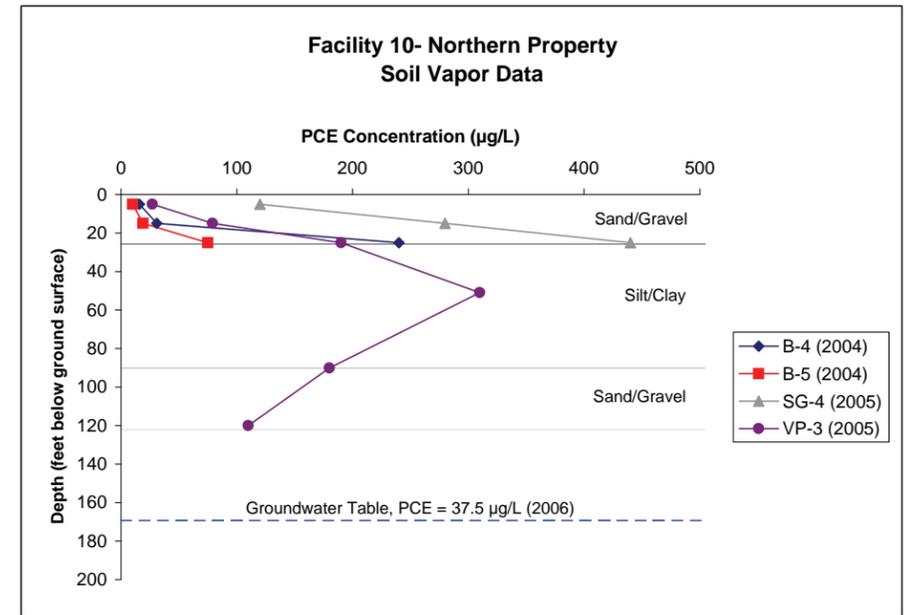
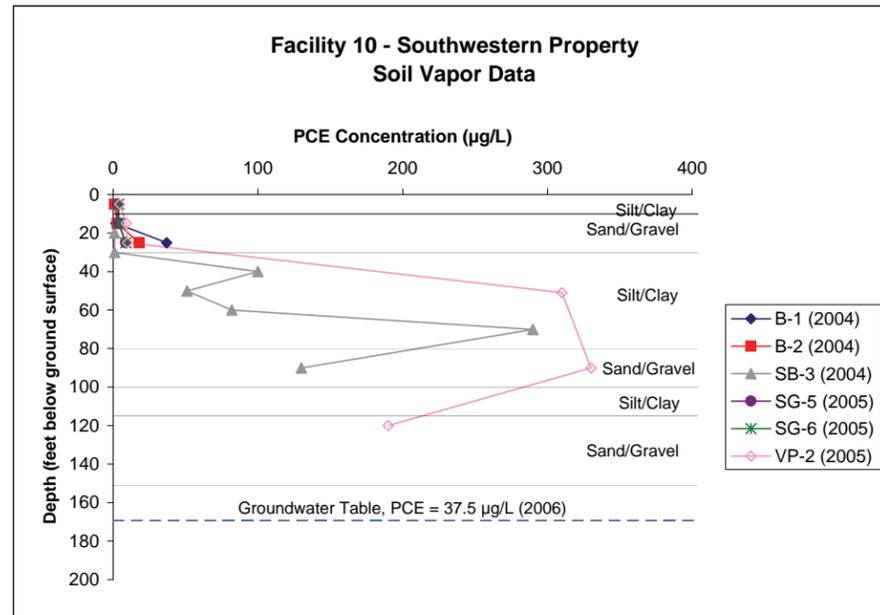
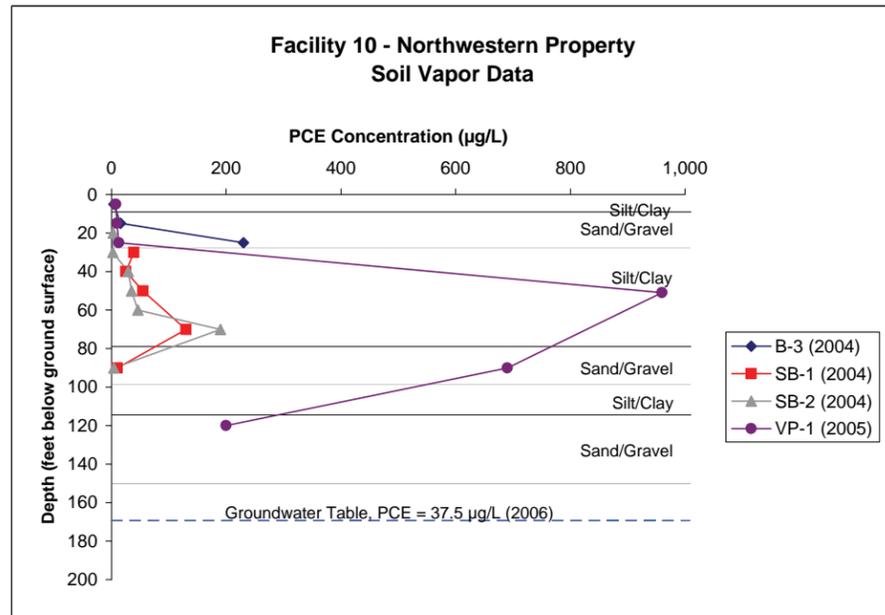


FIGURE 2-8b
PCE and TCE Concentrations in Soil Vapor at Facility 10
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

BORING LOG

Project Name: Facility 10 Project Number: 128537
 Soil Boring Hand Auger Boring Monitoring Well Boring/Well Number: VP-2 Sheet 1 of 5

Boring Location: 2101 W. Mission Rd, Alhambra, CA		Elevation and Datum:	
Drilling Contractor: Cascade	Driller: Travis	Date Started: 9-7-05	Date Finished: 9-8-05
Drilling Equipment: HSA	Borehole Diameter: 8"	Completed Depth: (feet) 151.0	Water Depth (Feet): State/First Encountered
Sampling Method: Split Spoon		WELL CONSTRUCTION	
Drilling Method: HSA	Drilling Fluid: N/A	Type and Diameter of Well Casing: Nested Vapor Probes	
Backfill Material: Soil Vapor Probes		Slot Size: NA	Filter Material:
Logged By: K. Foley	Checked By: R. Ruhmke	Development Method:	

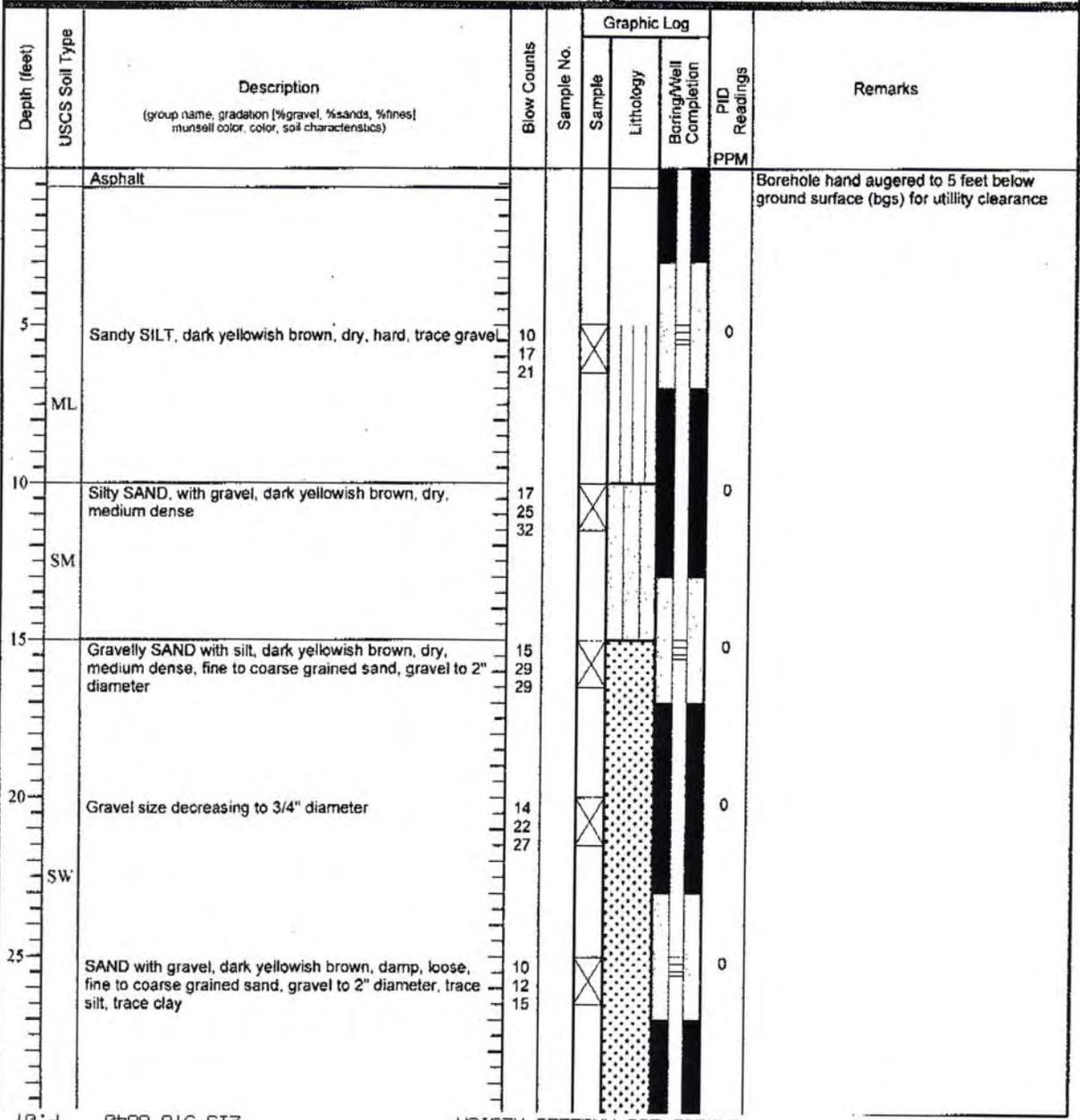


FIGURE 2-8c
 Facility 10 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

Depth (feet)	USCS Soil Type	Description (group name, gradation (%gravel, %sands, %fines), munsell color, color, soil characteristics)	Blow Counts	Sample No.	Graphic Log		PID Readings PPM	Remarks
					Sample	Lithology		
8-13	CL	Silty CLAY, dark yellowish brown, damp, firm, low plasticity, trace gravel	8 11 13				0	
14-25		SILT with clay, dark yellowish brown, damp, hard, trace sand.	14 20 25				0 NA	
40-46		Sandy SILT, dark yellowish brown, damp, trace gravel	10 12 16				0	
45-48		Clayey SILT, dark yellowish brown, damp, firm, trace sand	8 13 14				0 NA	
50-54	ML	SILT, dark yellowish brown, damp, firm, trace sand	11 14 18				1.2	
55-58		Same as above	9 10 12				4.3	
60-64		Same as above Clayey SILT, dark yellowish brown, damp, firm	10 10 14				139	
65-70		Same as above CLAY, dark yellowish brown, damp, hard, low plasticity, trace silt, trace sand	10 15 20				6.5	

BL VP-2.GPJ 11/1/05

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FIGURE 2-8c
Facility 10 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Depth (feet)	USCS Soil Type	Description (group name, gradation (%gravel, %sands, %fines) Munsell color, color, soil characteristics)	Blow Counts	Sample No.	Graphic Log			PID Readings PPM	Remarks
					Sample	Lithology	Boring/Well Completion		
70	CL	Same as above	18 20 23				0	Sample for geotech analysis collected at 70.5. No PID reading taken.	
75		Sandy CLAY, dark yellowish brown, damp, hard, trace silt	16 21 24				57.4		
80		Silty SAND, dark yellowish brown, damp, medium dense, fine to medium grained sand	17 20 27				4.6		
85	SM	Silty SAND, with gravel, dark yellowish brown, damp, medium dense, trace clay	21 27 32				15.5		
90		Same as above, very dense	29 50				90.2	Encore sample VP-2@90 collected at 14:00	
95		Same as above, medium dense	17 21 29				26	Encore sample VP-2@95 collected at 14:10	
100	ML	SILT, dark yellowish brown, damp, hard, trace sand	14 20 25				58.7	Encore sample VP-2@100 collected at 14:15	
105		Same as above	12 20 25				3019	Encore sample VP-2@105 collected at 14:25	

L:VP-2.GPJ 11/11/03

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CRWQCB LOS ANGELES REGION

AUG-24-2006 10:34

FIGURE 2-8c

Facility 10 Boring Log

Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Project Name: Facility 10

Project Number: 128537

Soil Boring Hand Auger Boring Monitoring Well Boring/Well Number: VP-2

Sheet 4 of 5

Depth (feet)	USCS Soil Type	Description (group name, gradation [%gravel, %sands, %fines], moisture color, color, soil characteristics)	Blow Counts	Graphic Log			PID Readings PPM	Remarks
				Sample No.	Sample	Lithology		
110		Same as above, very hard	24 50			723	Encore sample VP-2@110 collected at 14:30	
115	SP	SAND, dark yellowish brown, damp, very dense, trace gravel, fine to medium grained sand, trace silt, gravel up to 3/4" in diameter	29 50			80.2	Encore sample VP-2@115 collected at 14:45	
120		Gravelly SAND, dark yellowish brown, damp, very dense, decomposed granitic cobbles	27 50			77.5	Encore sample VP-2@120 collected at 14:55	
125		Same as above	46 50			257	Encore sample VP-2@125 collected at 15:10	
130		Same as above	38 50			413	Encore sample VP-2@130 collected at 15:15	
135	SW	Same as above	32 50			77.8	Encore sample VP-2@135 collected at 15:30	
140		Same as above	58			94	Encore sample VP-2@140 collected at 15:35	
145		Same as above	29 50			1692	Encore sample VP-2@145 collected at 15:40	

FIGURE 2-8c

Facility 10 Boring Log

Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Project Name: Facility 10

Project Number: 128537

Soil Boring Hand Auger Boring Monitoring Well

Boring/Well Number: VP-2

Sheet 5 of 5

Depth (feet)	USCS Soil Type	Description (group name, gradation (%gravel, %sands, %fines) munsell color, color, soil characteristics)	Blow Counts	Sample No.	Graphic Log			PID Readings PPM	Remarks
					Sample	Lithology	Boring/Well Completion		
150		Same as above	35 50				60.3	Encore sample VP-2@150 collected at 15:45 End of boring at 151 feet bgs, and installed soil vapor probes at 5', 15', 25', 51', 90', and 120'	

FIGURE 2-8c

Facility 10 Boring Log

Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

2.3.8 Facility 19

Table 2-15 presents a summary of the site history and the sampling results for Facility 19.

TABLE 2-15
Facility 19 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1954-2007 – Sheriff’s Station with motor-pool maintenance facilities.</p> <p>1991 – LADPW oversaw fuel investigation and underground storage tank (UST) removal.</p> <p>1999 – Work plan for additional site assessment submitted to LARWQCB.</p> <p>2005 – EPA began oversight.</p>	<p>Six probes installed to 20 feet bgs onsite and two probes installed offsite to 65 feet bgs.</p> <p>Two probes installed onsite to 180 feet bgs and three probes installed offsite to 180 feet bgs (Figure 2-9a).</p> <p>PCE concentrations ranged from ND to 74 µg/L-v on site (Table 2-16).</p> <p>TCE not detected onsite and at low levels offsite (Table 2-16).</p> <p>PCE concentrations ranged from 8.1 to 890 µg/L-v and TCE concentrations ranged from ND to 6.5 µg/L-v offsite to the northeast (Table 2-16).</p>	<p>Seven onsite and four offsite groundwater wells installed.</p> <p>Depth to groundwater – 200 feet bgs.</p> <p>TCE was detected in groundwater at a maximum concentration of 13.2 µg/L.</p> <p>PCE was detected in groundwater at a maximum concentration of 950 µg/L.</p>	<p>SVE system installed to remediate leak from underground gasoline tanks operated from 1993 to 1994. This system was designed to remove hydrocarbons not chlorinated solvents.</p>

Table 2-16 provides the soil vapor data used in the evaluation. Figure 2-9a shows the site layout. The maximum PCE concentration in soil vapor (890 µg/L-v) occurs in the intermediate interval at approximately 65 feet bgs within a relatively transmissive sand/gravel unit. TCE was detected at low concentration offsite, but not detected onsite. Figure 2-9b shows that maximum PCE concentrations occur beneath the shallow interval. Figure 2-9c provides a representative boring log for the facility.

Table 2-16
Facility 19: PCE and TCE Soil Vapor Concentrations

Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
KVP8-5	12/19/2006	5	13	ND
		20	29	ND
		35	30	ND
		50	71	ND
		65	120	0.5J

Table 2-16
 Facility 19: PCE and TCE Soil Vapor Concentrations

Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
KVP7-5	12/19/2006	5	240	ND
		20	340	1.1
		35	570	1
		50	320	ND
		65	890	4.5J
MW5VP	03/09/2007	30	150	ND
		60	220	1.3
		90	330	ND
		120	250	2.1J
		150	300	ND
		180	450	2.2J
MW6VP	01/23/2007	60	160	0.9J
		90	140	0.4J
		120	430	6.5
		150	410	2.1J
		180	280	ND
MW7VP	03/09/2007	30	260	0.4J
		60	340	ND
		90	420	2.6J
		120	650	4.4J
		150	450	3.2J
		180	540	4J
MW9VP	01/23/2007	30	7.2	0.2J
		60	8.9	ND
		60	ND	ND
		90	12	ND
		120	13	ND
		150	6.6J	ND
		150	13J	ND
		180	12	ND
MW10VP	01/24/2007	30	9.9	ND
		180	70	ND
KVP6-5	1/23/2007	5	0.4J	ND
		20	8.7	ND
KVP5-5	12/20/2006	5	3	ND
		20	13	ND

Shaded box with bold text indicates maximum concentration

ft bgs = feet below ground surface

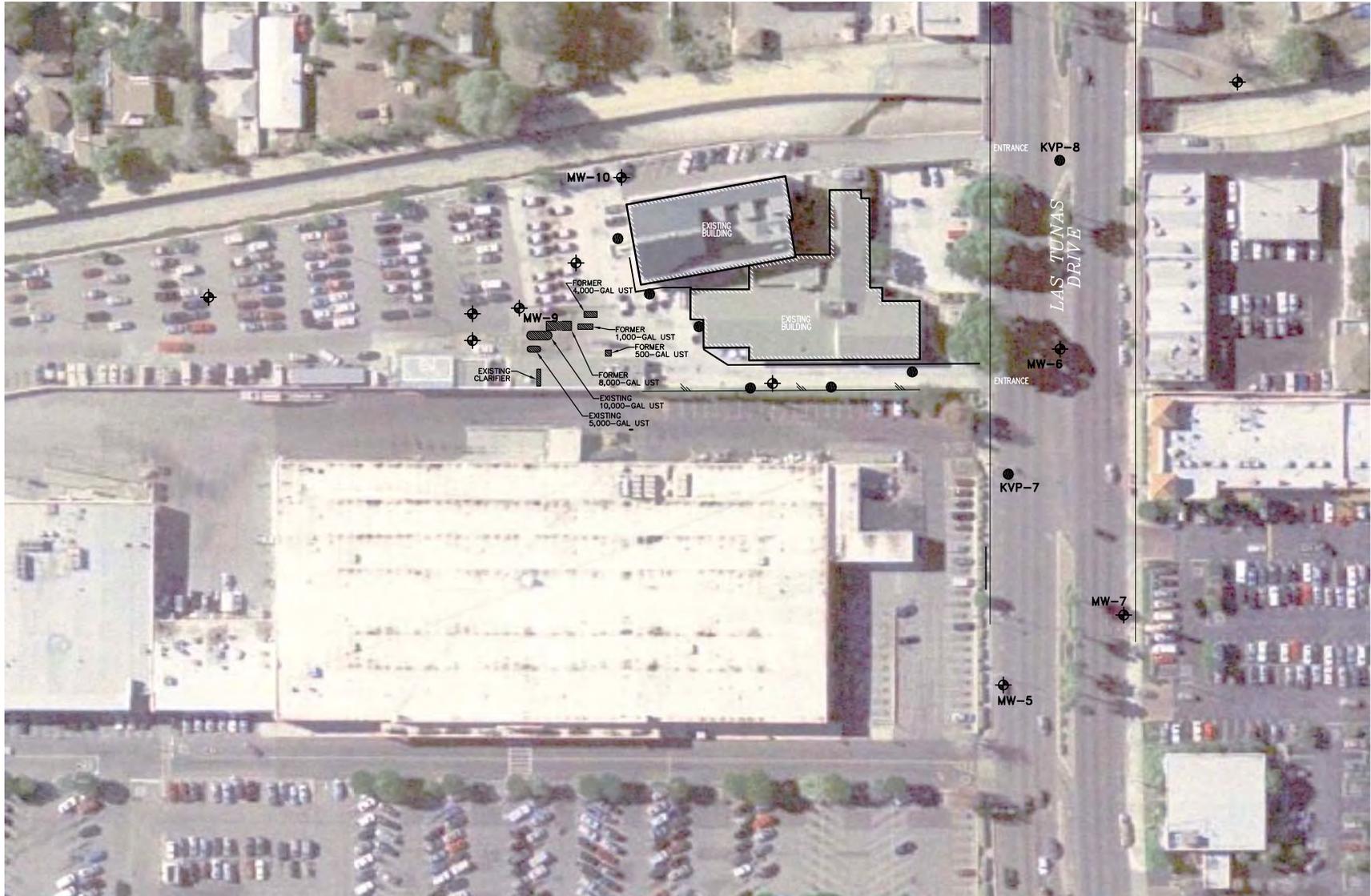
*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit

J = detected at concentrations below the laboratory reporting limit.



