

**Shell Oil Products US**

March 10, 2003

eva chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Alameda County
MAR 14 2003
Environmental Health

Subject: Shell-branded Service Station
1784 150th Avenue
San Leandro, California

Dear Ms. chu:

Attached for your review and comment is a copy of the *Soil and Water Investigation Work Plan and Well Screen Interval Evaluation* for the above referenced site. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

As always, please feel free to contact me directly at (559) 645-9306 with any questions or concerns.

Sincerely,

Shell Oil Products US

A handwritten signature in cursive script that reads "Karen Petryna".

Karen Petryna
Sr. Environmental Engineer

Ms. eva chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Soil and Water Investigation Work Plan and Well Screen Interval Evaluation**
Shell-branded Service Station
1784 150th Avenue
San Leandro, California
Incident #: 98996068
Project #: 245-0612-007



Dear Ms. chu:

Cambria Environmental Technology, Inc. (Cambria) is submitting this *Soil and Water Investigation Work Plan and Well Screen Interval Evaluation* (SWI) on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell). The objective of this investigation is to define the extent of the methyl tertiary butyl ether (MTBE) and hydrocarbon plume offsite to the west and northwest of the site. As recommended in the Alameda County Health Care Services Agency (ACHCSA) December 19, 2002 letter, this SWI will be conducted in two phases, using push-tool technology to advance temporary sampling points, followed by installing permanent monitoring wells. As requested in the ACHCSA letter, this SWI also includes an evaluation of the screened intervals for onsite and offsite monitoring wells. The site background and proposed scope of work for this investigation are presented below.

SITE BACKGROUND

Site Location: The site is an operating Shell service station located at the southern corner of 150th and Freedom Avenues in San Leandro, California (Figure 1).

Local Topography: The base of the San Leandro hills is approximately 0.25 miles to the northeast. The site is about 50 feet above mean sea level, and the local topography slopes westward toward San Francisco Bay, about 6 miles to the west.

Surroundings: The site is surrounded by mixed commercial and residential development.

**Cambria
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Local Geology: Sediments beneath the site are Quaternary alluvial deposits derived from sedimentary and igneous rocks of the Diablo Range. The site is intersected by the Hayward Fault Zone. The site is underlain by low estimated permeability sediments (clay) with interspersed moderate estimated permeability sediments. During recent investigations at the site, soil consisted of silty clay, clayey silts and clayey sandy silts interlayered with sands and gravels to the total explored depth of 26.5 feet below grade (fbg).

Groundwater: Local drinking water is supplied by a utility, not by groundwater. An area well survey in 1992 identified 21 wells within ½ mile of the site. No wells were identified immediately downgradient of the site. Groundwater depths have ranged between 17 and 30 fbg onsite and between approximately 4 and 15 fbg in offsite wells. Water level measurements have not shown a consistent or reliable groundwater flow direction. In December 2002, depth to groundwater measurements ranged from approximately 11 to 22 fbg.

Previous Investigations


1986 Waste Oil Tank Removal: According to an October 13, 1989 letter from Weiss Associates (WA) to Shell, Petroleum Engineering of Santa Rosa, California, removed a 550-gallon waste oil tank from the site in November 1986. Immediately following the tank removal, Blaine Tech Services (Blaine) of San Jose, California collected soil samples beneath the former tank at 8-foot and 11-foot depths. The soil samples contained petroleum oil and grease at 196 and 167 parts per million (ppm), respectively. The tank pit was overexcavated to a total depth of 16 feet, but soil samples were not collected. Groundwater was not encountered in the tank excavation. A new 550-gallon fiberglass waste oil tank was installed in the same location.

1990 Well Installation: In March 1990, WA advanced soil boring BH-A and converted it to groundwater monitoring well MW-1 adjacent to the waste oil tank. In a soil sample collected from 29 fbg, 35 ppm total petroleum hydrocarbons as gasoline (TPHg) and 0.23 ppm benzene were detected. Historical soil analytical results are summarized on Table 1.

1992 Well Installations: In February 1992, WA installed soil borings BH-B and BH-C and converted them to monitoring wells MW-2 and MW-3, respectively. A soil sample collected near the water table from the boring BH-B contained 79 ppm TPHg. Up to 68 parts per billion (ppb) TPHg were detected in soil from boring BH-C, located over 100 feet upgradient of the tanks.

1994 Subsurface Investigation: In 1994, WA drilled six soil borings (BH-1 through BH-6) onsite and offsite (Figure 2). No hydrocarbons were detected in soil samples from any borings, except for 0.013 ppm benzene in boring BH-3 at 16 fbg. Also, no hydrocarbons were detected in groundwater samples from borings BH-1, BH-4, BH-5 and BH-6. Groundwater from borings BH-2 and BH-3 contained over 5,000 ppb TPHg.

