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September 16, 2002

Mr. Scott Seery
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Alameda County
SEP 19 2002
Environmental Health

Re: **Subsurface Investigation Work Plan**
Shell-branded Service Station
1784 150th Avenue
San Leandro, California
Incident #: 98996068
Project #: 244-0612-010

Dear Mr. Seery

Cambria Environmental Technology, Inc. (Cambria) is submitting this *Subsurface Investigation Work Plan* 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) plume offsite to the northwest and to provide for ongoing groundwater monitoring. 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.

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 interlayed with sands and gravels to the total explored depth of 26.5 feet below grade (fbg).

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Groundwater: Local drinking water is supplied by a utility, not groundwater. An area well survey in 1992 identified 21 wells within ½ mile of the site. No wells were immediately downgradient of the site. Groundwater depths have ranged between 17 and 30 fbg onsite and between approximately 4 and 14 fbg in offsite well MW-4. Water level measurements have not shown a consistent or reliable groundwater flow direction. In June 2002 depth to groundwater measurements ranged from approximately 4 to 22 fbg.

Previous Investigations

1986 Waste Oil Tank Removal: According to an October 13, 1989 letter from Weiss Associates (Weiss) 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 feet and 11 feet depth. 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, Weiss installed 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.

1992 Well Installations: In February 1992, Weiss installed monitoring wells MW-2 and MW-3. A soil sample collected near the water table from the boring for well MW-2 contained 79 ppm TPHg. Although well MW-3 is located over 100 feet upgradient of the tanks, up to 68 parts per billion (ppb) TPHg were detected in soil from this boring.

1994-5 Subsurface Investigation: In 1994 and 1995, Weiss drilled 10 soil borings around the site (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, Weiss 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, Weiss 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 UST complex (SVS-5 at 3.0 ft bgs contained 7,600 parts per billion by volume [ppmv] 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. Weiss concluded that depleted oxygen concentrations and elevated carbon dioxide and methane concentrations in the vadose zone indicated that biodegradation was occurring.

1997 RBCA Evaluation: In 1997, Weiss prepared a RBCA evaluation for the site. Results of the RBCA analysis indicated that concentrations of BTEX, MTBE, 1,2-dichloroethane, and tetrachloroethane 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, a risk threshold exceedance was identified associated with ingestion of groundwater from a hypothetical well 25 feet downgradient of the source. Weiss 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 0.005 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; 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: Two monitoring wells (MW-5, MW-6) were installed offsite to the southwest. 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, 0.85 ppb, and 1.5 ppb, 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. Although hydrocarbons have been detected in water from wells MW-1 and MW-3, no hydrocarbons have been detected in water from downgradient well MW-4. The groundwater gradient is typically flat and no consistent flow direction can be determined. Based on the groundwater elevation contours since the first quarter of 2000, the average groundwater gradient is approximately 0.0028 ft/ft.

PROPOSED SCOPE OF WORK

To define the extent of the MTBE plume northwest of onsite well MW-2, Cambria proposes to install two wells (MW-7 and MW-8) at an approximate screened interval between 25 and 45 fbg, to monitor chemical concentrations in groundwater and to better define the groundwater gradient. Proposed well locations are shown in Figure 1. Sampling and well construction will be completed as described in our Standard Field Procedures for Soil Borings and Monitoring Wells (Attachment A).

Upon Alameda County Health Care Services Agency (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 on-site 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.

Well Installation and Sampling Activities: Using a hollow-stem auger drilling rig, Cambria will install the groundwater monitoring wells as outlined in our Standard Field Procedures for Soil Borings and Monitoring Wells (Attachment A). During field activities, we will collect soil samples at 5-foot intervals for lithologic description and field screening with a volatile vapor analyzer. We will select soil samples for chemical analysis based on observations of staining and odor or on the results of field screening with a volatile vapor analyzer.

Well Development and Top of Casing Survey: Blaine will develop and sample the monitoring wells. Virgil Chavez Land Surveying of Vallejo, California will survey the top of casing elevations to mean sea level.

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 and monitoring well logs,
- Tabulated analytical results for soil,
- Analytical reports and chain-of-custody forms,
- A discussion of the hydrocarbon distribution in the subsurface, and
- Recommendations.

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 wells, prior to drilling activities. Drilling is tentatively scheduled for

October 3 and 4, 2002. We anticipate submitting our investigation report within 60 days of completing the fieldwork.