EXPLANATION

MW-10 EXISTING MONITORING WELL LOCATION

KVP-8 EXISTING VAPOR PROBE LOCATION



FIGURE 2-9a
 Facility 19 Site Map
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

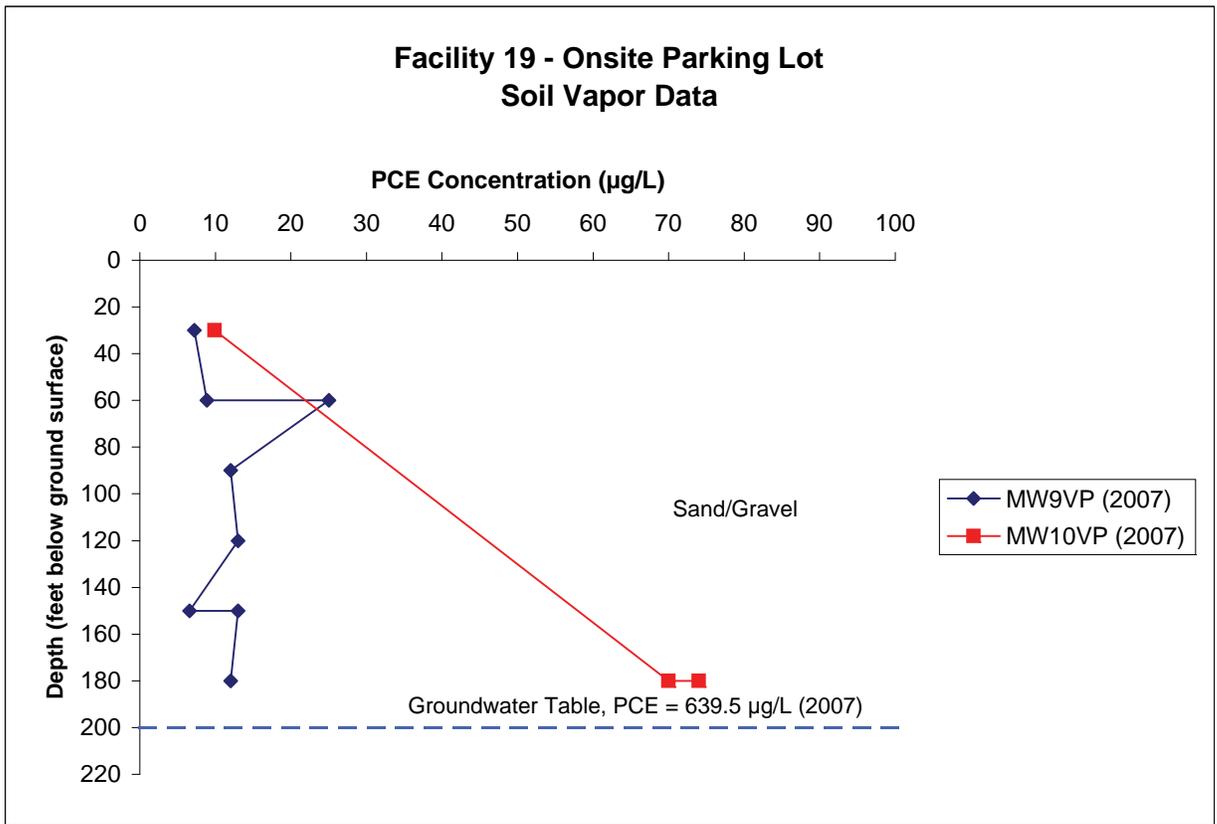
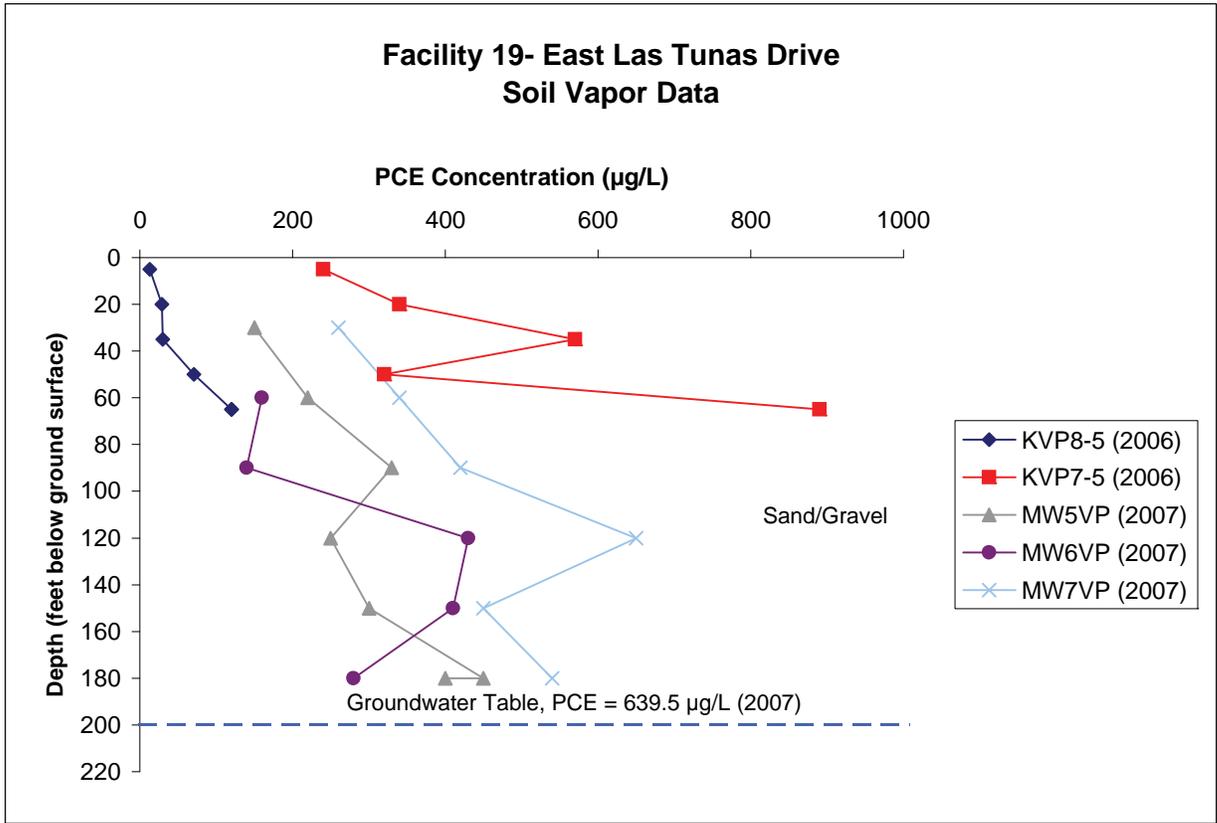


FIGURE 2-9b
PCE Concentrations in Soil Vapor at Facility 19
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION
	Lab.	Field PID/OVA (ppmv)							
12-inch traffic rated well box									
1 to 26-feet bgs: Bentonite grout		5.1	5				SM		Silty Sand: Brown, very moist, fine-to-medium-grained sand, slight petroleum odor-suspect it is probably from cold patch asphalt
		6.2					SP-SM		Sand with Silt: Brown, very moist, fine-to-medium-grained, no odor.
			10				SM		Silty Sand: Brown, very moist, fine-grained sand, trace coarse-grained sand and fine gravel. No odor, cohesive, asphalt and brick fragments.
		1.1					SP		Silty Sand: Light brown, moist, fine-grained sand, trace coarse-grained sand, moderately cohesive, friable, no odor.
									Sand: Light Brown, moist, medium-grained sand, some fine and coarse-grained sand, trace fine to coarse gravel. Same as above, coarser grained, increase in gravel fraction and gravel size, gravel up to 3".
	6.5		15						Same as above, weakly cemented, friable, decrease in gravel, predominantly medium-grained sand, some coarse-grained sand.
			20	MW7 -20	--				Same as above, trace gravel up to 2".
		10.1							Same as above, trace fine gravel, no coarse gravel.
SURFACE ELEVATION: feet					LOGGED BY: D. Hasham				
TOTAL DEPTH (feet): 220					DIAMETER OF BORING (inches): 8"				
DATE DRILLED: 2-14-07					DEPTH TO STATIC WATER (feet): 204				
				Facility 19				PLATE	
				8838 Las Tunas Drive, Temple City, CA				a	
PROJECT NO. 73252				LOG OF BORING MW-7					

ENVIRONMENTAL LASD-T-1.GPJ KA RDLND.GDT 3/5/07

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION (Continued From Previous Page)	
	Lab.	Field								
		PID/OVA (ppmv)								
26 to 27-foot bgs: Bentonite crumbles 27 to 28-foot bgs: Fine sand 30-foot bgs: Vapor probe tip 28 to 32-foot bgs: #3 Monterey sand filter pack 32 to 33-foot bgs: Fine sand 33 to 34-foot bgs: Bentonite crumbles 34 to 56-foot bgs: Hydrated bentonite chips		16.1	25					SP	Same as above, trace coarse gravel. Same as above, slightly better cementation, friable with moderate effort. Poorly-Graded Sand: Light Brown, moist, medium-grained sand, some fine and coarse-grained sand, trace fine and coarse gravel, moderately cemented, friable with moderate effort.	
		4.6	30					SP	Poorly-Graded Sand: Light brown, moist, medium-grained sand, some coarse-grained sand, trace fine and coarse gravel, no odor.	
		9.5	35					SM	Silty Sand: Brown, moist, fine-to-medium-grained, cohesive, friable, trace coarse-grained sand. Same as above, dry, slight increase in coarse-grained sand, non-cohesive Same as above, abrupt change in color, moisture content, dark brown, paleosol, moist, trace clay, decrease in coarse-grained sand Same as above, changed to 4" coarse gravel. Same as above, change in color to a lighter brown.	
		2.6						SM	Very fine grained, micaceous	
		18.0	40	MW7 -40	-					Uniform, fine-grained sand with silt.
		5.4								Slight increase in grain size, fine-grained sand, trace medium and coarse-grained sand, cohesive, friable, trace fine gravel. Top portion of sample very wet due to added water.
	SURFACE ELEVATION: feet		LOGGED BY: D. Hasham							
	TOTAL DEPTH (feet): 220		DIAMETER OF BORING (inches): 8"							
DATE DRILLED: 2-14-07		DEPTH TO STATIC WATER (feet): 204								
						Facility 19 8838 Las Tunas Drive, Temple City, CA			PLATE	
PROJECT NO. 73252						LOG OF BORING MW-7			b	

ENVIRONMENTAL LASD-T-1.GPJ KA ROLIND.GDT 3/5/07

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c

Facility 19 Boring Log

Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION (Continued From Previous Page)	
	Lab.	Field PID/OVA (ppmv)								
56 to 57-feet bgs: Bentonite crumbles 57 to 58-feet bgs: Fine sand 58 to 62-feet bgs: #3 Monterey sand filter pack 60-foot bgs: Vapor probe tip 62 to 63-feet bgs: Fine sand 63 to 64-feet bgs: Bentonite crumbles		38.1	45	MW7 -60				SP	Poorly-Graded Sand: Pale brown, very moist, fine-to-medium-grained, trace coarse-grained sand, trace fine gravel, no odor.	
			8.5							Same as above, trace coarse gravel.
			31.1		50				SM	Silty Sand: Reddish brown, moist, fine-grained sand, some medium-grained sand, trace coarse-grained sand, cohesive, friable, no odor.
			39.0						SP	Poorly-Graded Sand: Light brown, moist, medium-grained sand, very uniform grain size Same as above, occasional thin (+/- 1") layers of pale reddish brown silt.
									SM	Same as above, decrease in silt.
			19.4		55				SP	Silty Sand: Brown, moist, fine-grained sand, cohesive very slightly plastic, no odor.
			56.5						SM-ML	Poorly-Graded Sand: Brown, moist, medium-grained sand, trace coarse-grained sand, no odor
			53.4		60				SM	Silty Fine Sand/Sandy Silt: Brown, moist, very fine-grained sand, trace coarse-grained sand, cohesive, slightly plastic, no odor
									SP	Silty Sand: Brown, moist, fine-to-medium-grained sand, trace coarse gravel, very slight chemical odor
			44.9						SM-ML	Poorly-Graded Sand: Brown, moist, fine-to-medium-grained sand, trace coarse-grained sand, no odor
							SP	Silty Fine Sand/Sandy Silt: Brown, moist, very fine-grained sand, cohesive, friable, no odor		
		45.4	65				SM	Poorly-Graded Sand: Brown, moist, fine-to-medium-grained sand Silty Fine Sand/Sandy Silt: Brown, moist, very fine-grained sand, cohesive, very slightly plastic, no odor Poorly-Graded Sand: Brown, moist, fine-grained sand, some silt, no odor Same as above, fine-grained sand		
SURFACE ELEVATION: feet					LOGGED BY: D. Hasham					
TOTAL DEPTH (feet): 220					DIAMETER OF BORING (inches): 8"					
DATE DRILLED: 2-14-07					DEPTH TO STATIC WATER (feet): 204					
					Facility 19 8838 Las Tunas Drive, Temple City, CA			PLATE		
					PROJECT NO. 73252					LOG OF BORING MW-7

ENVIRONMENTAL L&SD-T-1.GPJ KA RDLND.GDT 3/5/07

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
Facility 19 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION (Continued From Previous Page)
	Lab.	Field PID/OVA (ppmv)							
64 to 86-feet bgs: Hydrated bentonite chips		23.6						SP-SM	Silty Sand: Brown, slightly moist to moist, fine-grained sand, some medium-to-coarse-grained sand, trace fine gravel, very weakly cemented locally, friable, no odor (continued)
			70					SP SM	Sand with Silt: Brown, slightly moist, fine-grained sand, occasional thin silt lenses, weakly cemented around silt layers, no odor
		8.2						SP	Poorly-Graded Sand: Light brown, slightly moist, fine-to-medium-grained sand, occasional silt lenses, no odor
			30.1						Silty Sand: Brown, moist, fine-grained sand, trace coarse-grained sand, cohesive, very weakly cemented, friable, no odor
			75					SM SP	Poorly-Graded Sand: Brown, moist, fine-grained sand, no odor Same as above, trace coarse-grained sand and fine gravel Same as above, fine-to-medium-grained sand, occasional 1/8 to 1/4-inch thick hard silt lenses, no odor
		54.6						SM	Same as above, increase in coarse-grained sand
			80					SP	Silty Sand: Brown, moist, fine-grained sand, no odor
			52.7	MW7 -80				SM	Poorly-Graded Sand: Light brown, slightly moist, very fine-grained sand, no odor Silty Sand: Brown, moist, very fine-grained sand, cohesive, very slightly plastic, no odor
			76.3					SM	Poorly-Graded Sand: Brown, moist, fine-grained sand, no odor
			89.9					SP	Silty Sand: Brown, moist, very fine-grained sand, micaceous, cohesive, very slightly plastic, no odor
86 to 87-feet bgs: Bentonite crumbles 87 to 88-feet		21.7	85						Poorly-Graded Sand: Brown, moist, fine-to-medium-grained sand, trace coarse gravel, no odor Same as above, increase in grain size, medium-grained sand, some coarse-grained sand, 1.5-inch silty sand layer, trace coarse gravel, no odor

ENVIRONMENTAL LASD-T-1.GPJ KA ROLIND.GDT 3/5/07

SURFACE ELEVATION: feet
TOTAL DEPTH (feet): 220
DATE DRILLED: 2-14-07

LOGGED BY: D. Hasham
DIAMETER OF BORING (inches): 8"
DEPTH TO STATIC WATER (feet): 204



KLEINFELDER
PROJECT NO. 73252

Facility 19
8838 Las Tunas Drive, Temple City, CA

LOG OF BORING MW-7

PLATE
d

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
Facility 19 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>	
	Lab.	Field PID/OVA (ppmv)								
bgs: Fine sand 88 to 92-feet bgs: #3 Monterey sand filter pack 90-feet bgs: Vapor probe tip 92 to 93-feet bgs: Fine sand 93 to 94-feet bgs: Bentonite crumbles 94 to 116-feet bgs: Hydrated bentonite chips		45.5	90	Grab				SM	Silty Sand: Brown, moist, fine-grained sand, very weakly cemented, friable, no odor	
									SP	Poorly-Graded Sand: Brown, moist, fine-grained sand, trace coarse gravel, no odor
			66.1	95	Grab				SM	Silty Sand: Brown, moist, very fine-grained sand, weakly cemented, friable, no odor
			27.1						ML	Same as above, slightly moist Silty Sand: Brown, slightly moist, very fine-grained sand, no odor
									SP	Sandy Silt: Brown, moist, with very fine-grained sand, cohesive, slightly plastic, no odor
			39.0	100	MW7 -100				SM	Poorly-Graded Sand: Brown, moist, medium-grained sand, some coarse-grained sand, no odor
									SP	Silty Sand: Brown, moist, fine-to-medium-grained sand, trace coarse-grained sand, no odor Same as above, occasional (1-inch) thick sand lenses
			36.0	105					SP	Poorly-Graded Sand: Light brown, moist, medium-grained sand, fairly uniform grain size Same as above, trace fine gravel
			51.6						ML	Sandy Silt: Brown, dry to slightly moist, friable, fine-grained sand, no odor
			76.8						SM	Silty Sand: Brown, dry to slightly moist, fine-to-medium-grained sand, trace coarse-grained sand, weakly cemented, friable, no odor
		106.0						SP	Poorly-Graded Sand: Light brown, slightly moist, fine-grained sand, no odor	
								SM	Silty Sand: Brown, moist, fine-grained sand, occasional thin (1/4-inch) silt lenses, very weakly cemented, friable, no odor Same as above, coarsens downward Same as above, trace coarse-grained sand, decrease in silt	

ENVIRONMENTAL_LASD-T-1.GPJ KA_RDLND.GDT 3/5/07

SURFACE ELEVATION: feet
 TOTAL DEPTH (feet): 220
 DATE DRILLED: 2-14-07

LOGGED BY: D. Hasham
 DIAMETER OF BORING (inches): 8"
 DEPTH TO STATIC WATER (feet): 204

KLEINFELDER
 PROJECT NO. 73252

Facility 19
 8838 Las Tunas Drive, Temple City, CA
LOG OF BORING MW-7

PLATE
 e

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>						
	Lab.	Field													
		PID/OVA (ppmv)													
116 to 117-feet bgs: Bentonite crumbles 117 to 118-feet bgs: Fine sand 118 to 122-feet bgs: #3 Monterey sand filter pack 120-foot bgs: Vapor probe tip 122 to 123-feet bgs: Fine sand 123 to 124-feet bgs: Bentonite crumbles 124 to 146-feet bgs: Hydrated bentonite chips		63.2	115	Grab MW7 -120				SP	Poorly-Graded Sand: Light brown, slightly moist, medium-grained sand, trace coarse-grained sand, occasional silty layers (1-inch thick), weakly cemented, friable, no odor Same as above, trace coarse gravel, no odor Same as above, occasional cohesive silty lenses, no odor Same as above, trace fine gravel, no odor Same as above, coarsens slightly downward, no odor Same as above, some coarse-grained sand, no odor Same as above, trace gravel up to 1.5-inch, no odor						
		30.4													
		13.0													
			23.7	120	Grab MW7 -120				SP	Same as above, some coarse-grained sand, no odor Same as above, trace gravel up to 1.5-inch, no odor Same as above, occasional cemented layers, no odor Same as above, light olive-gray, medium-grained sand, trace coarse-grained sand, no odor Same as above, light brown, uniform medium-grained sand, no odor Same as above, trace coarse gravel, no odor Same as above, some coarse-grained sand, trace fine and coarse gravel, no odor Same as above, light olive gray, no odor					
			25.9												
			20.5												
			15.8	125	Grab				SP	Same as above, light olive-gray, dry to slightly moist, fine-to-medium-grained sand, some coarse-grained sand, some gravel up to 2-inches					
			33.7												
			71.4												
									SM	Silty Sand: Brown, moist, fine-grained sand, slightly cohesive, non-plastic, possibly very					

ENVIRONMENTAL_LASD-T-1.GPJ KA RD.LND.GDT 3/6/07

SURFACE ELEVATION: feet
 TOTAL DEPTH (feet): 220
 DATE DRILLED: 2-14-07

LOGGED BY: D. Hasham
 DIAMETER OF BORING (inches): 8"
 DEPTH TO STATIC WATER (feet): 204



PROJECT NO. 73252

Facility 19
 8838 Las Tunas Drive, Temple City, CA

LOG OF BORING MW-7

PLATE

f

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>
	Lab.	Field PID/OVA (ppmv)							
<p>146 to 147-feet bgs: Bentonite crumbles 147 to 148-feet bgs: Fine sand</p> <p>150-foot bgs: Vapor probe tip 148 to 152-feet bgs: #3 Monterey sand filter pack 152 to 153-feet bgs: Fine sand</p> <p>153 to 154-feet</p>		31.5							fine SP, very slight chemical odor
				Grab				SP	Same as above, slight increase in fines, more cohesive, no odor
			115					SM-ML	Poorly-Graded Sand: Brown, slightly moist, very fine-grained sand, no odor Silty Fine Sand/Sandy Silt: Brown, moist, very slight chemical odor
				MW7 -137 Grab				SP-SM ML	Sand with Silt: Brown, moist, fine-grained sand with silt, very slightly cohesive, very slight odor Silt: Brown, moist, friable, some fine-grained sand, no odor
			67.4		MW7 -140			ML	Poorly-Graded Sand: Brown, moist, medium-grained sand, some coarse-grained sand, trace fine and coarse gravel, coarse sand and gravel increases downward, no odor Sandy Silt: Interbedded layers of brown sandy silt and very thin dark olive silt, slightly moist, friable, trace coarse-grained sand, no odor
			24.7					SP	Poorly-Graded Sand: Brown, slightly moist to moist, fine-to-medium-grained sand, no odor
			63.3						Same as above, some coarse-grained sand, trace fine and coarse gravel, no odor
			85.4						Poorly-Graded Sand: Light brown, moist, fine-to-medium-grained sand, some coarse-grained sand, trace fine and coarse gravel, no odor
			69.3						Same as above, pale olive gray, slightly moist, no odor Same as above, increase in gravel, numerous rock chips in sample
			92.8		Grab			SM	Silty Sand: Olive-brown, moist, fine-grained sand, friable, no odor
		28.5					SP		
SURFACE ELEVATION: feet TOTAL DEPTH (feet): 220 DATE DRILLED: 2-14-07				LOGGED BY: D. Hasham DIAMETER OF BORING (inches): 8" DEPTH TO STATIC WATER (feet): 204					
				Facility 19 8838 Las Tunas Drive, Temple City, CA				PLATE g	
PROJECT NO. 73252				LOG OF BORING MW-7					

ENVIRONMENTAL_LASD-T-1.GPJ KA_RDLND.GDT_3/5/07

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>
	Lab.	Field PID/OVA (ppmv)							
bgs: Bentonite crumbles 154 to 176-feet bgs: Hydrated bentonite chips		34.0	155	Grab					Poorly-Graded Sand: Light brown, moist, medium-to-coarse-grained sand, trace fine and coarse gravel, possible SW, coarse gravel up to 3-inches, no odor <i>(continued)</i>
			48.2					SM	
			29.1	160	Grab MW7 -160				Silty Sand: Mottled brown and minor olive, fine-to-medium-grained sand, trace coarse-grained sand, no odor Same as above, mottled olive and brown, cohesive, plastic, locally and weakly cemented, friable, no odor
			33.2					SP	
			40.7						Poorly-Graded Sand: Light brown, moist, medium-grained sand, trace coarse-grained sand and fine gravel, no odor Same as above, some coarse-grained sand, trace fine-grained sand and coarse gravel, no odor
			68.0	165					Same as above, pale olive, no odor Same as above, mottled light brown and olive, some silt, no odor Same as above, olive-brown, predominantly medium-grained sand, trace coarse-grained sand and fine gravel, no odor Same as above, occasional silt lenses (1/2-inch), no odor Same as above, pale olive-gray, dry to slightly moist
			47.6						
			27.0	170					Same as above, light brown, moist, fine-to-coarse-grained sand, possible SW, trace fine gravel, very slight odor (possibly steam)
			37.2					GW	Same as above, increase in coarse-grained sand and gravel, trace coarse gravel up to 1.5-inch
			166		Grab MW7 -174				Sandy Gravel: Pale gray, dry, fine-to-coarse gravel to 2-inch, with fine-to-coarse-grained sand, no odor
			22.7	175					Silty Sand: Brown, very moist, very fine-grained sand, very slight odor (possibly steam)
									Sandy Silt: Olive-brown, slightly moist to moist, friable, no odor
								ML	
								SM	

ENVIRONMENTAL LASD-T-1.GPJ KA RDLND.GDT 3/5/07

SURFACE ELEVATION: feet
 TOTAL DEPTH (feet): 220
 DATE DRILLED: 2-14-07

LOGGED BY: D. Hasham
 DIAMETER OF BORING (inches): 8"
 DEPTH TO STATIC WATER (feet): 204



Facility 19
 8838 Las Tunas Drive, Temple City, CA

PLATE

PROJECT NO. 73252

LOG OF BORING MW-7

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Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION <i>(Continued From Previous Page)</i>	
	Lab.	Field PID/OVA (ppmv)								
176 to 177-feet bgs: Bentonite crumbles 177 to 178-feet bgs: Fine sand 178 to 182-feet bgs: #3 Monterey sand filter pack 180-feet bgs: Vapor probe tip 182 to 183-feet bgs: Fine sand 183 to 184-feet bgs: Bentonite crumbles 184 to 196-feet bgs: Hydrated bentonite chips		26.8	180	MW7				Silty Sand: Reddish-brown, moist, medium-grained sand, slightly cohesive, non-plastic, no odor Same as above, olive-brown, slight increase in fines		
		75.7		-180					Same as above, trace coarse-grained sand, no odor Same as above, abrupt decrease in fines, alternating 2-inch layers of SM and SP	
		57.9	185	Grab				SP	Poorly-Graded Sand: Olive, slightly moist, fine-to-medium-grained sand, some silt, no odor Same as above, coarsens slightly downwards, no odor Same as above, trace coarse-grained sand, no odor Same as above, fine-grained sand, no odor	
		19.8							ML	Silt: Brown, moist, no odor
		8.8	190						SM-ML	Silty Sand/Sandy Silt: Olive-brown, moist, fine-grained sand, some coarse-grained sand, no odor
		37.1							ML	4-inch thick layer of olive silt
		3.1	195						SP	Poorly-Graded Sand: Pale brown-gray, slightly moist, medium-grained sand, some coarse-grained sand, trace silt and fine gravel, no odor
		88.0							SM	Silty Sand: Brown, moist, fine-to-medium-grained sand, cohesive, friable, no odor
		24.9							SP	Same as above, some olive mottling, sandier, no odor
									ML	Poorly-Graded Sand: Light brown, moist, fine-to-medium-grained sand, trace coarse-grained sand, no odor Same as above, trace coarse gravel, no odor
								ML	Sandy Silt: Olive, slightly moist, very fine-grained sand, friable, with fine-grained sand, no odor	

SURFACE ELEVATION: feet
 TOTAL DEPTH (feet): 220
 DATE DRILLED: 2-14-07

LOGGED BY: D. Hasham
 DIAMETER OF BORING (inches): 8"
 DEPTH TO STATIC WATER (feet): 204



Facility 19
 8838 Las Tunas Drive, Temple City, CA

PLATE

PROJECT NO. 73252

LOG OF BORING MW-7

i

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
 Facility 19 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

Well Construction	Chemical Analyses		Depth (feet)	Sample Number	Blows per Foot	Sample Type	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION AND CLASSIFICATION (Continued From Previous Page)	
	Lab.	Field PID/OVA (ppmv)								
		20.2		-220					Borehole completed to approximately 220.5-feet bgs. Groundwater encountered at approximately 204-feet bgs.	
SURFACE ELEVATION: feet				LOGGED BY: D. Hasham						
TOTAL DEPTH (feet): 220				DIAMETER OF BORING (inches): 8"						
DATE DRILLED: 2-14-07				DEPTH TO STATIC WATER (feet): 204						
				Facility 19				8838 Las Tunas Drive, Temple City, CA		PLATE
				PROJECT NO. 73252				LOG OF BORING MW-7		

ENVIRONMENTAL_LASD-T-1.GPJ KA_RDLND.GDT 3/5/07

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

FIGURE 2-9c
Facility 19 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

2.3.9 Facility 20

Table 2-17 presents a summary of the site history and the sampling results for Facility 20.