1995 Well Installation: In February and March 1995, WA drilled four soil borings (BH-7 through BH-10) and converted BH-10 to monitoring well MW-4. No petroleum hydrocarbons were detected in any of the soil samples. Up to 100 ppb TPHg and 1.0 ppb benzene were detected in grab groundwater samples from BH-7 and BH-9. No TPHg or benzene was detected in the grab groundwater sample from MW-4. Groundwater was not encountered in soil boring BH-8.



1996 Soil Vapor Survey and Soil Sampling: In July 1996, WA conducted a subsurface investigation to obtain site-specific data for a risk-based corrective action (RBCA) evaluation of the site. Soil vapor and soil samples were collected from the vadose zone at 10 onsite and offsite locations (SVS-1 through SVS-10). The highest soil vapor hydrocarbon concentrations were detected near the northwest corner of the underground storage tank (UST) complex (SVS-5 at 3.0 ft bgs contained 7,600 parts per billion by volume [ppbv] benzene). No TPHg, benzene, toluene, ethylbenzene, and xylenes (BTEX), or MTBE was detected in any of the soil samples except for 1.1 ppm TPHg detected in sample SVS-5 at 18-20 fbg. WA concluded that depleted oxygen concentrations and elevated carbon dioxide and methane concentrations in the vadose zone indicated biodegradation was occurring.

1997 RBCA Evaluation: In 1997, WA prepared a RBCA evaluation for the site. Results of the RBCA analysis indicated that concentrations of BTEX, MTBE, 1,2-dichloroethane, and tetrachloroethene detected in soil and groundwater beneath the site did not exceed a target risk level of 10^{-5} for residential indoor or outdoor air exposure pathways. However, an exceeded risk threshold was identified associated with ingestion of groundwater from a hypothetical well 25 feet downgradient of the source. WA recommended preparation of a corrective action plan to address this potential risk.

1997 Dispenser and Turbine Sump Upgrade: The dispensers and turbine sumps at the station were upgraded in December 1997. Cambria collected soil samples Disp-A through Disp-D from beneath the dispenser islands during upgrade activities. Up to 590 ppm TPHg (Disp-C at 4.5 feet bgs), 1.8 ppm benzene (Disp-C at 2.0 feet bgs) and 1.4 ppm MTBE (Disp-C at 2.0 feet bgs) were detected.

1998 Soil Vapor Survey and Soil Sampling: In November 1998, Cambria conducted a subsurface investigation to obtain site-specific data for a RBCA evaluation of the site. Soil samples, soil vapor samples and grab groundwater samples were collected from the vadose zone at three onsite and three offsite locations (SVS-11 through SVS-16). In soil vapor, maximum concentrations of 2.7 ppmv TPHg (C5+ hydrocarbons) and 0.17 ppmv TPHg (C2-C4 hydrocarbons) were detected in borings SVS-14 and SVS-15, respectively, at 10 fbg. A maximum concentration 0.0099 ppmv benzene was detected in SVS-16 at 5 fbg. In soil, 1.6 ppm TPHg and 0.005 ppm benzene were detected in boring SVS-11 at 19.5 fbg. No TPHg or

benzene was detected in any other soil samples. MTBE was detected at 0.029 ppm in boring SVS-14 at 19 fbg using EPA Method 8020; however, MTBE was not detected in this sample by EPA Method 8260. In groundwater, maximum concentrations of 130,000 ppb TPHg, 18,000 ppb benzene, and 1,500 ppb MTBE were detected in boring SVS-11.

1999 RBCA Evaluation: In September 1999, Cambria prepared a RBCA evaluation for the site. Cambria analyzed the following potential exposure pathways: offsite ingestion of groundwater, onsite ingestion of surficial soil, volatilization of benzene from soil or groundwater into onsite or offsite indoor air, and migration of benzene soil vapor to onsite or offsite outdoor air. Results of Tier 1 and Tier 2 RBCA analysis indicated that contaminants within soil and groundwater do not present significant health risks.




October 2001 Offsite Monitoring Well Installation: In October 2001, two monitoring wells (MW-5, MW-6) were installed in a private driveway southwest of the site. Soil sample results collected during this investigation indicate only minimal MTBE impact to offsite soil southwest of the site. This finding is corroborated by Cambria's 1998 subsurface investigation, in which no TPHg or benzene and only low MTBE concentrations were detected in soil from three borings (SVS-14 through 16) along the private driveway. No MTBE or benzene was detected in groundwater from either of the new wells; however, TPHg, ethylbenzene and xylene were detected in groundwater from well MW-5 at concentrations of 190 ppb, 0.85 ppb, and 1.5 ppb, respectively.

