RO 486

Shell Oil Products US

September 22, 2003 DH

Alameda County

SEP 2 3 2003

Environmental Health

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

Subject: **Shell-branded Service Station**
4255 MacArthur Boulevard
Oakland, California

Dear Mr. Chan:

Attached for your review and comment is a copy of the *Subsurface Investigation Work Plan* 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

Karen Petryna

Karen Petryna
Sr. Environmental Engineer

P.O. Box 7869 Burbank, CA 91510-7869 Phone (559) 645-9306 Facsimile (559) 645-5643

CAMBRIA

September 22, 2003

Mr. Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: **Subsurface Investigation Work Plan**
Shell-branded Service Station
4255 Mac Arthur Boulevard
Oakland, California
Incident # 98995758
Cambria Project #245-0524-008

Dear Mr. Chan:

Cambria Environmental Technology, Inc. (Cambria) is submitting this *Subsurface Investigation Work Plan* on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell). As recommended in the April 28, 2003 *Tank Closure and Soil Investigation Report*, Cambria is proposing to install one additional groundwater monitoring well in the southern corner of the former tank pit (Figure 1) to monitor chemical concentrations in groundwater. Cambria may also include the proposed well in periodic mobile groundwater extraction events. The site background and proposed activities are presented below.

SITE BACKGROUND

Site Location: The site is the site of a former Shell service station located at the intersection of MacArthur Boulevard and High Street in a mixed commercial and residential area of Oakland, California. An active Unocal service station and a former Chevron service station are located east of the site. A trailer park and adjacent California Department of Transportation (Caltrans) access to Interstate 580 are located immediately southwest of the site. Topography slopes toward the west, with a 5-foot (ft) elevation difference between grade at the Shell service station and the trailer park property, and an additional 5-ft elevation difference between grade at the trailer park property and the Caltrans property.

Soil Lithology: The lithology beneath the site and vicinity typically consists of 12 to 15 ft of silts and clays, underlain by silty and clayey sands.

Cambria Environmental Technology, Inc.

5900 Hollis Street
Suite A
Emeryville, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

Groundwater Depth and Flow Direction: Quarterly groundwater monitoring has been conducted at the site since November 1993. The historical depth to groundwater on site has ranged from approximately 4 to 17 feet below grade (fbg), and currently (third quarter of 2003) ranges from 8 to 14 fbg on site. Groundwater typically flows in a west-southwesterly direction.

June 1985 Subsurface Investigation: In June 1985, Emcon Associates of San Jose, California drilled three soil borings and installed one groundwater monitoring well adjacent to the underground storage tanks (USTs). Up to 15,800 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) were detected in the shallow soil samples from inside the UST area. In July 1992, GeoStrategies, Inc. of Hayward, California performed a site reconnaissance and verified that the original monitoring well had been destroyed during the 1985 UST replacement activities.

December 1985 UST Replacement: In December 1985, the USTs were replaced, and approximately 810 cubic yards of hydrocarbon-bearing soil were transported to a disposal facility. Up to 22,000 ppm total volatile hydrocarbons and 500 ppm benzene were detected in the soil samples from the excavation.

November 1993 Subsurface Investigation: In November 1993, Weiss Associates (WA) of Emeryville, California drilled soil borings BH-A, BH-B and BH-C, which were converted into monitoring wells MW-1, MW-2 and MW-3, respectively. Up to 1,700 ppm TPHg and 3.3 ppm benzene were detected in soil boring BH-C (MW-3) between the 11 ft and 16 ft depth. Up to 66 ppm TPHg and 0.07 ppm benzene were detected in soil boring BH-B (MW-2) between 9 ft and 14 ft depth.

November 1994 Subsurface Investigation: In November 1994, WA drilled on-site soil borings BH-D and BH-E located on the northeastern end of the lot and off-site boring BH-F (MW-4) located near the Highway 580 on-ramp. Up to 5,900 ppm TPHg and 23 ppm benzene were detected at 5 fbg in soil boring BH-E located adjacent to the central eastern pump island. Trace hydrocarbon concentrations were detected in the capillary fringe soil samples collected from each of the borings.