TABLE 2-17
Facility 20 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
1920 to current – Property used as an industrial electrical facility. 2000 – DTSC provided oversight of remedial investigation.	Seventy probes installed to 5 feet bgs. Nine probes installed onsite to 99 feet bgs and six probes installed offsite to 90 feet bgs. One probe installed to 240 feet bgs. Distance between the probes varied by area: northwest probes were 10 to 120 feet apart; southwestern probes were 170 to 340 feet apart (Figure 2-10a). TCE concentrations ranged from ND to 1,870 µg/L-v in the northwestern area (Table 2-18). TCE concentrations ranged from ND to 405 µg/L-v in the southwestern area (Table 2-18).	None.	None

Table 2-18 provides the soil vapor data used in the evaluation. Figure 2-10a shows the site layout. Figure 2-10b shows the maximum TCE concentration in soil vapor (1,870 µg/L-v) occurs in the intermediate interval at approximately 92 feet bgs within a sand and gravel unit. PCE was generally not detected at this facility. Figure 2-10c provides a representative boring log for the facility.

Table 2-18
Facility 20: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
Northwestern AOC-1	SCE-1	9/19/2000	135	ND	1,550
			165	ND	565
			240	ND	229
		3/30/2004	129	ND	1.1
			164	ND	70
Northwestern AOC-1	SP-5	4/3/2000	25	ND	408
			48	ND	19
			53	ND	104
			65	ND	559
			92	ND	597
		9/19/2000	92	ND	1,870

Table 2-18
Facility 20: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
Northwestern AOC-1	DSG-2	11/16/1999	25	ND	ND
			50	ND	ND
			75	ND	32
			92	ND	1,150
Northwestern AOC-1	DSG-1	11/16/1999	5	ND	26
			25	ND	ND
			50	ND	ND
			75	ND	41
			88	ND	299
Northwestern AOC-1	DSG-4	11/16/1999	2	ND	ND
			50	ND	41
			75	ND	11
			90	ND	ND
Northwestern AOC-1	SP-4	4/4/2000	25	5	671
		3/31/2000	53	ND	667
		4/5/2000	85	ND	1,710
Northwestern AOC-1	SP-9	6/13/2005	55	3	330
			85	4	460
			105	6.3	1,200
Northwestern AOC-1	SG-134	3/31/2000	5	ND	157
Northwestern AOC-1	SG-135	3/31/2000	5	ND	129
Northwestern AOC-1	SG-125	3/31/2000	5	3	86
Southwestern AOC-1	SP-1	3/29/2000	23.5	ND	2
			56.5	ND	12
			92.5	ND	ND
Southwestern AOC-1	SP-2	3/29/2000	27.5	ND	2
			59	ND	405
			89	ND	6
Southwestern AOC-1	SG-127	3/31/2000	5	ND	26
Southwestern AOC-1	SG-27	10/5/1999	5	ND	ND

Shaded box with bold text indicates maximum concentration

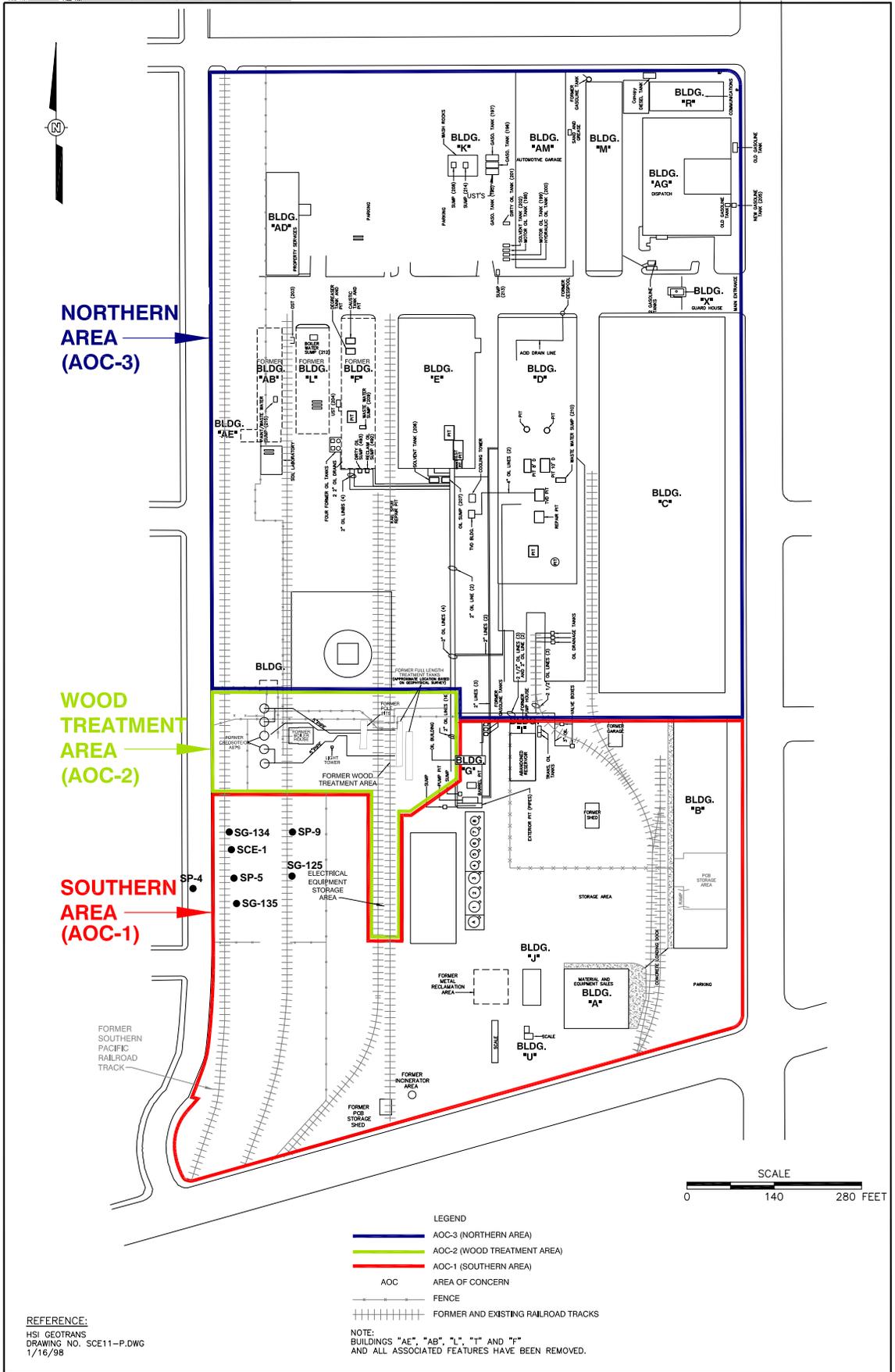
ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit



NORTHERN AREA (AOC-3)

WOOD TREATMENT AREA (AOC-2)

SOUTHERN AREA (AOC-1)

REFERENCE:
 HSI GEOTRANS
 DRAWING NO. SCE11-P.DWG
 1/16/98

- LEGEND**
- AOC-3 (NORTHERN AREA)
 - AOC-2 (WOOD TREATMENT AREA)
 - AOC-1 (SOUTHERN AREA)
 - AOC
 - FENCE
 - FORMER AND EXISTING RAILROAD TRACKS

NOTE:
 BUILDINGS "AE", "AB", "L", "I" AND "F"
 AND ALL ASSOCIATED FEATURES HAVE BEEN REMOVED.

FIGURE 2-10a
 Facility 20 Site Map
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

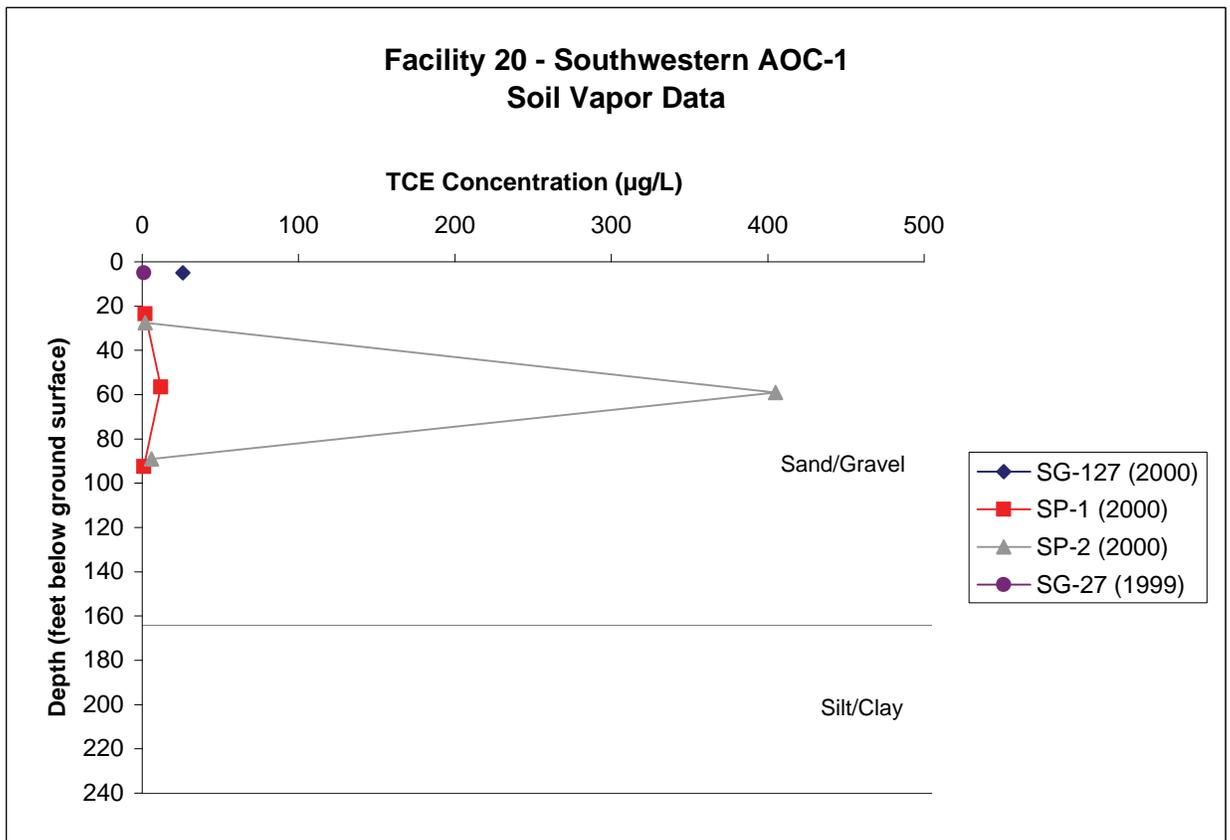
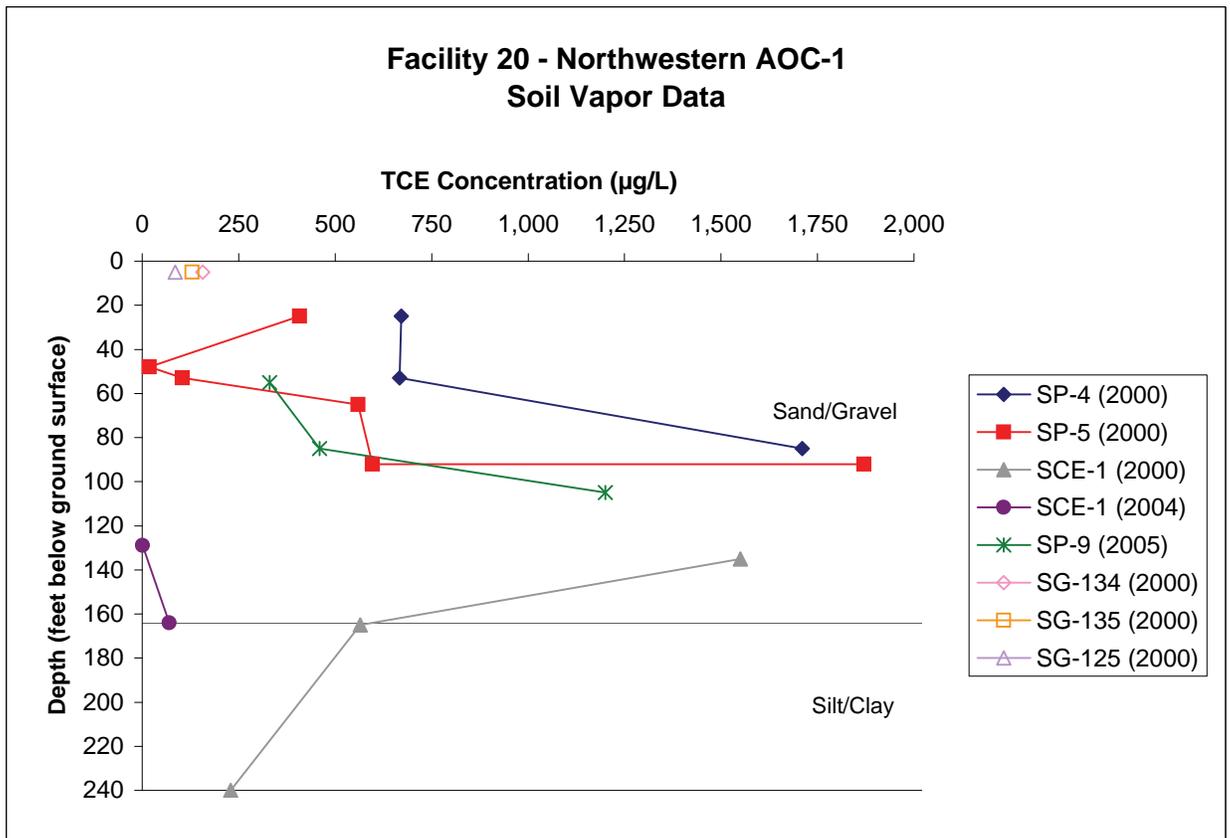
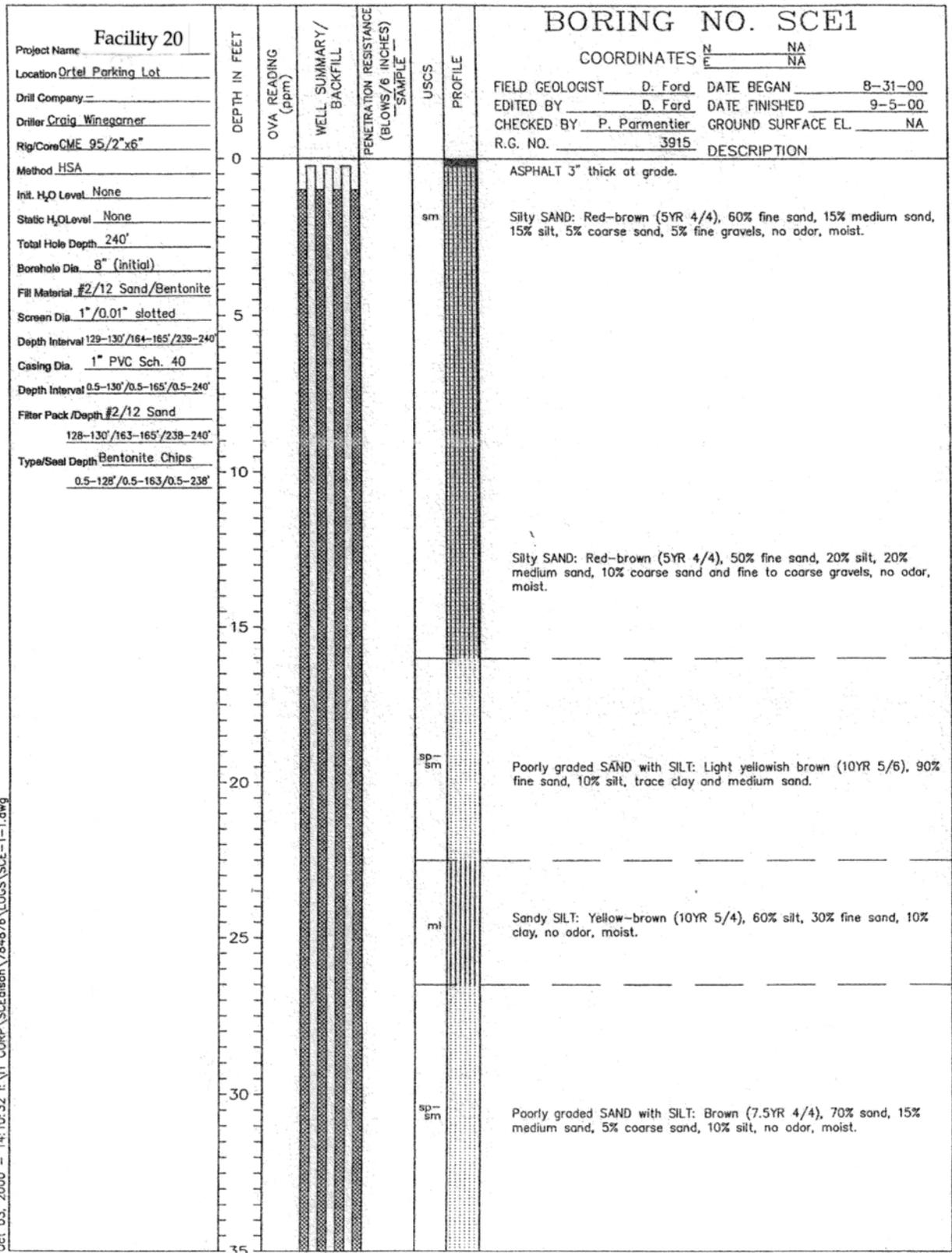


FIGURE 2-10b
TCE Concentrations in Soil Vapor at Facility 20
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