October 2002 Offsite Monitoring Well Installation: In October 2002, two monitoring wells (MW-7, MW-8) and one soil boring (SB-9) were installed offsite to the west of the site on 150th Avenue. No MTBE was detected in any of the soil or grab groundwater samples collected. However, TPHg and BTEX compounds were detected in grab groundwater samples from each of the borings, with maximums of 2,200 ppb benzene and 83,000 ppb TPHg from SB-9 and MW-8, respectively.

Groundwater Monitoring: Groundwater has been sampled quarterly since March 1990. Groundwater samples from MW-2 have contained the highest TPHg and benzene concentrations, up to 160,000 and 36,000 ppb, respectively. Hydrocarbons have also been detected in water from onsite wells MW-1 and MW-3 and from offsite well MW-5. However, no hydrocarbons have been detected in water from offsite well MW-4 or MW-6. The groundwater gradient is typically flat and fluctuates between west-northwest and south-southeast. Based on the groundwater elevation contours since the first quarter of 2000, the average groundwater gradient is approximately 0.0028 ft/ft.

Well Screen Interval Evaluation

As recommended in the December 19, 2003 ACHCSA letter, Cambria has evaluated long-screened wells in critical areas to determine whether the existing screened interval is suitable for monitoring the status of the fuel release at the site. Wells were evaluated based on well location, whether the screened interval is submerged, and the screen length. Well construction details are summarized in Table 2.



Well MW-1, located adjacent to and downgradient of the waste oil tank, is screened from 30 to 45 fbg. The well was constructed in clayey sandy silt with low to very low hydraulic conductivity. The maximum depth to water observed in this well is 27.96 fbg; therefore, the screen is submerged at all times. The minimum depth to water in this well is 18.25 fbg. No significant hydrocarbon impact to soil was observed during well installation; therefore, it is unlikely that separate phase hydrocarbons (SPH) would be observed in this well. In this case, Cambria does not believe it is necessary for the well screen to extend across the air/water interface. Although dilution due to the length of the well screen may occur, we believe that the well screen length is adequate for the purpose of monitoring the concentrations of hydrocarbons in shallow groundwater at this location.

Well MW-2, located adjacent to and downgradient of the UST complex, is screened from 25 to 45 fbg. The well screen is in sandy silt and silty sand with moderate hydraulic conductivity. Since groundwater elevations have ranged from a minimum of 14.84 to a maximum of 24.21 fbg, the screened interval in MW-2 is always submerged. As with well MW-1, the hydrocarbon concentrations observed in soil at the time of well installation do not suggest that SPH would be present in groundwater at this location. Similarly, although dilution due to the length of the well screen may occur, we believe that the well screen length is adequate for the purpose of monitoring the concentrations of hydrocarbons shallow groundwater at this location.

Well MW-3 is located approximately 90 feet upgradient of the UST complex and is therefore not considered to be in a critical area. The well is screened from 22 to 42 fbg in sandy silt with low to moderate hydraulic conductivity. Since installation in 1992, the groundwater elevation has exceeded the top of the screened interval five times, always in the first quarter of the year. Although TPHg is consistently detected in this well, other hydrocarbon concentrations have been at or near the laboratory detection limits since the well was installed. No MTBE has been detected in MW-3 using EPA Method 8260. Once again, although dilution due to the length of the well screen may be possible, we believe that the well screen length is appropriate for monitoring hydrocarbon and oxygenate concentrations at this location.

Well MW-4 is located approximately 200 feet downgradient of the UST complex, screened from 5 to 27 fbg. With the exception of one event in 1996, no hydrocarbons or oxygenates have been

detected in this well since it was installed in 1995. If hydrocarbons had impacted this well, we would expect some detection in spite of any dilution resulting from the length of the well screen. We therefore believe that the construction of this well is adequate to act as a sentry well for the site.

Offsite wells MW-5 through MW-8 have been installed since January 2002, with approval by ACHCSA. We believe that the screened intervals in these wells are appropriate for monitoring shallow groundwater downgradient of the site.



PROPOSED SCOPE OF WORK

To further define the extent of the chemical plume west and northwest of the site, Cambria proposes to install one onsite and five offsite Geoprobe® soil borings (Figure 2). It should be noted that access to Freedom Avenue (northwest) serves as an off-ramp from Interstate Highway 580 and therefore access is very limited. The soil borings will be advanced to the current depth of groundwater. The borings will be continuously sampled for lithologic logging, and soil samples will be collected for chemical analysis from depths of 5 fbg, 10 fbg, 15 fbg, and 20 fbg, at a minimum. In addition, one soil sample will be collected immediately above the first encountered groundwater, and soil samples may be collected from other depths based on field observations such as odor, staining and PID screening of the samples.