November 1995 Dispenser and Piping Removal and Sampling: In November 1995, WA collected 15 soil samples during dispenser and piping replacement activities. Up to 7,800 ppm TPHg were detected in samples collected from beneath the former middle dispenser and 2,800 ppm TPHg were detected in the sample collected from beneath the adjacent product piping. Up to 7,300 ppm TPHg were detected in the sample collected from beneath the northeast dispenser island. No benzene above 1 ppm was detected in any of the 15 samples collected. During the dispenser replacements, horizontal wells HW-1 through HW-4 were installed in the

vadose zone about 5 ft below ground surface and adjacent to the former piping and dispensers to facilitate future removal of petroleum hydrocarbons from the impacted soil.

August 1997 Soil Vapor Extraction (SVE) Test: In August 1997, Cambria performed short-term SVE tests using a VR Systems Model V3 internal combustion engine on horizontal vapor extraction wells HW-1, HW-2 through HW-4, and monitoring wells MW-2 and MW-3. Cambria measured vapor extraction flow rates, the vacuum applied to the wellheads, and the vacuum influence in nearby wells. Cambria calculated an effective radius of influence of 35 to 50 ft during testing of wells MW-3 and MW-2. The relatively high TPHg removal rates measured in horizontal wells HW-1 and HW-2 through HW-4 were most likely temporary, and are not believed to be representative of site conditions due to extensive well screen in permeable fill material. The results of the short-term testing indicated that SVE achieves only low hydrocarbon removal rates in wells MW-2 and MW-3, which are more representative of native soil conditions.

February 1998 Subsurface Investigation: In February 1998, Cambria drilled two off-site borings (SB-1 and SB-2) in the trailer park adjacent to the Shell site. No TPHg or benzene was detected in the soil samples collected from the two borings. The highest methyl-tert-butyl ether (MTBE) concentration detected in soil was 1.4 ppm detected in soil boring SB-2 at a depth of 7 fbg. Up to 7,700 parts per billion (ppb) TPHg, 210 ppb benzene, and 46,000 ppb MTBE were detected in the grab groundwater sample collected from soil boring SB-2. In sample analysis of soil physical parameters, total organic carbon was detected at 2,140 ppm and 7,210 ppm at a depth of 5.5 fbg in borings SB-1 and SB-2, and total porosity was measured as 35.2% and 37.4%, respectively. Specific permeability values were 181 millidarcies (md) for SB-1-5.5 and 71 md for SB-2-5.5, but the lab noted that due to fine fractures developed in the samples upon drying, the measured values were an order or more of magnitude too high. Permeability measurements confirmed the low permeability of the shallow soils beneath the site.

2001 Sensitive Receptor Survey, Conduit Study and Site Conceptual Model (SCM): Cambria included a sensitive receptor survey, conduit study results and an SCM in the *First Quarter 2001 Monitoring Report.* The sensitive receptor survey identified 25 monitoring wells, 4 cathodic protection wells, and 1 domestic well within ½ mile of the site. Given the conduit study results, Cambria concluded that nearby sewer, storm drain, and water lines located between 8 to 13 fbg could serve as preferential pathways for the migration of petroleum hydrocarbons and MTBE. However, Cambria did not identify any conduits in the nearby downgradient direction.

November 2001 Off-Site Monitoring Well Installation: Shell voluntarily instructed Cambria to delineate the off-site plume, and on November 12, 2001, Cambria supervised the installation on one downgradient monitoring well (MW-5) approximately 200 ft southwest of the site, on the Caltrans right-of-way adjacent to the I-580 on-ramp. No TPHg, benzene, toluene, ethylbenzene and xylenes (BTEX) or MTBE were detected in the soil sample collected during the

investigation. MW-5 has been included in the quarterly groundwater monitoring schedule since the first quarter of 2002. MTBE concentrations have ranged from 32 to 110 ppb. No other hydrocarbons have been detected in groundwater from this well.