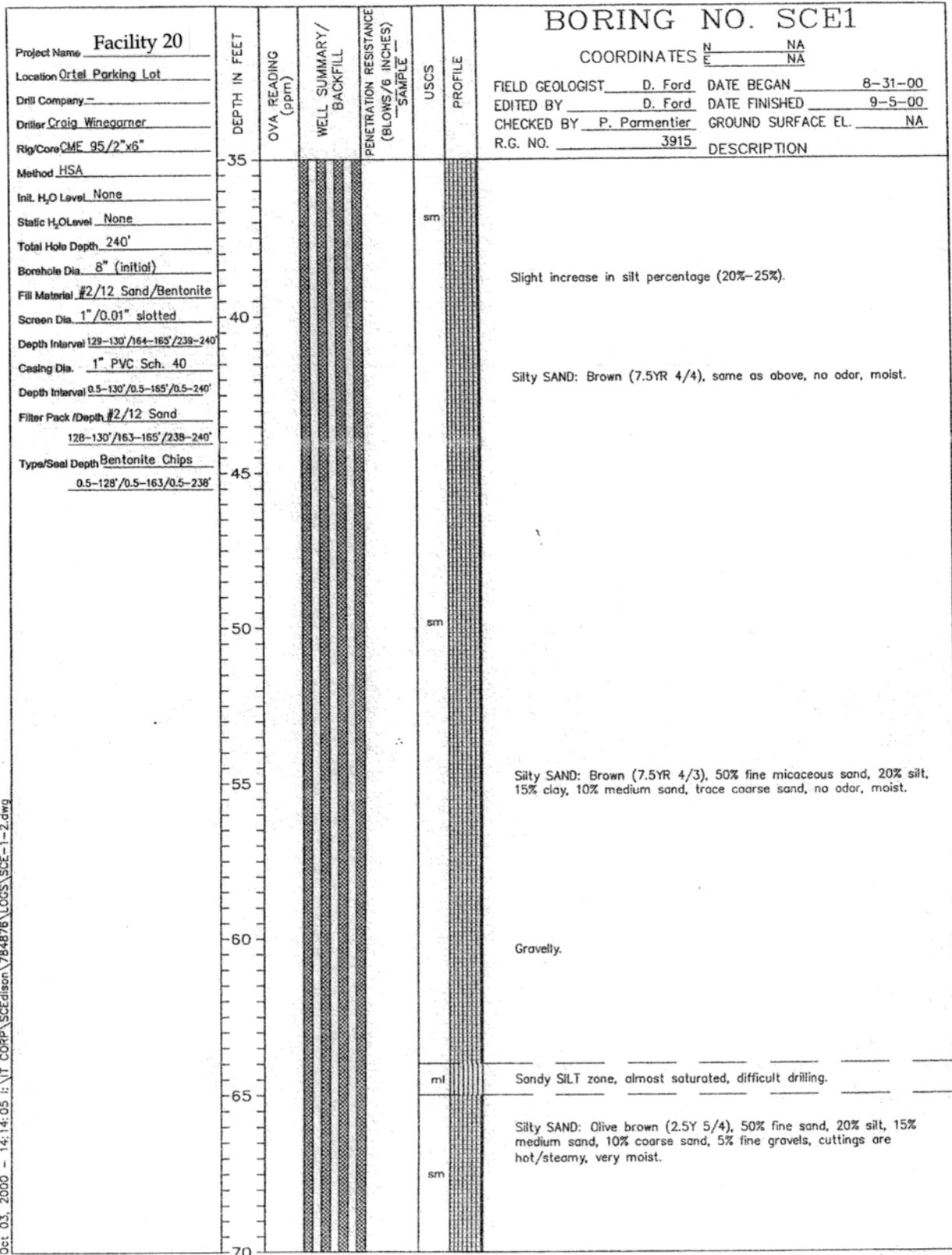


Oct 03, 2000 - 14:10:32 I:\VT CORP\SCE\disc\784876\LOGS\SCE-1-1.dwg

PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

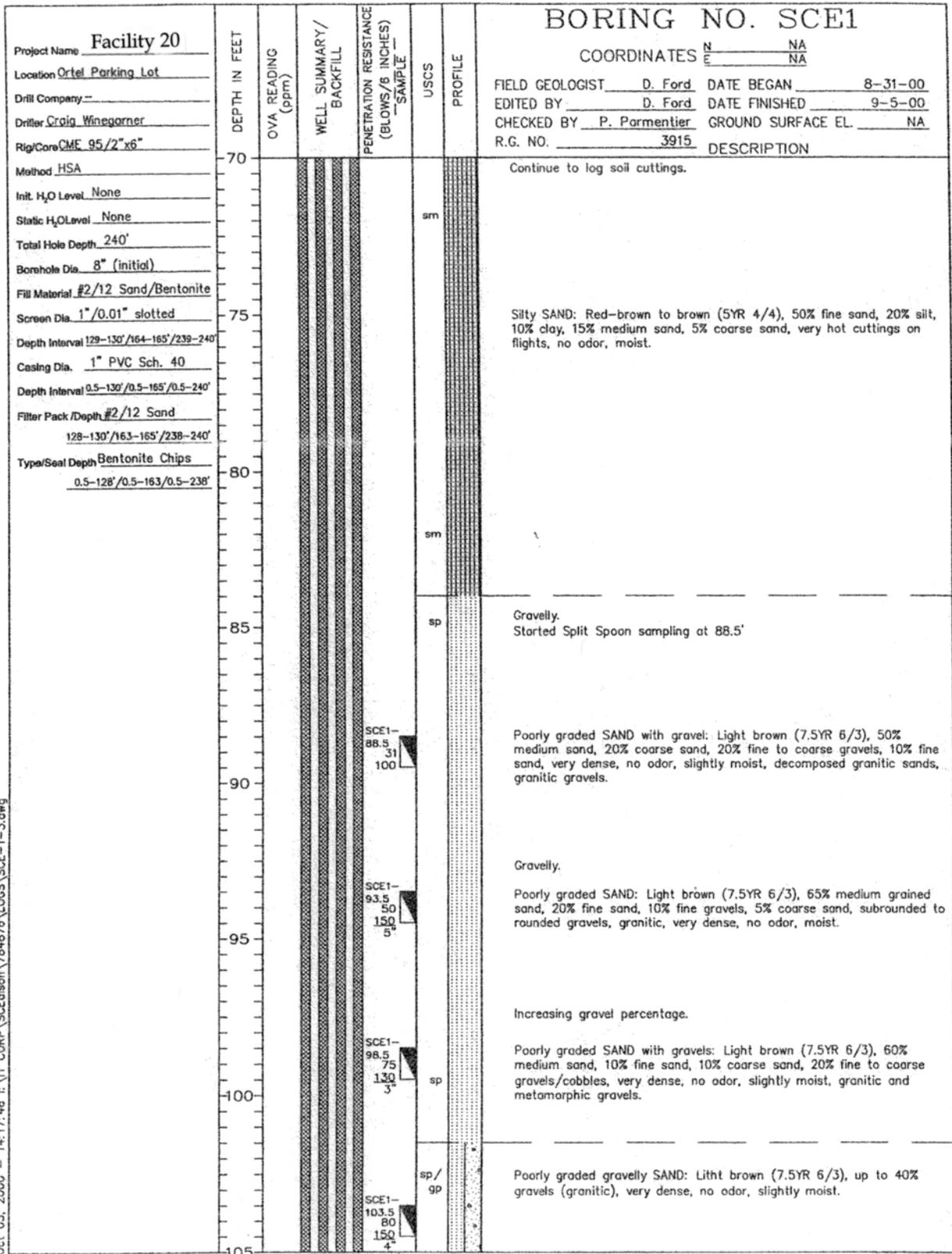


Oct. 03, 2000 - 14:14:05 :: IT CORP \SCE\LOGS\SCE-1-2.dwg

PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

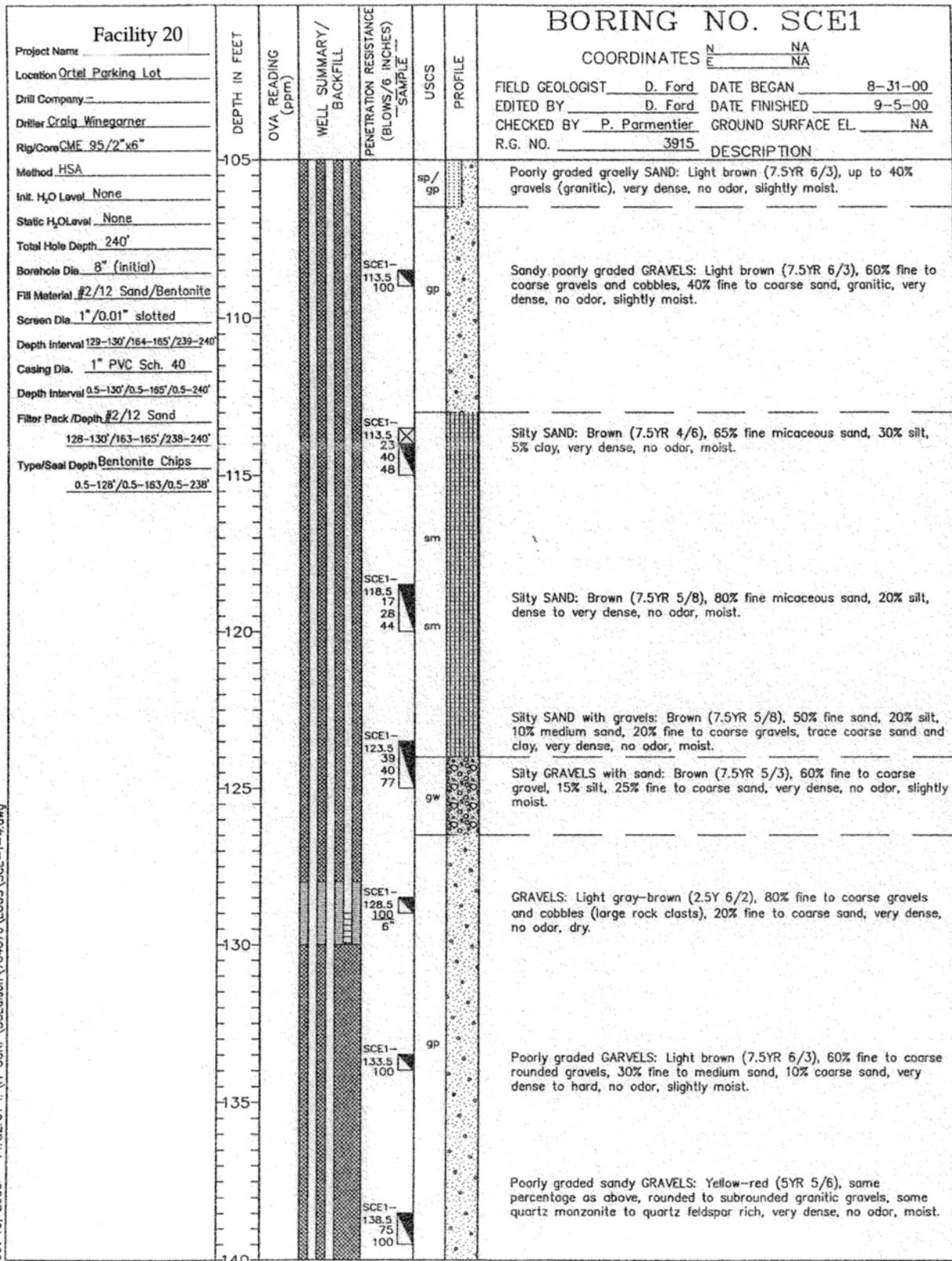


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PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

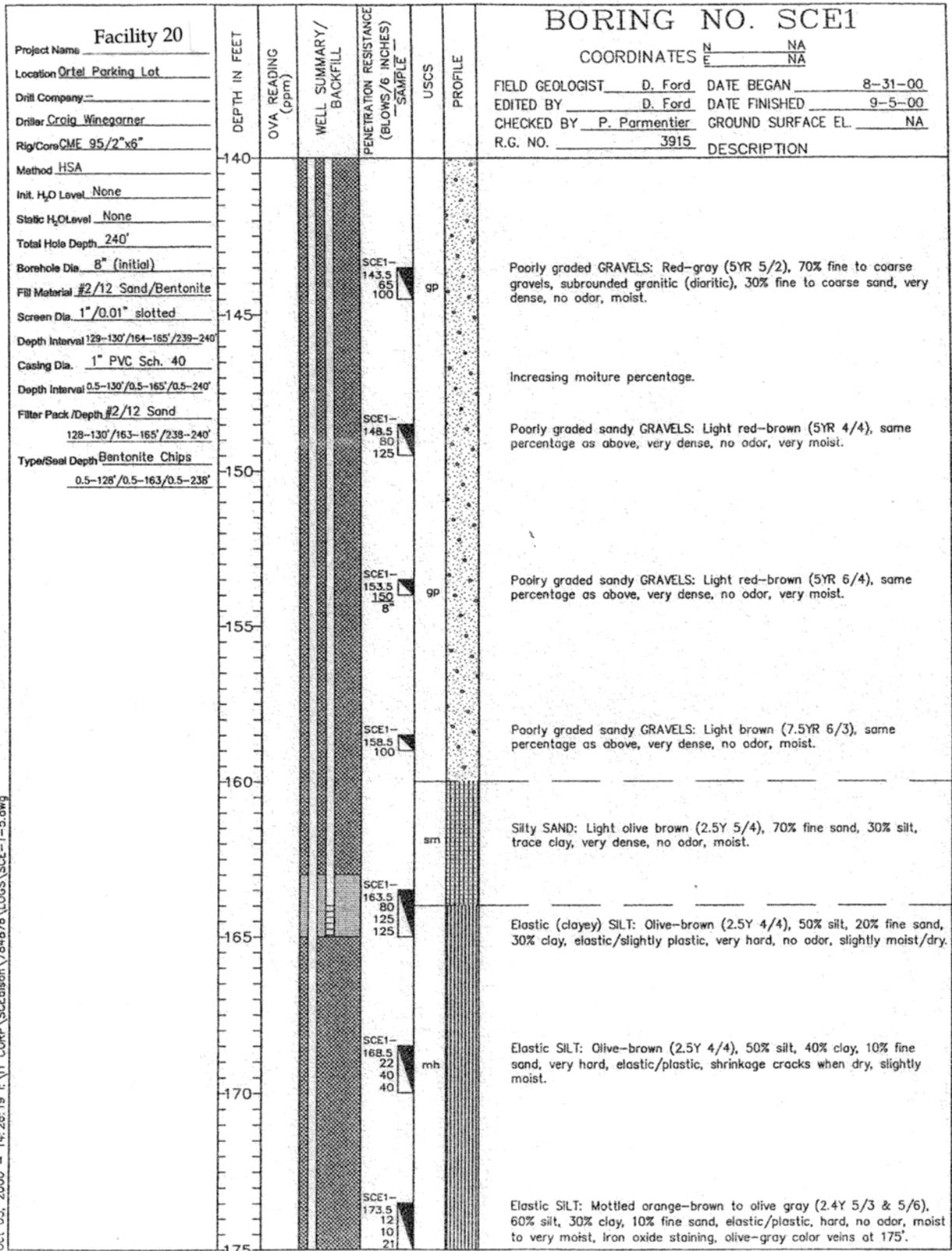


Oct. 13, 2000 - 14:52:01 I:\NT CORP\SCE\dison\784876\LOGS\SCE-1-4.dwg

PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

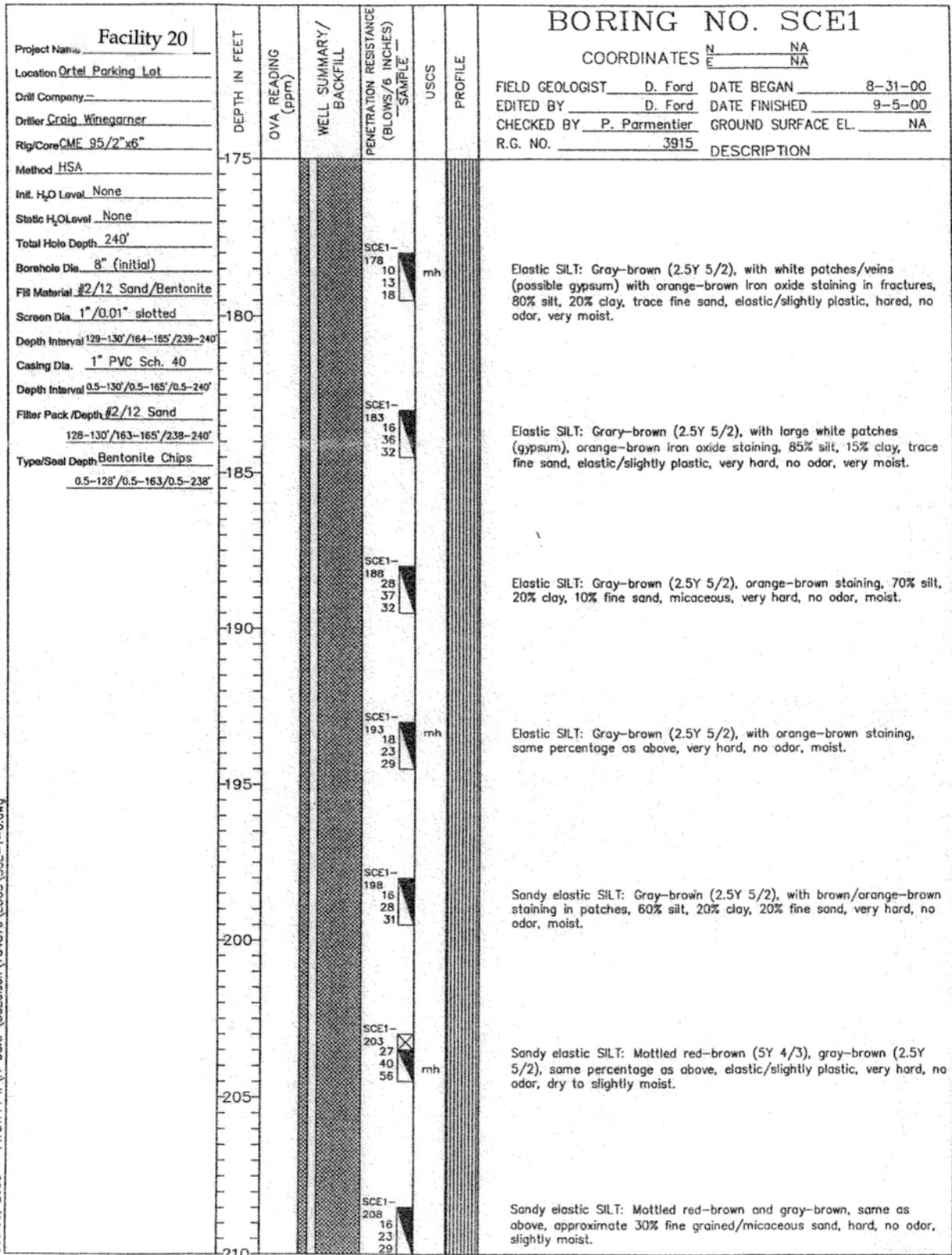


Oct 03, 2000 14:26:19 I:\CORP\SCE\dison\784876\LOGS\SCE-1-5.dwg

PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*



Oct. 03, 2000 -- 14:31:14 I:\VT CORP\SCE\olson\784876\LOGS\SCE-1-6.dwg

PROJECT NO. 784876
 CLIENT:
 SEE LEGEND FOR LOGS AND TEST PITS
 FOR EXPLANATION OF SYMBOLS AND TERMS



FIGURE 2-10c
 Facility 20 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3



2.3.10 Facility 21

Table 2-19 presents a summary of the site history and the sampling results for Facility 21.

TABLE 2-19
Facility 21 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1966 to 2007 – Property used for laundry and dry cleaning operations. PCE is used onsite.</p> <p>1999 – Site inspected by LARWQCB.</p> <p>2000 – Site investigation began with LARWQCB oversight.</p>	<p>Seven probes installed down to 5 feet bgs and 9 probes installed down to 10 feet bgs.</p> <p>One probe installed to 20 feet bgs and one probe installed to 24 feet bgs.</p> <p>Four probes installed to 100 feet bgs and two probes installed down to 240 feet.</p> <p>Chlorinated solvents were found in three areas; the parking lot, offsite in Las Tunas Drive and in Charlotte Avenue. Distance between the evaluated probes ranged between 17 and 130 feet (Figure 2-11a).</p> <p>TCE was not detected at the facility.</p> <p>PCE concentrations ranged from 1.1 to 1,760 µg/L-v in the parking lot (Table 2-20.)</p> <p>PCE concentrations ranged from 0.1 to 986 µg/L-v offsite on Las Tunas Drive (Table 2-20).</p> <p>PCE concentrations ranged from 2 to 14 µg/L-v offsite on Charlotte Avenue (Table 2-20).</p>	<p>Four groundwater wells installed.</p> <p>Depth to groundwater – 161 feet bgs.</p> <p>PCE detected in groundwater at a maximum concentration of 9.7 µg/L.</p> <p>TCE not detected in groundwater.</p>	<p>SVE system operated from March through June 2005. All data used for this evaluation predate operation of the SVE system.</p>

Figure 2-11a shows the site layout. Table 2-20 provides the soil vapor data used in the evaluation. Figure 2-11b shows that the maximum PCE concentration in soil vapor (1,760 µg/L-v) occurs in the intermediate interval at approximately 60 feet bgs within a relatively transmissive sand/gravel unit. TCE was not detected at this facility. Figure 2-11c provides a representative boring log for the facility.

Table 2-20
 Facility 21: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
N. Parking Lot	JSV-2	8/26/2004	15	423	ND
			30	326	ND
			45	372	ND
			60	1,760	ND
			75	1,500	ND
			90	327	ND
			105	1,650	ND
N. Parking Lot	JSV-3	8/26/2004	25	834	ND
			50	550	ND
			75	262	ND
			100	250	ND
E. Las Tunas	JSV-4	8/26/2004	25	0.1	ND
			50	475	ND
			75	434	ND
			100	317	ND
E. Las Tunas	JSV-5	8/26/2004	25	750	ND
			50	986	ND
			75	740	ND
			100	555	ND
N. Parking Lot	JSV-6	8/26/2004	120	1.6	ND
			150	2.4	ND
			180	1.1	ND
			210	12.5	ND
			240	313	ND
Charlotte	JSV-7	8/26/2004	120	14.2	ND
			150	9.2	ND
			180	2	ND
			210	1.2	ND
			240	4.2	ND
N. Parking Lot	JB-1	1/21/2002	5	5.6	ND
			10	6.0	ND
N. Parking Lot	JB-2	1/21/2002	5	115.3	ND
			10	101.7	ND
N. Parking Lot	JB-3	1/21/2002	5	18.3	ND
			10	8.1	ND

Shaded box with bold text indicates maximum concentration

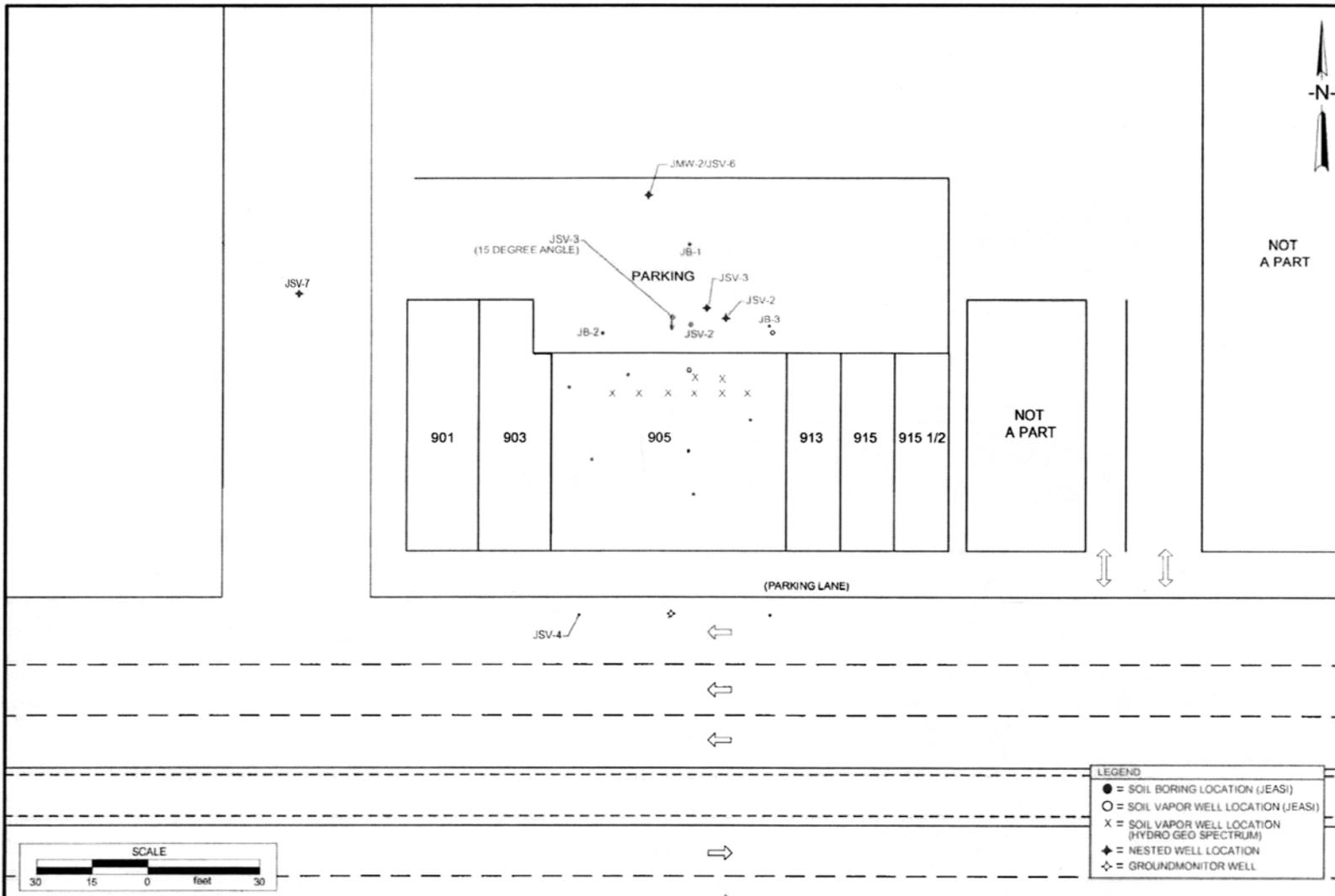
ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit



		Soil Boring and Well Location Map	
		DWG-0400851	
		Figure 5	Page

FIGURE 2-11a
 Facility 21 Site Map
 Recommendations for
 Conducting Soil Vapor
 Investigations
 San Gabriel Valley Area 3