Upon ACHCSA approval of this work plan, Cambria will complete the following tasks:

Utility Location: Cambria will notify Underground Service Alert (USA) of our proposed drilling activities. USA will have the utilities in the vicinity identified.

Site Health and Safety Plan: Cambria will prepare a comprehensive site safety plan to protect site workers. The plan will be kept onsite during field activities and signed by each site worker.

Permits: We will obtain necessary permits and access agreements for installation of soil borings/monitoring wells, including an encroachment permit.

Soil Borings: A total of six soil borings will be advanced using a limited-access, direct-push (Geoprobe®) drilling rig. Upon completion, the borings will be sealed with cement grout to match the existing grade. Samples will be transported to a state-approved analytical laboratory for chemical analysis. Cambria's Standard Field Procedures for Geoprobe® Sampling is presented as Attachment A.

Laboratory Analyses: Selected soil and groundwater samples will be analyzed by a State-certified laboratory for:

- TPHg, BTEX and MTBE by EPA Method 8260B

Subsurface Investigation Report: After the analytical results are received, Cambria will prepare a report that, at a minimum, will contain:

- A summary of the site background and history,
- Descriptions of drilling and sampling activities,
- Soil boring logs,
- Tabulated analytical results for soil,
- Analytical reports and chain-of-custody forms,
- A discussion of the hydrocarbon distribution in the subsurface, and
- Recommendations, including locations for new monitoring wells, if necessary.



SCHEDULE

Upon receiving written approval of this work plan from the ACHCSA, Cambria will apply for the necessary permits and schedule drilling. We will provide you with a 72-hour notice prior to field activities so Cambria field staff and ACHCSA representatives may identify and agree on the final locations of the soil borings, prior to the start of work. We anticipate submitting our investigation report within 60 days of completing the fieldwork.

CLOSING

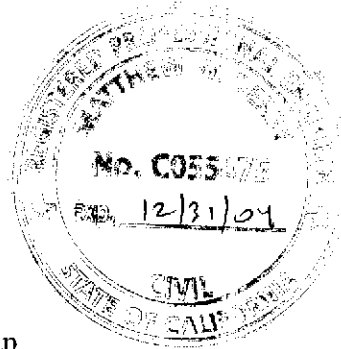
Please call Melody Munz at (510) 420-3324 if you have any questions or comments. Thank you for your assistance.

Sincerely,
Cambria Environmental Technology, Inc.



Melody Munz
Project Engineer

Matthew W. Derby, P.E.
Senior Project Engineer



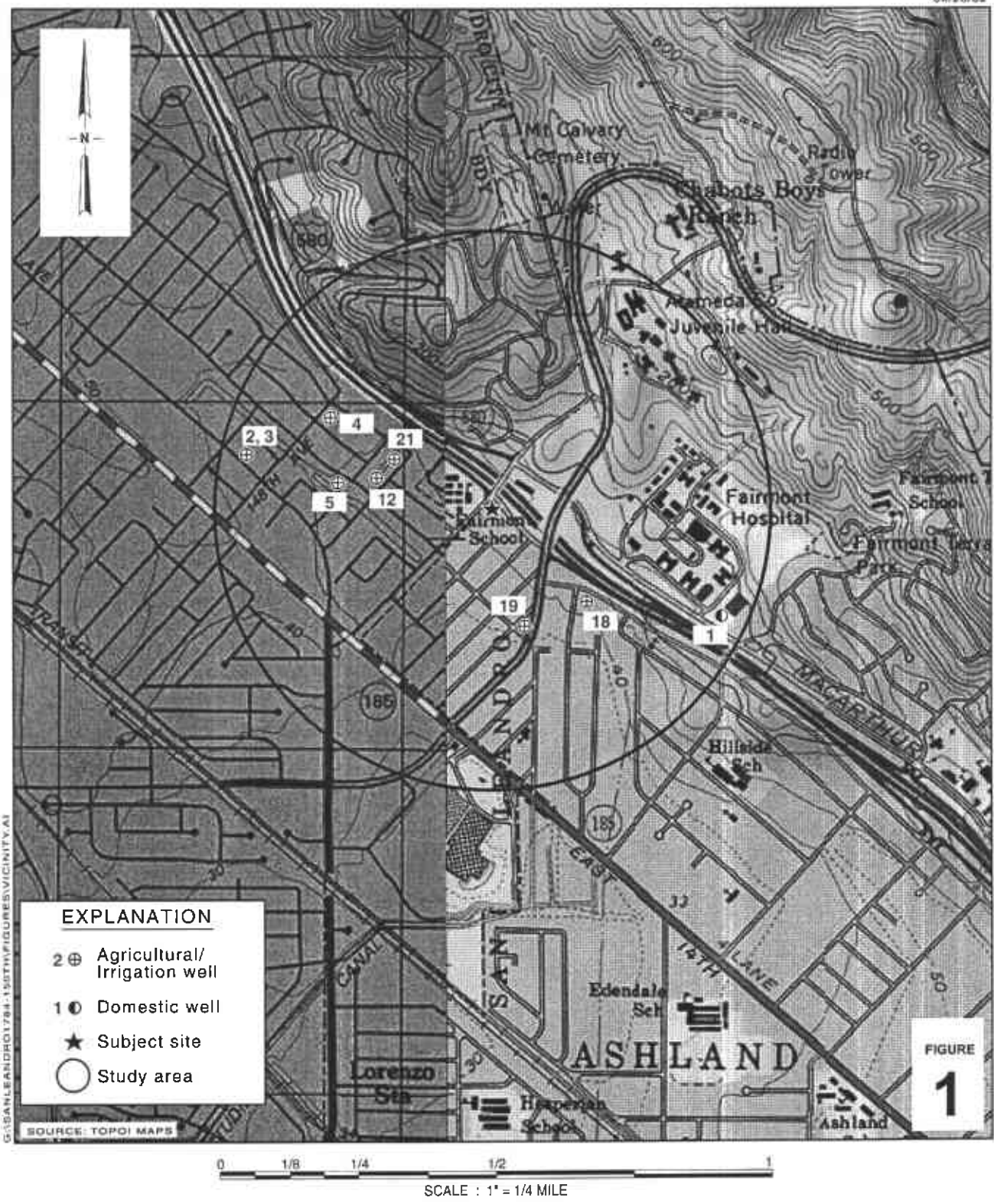
Figures: 1 - Vicinity/Area Well Survey Map
 2 - Proposed Boring Location Map