January 2003 Tank Removal: Between January 27 and February 7, 2003, all surface features, USTs, fuel dispensers, and associated product piping were removed from the site. Cambria conducted soil and groundwater sampling and supervised overexcavation to remove hydrocarbon-impacted soils to practical extents. Approximately 875 cubic yards of soil were removed from the site during the tank pull and overexcavation activities. Approximately 4,600 gallons of groundwater were pumped to dewater the UST excavation prior to removing the tanks. The highest chemical concentrations in soil in the former UST area were 380 parts ppm TPHg, 1.7 ppm benzene and 1.2 ppm MTBE, detected in the southeast corner of the tank pit in sample TP-5. The grab groundwater sample from the former tank pit area (TP-1-Water) contained 11,000 ppb TPHg, 410 ppb benzene and 5,200 ppb MTBE. The highest hydrocarbon concentrations remaining in soil in any of the former dispenser areas were 980 ppm TPHg and 1.2 ppm benzene, detected in sample P-2-8 at 8 fbg. The highest detected MTBE concentration remaining in soil in any of the former dispenser areas was 0.9 ppm, detected in sample D-5-S10. Following overexcavation, approximately 720 pounds of oxygen-releasing compound were mixed in the excavation base before backfilling with 1.5-inch drain rock to 4 fbg. The remainder of the tank pit and the over-excavation was backfilled and compacted with Class II road base material. In the April 28, 2003 *Tank Closure and Soil Excavation Report,* Cambria recommended installing one additional groundwater monitoring well in the southern corner of the former tank pit.

PROPOSED SCOPE OF WORK

Cambria proposes to advance one on-site hollow-stem-auger soil boring and convert it to a groundwater monitoring well (MW-6) in the southern corner of the former tank pit. Well MW-6 will be included in the quarterly groundwater monitoring schedule and may also be included in periodic mobile groundwater extraction events. Upon approval of this work plan by Alameda County Health Care Services, Cambria will complete the following tasks:

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

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

Permits: Cambria will obtain required permits for well installation from the Alameda County Public Works Agency.

Soil Boring: Cambria will advance one soil boring to an approximate depth of 15 fbg using a hollow-stem-auger drill rig, and will collect soil samples at 5-ft intervals for lithological logging purposes. Only the sample collected from the capillary fringe zone will be submitted for chemical analyses since material above 11 fbg is drain rock used to backfill the excavation during the January 2003 tank removal activities. The boring will be converted to a monitoring well (MW-6) and will be completed following our Standard Field Procedures for Soil Borings and Monitoring Wells (Attachment A).

Well Construction: Well MW-6 will be constructed using 4-inch diameter, schedule 40 PVC casing with 0.010-inch slotted PVC screen from approximately 10 to 15 fbg. The well will be completed by placing a filter pack of Monterey #2/12 sand from the bottom of the well casing to approximately 2 ft above the top of the screened casing, approximately 2 ft of bentonite above the filter pack, and neat Portland cement to 1 fbg in the annular space between the boring and the PVC casing and screen. A flush-mounted, traffic-rated well box will be installed to protect and finish the well to grade.

Well Development, Groundwater Sampling and Top of Casing Survey: Blaine Tech Services, Inc. of San Jose, California will develop and sample the new monitoring well. Virgil Chavez Land Surveying of Vallejo, California will survey the top of casing elevation to mean sea level.

Chemical Analysis: Soil and groundwater samples will be analyzed by a State-approved analytical laboratory using EPA Method 8260 for TPHg, BTEX, and MTBE.

Reporting: Upon receipt of the analytical results, we will prepare a report that, at a minimum, will contain:

- A summary of the site background and history;
- Descriptions of the drilling and sampling methods;
- Monitoring well construction and soil boring log;
- Tabulated soil and groundwater analytical results;
- Analytical reports and chain-of-custody forms; and
- Cambria's conclusions and recommendations.