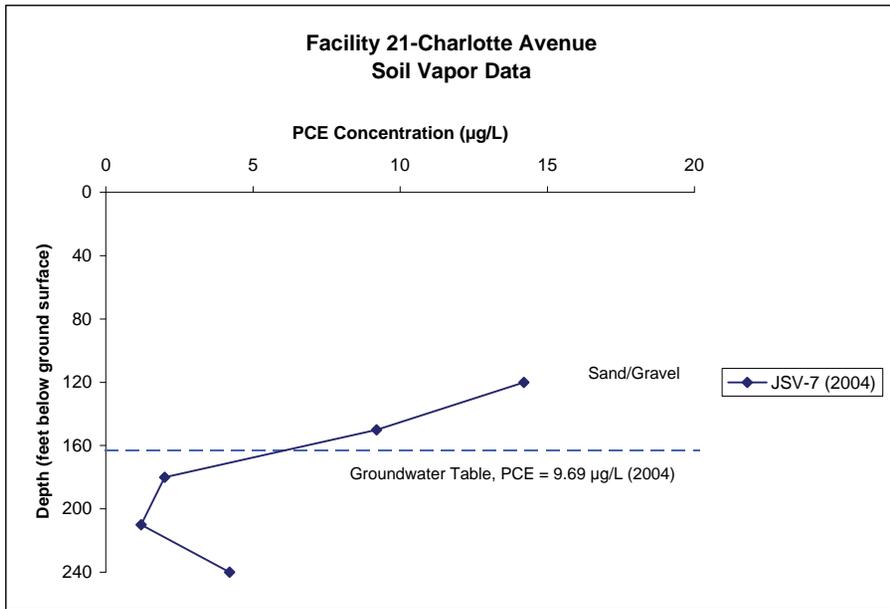
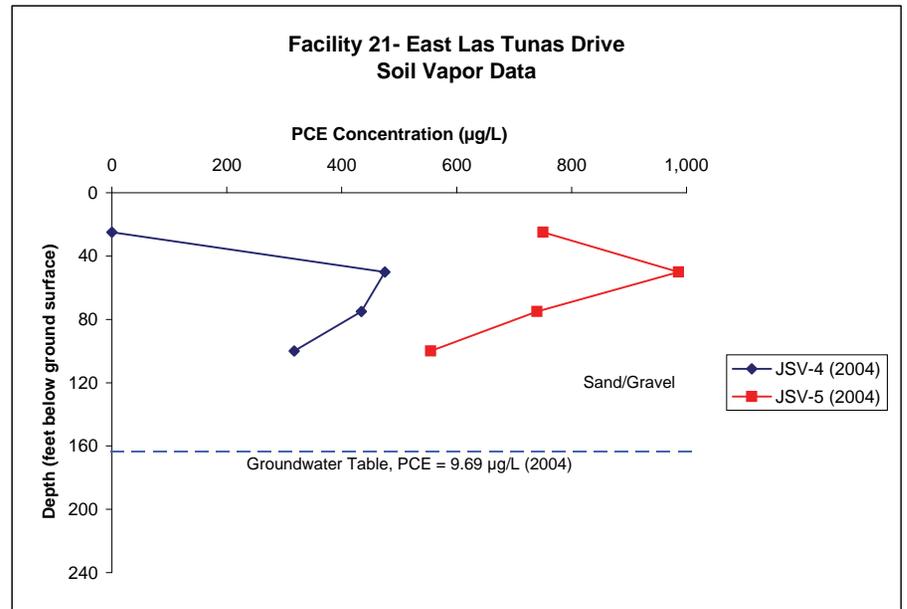
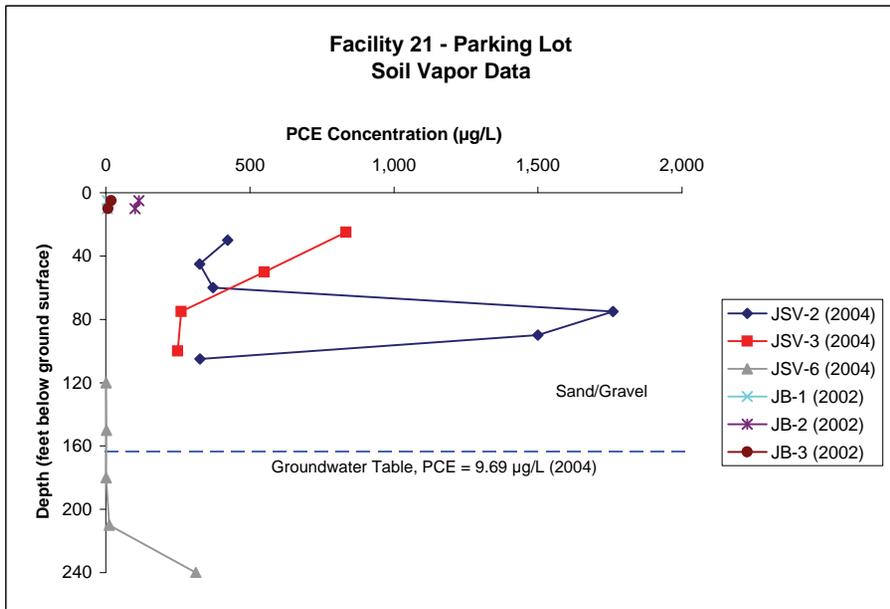


FIGURE 2-11b
PCE Concentrations in Soil Vapor at Facility 21
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/21/04	Drilling Method: Air Rotary	Notes: Northern parking lot Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
10		monitoring well			SW		Sand; very fine-coarse grained, subangular, reddish brown; very moist	FID - 3.1 ppm (Background - 3.2 ppm)
20		monitoring well			SW		Sand; very fine-coarse grained, subangular, medium brown; damp	FID - 2.0 ppm (Background - 2.1 ppm)
30		monitoring well			SW		Sand, fine coarse grained, subangular, medium brown; moist; trace fine gravel, subrounded	FID - 1.1 ppm (Background - 1.1 ppm)
40		monitoring well			SP		Sand; fine-medium grained, subangular, medium brown; damp	FID - 0.7 ppm (Background - 0.7 ppm)
50	VOC	monitoring well	JMW-2-50'	50	SP		Sand, medium grained, trace fine, subangular, medium brown; moist; trace fine gravel $\leq \frac{1}{2}$ " diameter, subangular to subrounded	FID - 0.3 ppm (Background - 0.3 ppm)

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 1 of 8
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Clay

Sand and gravel



FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/21/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
60		monitoring well			SP		Sand, medium grained, trace fine, subangular, medium brown; moist; trace fine gravel $\leq \frac{1}{2}$ " diameter, subangular to subrounded	FID - 0.0 ppm (Background - 0.0 ppm)
70		monitoring well			SP		Sand; fine-medium grained, subangular to subrounded, medium brown; moist	FID - 0.0 ppm (Background - 0.0 ppm)
80		monitoring well			SW		Sand; very fine-medium grained, trace coarse, subangular, medium reddish brown; damp	FID - 0.5 ppm (Background - 0.5 ppm)
90		monitoring well			SW		Sand; very fine-coarse grained, subangular to subrounded, medium brown; moist	FID - 2.8 ppm (Background - 3.2 ppm)

Clay

Silt

Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/22/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
100	VOC	monitoring well	JMW-2-100'	20 50	SW		Sand, very fine-coarse grained, subangular, medium brown; moist; trace fine gravel, $\leq \frac{1}{4}$ " diameter, subangular	FID - 3.4 ppm (Background - 4.6 ppm)
110		monitoring well			SW		Sand; very fine-coarse grained, subangular, medium brown; damp	FID - 1.6 ppm (Background - 2.4 ppm)
120		monitoring well			SW		Sand; very fine-coarse grained, subangular, reddish brown; moist	FID - 2.8 ppm (Background - 4.5 ppm)
130		monitoring well			SW		Sand; very fine-coarse grained, subangular to subrounded, medium brown; dry	FID - 4.5 ppm (Background - 5.5 ppm)

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 3 of 8
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Clay

Silt

Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/23/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
140		monitoring well			GW		Gravel, fine grained, subangular with angular fragments, ≤ ½" diameter; sand, medium-coarse grained with trace fine and silt; subangular, medium brown; very moist	No reading taken due to water added by driller
151		monitoring well			SP		Sand; medium-very coarse grained, subangular, medium brown; saturated (from water added during drilling)	No reading taken due to water added by driller
160	VOC	monitoring well	JMW-2-160'	50	SW		Sand; fine-coarse grained, subangular, medium brown; saturated (from water added during drilling)	No reading taken due to water added by driller

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 4 of 8
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 Clay

 Silt

 Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/23/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	BLOW COUNTS	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
181		monitoring well			SP		Sand; coarse-very coarse grained, subangular, light brown; wet (from water added during drilling)	No reading taken due to water added by driller
190		monitoring well			GW		Gravel; fine-coarse grained, subrounded to subangular; sand medium to coarse grained, subangular, medium brown; moist	No reading taken due to water added by driller
200	VOC	monitoring well	JMW-2-200'	50	SW		Sand; medium-very coarse grained, medium brown; moist; trace fine gravel, subangular to subrounded	No reading taken due to water added by driller

Clay
 Silt
 Sand and gravel

FIGURE 2-11c
 Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/24/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

D E P T H (FT)	L A B T E S T S	B O R E H O L E C O M P L E T I O N D E S C R I P T I O N	S A M P L E N U M B E R & S A M P L E D E S C R I P T I O N	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	S O I D E S C R I P T I O N	N O T E S
211		monitoring well			SP		Sand (trace of silt?); very fine-medium grained, subangular, medium brown; saturated (water added during drilling)	No reading taken due to water added by driller
220		monitoring well			SM		Silty sand, trace of coarse sand; very fine-medium grained, subangular, medium brown; saturated (water added during drilling)	No reading taken due to water added by driller

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 6 of 8
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Clay

Silt

Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/25/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

D E P T H (FT)	L A B T E S T S	B O R E H O L E C O M P L E T I O N D E S C R I P T I O N	S A M P L E N U M B E R & S A M P L E D E S C R I P T I O N	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	S O I L D E S C R I P T I O N	N O T E S
250	VOC	monitoring well	JMW-2-250'		GW		Gravel; fine-medium grained, subangular to subrounded, medium brown; moist; trace sand, fine-coarse grained, subangular medium brown; moist	FID - 0.01 ppm (Background - 0.01 ppm) ▽ First groundwater encountered at 254 feet
256		monitoring well			GW		Gravel; fine-medium grained, subangular to subrounded, medium brown; moist; trace sand, fine-coarse grained, subangular medium brown; moist	FID - 0.0 ppm (Background - 0.0 ppm)
258		monitoring well			SP		Sand; medium-coarse grained, subangular, medium brown; moist	FID - 0.0 ppm (Background - 0.0 ppm)
260		monitoring well			SW		Sand with trace gravel; gravel, fine grained, subangular to subrounded; sand subangular, medium brown; moist	FID - 0.0 ppm (Background - 0.0 ppm)

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 7 of 8
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Clay

Silt

Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Boring Log

Project: 100261		Sketch Map:
Date Drilled: 07/25/04	Drilling Method: Air Rotary	Notes: Facility 21
Driller: West Hazmat	Drilling Angle: None	
Log By: Dale Schneeberger	Geologist: Dale Schneeberger	

DEPTH (FT)	LAB TESTS	BOREHOLE COMPLETION DESCRIPTION	SAMPLE NUMBER & SAMPLE DESCRIPTION	B L O W C O U N T S	C L A S S I F I C A T I O N	L I T H O L O G Y	SOIL DESCRIPTION	NOTES
269		monitoring well			SM		Silty sand, trace of coarse sand; very fine-medium grained, subangular, medium brown; saturated (water added during drilling)	FID - 0.0 ppm (Background - 0.0 ppm)
279		monitoring well			SW		Sand; fine-coarse grained, subangular, medium brown; saturated (water added during drilling)	FID - 0.0 ppm (Background - 0.0 ppm)

JE Assessment Services, Inc.	Boring Number: JMW-2	Page 8 of 8
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Clay

Silt

Sand and gravel

FIGURE 2-11c
Facility 21 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

2.3.11 Facility 22

Table 2-21 presents a summary of the site history and the sampling results for Facility 22.

TABLE 2-21

Facility 22 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
<p>1975 to 2007 – Property used for dry cleaning operations. Two PCE spills were reported between 1975 and 1989 during delivery.</p> <p>2000 – Site investigation and oversight by LARWQCB.</p>	<p>Five probes installed inside the building to a maximum depth of 25 feet bgs.</p> <p>One probe installed in the alley to 20 feet bgs and 1 probe installed in the alley to 150 feet bgs.</p> <p>One probe installed in the open field next to the building to a depth of 20 feet bgs.</p> <p>PCE concentrations ranged from ND to 4,234 µg/L-v (Table 2.-22).</p> <p>TCE concentrations ranged from ND to 248 µg/L-v (Table 2.-22).</p>	<p>One groundwater well installed.</p> <p>Depth to groundwater – 160.5 feet bgs.</p> <p>TCE was not detected in groundwater.</p> <p>PCE detected in groundwater at a concentration of 190 µg/L.</p>	None.

Table 2-22 provides the soil vapor data used in the evaluation. Figure 2-12a shows the site layout. The maximum PCE concentration in soil vapor (4,234 µg/L-v) occurs in the shallow interval at approximately 20 feet bgs. The maximum TCE concentration in soil vapor (248 µg/L-v) occurs in the deep interval at approximately 135 feet bgs, within a silt/clay unit. Figure 2-12b shows the maximum PCE and TCE concentrations for this facility. Figure 2-12c provides a representative boring log for the facility.

Table 2-22

Facility 22: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
Parking Area/Alley	SV-1	4/8/2000	5	523	0.8
			10	2,835	2.2
			15	1,783	2.6
			20	397	1
Parking Area/Alley	SV-2	4/8/2000	5	1,455	ND
			10	10	ND
			15	709	ND
			20	4,234	3.3
	SV-2	2/16/2000	30	2,726	1.6
			40	975	0.7
			50	931	0.6
			60	745	ND
			70	685	ND

Table 2-22
 Facility 22: PCE and TCE Soil Vapor Concentrations

Area	Location	Date	Depth* (ft bgs)	PCE ($\mu\text{g/L-v}$)	TCE ($\mu\text{g/L-v}$)
Parking Area/Alley	SV-9	9/9/2002	90	1,569	161
			105	1,081	121
			135	31	248
			150	11	ND
Parking Area/Alley	SV-9	11/3/2006	90	842	11.3
			105	8.6	ND
			135	6.1	ND
			150	ND	ND

Shaded box with bold text indicates maximum concentration

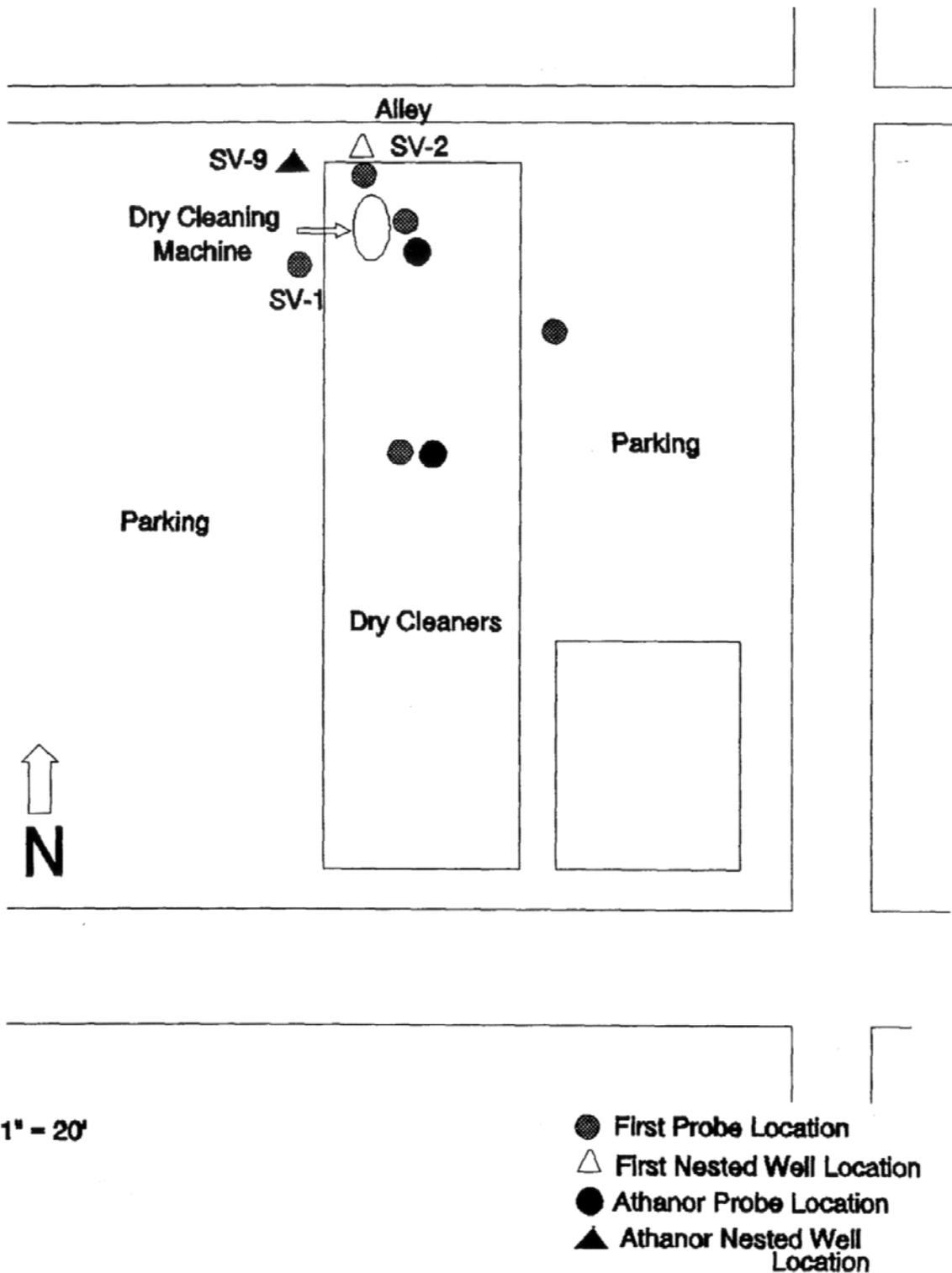
ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit



**FIGURE 3. FIRST AND CURRENT PROBE/
NESTED WELL LOCATION DIAGRAM**

FIGURE 2-12a
 Facility 22 Site Map
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

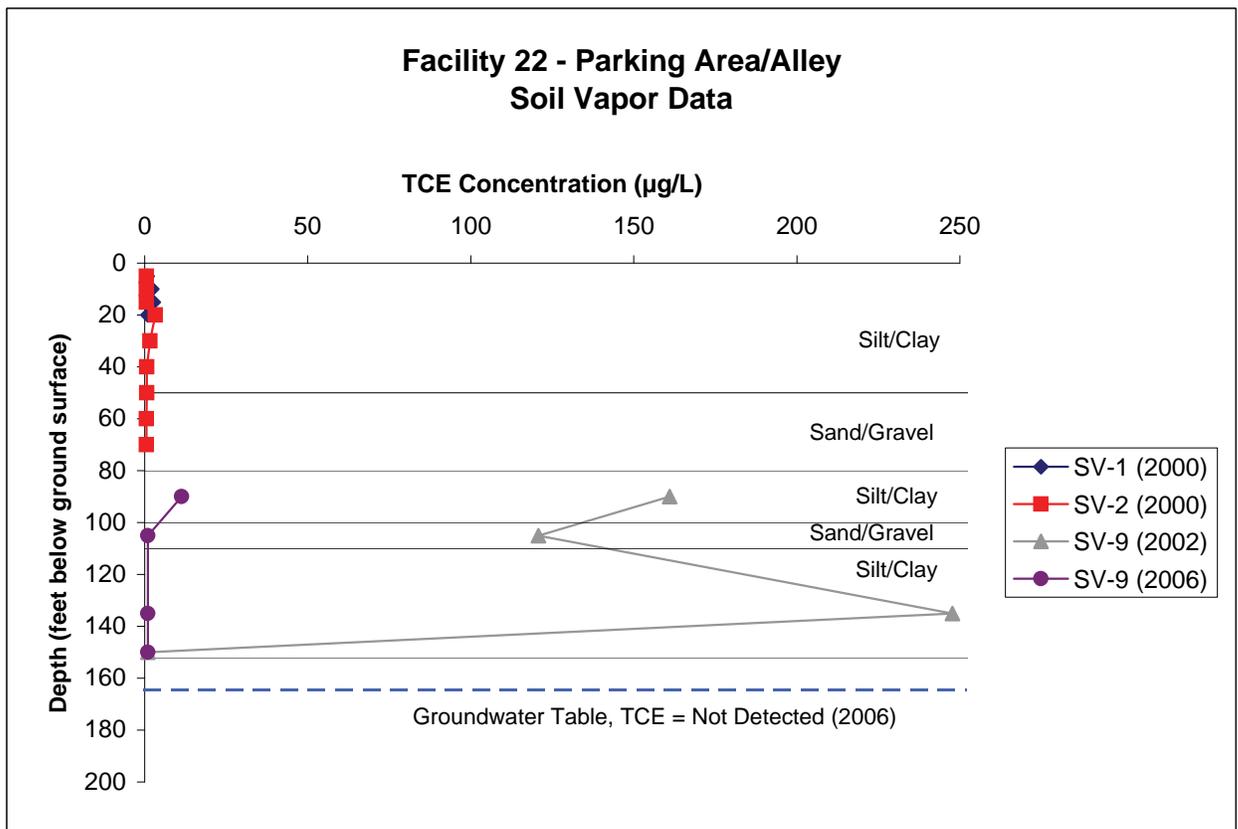
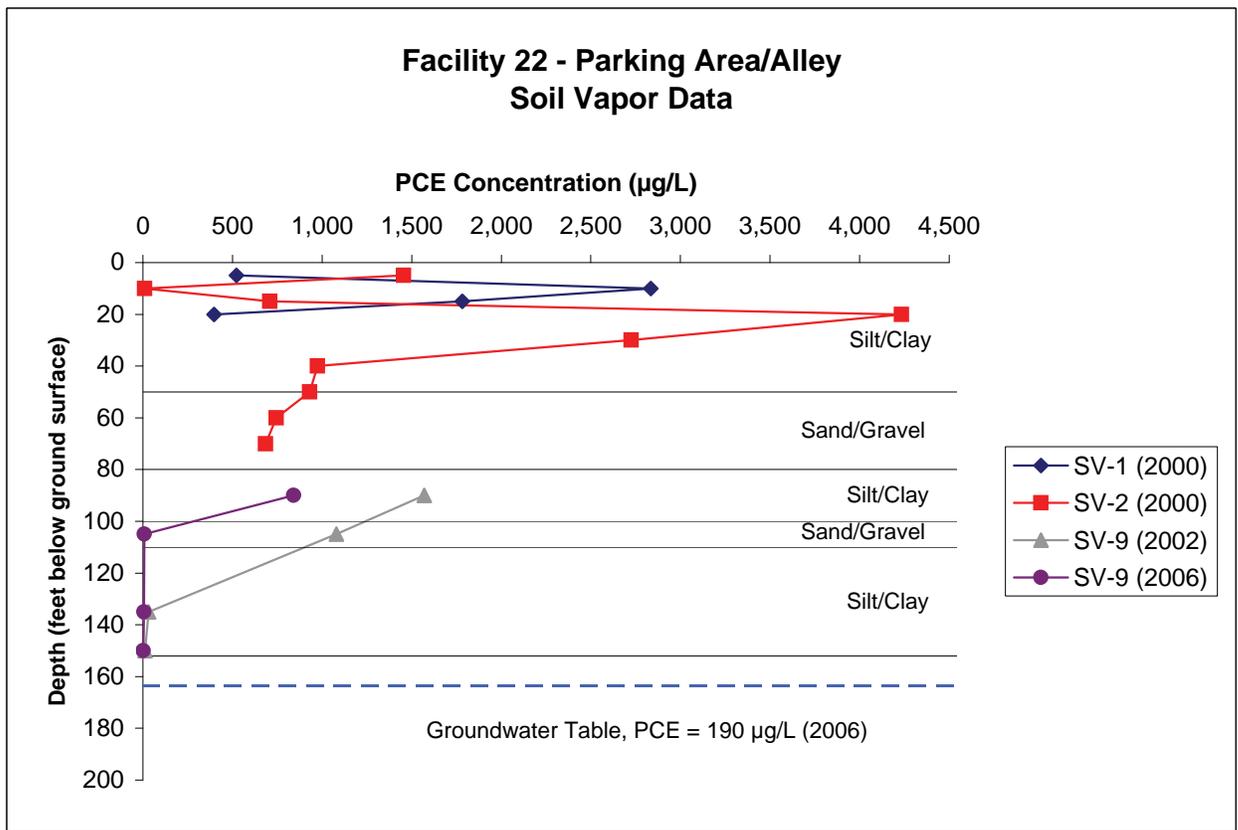


FIGURE 2-12b
PCE and TCE Concentrations in Soil Vapor at Facility 22
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