Tables: 1 - Soil Analytical Results
 2 - Well Construction Details

Attachment: A - Standard Field Procedures for Geoprobe® Sampling

cc: Karen Petryna, Shell Oil Products US Shell, P.O. Box 7869, Burbank, CA 91510-7869
Victor Lemon, City of San Leandro Engineering and Transportation Department, 835 East
14th Street, San Leandro, CA 94577

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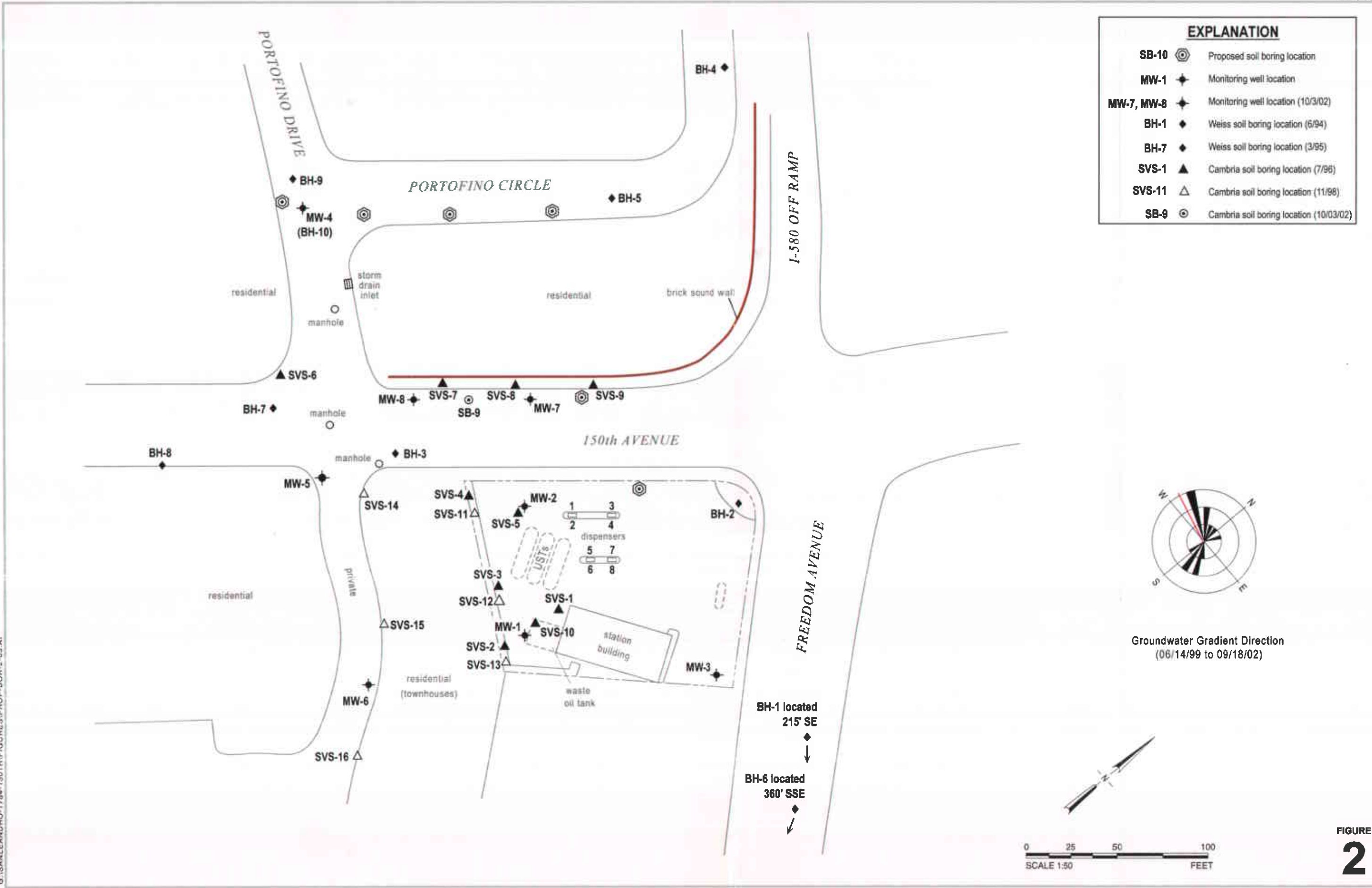
Shell-branded Service Station
 1784 150th Avenue
 San Leandro, California
 Incident #98996068