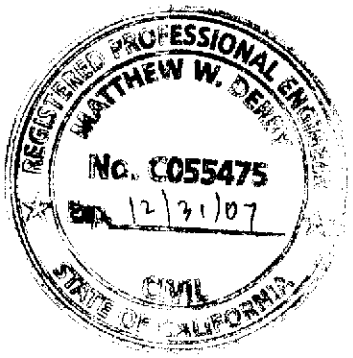
CLOSING

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 - Proposed Monitoring Well Location Map
2 - Boring Location Map

Attachment: A - Standard Field Procedures for Soil Borings and Monitoring Wells

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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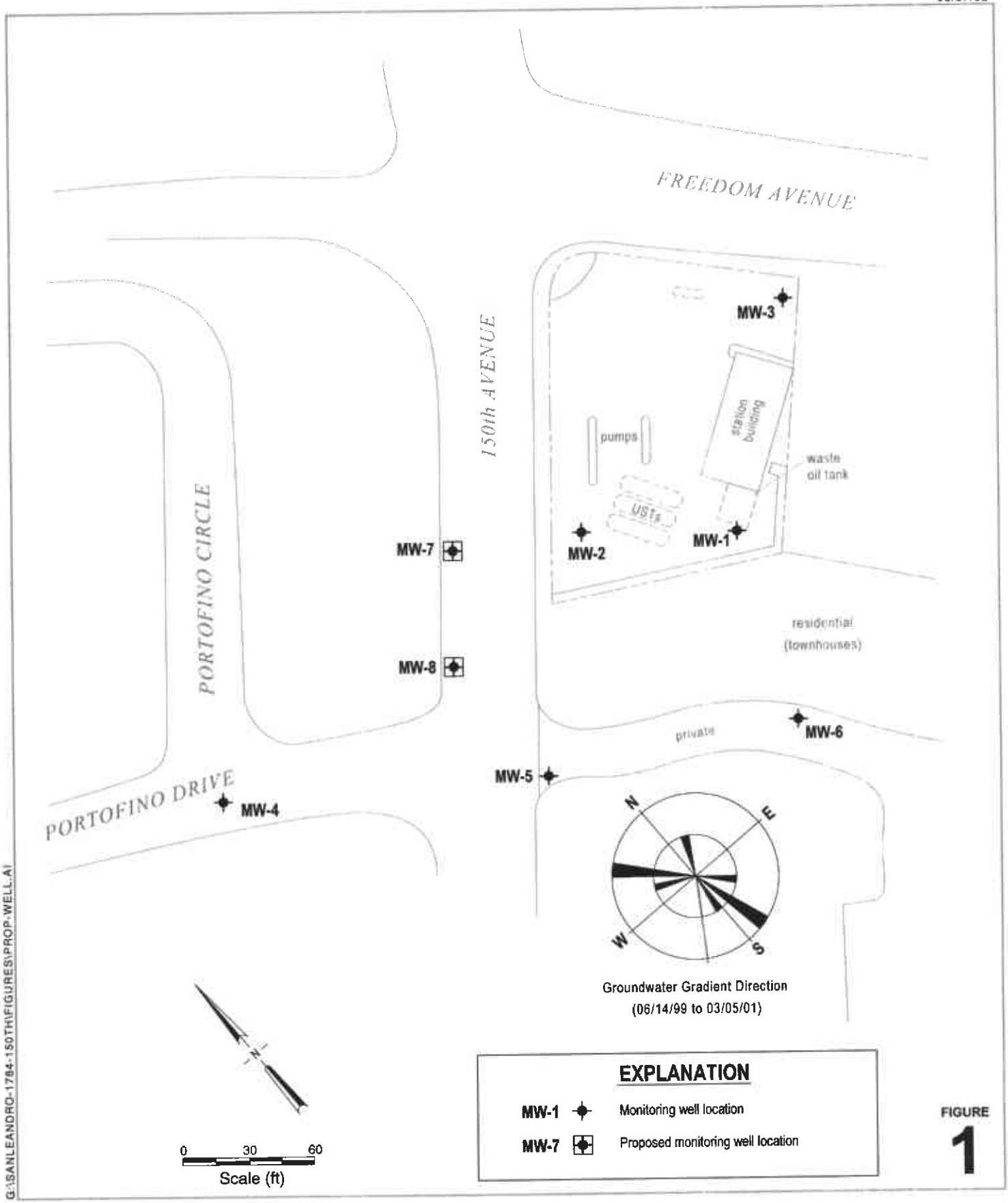

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Proposed Monitoring Well Location Map