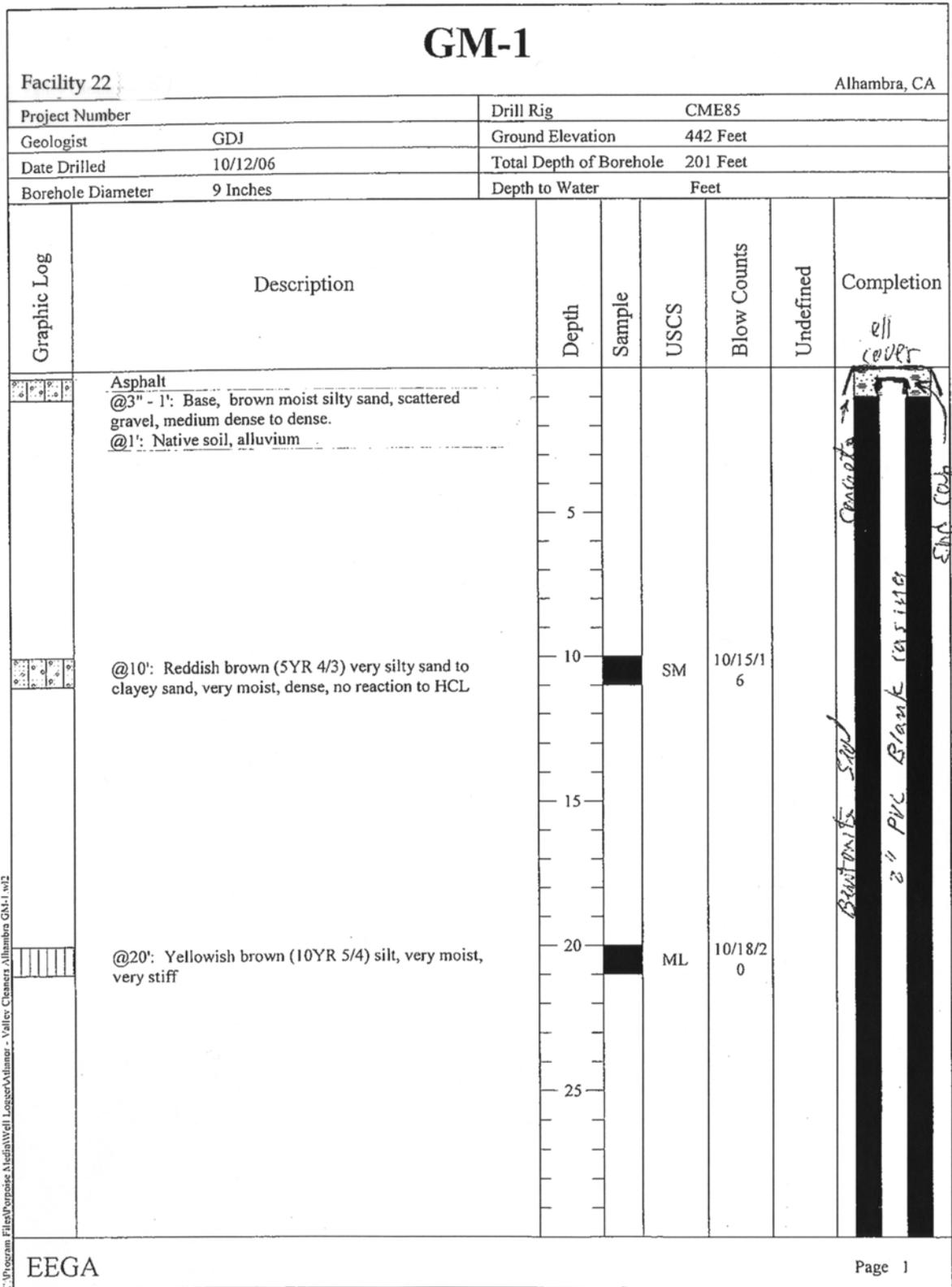


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

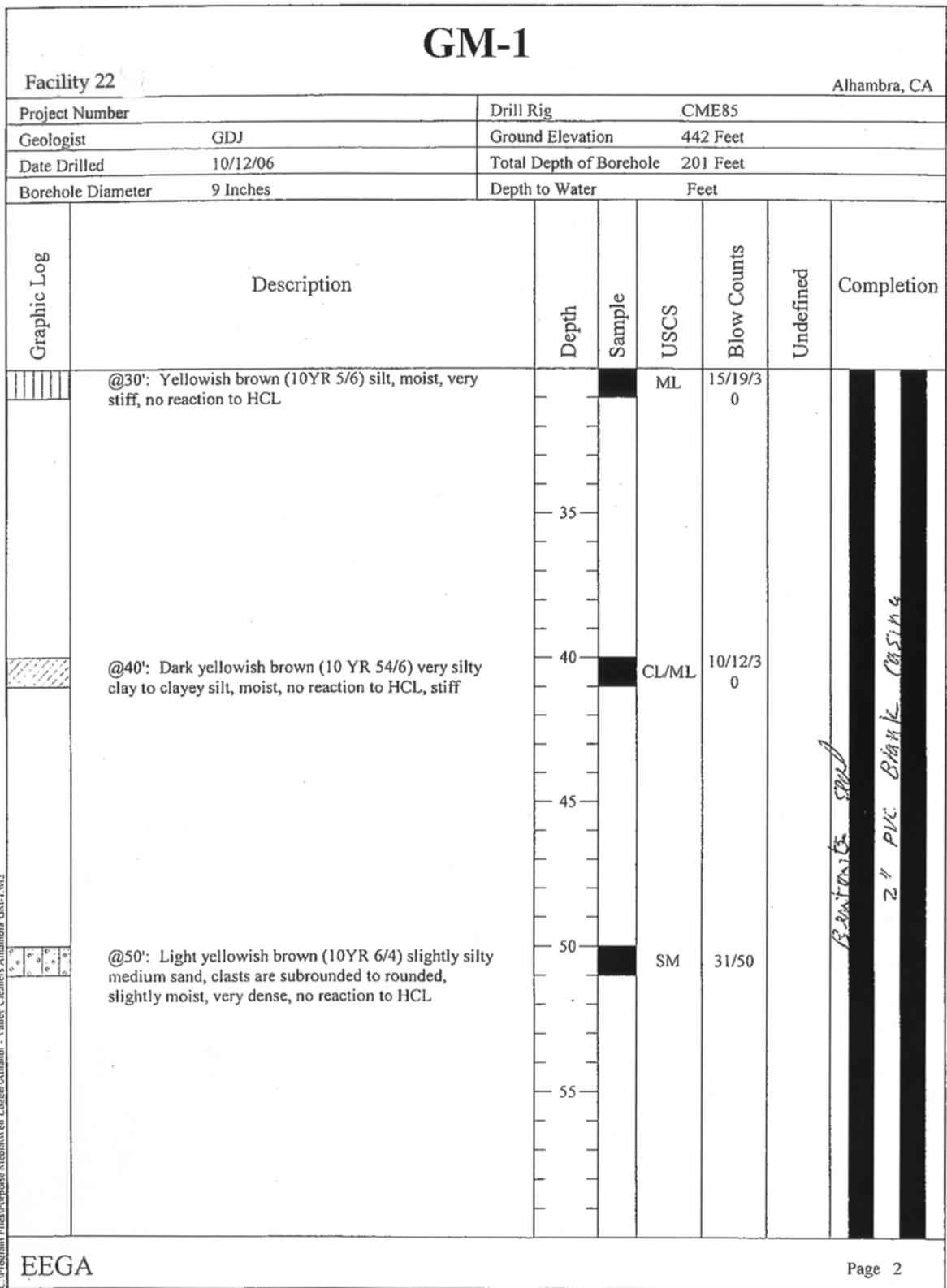


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

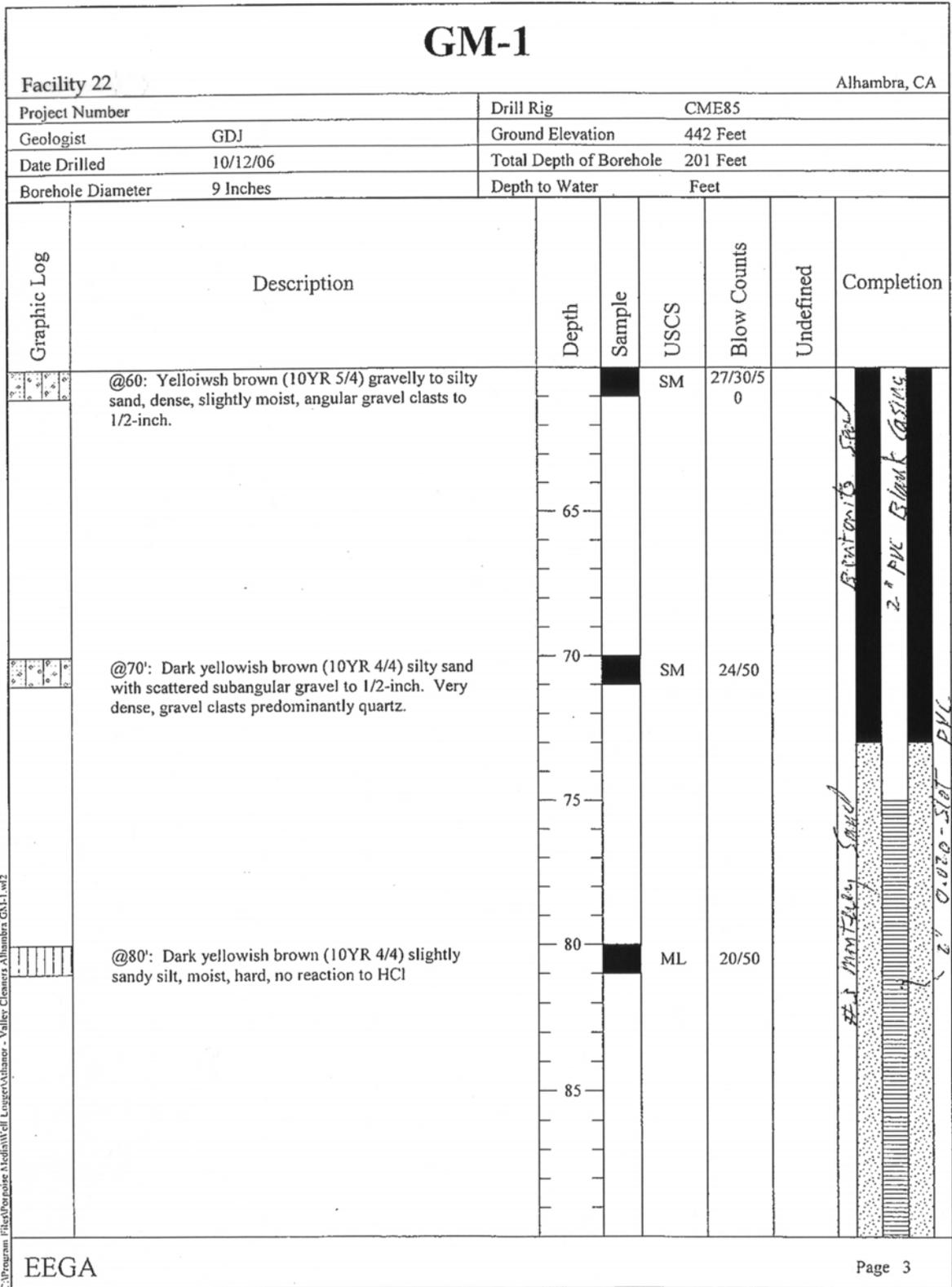


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

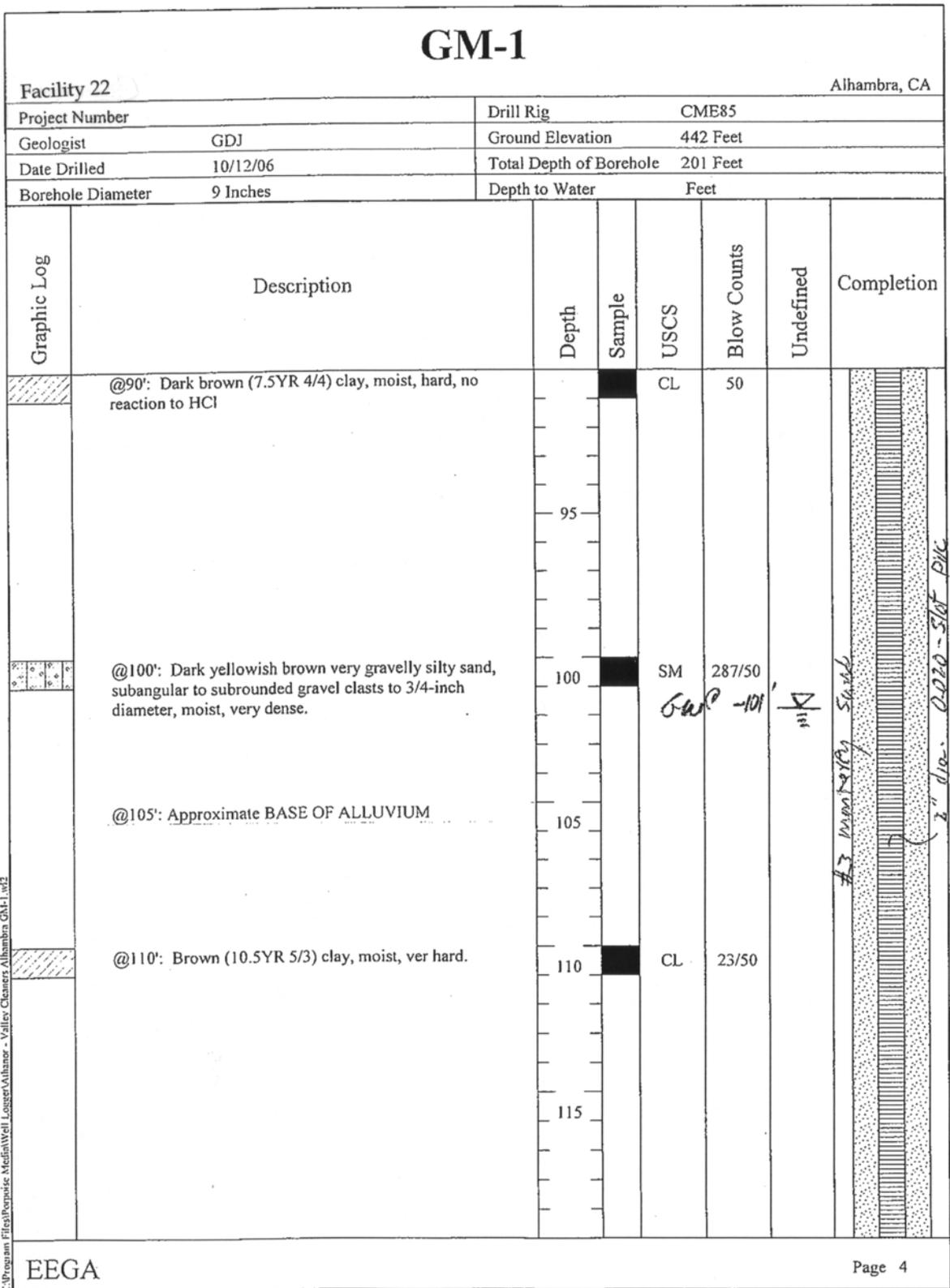


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

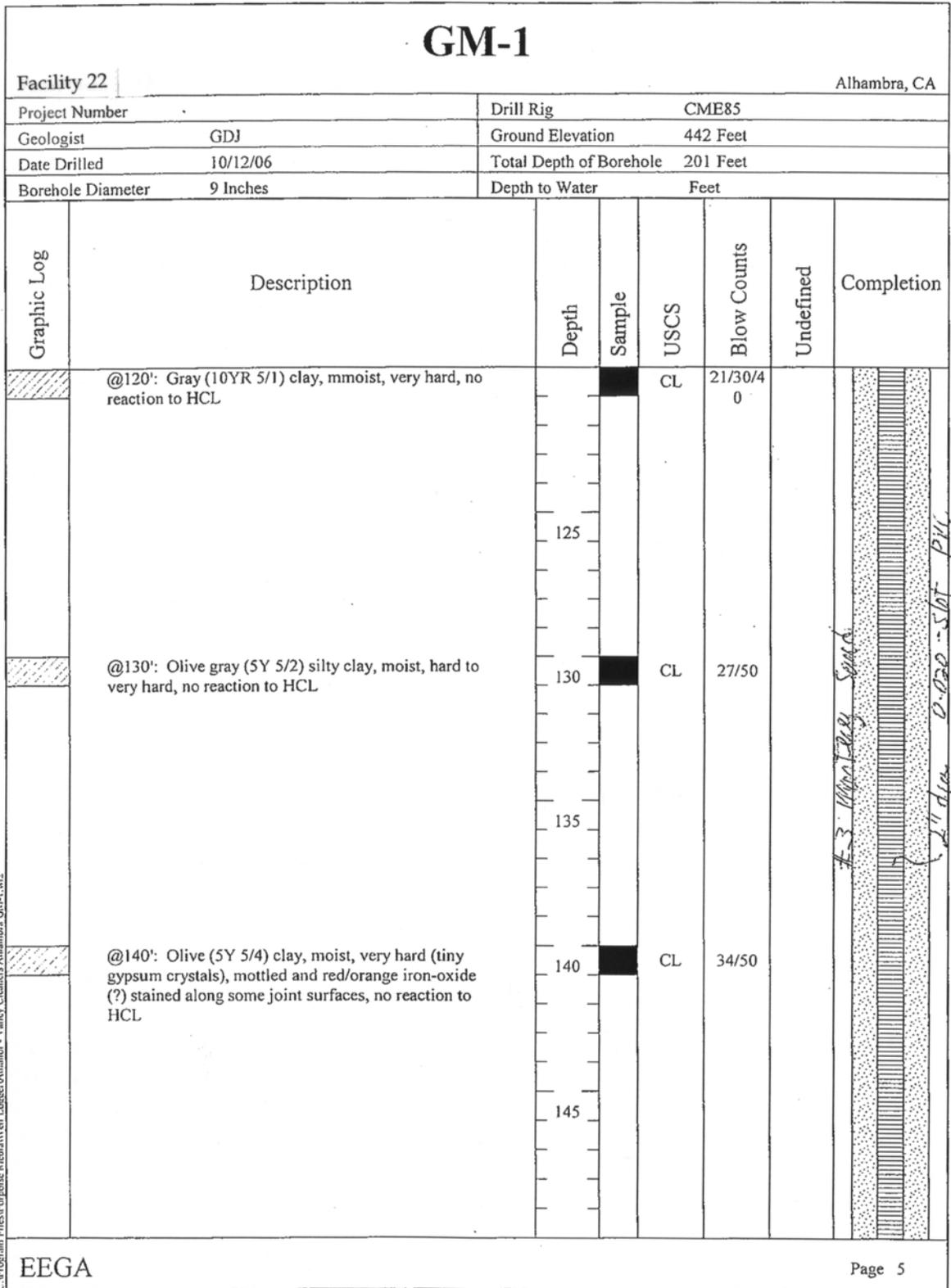


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

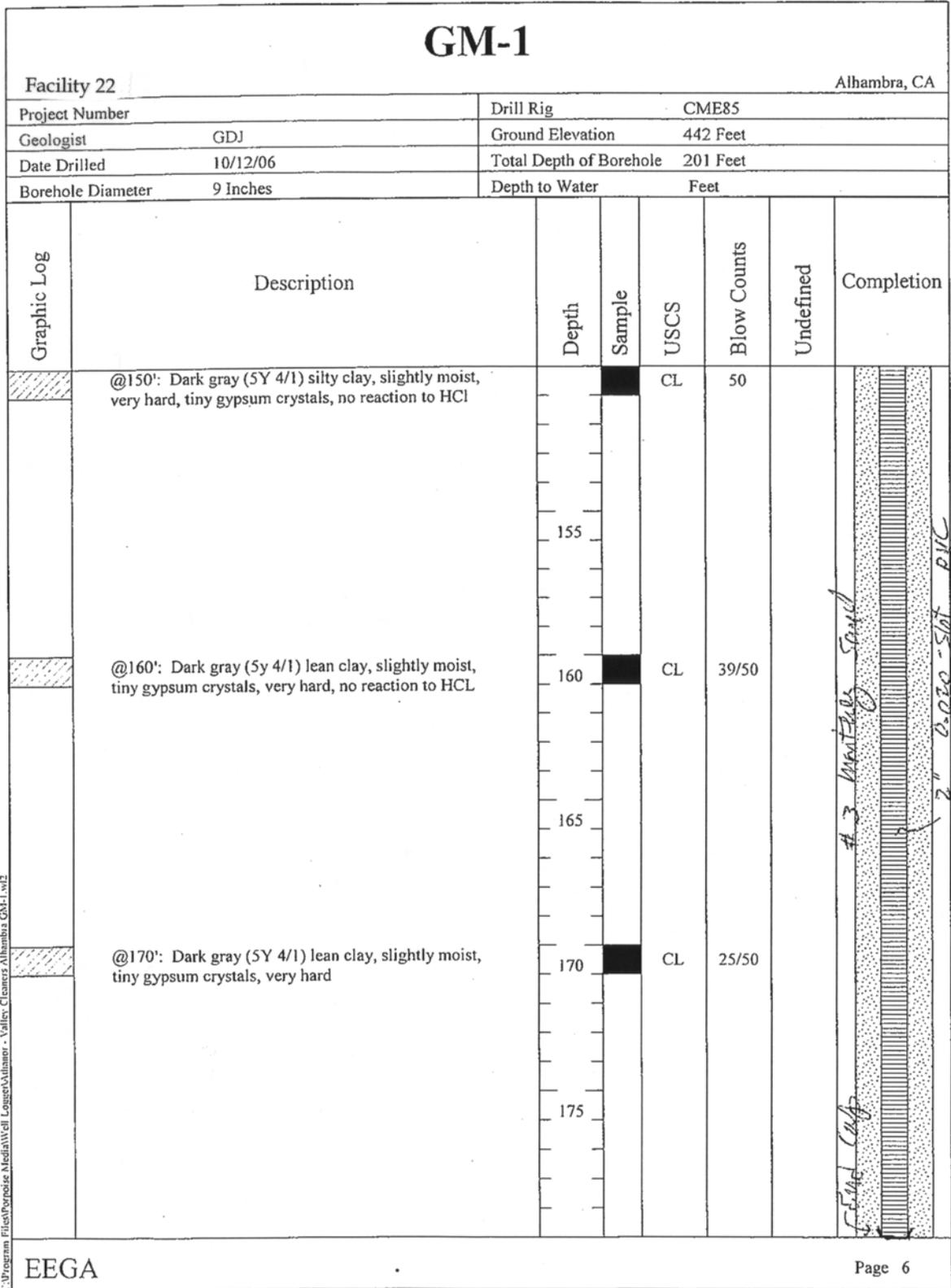


FIGURE 2-12c
 Facility 22 Boring Log
 Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3

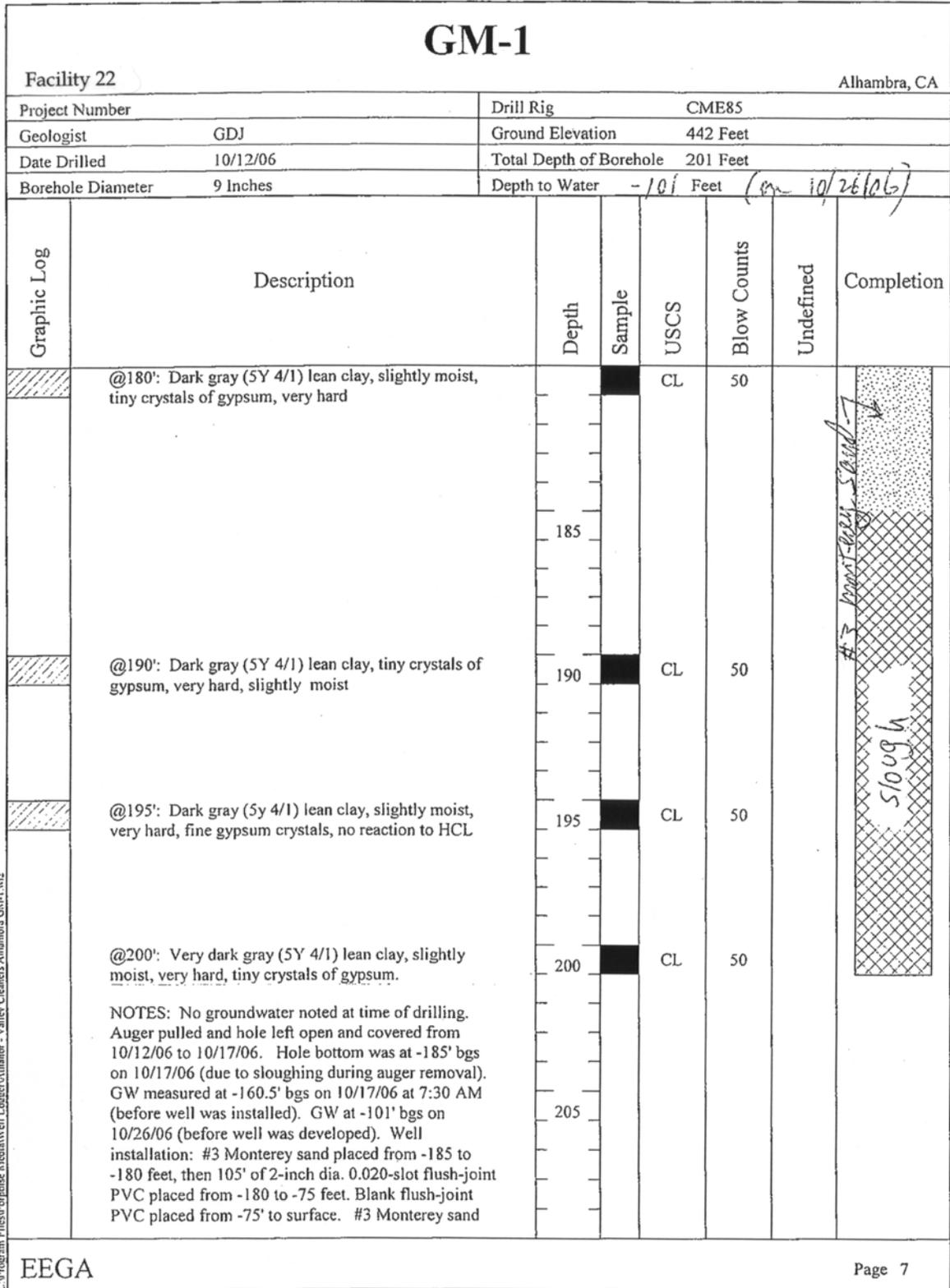


FIGURE 2-12c
Facility 22 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

GM-1								
Facility 22				Alhambra, CA				
Project Number			Drill Rig		CME85			
Geologist			Ground Elevation		442 Feet			
Date Drilled			Total Depth of Borehole		201 Feet			
Borehole Diameter			Depth to Water		Feet			
Graphic Log	Description		Depth	Sample	USCS	Blow Counts	Undefined	Completion
	<p>placed from -180' to -73'. Five feet of medium chips (Enviroplug) placed from -73-ft. to -68' and hydrated. Bentonite slurry placed from -68' to -1'. Traffic rated well cover set into concrete at ground surface. Well developed on 10/26/06 by Strongarm Environmental, Inc. See well completion sketch above.</p>		215					
			220					
			225					
			230					
			235					
EEGA								Page 8

C:\Program Files\Purpose Media\Well Logger\Alhambra - Valley Cleaners Alhambra GM-1.w2

FIGURE 2-12c
 Facility 22 Boring Log
*Recommendations for Conducting Soil Vapor Investigations
 San Gabriel Valley Area 3*

2.3.12 Facility 24

Table 2-23 presents a summary of the site history and the sampling data results for Facility 24.