C A M B R I A

Vicinity/Area Well Survey Map
 1/2-Mile Radius

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Proposed Soil Boring Location Map



Shell-branded Service Station
1784 150th Avenue
San Leandro, California
Incident #98996068

FIGURE 2

Table 1. Soil Analytical Results - Shell-branded Service Station, 1784 150th St., San Leandro, California - Incident #98996068

Sample ID	Date	Depth	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	MTBE
								EPA Method 8020	EPA Method 8260
			(fbg)	(Concentrations in mg/kg)					
BH-A ^{a,b}	3/5/1990	5.0	<1	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-A ^{a,b}	3/5/1990	15.7	<1	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-A ^{a,b,c}	3/5/1990	24.7	<1	0.020	<0.0025	<0.0025	<0.0025	---	---
BH-A ^{a,d}	3/5/1990	29.2	35	0.23	0.20	<0.0025	0.64	---	---
BH-A ^{a,b}	3/5/1990	41.2	<1	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-B ^b	2/4/1992	11.5	<1	0.0026	<0.0025	<0.0025	<0.0025	---	---
BH-B	2/4/1992	16.5	<1	0.0058	<0.0025	<0.0025	<0.0025	---	---
BH-B ^{b,e}	2/4/1992	21.5	79	0.20	0.60	1.0	4.1	---	---
BH-B	2/4/1992	26.5	74	0.59	0.91	1.5	3.9	---	---
BH-C ^b	2/5/1992	11.5	<1	0.0042	0.0029	0.0039	<0.0025	---	---
BH-C ^b	2/5/1992	21.5	<1	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-C ^{b,f}	2/5/1992	26.5	3.9	<0.0025	<0.0025	<0.0025	0.0054	---	---
BH-C	2/5/1992	31.5	68	<0.05	<0.05	<0.05	0.17	---	---
BH-1-21	6/6/1994	21	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
BH-2-20	6/6/1994	20	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
BH-3-16 ^g	6/6/1994	16	<1.0	0.013	<0.0050	<0.0050	<0.0050	---	---
BH-4-20.6	6/7/1994	20.6	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
BH-5-15.6	6/7/1994	15.6	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
BH-6-20.5	6/7/1994	20.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
BH-7-15.8	2/14/1995	15.8	<1.0	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-8-16.0	2/14/1995	16.0	<1.0	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-9-19.5	2/14/1995	19.5	<1.0	<0.0025	<0.0025	<0.0025	<0.0025	---	---
BH-10-15.2	3/3/1995	15.2	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	---
SVS-3	7/18-19/96	16-18	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-5	7/18-19/96	4-6	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-5	7/18-19/96	8-10	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-5	7/18-19/96	18-20	1.1	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-9	7/18-19/96	3-5	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-9	7/18-19/96	8-10	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---
SVS-9	7/18-19/96	16-18	<1.0	<0.005	<0.005	<0.005	<0.005	<0.025	---

Table 1. Soil Analytical Results - Shell-branded Service Station, 1784 150th St., San Leandro, California - Incident #98996068