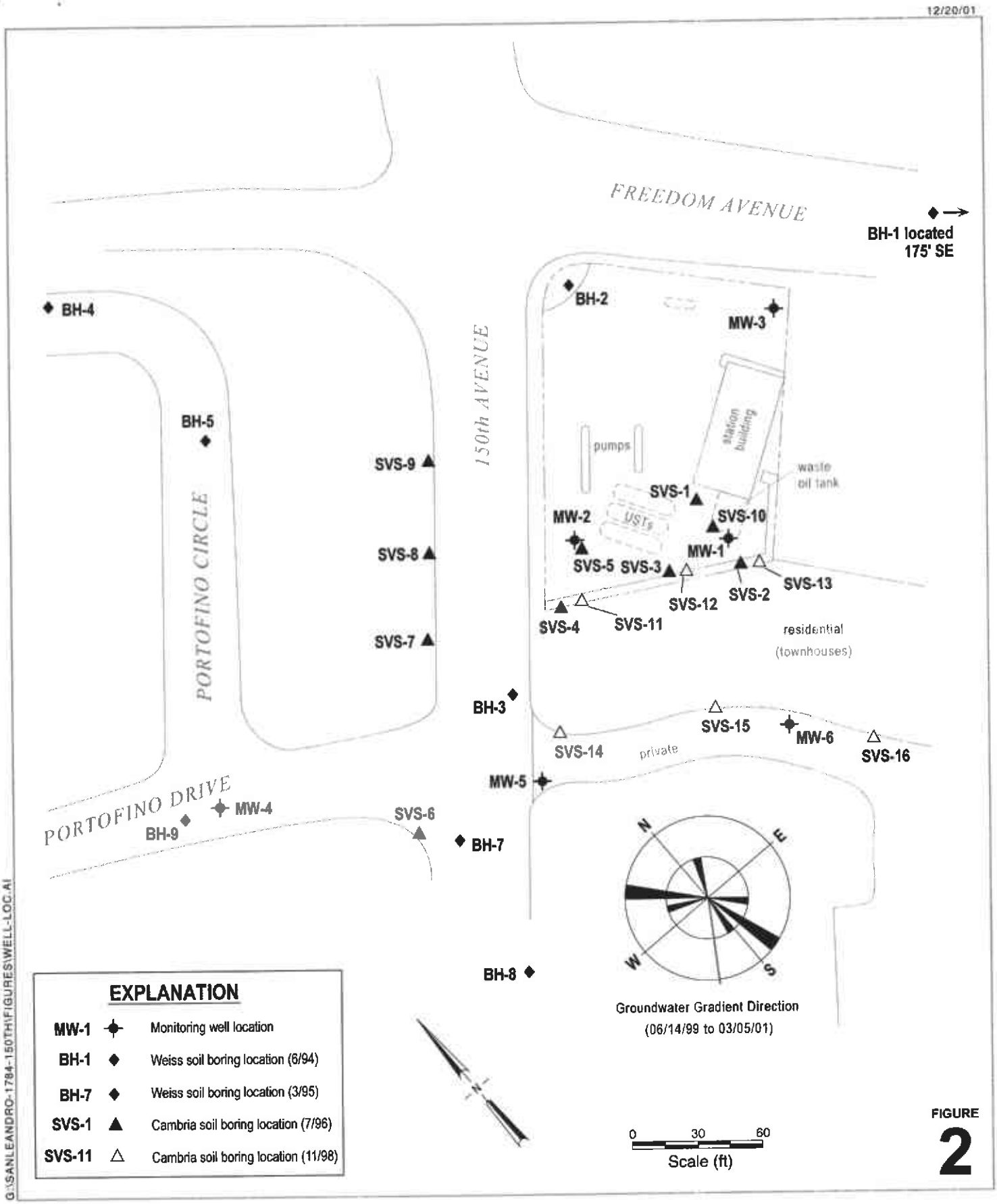

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FIGURE **2**

Shell-branded Service Station
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San Leandro, California
Incident #98996068

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Boring Location Map

ATTACHMENT A

Standard Field Procedures for Soil Borings and Monitoring Wells

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STANDARD FIELD PROCEDURES FOR SOIL BORINGS AND MONITORING WELLS

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

SOIL BORINGS

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is steam-cleaned 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 Analysis

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 analytic laboratory.

Field Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The groundwater 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. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may 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.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Groundwater monitoring wells are installed to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 ft below and 5 ft above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three ft thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two ft thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of groundwater are extracted and the sediment volume in the groundwater is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater samples are collected using bailers or pumps and 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. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

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