TABLE 2-23
Facility 24 - Site Investigative Summary

Site History	Site Investigation		
	Soil Vapor Probes	Groundwater Wells	Remedial Actions
1996 to 2007 – Property located in shopping center has been used as a dry cleaner, since the shopping center was built. 2003 – Site inspected by LARWQCB. 2004 – Site investigation and oversight by LARWQCB.	Three probes installed inside the building to a maximum depth of 40 feet bgs. Three probes installed in alley to a depth of 40 feet, 100 feet, and 172 feet bgs. PCE concentrations ranged from 0.94 to 13 µg/L-v and TCE concentrations ranged from ND to 0.53 µg/L-v (Table 2-24).	None	None

Table 2-24 provides the soil vapor data used in the evaluation. Figure 2-13a shows the site layout. The maximum PCE concentration in soil vapor (13 µg/L-v) occurs in the deep interval at approximately 172 feet bgs. Figure 2-13b shows that the maximum PCE concentrations in soil vapor at this facility generally are within the deep interval. TCE was generally not detected at this facility. Figure 2-13c provides a representative boring log for the facility.

Table 2-24
Facility 24: PCE and TCE Soil Vapor Concentrations

Location	Date	Depth* (ft bgs)	PCE (µg/L-v)	TCE (µg/L-v)
SP-10	1/12/2006	20	3	ND
		40	2.7	ND
		60	2.1	ND
		80	2.9	ND
		100	2.7	ND
SP-12	2/7/2007	120	2.16	0.02
		140	7.01	0.02
		160	0.94	0.53
		172	13	0.02
SP-11	1/12/2006	15	5.4	ND
		15	5.5	ND
		30	4.5	ND
		40	4.4	ND

Shaded box with bold text indicates maximum concentration

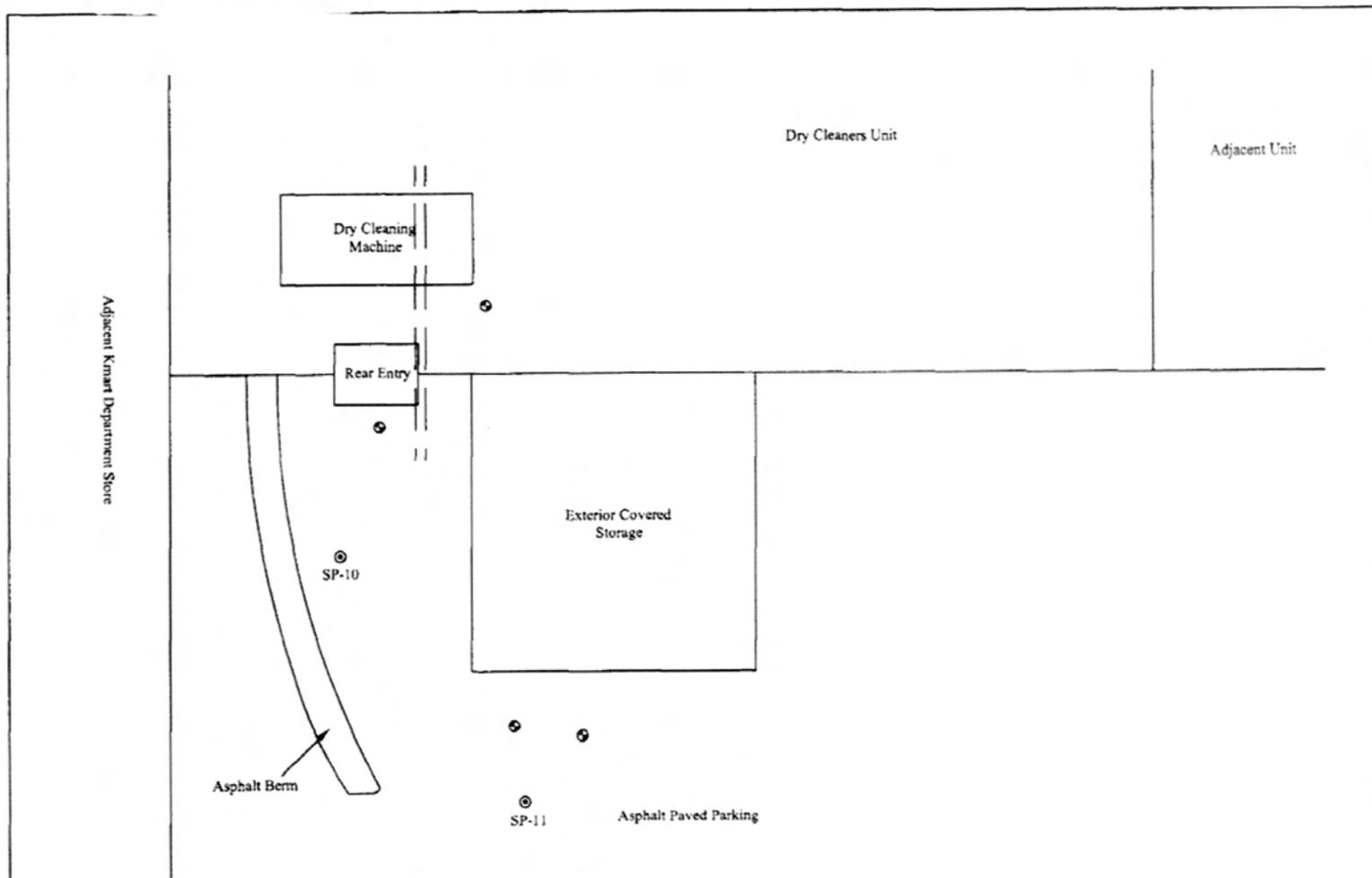
ft bgs = feet below ground surface

*Shallow interval of vadose zone = 0 to 40 ft bgs

Intermediate interval = 40 to 100 ft bgs

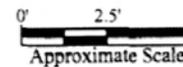
Deep interval = > 100 ft bgs

ND = not detected at a concentration greater than the laboratory reporting limit



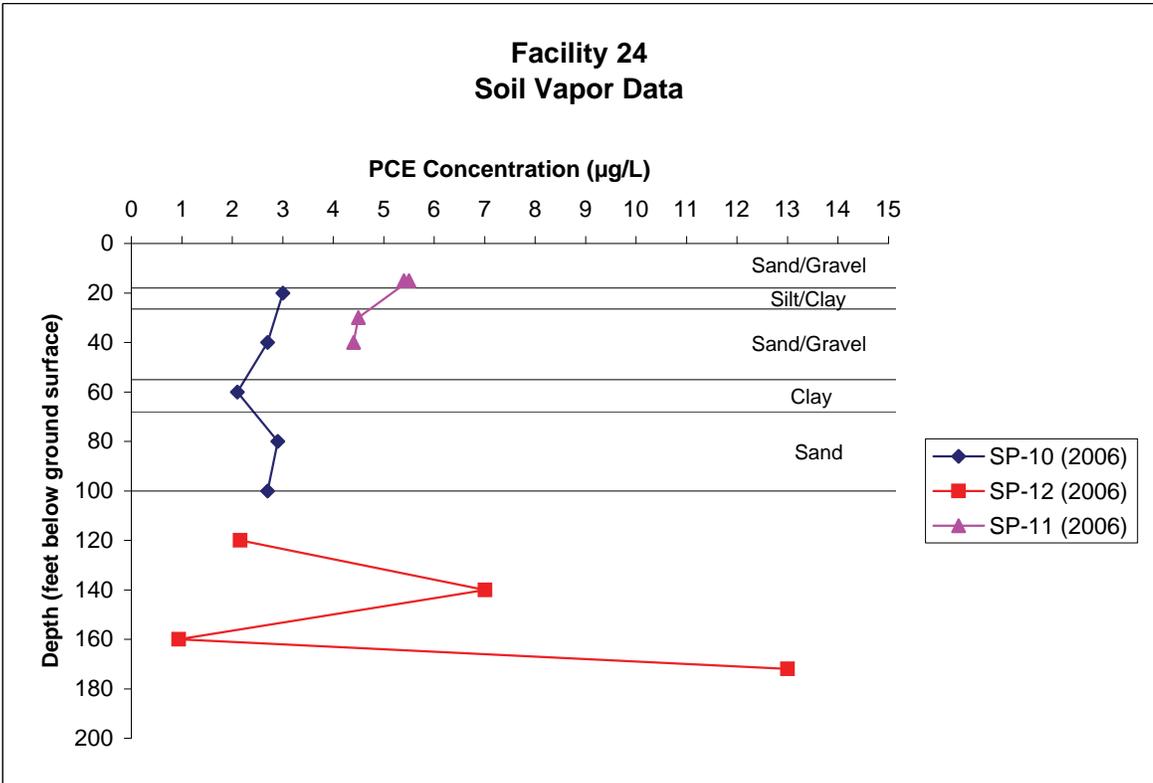
*SP-12 is not identified in the map

Legend:	
SP	- Proposed Vapor Probes
UPI	- Previous Soil Borings



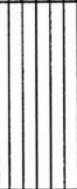
	Site Name:		SITE PLOT PLAN WITH PROBE LOCATIONS
	Prepared By: The Reynolds Group	Project No: 6782 Date: December 2005	

FIGURE 2-13a
 Facility 24 Site Map
 Recommendations for Conducting
 Soil Vapor Investigations
 San Gabriel Valley Area 3



Note: A groundwater well has not been installed at this facility yet.

FIGURE 2-13b
PCE Concentrations in Soil Vapor at Facility 24
*Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3*

Reynolds Group a California corporation Tustin, CA					LOG OF BORING SP-12 (Page 1 of 1)	
Facility 24					Date Started : 1/16/07	Drilling Contractor : J&H Drilling
Project # 6782					Time Started : 7:00 am	Drilling Equipment : HSA
See "Soil Vapor Probe Details" for Well Diagram					Date Finished : 1/16/07	Sampling Equipment : Split-Spoon Sampler
					Time Finished : 1:30 pm	Boring Length : 180
					Logged By : Danny Nunez	Depth to Water : N/A
Depth in Feet	Blow Count	USCS	GRAPHIC	Lab No.	DESCRIPTION	
115						
120	12 15 21	SM		SP12-120	silty SAND, 80% fine sand, 20% silts, dense, no odor, moist, light brown. note: lithology from 120' to 170' see boring log SP-10 for soil details less than 120'	
125						
130	17 34 36	ML			SILT, <10% fines, no plasticity or dry strength, hard, no odor, dry, brown.	
135						
140	13 28 39	SP		SP12-140	poorly graded SAND, fine to coarse grains, dry, no odor, brown.	
145						
150	13 23 29	SP			poorly graded SAND, fine to coarse grains, dry, no odor, brown.	
155						
160	50 for 6"	SP			poorly graded SAND, fine to coarse grains, no odor, dry, brown.	
165						
170	50 for 6"	SP		SP12-172	poorly graded SAND, fine to coarse grains, no odor, dry, brown.	
175						

02-27-2007 \\TRG\MAIN\nterserver\1\TRG Files\6782 ALLEN Temple City\Boring Logs\6782 SP-12.bor

FIGURE 2-13c
Facility 24 Boring Log
Recommendations for Conducting Soil Vapor Investigations
San Gabriel Valley Area 3

2.4 Uncertainty Analysis

This evaluation presents soil vapor data collected from the shallow, intermediate, and deep intervals of the vadose zone at 12 facilities in Area 3. EPA compiled the data set based on the availability of suitable, comparable data for the 12 facilities.

The data set is suitable for the evaluation described in this document; the evaluation is intentionally limited in scope and semi-quantitative. The data set also supports the specific technical recommendations developed as a result of this evaluation. However, the data set does include inherent uncertainties. The main sources of uncertainty in the data set include:

- Limited number of data points – In general, the data set for each facility includes few measurements (for the facility as a whole and the facility with respect to each of the three intervals of the vadose zone).
- Data collection over extended period - Data collection for each facility generally involved sampling soil vapor from multiple vapor probes over several field investigation efforts. Sampling at various probes may have spanned different months and years and at different times of the day. Variations in atmospheric conditions, soil moisture content, and sample collection and handling protocols during separate field investigation efforts potentially contribute to differences in soil vapor measurements.

EPA confirmed the suitability of all data used for comparison in this limited evaluation through the data usability assessment described in Section 2.2. The data usability assessment included verifying that the investigations directed by the State generally conformed to procedures outlined in State guidance documents; and the data met the specific requirements of the responsible agency at the time of data collection.

3.0 Conclusions and Recommendations

3.1 Conclusions

Data from 11 of the 12 facilities in Area 3 analyzed in this evaluation show that the maximum concentrations of either PCE, or TCE, or both in soil vapor occurred in the intermediate and deep intervals of the vadose zone. Table ES-1 summarizes the maximum concentrations of PCE and TCE in soil vapor measured throughout the vadose zone. The results of this evaluation indicate that investigating VOC concentrations in shallow soil vapor alone would have inadequately characterized subsurface contamination.

In Area 3, the presence of maximum VOC concentrations at depth may reflect the relative age of contaminant releases coupled with contaminant migration processes over time. Because industrial operations at many facilities date to the 1920s, the release and migration of solvents from shallow soils downward might have occurred over decades. Appendix A provides a brief summary of soil vapor migration mechanisms for reference. Assessing the mechanisms that drive soil vapor migration is beyond the scope of this evaluation.

3.2 Recommendations and Rationales

The conclusions of this evaluation provide a basis for potentially characterizing soil vapor in the intermediate and deep intervals of the vadose zone at all facilities in Area 3 with VOC contamination. Subsurface investigations at facilities in Area 3 should consider the recommendations provided below. Section 3.2 includes rationales for the recommendations. Appendix B provides a flowchart that depicts the subsurface investigative process of the LARWQCB.

- Assess soil vapor concentrations vertically beyond the shallow interval of the vadose zone to the groundwater table, if necessary. This evaluation shows that the maximum soil vapor concentrations at facilities in Area 3 frequently occur within the intermediate and deep intervals of the vadose zone rather than in the shallow interval.
- Place vapor monitoring probes at depth intervals (i.e., sample depths) in areas of known or suspected historic operations and based on current analytical data. Review excavation and grading records. Consider lithology per the State's guidance document (LARWQCB, 2003).
- Install nested vapor monitoring probes or, alternatively, install deep vapor monitoring probes near the existing shallow probes. Collect samples from all intervals in one event to minimize temporal variations related to temperature and seasonal changes. Such data will help determine the site conceptual model.
- Install multiple vapor monitoring probes, if necessary, for adequate lateral characterization of the contamination based on the number and size of potential releases of contamination.

-
- Evaluate the potential for soil vapor intrusion at facilities with: 1) VOC concentrations that exceed the screening levels in the shallow interval of the vadose zone; and 2) commercial or industrial buildings or residences located nearby. Refer to the flowchart and check list in Appendix B for guidance in initiating assessments of potential soil vapor intrusion.

4.0 References

California Regional Water Quality Control Board, Los Angeles Region (LARWQCB). 1997. *Interim Guidance for Active Soil Gas Investigation*. February 25.

LARWQCB and California Department of Toxic Substances Control (DTSC). 2003. *Advisory – Active Soil Gas Investigations*. January 28.

Appendix A
Soil Vapor Migration Mechanisms

Acronyms and Abbreviations

atm-m ³ /mol	atmospheres-cubic meters per mole
DNAPL	dense nonaqueous-phase liquid
g/cm ³	grams per cubic centimeter
g/L	grams per liter
K _{OC}	Organic Carbon Partition Coefficient
LARWQCB	California Regional Water Quality Control Board-Los Angeles Region
µg/L	microgram(s) per liter
µg/L-v	microgram(s) per liter by volume
mm Hg	millimeters of mercury
PCE	tetrachloroethene
TCE	trichloroethene
VOC	volatile organic compound

Glossary

Advection: The process by which particles are transported by the bulk motion of the flowing groundwater.

Aquifer: A saturated geologic unit, often of sand or gravel that contains and transmits significant quantities of water under normal conditions.

Aquitard: A saturated finer-grained geologic unit that retards, but does not prevent, flow to or from adjacent aquifer units.

Atmospheric pressure: The force per unit area exerted against a surface by the weight of the air above that surface.

Barometric pumping: The variation in the ambient atmospheric pressure resulting in subsurface motion of air in porous and fractured earth materials.

Dense nonaqueous-phase liquid: A liquid that is denser than water and does not dissolve or mix easily in water. Also known as free-phase liquid.

Density: The mass per unit volume of a substance. The density of a chemical determines if the chemical will float or sink in water. Chemicals that are less dense than water tend to float, and chemicals that are denser tend to sink.

Diffusion: The movement of suspended or dissolved particles from a more concentrated to a less concentrated area. The diffusion process occurs independently of groundwater flow.

Dispersion: Process whereby a chemical, contained in water, deviates from the path that would be expected due to bulk flow. In the process the chemical is mixed with surrounding liquids, causing its concentration to be reduced.

Groundwater: Water occurring underground, in the zone of saturation in an aquifer.

Henry's Law: The law states that at a constant temperature, the amount of a given gas dissolved in a given type and volume of liquid is directly proportional to the partial pressure of that gas in equilibrium with that liquid.

Permeability: The ability of soil, sediment, or rock to transmit fluid.

Porosity: The ratio of the volume of void spaces in a rock or sediment to the total volume of the rock or sediment.

Saturated zone: A region below the Earth's surface in which pore space in the soil or rock is completely filled with water. The top of the saturated zone is the water table.

Secondary porosity: Any porosity created in a sediment or rock after final deposition of the sediment or rock.

Soil vapor: Elements and compounds in gaseous state in the small spaces between particles of soil. Such vapor can be moved or driven out under pressure.

Solubility: The ability of a substance to be dissolved in a given amount of water.

Tetrachloroethene: A volatile organic compound primarily used for dry cleaning and in manufacturing processes as a solvent and metal degreaser.

Trichloroethene: A colorless or blue organic liquid volatile organic compound with a chloroform-like odor. TCE is used primarily in manufacturing processes as a solvent, metal degreaser, and textile degreaser.

Vadose zone: The unsaturated zone between the land surface and the regional water table.

Vapor pressure: A measure of the natural inclination of a substance to evaporate. The relative measure of the volatility of a chemical.

Viscosity: A measure of the resistance of a fluid to flow.

Volatile organic compound: Organic (carbon-containing) compound that evaporates readily at room temperature. These compounds are toxic and often carcinogenic.

Weathering: Decomposition of rocks, soils, and their minerals through direct contact with the Earth's atmosphere.

A. Soil Vapor Migration Mechanisms

This appendix discusses the fate and transport processes that affect the migration of *tetrachloroethene* (PCE) and *trichloroethene* (TCE) in *soil vapor* within the subsurface. Table A-1 summarizes the physical and chemical properties of PCE and TCE and the factors that govern fate and transport processes.

As discussed in Section 1.1, contaminant releases tend to occur at the surface or in the shallow subsurface. The concentrations of volatile organic compounds (VOCs) from a recent release often are highest in the shallow interval of the *vadose zone*. However, over time, several factors can cause the contaminants to move into the intermediate and deep intervals of the vadose zone. These factors include the physical and chemical properties of the contaminant and the subsurface conditions. VOC concentrations in the deeper intervals eventually may exceed the relative VOC concentrations in the shallow interval.

Additional factors may also contribute to maximum soil vapor concentrations at depth than in the shallow interval. These factors include: 1) disposal of wastewater and solvents in dry wells, which was a common practice that occurred before 1984 and can result in releases of contaminants at depth; 2) excavation of shallow soils and backfilling with clean material; and 3) venting of vapors in shallow soils to the atmosphere through *barometric pumping*, changing contaminant levels over time.

Most of the properties and processes described below may more directly apply to PCE and TCE in the form of *free-phase liquid* or as *dense nonaqueous phase liquid* (DNAPL). However, DNAPL has not been found in Area 3. DNAPL might have been present decades ago at the time of release and possibly migrated downward and dispersed over time. DNAPL migration would have acted as a source for vapor-phase contamination and contributed to the current vertical contaminant distribution.