Sample ID	Date	Depth (fbg)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	MTBE	
								EPA Method 8020	EPA Method 8260	
			← (Concentrations in mg/kg) →							
Disp-A	12/4/1997	2.0	3.1	<0.005	0.037	0.022	<0.01	0.019	---	
Disp-A, 4.5	12/4/1997	4.5	6.3	0.096	0.012	0.46	0.037	0.056	---	
Disp-B	12/4/1997	2.0	130	<1	<1	<1	<2	<1	---	
Disp-B, 4.5	12/4/1997	4.5	1.0	0.045	<0.005	0.064	0.32	<0.03	---	
Disp-C	12/4/1997	2.0	190	1.8	2.1	3.6	20	1.4	---	
Disp-C, 4.5 ^h	12/4/1997	4.5	590	<0.5	0.98	2.3	3.1	<0.5	---	
Disp-D	12/4/1997	2.0	3.8	0.11	<0.005	0.15	0.17	0.11	---	
Disp-D, 4.5	12/4/1997	4.5	1.4	0.027	<0.005	0.036	0.178	0.005	---	
SVS-11-5.5	11/10/1998	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-6	11/10/1998	6	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-9.5	11/10/1998	9.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-10	11/10/1998	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-15	11/10/1998	15	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-15.5	11/10/1998	15.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-19	11/10/1998	19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-11-19.5	11/10/1998	19.5	1.6	0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-5	11/11/1998	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-5.5	11/11/1998	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-10	11/11/1998	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-10.5	11/11/1998	10.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-15	11/11/1998	15	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-14-15.5	11/11/1998	15.5	<1.0	<0.0050	0.006	<0.0050	<0.0050	<0.025	---	
SVS-14-19	11/11/1998	19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	0.029	<25	
SVS-14-19.5	11/11/1998	19.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-15-4.5	11/11/1998	4.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-15-5	11/11/1998	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-15-10	11/11/1998	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-15-10.5	11/11/1998	10.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	
SVS-15-15	11/11/1998	15	<1.0	<0.0050	<0.0050	<0.0050	0.013	<0.025	---	
SVS-15-15.5	11/11/1998	15.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---	

Table 1. Soil Analytical Results - Shell-branded Service Station, 1784 150th St., San Leandro, California - Incident #98996068

Sample ID	Date	Depth (fbg)	TPHg	(Concentrations in mg/kg)				MTBE EPA Method 8020	MTBE EPA Method 8260
				Benzene	Toluene	Ethylbenzene	Xylenes		
SVS-15-19.5	11/11/1998	19.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-15-20	11/11/1998	20	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-16-5	11/11/1998	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-16-5.5	11/11/1998	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-16-10	11/11/1998	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-16-10.5	11/11/1998	10.5	<1.0	<0.0050	<0.0050	<0.0050	0.0093	0.026	---
SVS-16-15	11/11/1998	15	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
SVS-16-15.5	11/11/1998	15.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	---
MW-5-515.5	10/24/01	15.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.0050
MW-6-5.5	10/24/01	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	0.012
MW7@5'	10/03/02	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW7@10'	10/03/02	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW7@15'	10/03/02	15	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW7@20'	10/03/02	20	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW7@25'	10/03/02	25	11	<0.0050	0.0060	0.086	0.13	---	<0.5
MW7@30'	10/03/02	30	68	<0.025	0.19	0.89	3.7	---	<0.5
MW7@32'	10/03/02	32	1.2	<0.0050	0.0069	0.025	0.11	---	<0.5
MW8@5'	10/04/02	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW8@10'	10/04/02	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW8@15'	10/04/02	15	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW8@20'	10/04/02	20	1.2	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.5
MW8@25'	10/04/02	25	140	0.072	0.15	1.5	5.8	---	<0.5
SB9@22	10/04/02	22	1.1	<0.0050	<0.0050	0.016	0.088	---	<0.5

Table 1. Soil Analytical Results - Shell-branded Service Station, 1784 150th St., San Leandro, California - Incident #98996068

Sample ID	Date	Depth (fbg)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE EPA Method 8020	MTBE EPA Method 8260	
			← (Concentrations in mg/kg) →							

Abbreviations:

TPHg = Total petroleum hydrocarbons as gasoline. From 1990 through 1998, analyzed by modified EPA Method 8015; from 2001 through 2002, analyzed by EPA Method 8260B.
 Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8020 from 1990 through 1998; from 2001 through 2002, analyzed by EPA Method 8260B.
 MTBE = Methyl tert-butyl ether
 fbg = Feet below grade
 mg/kg = milligrams per kilogram
 <n = Below detection limit of n mg/kg
 --- = Not analyzed