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

Figure: 1 - Boring Location Map

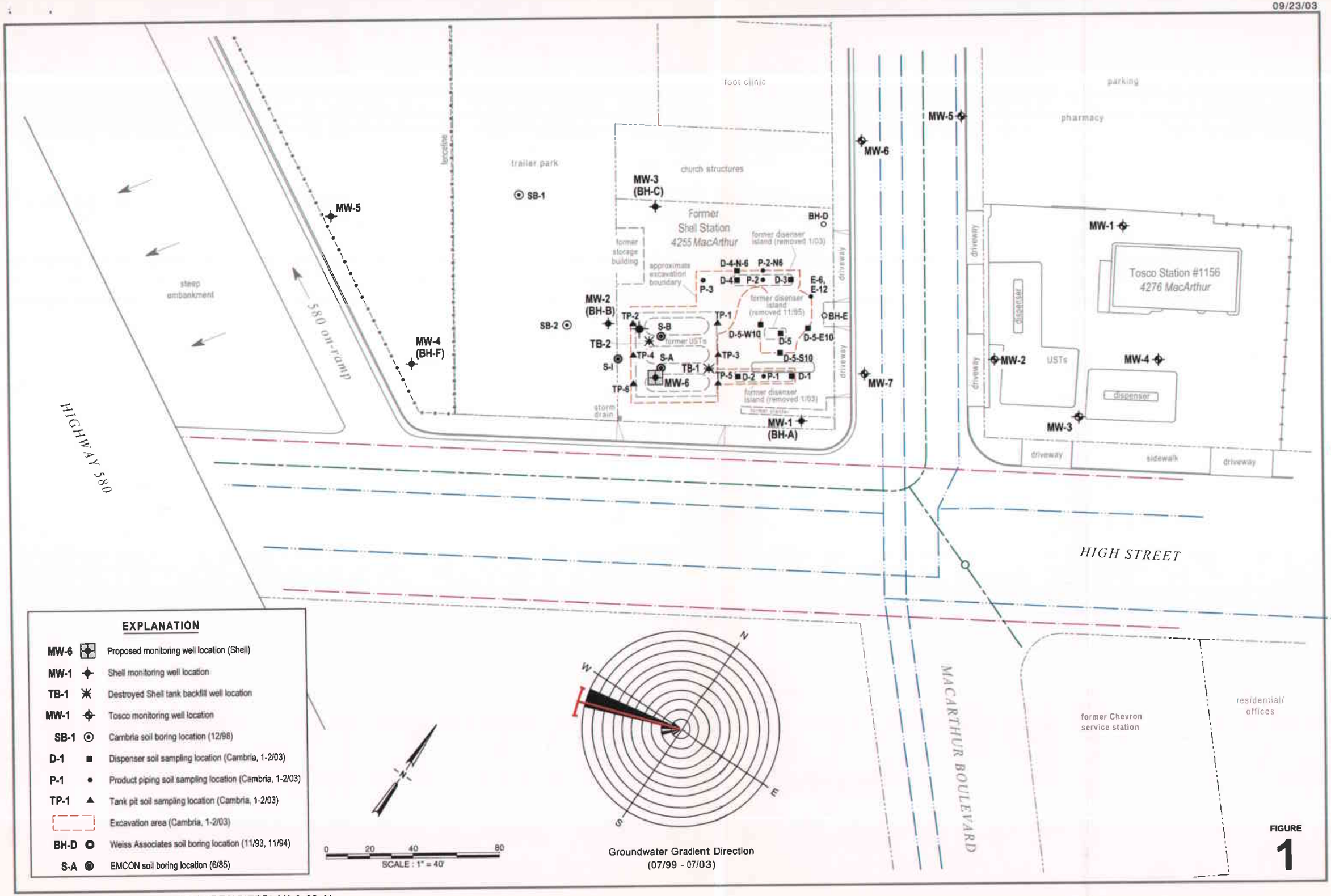
Attachment: A - Standard Field Procedures for Soil Borings and Monitoring Wells

cc: Karen Petryna, Shell Oil Products US, P.O. Box 7869, Burbank, CA 91510-7869
Roland C. Malone, Jr., PO Box 2744, Castro Valley, CA 94546

G:\Oakland 4255 MacArthur\2003 MW Installation\4255Macarthur_WP_Sept03.doc

09/23/03

Boring Location Map



EXPLANATION

MW-6	Proposed monitoring well location (Shell)
MW-1	Shell monitoring well location
TB-1	Destroyed Shell tank backfill well location
MW-1	Tosco monitoring well location
SB-1	Cambria soil boring location (12/98)
D-1	Dispenser soil sampling location (Cambria, 1-2/03)
P-1	Product piping soil sampling location (Cambria, 1-2/03)
TP-1	Tank pit soil sampling location (Cambria, 1-2/03)
	Excavation area (Cambria, 1-2/03)
BH-D	Weiss Associates soil boring location (11/93, 11/94)
S-A	EMCON soil boring location (6/85)

CAMBRIA

Former Shell-branded Service Station
4255 MacArthur Boulevard
Oakland, California
Incident #98995758

FIGURE
1

G:\OAKLAND4255MACARTHUR\FIGURES\SITEPLAN-9-03.AI

ATTACHMENT A

Standard Field Procedures for Soil Borings and Monitoring Wells

CAMBRIA

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.

F:\TEMPLATE\SOPS\WELLS-BORINGS-GW.DOC