TABLE A-1
Properties of PCE and TCE

Property	PCE			TCE		
	Value	Reference	Effect	Value	Reference	Effect
Density at 20°C (Water = 1)	1.623 g/cm ³	ATSDR, 2007a	More dense than water, can act as an dense nonaqueous phase liquid (DNAPL)	1.465 g/cm ³	ATSDR, 2007b	Denser than water, can act as DNAPL
Vapor Pressure at 25°C	18.47 mm Hg	EPA, 1997	Relatively insoluble, but up to 954 mg/L have been found in groundwater	57.8 mm Hg	ATSDR, 2007b	High vapor pressure, highly volatile, evaporates readily, but vapor is heavier than air
Relative Vapor Density (Air = 1)	5.8	ATSDR, 2007a	Very dense vapor – sinks in air	4.5	ATSDR, 2007b	Very dense vapor – sinks in air
Henry's Law Constant at 25°C	0.018 atm-m ³ /mol	EPA, 2007a	Highly volatile – readily evaporates from water	0.01 atm-m ³ /mol	EPA, 2007a	Highly volatile – readily evaporates from water
Solubility at 25°C	0.15 g/L	EPA, 1997	Slightly soluble in water	1.1- 1.4 g/L	EPA, 2007b	Slightly soluble in water
Organic Carbon Partition Coefficient (log K _{oc})	2.32	EPA, 1996	Moderate mobility in soil, does not significantly sorb to sediment, does not readily volatilize from soil, slowly leaches to groundwater	2	EPA, 1996	Very highly mobile in soil, low sorption to sediment, high potential to leach in to groundwater

Notes:

g/cm³ = grams per cubic centimeters

mm Hg = millimeters of mercury

g/L = grams per liter

Atm-m³/mol = atmospheres-cubic meters per mole

A.1 Contaminant Migration from a Surface Source

Three main mechanisms control PCE and TCE migration within the subsurface following a release: *free-phase DNAPL* migration, infiltration of water containing dissolved contaminants, and migration of vapor-phase contamination. The contaminant vapors, DNAPL, and contaminated *pore water* move simultaneously through the soil.

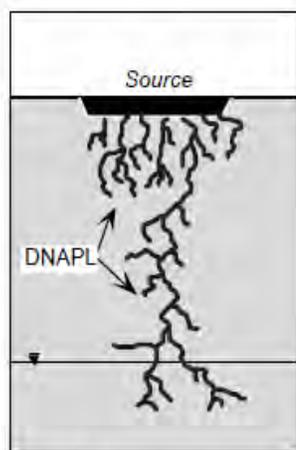
A.1.1 Free-Phase DNAPL Migration

DNAPL released to the subsurface tends to migrate downward until large changes in permeability within the unsaturated or *saturated zone*, and to spread laterally along the “path of least resistance” (ITRC, 2003).

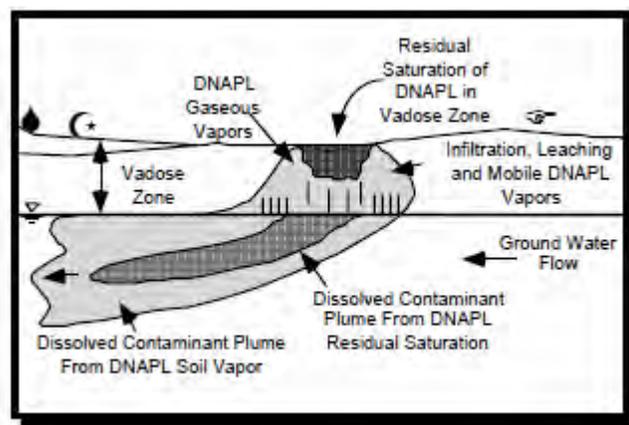
Residual DNAPL may remain in available pore space and may contribute to ongoing vapor phase contamination. A typical porous medium, such as silt, sand, or gravel, typically will retain DNAPL in amounts that range between 5 and 20 percent of the pore space. DNAPL that remains on layers of low permeability strata may begin to vaporize into the gaseous phase and migrate by *diffusion* away from the source (Kueper, et al., 2003). Section A.1.3 discusses the migration of vapor-phase contamination.

High *density* and low *viscosity* make PCE and TCE very mobile in the vadose zone and likely to readily flow through soil pores and channels. At many sites, DNAPL will migrate preferentially through *secondary porosity* features in the soil/*aquifer* matrix rather than saturate the open pore volume of a porous media (Newell and Conner, 1992). Fractures related to clay *weathering* can extend through existing *aquitards* and facilitate DNAPL transport deep into the subsurface.

Figure A-1 illustrates the features of secondary porosity that permit DNAPL to penetrate deeper into the subsurface (Newell and Conner, 1992). Even small releases of DNAPL chemicals can penetrate tens to hundreds of feet through the vadose zone before reaching the water table (Newell and Conner, 1992).



DNAPL Migration Through Secondary Porosity Features (Fractures, rootholes, etc.)



Source: Newell and Connor, 1992

Figure A-1 DNAPL Migration

A.1.2 Infiltration of Water Containing Dissolved Contaminants

Infiltrated water dissolves PCE and TCE present in the subsurface at source areas and migrates downward. Depending on the infiltration rate, depth to groundwater, and soil characteristics, the travel time for contamination reaching the water table can vary from days to decades.

Water can infiltrate from leaking underground pipes, unlined discharge or drainage structures, irrigation or rain within the area. Disposal of fluids, process water or irrigation water could enhance or induce the infiltration of PCE and TCE into the soil and possibly to the water table.

A.1.3 Migration of Vapor-Phase Contamination

The processes that control migration of vapor phase contamination include *advection*, *dispersion*, *diffusion*, and density-flow. The discussion below describes each process.

A.1.3.1 Advection

Advective transport carries the contaminants with moving vapor. Significant advection can occur in soil vapor near the ground surface where air flows into and out of the subsurface. Advective transport of soil vapor also occurs near buildings, of which heating, ventilation, and air-conditioning systems can create subsurface pressure gradients (Hartman, 1998).

A.1.3.2 Dispersion

Dispersion of a compound moving through a porous medium results in the spreading and mixing of the compound. Dispersion depends on the velocity of the fluid and also on the scale of the transport (Zheng and Bennet, 1995).

A.1.3.3 Diffusion

Diffusion is the primary transport mechanism for contaminants in vapor phase through the deep interval of vadose zone. Diffusion is contaminant movement by molecular processes that arise from the random movement of particles suspended in a fluid. Under most environmental conditions, molecular diffusion in natural systems proceeds from locations of higher concentration towards locations of lower concentrations (Hartman, 1998).

A.1.3.4 Density

As DNAPLs volatilize, the density of the soil vapor increases. The resulting density-driven flow will be in a downward direction (Tillman and Weaver, 2005).

A.2 Contaminant Migration from a Groundwater Source

This section describes mechanisms by which groundwater contaminants may impact the unsaturated zone in the vapor phase. Dissolved PCE and TCE in groundwater can enter the vadose zone in the vapor phase.

A.2.1 Direct Partitioning from Groundwater to Soil Vapor

Henry's Law predicts the partitioning of a contaminant between the aqueous phase and the vapor phase. Compounds with high Henry's constants (and high vapor pressures) like PCE and TCE will readily volatilize from groundwater and readily partition to the vapor phase from aqueous phase.

A.2.2 Residual Groundwater Contaminants

Groundwater contaminants may also enter the vadose zone via the exposure of adsorbed contaminants due to water table fluctuations. As the water table declines, soil containing adsorbed contaminants and contaminants is now located in the unsaturated zone. The residual adsorbed contaminants may then partition to soil vapor and migrate within the vadose zone by diffusion and advection. Diffusion generally is the primary vapor transport mechanism because *atmospheric pressure* changes attenuate with depth and induce very little or no air flow in the deep interval of the vadose zone.

A.3 References

- Agency for Toxic Substances and Disease Registry (ATSDR). 2007a. *Medical Management Guidelines for Tetrachloroethylene*. U.S. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. <http://www.atsdr.cdc.gov/MHMI/mmg18.html>
- ATSDR. 2007b. *Medical Management Guidelines for Trichloroethylene*. U.S. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. <http://www.atsdr.cdc.gov/MHMI/mmg19.html>
- Hartman, Blayne, 1998. *The Downward Migration of Vapors*, LUSTLine Bulletin 28 February.
- Interstate Technology and Regulatory Cooperation (ITRC). 2003. *Dense Non-Aqueous Phase Liquid Team. An Introduction to Characterizing Sites Contaminated with DNAPLs*. September.
- Kueper, B.H., Wealthhall, Dr. G.P., Smith, J.W.N, Leharne, S.A., Lerner, D.N. 2003. *An Illustrated Handbook of DNAPL Transport and Fate in the Subsurface*, Prepared by Environmental Agency-U.K, June.
- Newell, Charles J. and Connor, John A., 1992. *Detection and Delineation of Subsurface DNAPL Distribution*, Groundwater Services, Inc., Houston, Texas.
- Tillman, Fred D and Weaver, James W., 2005. *Review of Recent Research on Vapor Intrusion*, EPA/600/R-05/106, September.
- U.S. Environmental Protection Agency (EPA). 2007a. *Estimated Henry's Law Constants*. July. <http://www.epa.gov/athens/learn2model/part-two/onsite/esthenry.htm>
- EPA. 2007b. *Superfund Chemical Data Matrix*. July. <http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm>
- EPA. 1997. *The Parameter Guidance Document. A Companion Document to the Methodology for Assessing Health Risks Associated with Multiple Pathways Exposure to Combustor Emissions (Internal Draft)*. NCEA-0238. National Center for Environmental Assessment, Cincinnati, OH. March.
- EPA. 1996. *Soil Screening Guidance: Technical Background Document and User's Guide*. Office of Solid Waste and Emergency Response. Washington, D.C. EPA/540/R-95/128. May.
- Zheng, C. and G. C. Bennett. 1995. *Applied Contaminant Transport Modeling*. Van Nostrand Reinhold, A Division of International Thompson Publishing Inc., New York, 440 pp.



Appendix B
California Regional Water Quality Control Board, Los Angeles
Region Investigative Process Flowchart

Facility Site Investigation Checklist
Regional Water Quality Control Board – Los Angeles Region
San Gabriel Valley Superfund Site Area 3

- Submit Chemical Use Questionnaire (CUQ)**
(Phase I Environmental Site Assessment and Material Safety Data Sheets [MSDS] may be requested, if available.)
- Submit AB 681 Form**
- LARWQCB Perform Site Inspection**
- Perform Preliminary Site Investigation¹**
(Consists of shallow soil/soil vapor sampling. May include sampling for emergent compounds.)
- Characterize Contamination in Soil/Soil Vapor¹**
(Includes characterization of the vertical and lateral extent of contamination. May be an iterative process.)
- Characterize Contamination in Groundwater¹**
(Includes installation of a minimum of one on-site groundwater monitoring well. May include installation of off-site and/or upgradient groundwater monitoring wells. May include long-term groundwater monitoring.)
- Assess Potential Vapor Intrusion¹**
(Applies where shallow soil vapor concentrations exceed screening levels beneath or near occupied structures. May include modeling and/or direct measurement of indoor air concentrations, and preparation of a human health risk assessment.)
- Submit Corrective Action Plan**
(May apply to any medium in which concentrations exceed screening levels or cleanup goals. May require separate documents for separate media.)
- Implement Approved Corrective Action/ Remedial Action¹**
(May require confirmation sampling. May include long-term groundwater or indoor air monitoring component following remedial action.)
- Deed Restriction/Environmental Covenant Needed?**
(Institutional controls such as a deed restriction or environmental covenant may be required to achieve regulatory closure where residual contamination is present.)
- Submit Closure Package for Evaluation**
(Closure package includes all relevant information required by the LARWQCB.)
- Closure**

Notes:

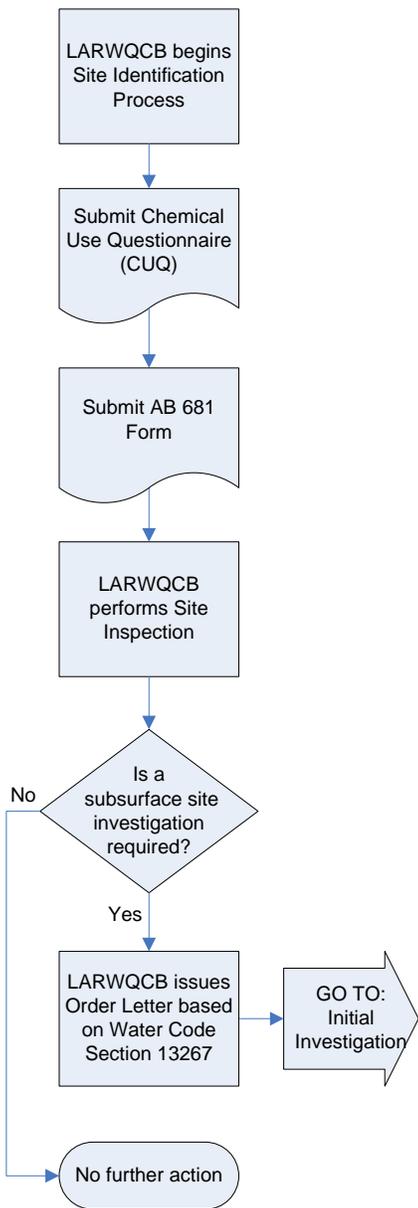
-Not all actions listed may be required.

-Order of requirements may vary

1. This activity requires Regional Board approved WP(s) and investigation report(s).

LARWQCB Area 3 Site Investigation Process – Page 1 – Site Identification and Initial Investigation

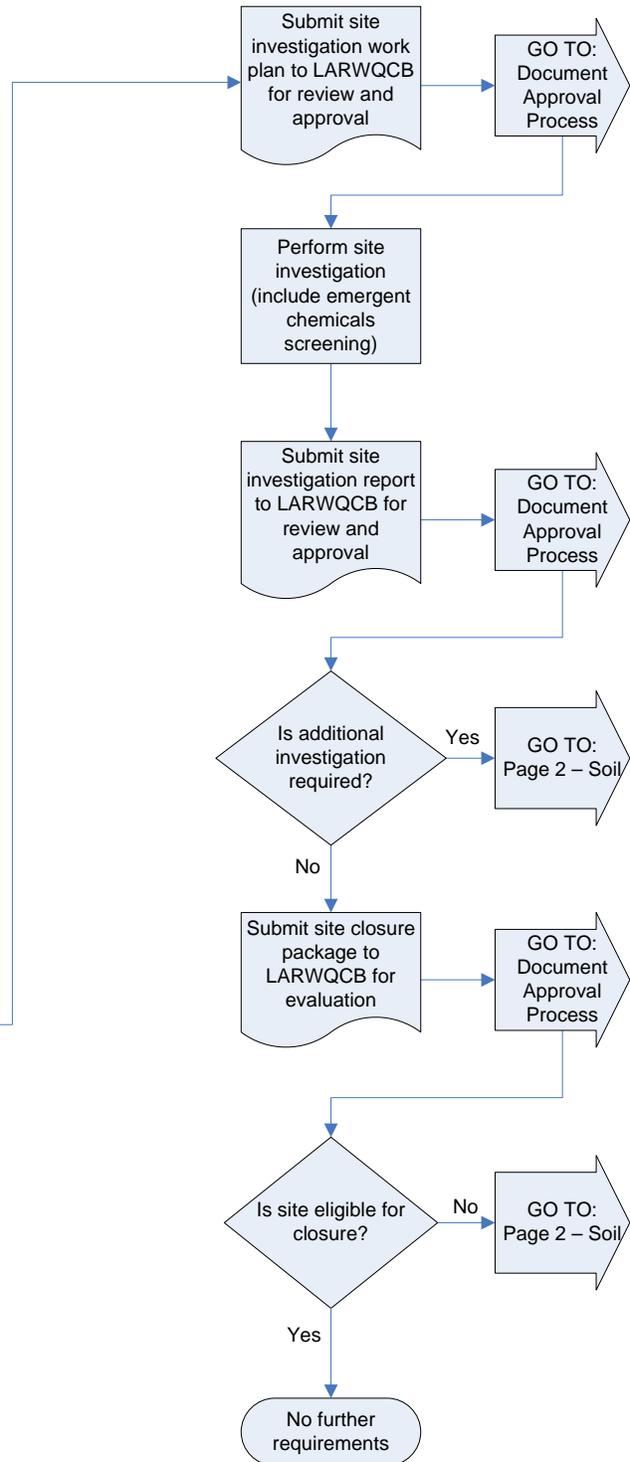
Site Identification

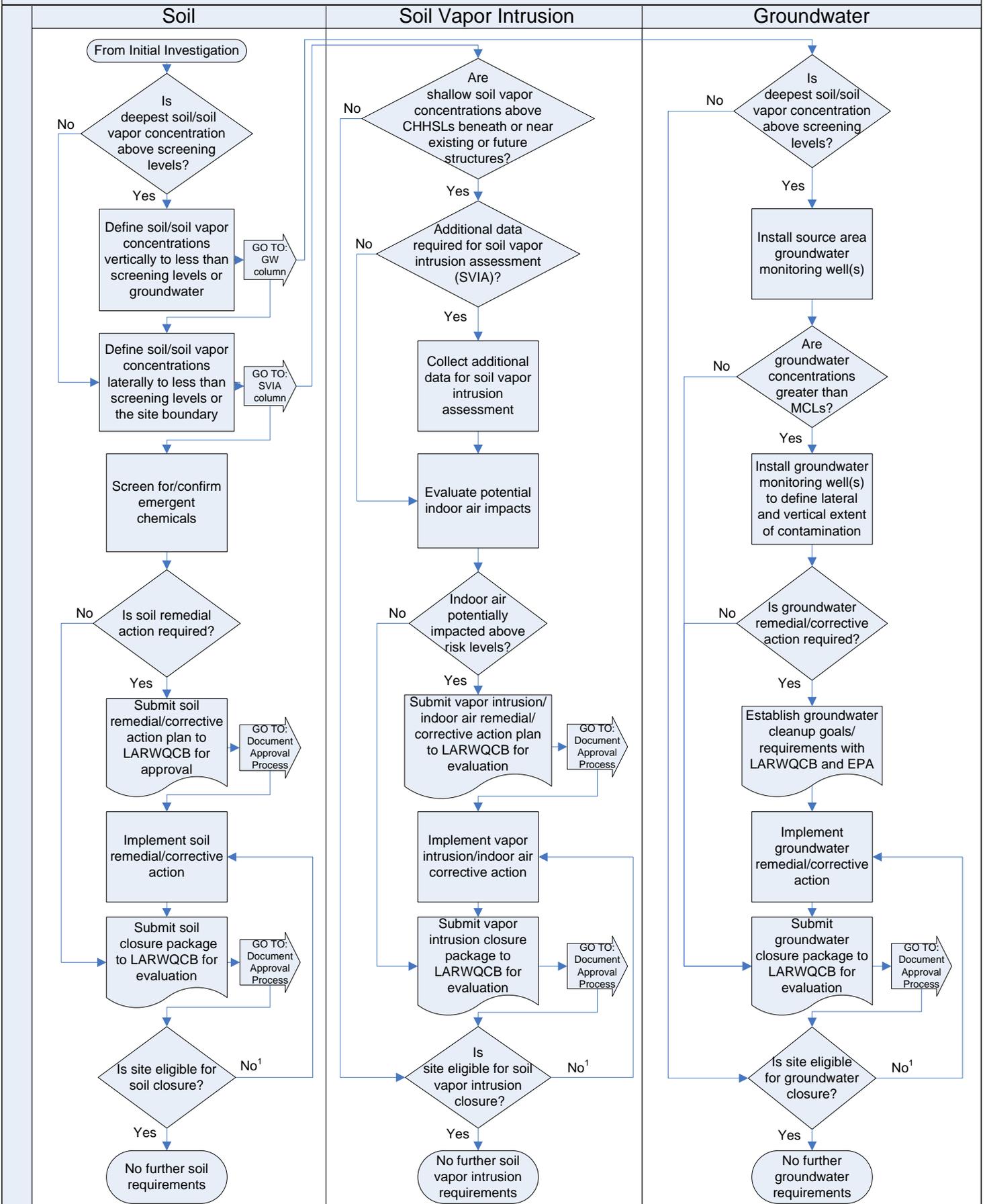


LEGEND

-  Action Step
-  Decision Step
-  Document Step
-  End Point

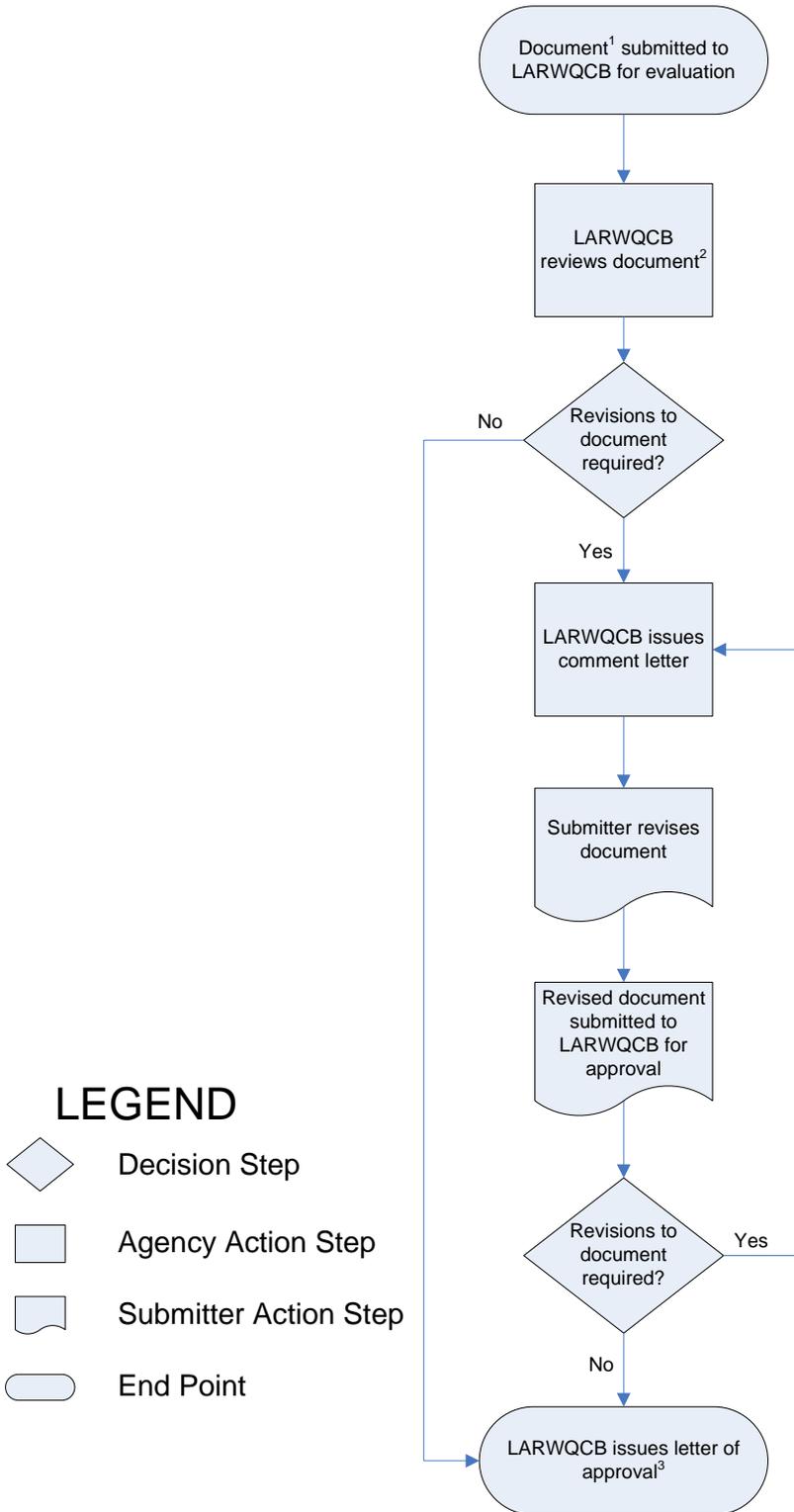
Initial Investigation





Note 1 = Additional corrective action may require submittal and LARWQCB approval of an additional corrective action plan document.

Document Review/Approval



LEGEND

-  Decision Step
-  Agency Action Step
-  Submitter Action Step
-  End Point

Notes:

1 = A document may be a workplan, an investigation report, a corrective action plan, a closure package, or any other technical document ordered by the LARWQCB.

2 = A review period of 30 – 60 days should be expected when submitting a document to the LARWQCB.

3 = A letter of approval is generally issued only for a plan document. Approval may be in the form of a “conditional approval”, in which the LARWQCB approves the plan with the condition that certain technical adjustments be made in implementation.