Notes:

a = Petroleum oil and grease analyzed by American Public Health Association Standard Method 503E; no detections above 100 ppm detection limit. Total oil and grease analyzed by American Public Health Association Standard Method 503E; no detections above 50 ppm detection limit.
 b = Analyzed for halogenated volatile organic compounds by EPA Method 8010; none detected.
 c = Total petroleum hydrocarbons as diesel (TPHd) and total petroleum hydrocarbons as motor oil (TPHmo) analyzed by modified EPA Method 8015; no TPHd detected at 1 ppm limit; no TPHmo detected at 10 ppm limit.
 d = 1,2-dichloroethane detected at 0.0064 ppm by EPA Method 8010.
 e = TPHd detected at 23 ppm by modified EPA Method 8015; lab characterized detected compounds as hydrocarbons lighter than diesel.
 f = TPHd detected at 4.9 ppm by modified EPA Method 8015; lab characterized detected compounds as hydrocarbons lighter than diesel.
 g = Analyzed for volatile organic compounds by EPA Method 8010; none detected above detection limits ranging from 0.005 to 0.050 ppm.
 h = Sample saturated with perched water from beneath dispenser.

Table 2. Well Construction Details - Shell-branded Service Station, 1784 150th St., San Leandro, California - Incident #98996068

Well No.	Date Installed	Elevation TOC ⁽¹⁾ (ft-msl)	Casing Material	Total Depth (fbg)	Well Depth (fbg)	Borehole Diameter (inches)	Casing Diameter (inches)	Screened Interval (fbg)	Screened Interval (ft-msl)	Slot Size (inches)	Filter Pack Interval (fbg)	Filter Pack Material	Current ⁽²⁾ GW Elev (ft-msl)	Historical GW Elevation Maximum (ft-msl)	Historical GW Elevation Minimum (ft-msl)		
MW-1	3/6/1990	49.10	PVC	45	45	10	4	30	45	19.1	4.1	0.020	28-45	#3 sand	29.00	30.85	21.14
MW-2	2/4/1992	45.79	PVC	45	45	10	4	25	45	20.79	0.79	0.010	24-45	#1/20 sand	29.08	30.95	21.58
MW-3	2/5/1992	51.92	PVC	42	42	10	4	22	42	29.92	9.92	0.010	20-42	#1/20 sand	--	30.9	21.71
MW-4	6/6/1994	40.45	PVC	30	27	8	2	5	27	35.45	13.45	0.010	3-28	#1/20 sand	29.22	31.86	25.9
MW-5	6/6/1994	41.46	PVC	25	25	8	2	10	25	31.46	16.46	0.010	7-25	#2/12 sand	28.95	26.64	25.89
MW-6	6/6/1994	41.50	PVC	20	20	8	2	5	20	36.5	21.5	0.010	3.5-20	#2/12 sand	29.39	37.62	28.68
MW-7	10/3/2002	44.45	PVC	27	27	8	2	22	27	22.45	17.45	0.010	20-27	#2/12 sand	--	--	--
MW-8	10/3/2002	43.27	PVC	24	24	8	2	19	24	24.27	19.27	0.010	17-24	#2/12 sand	--	--	--

feet-msl = feet above mean sea level

fbg = feet below grade

(1) TOC = Top of casing elevation. The survey was completed on January 23, 2002. The benchmark for this survey was a cinch nail in top of catch basin northwest corner of 150th and East 14th Streets. The latitude, longitude and coordinates are for top of casings and are based on the California State Coordinate System, Zone III (NAD83). Benchmark Elevation 36.883 feet (NGVD 29).

GW Elevation = Groundwater Elevation (feet, msl)

(2) Current groundwater elevation measured on 12/27/02

-- Information not available.

ATTACHMENT A

Standard Field Procedures for Geoprobe® Sampling

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STANDARD FIELD PROCEDURES FOR GEOPROBE® SAMPLING

This document describes Cambria Environmental Technology's standard field methods for GeoProbe® soil and ground water sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate ground water depth and quality and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e., sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or separate-phase hydrocarbon saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e., cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Sampling

GeoProbe® soil samples are collected from borings driven using hydraulic push technologies. A minimum of one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples can be collected near the water table and at lithologic changes. Samples are collected using samplers lined with polyethylene or brass tubes driven into undisturbed sediments at the bottom of the borehole. The ground surface immediately adjacent to the boring is used as a datum to measure sample depth. The horizontal location of each boring is measured in the field relative to a permanent on-site reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned or washed prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Storage, Handling and Transport

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon® tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytical laboratory.

CAMBRIA

Field Screening

After a soil sample has been collected, soil from the remaining tubing is placed inside a sealed plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable GasTech® or photoionization detector measures volatile hydrocarbon vapor concentrations in the bag's headspace, extracting the vapor through a slit in the plastic bag. The measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Grab Ground Water Sampling

Ground water samples are collected from the open borehole using bailers, advancing disposable Tygon® tubing into the borehole and extracting ground water using a diaphragm pump, or using a hydro-punch style sampler with a bailer or tubing. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

Duplicates and Blanks

Blind duplicate water samples are usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory quality assurance/quality control (QA/QC) blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.