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ENVIRONMENTAL PROTECTION
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May 14, 1998

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

Re: **Investigation Work Plan**
Shell Service Station
540 Hegenberger Road
Oakland, California
WIC# 204-5508-5900
Cambria Project# 240-0414-009

Dear Mr. Chan:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria) is submitting this work plan for a subsurface investigation at the site referenced above in response to the April 23, 1998 Alameda County Health Care Services Agency Department of Environmental Health (ACDEH) letter. Our objective is to investigate the extent of hydrocarbons in soil and ground water in the vicinity of the underground storage tanks (USTs) and western dispenser island. A site summary and our proposed scope of work for this investigation are presented below.

SITE HISTORY

Site Description: The site is located at the intersection of Hegenberger Road and Edes Avenue, in a commercially-zoned area in Oakland, California. Highway 880 runs near the southern boundary of the site. The site is an active service station with three gasoline USTs and one diesel UST.

August 1996 Piping Repair: On August 8, 1996, Cambria collected a soil sample beneath the piping at Dispenser 1, located on the northwest dispenser island, which was being repaired (Figure 1). The hydrocarbon concentrations were 3,400 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg), 17 mg/kg benzene, and 720 mg/kg methyl tert-butyl ether (MTBE) in this sample.

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1998 Station Upgrade: In January and February 1998, Paradiso Mechanical of San Leandro, California (Paradiso) added containment underneath the existing dispensers and submersible turbine pumps and Cambria collected soil samples. The highest TPHg and benzene concentrations were detected in soil samples collected from beneath the northwest dispenser island, at 340 mg/kg and 3.7 mg/kg, respectively. During the line tightness test on February 6, 1998, Paradiso discovered a leak in the piping between the USTs and the northwest dispenser island, which was repaired on the same day (Figure 1).

1998 Soil Borings: On March 6, 1998, Cambria installed five soil borings on site. The highest hydrocarbon concentrations were detected in the area of the northwest dispenser island at 3,400 mg/kg TPHg, 39 mg/kg benzene, and 170 mg/kg MTBE in soil at 6.0 feet below ground surface (ft bgs); and 200,000 µg/L TPHg, 11,000 µg/L benzene, and 1,300,000 µg/L MTBE in ground water.

Ground Water Depth: Depth to ground water on site is approximately 6 to 12 ft bgs.

Lithology: The site subsurface consists primarily of silty clay of very low estimated permeability, interbedded with sandy silty clay, silty sand, and silty gravelly sand of low to moderate estimated permeability to the maximum depth explored of 20 ft bgs. Foreign objects, such as pieces of glass and cinders, found in previous borings suggest that approximately the first 6 ft of soil beneath the site is comprised of mainly fill material.

PROPOSED SCOPE OF WORK

To delineate the extent of hydrocarbons in soil and ground water beneath the site, we propose installing three ground water monitoring wells in the vicinity of the western dispenser island and the USTs (Figure 1). In addition, we will advance a soil boring in the vicinity of the site building, and collect a water sample from the tank backfill. Soil and ground water samples will be analyzed for TPHg, BTEX, and MTBE. + TPHd & Semivolatiles(?)

Our scope of work for this investigation includes the following tasks:

Utility Location: Cambria will notify Underground Service Alert (USA) of our drilling activities. USA will have the utilities in the site vicinity identified. Due to proximity of the proposed soil boring to the active USTs and pump islands, we will review available engineering plans for the site, and if necessary, survey the location using a private line locating firm.

Site Health and Safety Plan: We will prepare a site safety plan to protect site workers. The plan will be kept on site at all times and signed by all site workers.

Permits: We will obtain the necessary permits for the installation of the borings and wells from the Alameda County Public Works Agency and the City of Oakland.

Soil Borings: Cambria will drill four soil borings using 8" diameter hollow-stem augers, collecting soil samples at five foot intervals, at lithologic changes, and from just above the water table. We will select soil samples for chemical analysis based on observations of hydrocarbon staining and odor and on the results of field screening with a photo-ionization detector. Because ground water is shallow, we anticipate analyzing only one or two soil samples per boring. We will also collect grab ground water samples from the borings. Our standard field procedures are presented as Attachment A.

Well Construction: The wells will be constructed using 2-inch diameter 0.010-inch slotted PVC and will be screened from 10 ft below to 5 ft above the static water table. The wells will be covered with a traffic-rated vault and a locking well cap. Our standard field procedures are included in Attachment A.

Well Development and Sampling: At least 72 hours after we install the well, we will develop it using consecutive episodes of surge block agitation and well evacuation. Evacuation will continue until at least 10 well-casing volumes of water have been removed and the well purge water is as sediment-free as practical. At least 48 hours after well development, we will purge and sample the new well following our standard field procedures included in Attachment A. Based on the January 31, 1997 San Francisco Bay Regional Water Quality Control Board letter entitled *Utilization of Non-Purge Approach for Sampling of Monitoring Wells Impacted by Petroleum Hydrocarbons, BTEX, and MTBE*, the first ground water monitoring event will include sampling by both purging and non-purging sampling methods. Sampling will include measurements of dissolved oxygen, specific conductance, pH, and temperature prior to and during purging. Provided that no separate-phase hydrocarbons (SPH) are detected in the wells, the wells will be sampled using the non-purge approach for subsequent monitoring events. Any SPH detected in the wells will be manually bailed and returned to the Shell manufacturing facility in Martinez, California for recycling.

Chemical Analyses: The soil and ground water samples will be analyzed for TPHg by modified EPA Method 8015 and for BTEX and MTBE by EPA Method 8020. MTBE in ground water samples will be confirmed by EPA Method 8260.

Additional Analyses: The soil samples collected from the boring in the vicinity of the site building will also be analyzed for dry bulk density, moisture content, porosity, and fraction organic carbon.

Reporting: After we receive the analytical results, we will prepare a subsurface investigation report that, at a minimum, will contain:

- A summary of the site background and history;
- Descriptions of the drilling and soil sampling methods;
- Well and boring logs;
- Tabulated soil and ground water analytical results;
- Analytical reports and chain-of-custody forms;
- Soil and water disposal methods; and,
- A discussion of the hydrocarbon distribution in soil and ground water.

SCHEDULE

Upon receiving written approval of our work plan from ACDEH, Cambria will obtain the necessary permits and commence drilling. We will submit our investigation report approximately four to six weeks after completing the field work.

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CLOSING

We appreciate your continued assistance with this project. Please call if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Maureen D. Feineman
Staff Geologist

Diane Lundquist, P.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
DIANE M. LUNDQUIST
NO. C46725
CIVIL
STATE OF CALIFORNIA

Attachments: A - Standard Field Procedures for Monitoring Well Installation

cc: Mr. A.E. (Alex) Perez, Shell Oil Products Company, P.O. Box 8080, Martinez, CA 94553

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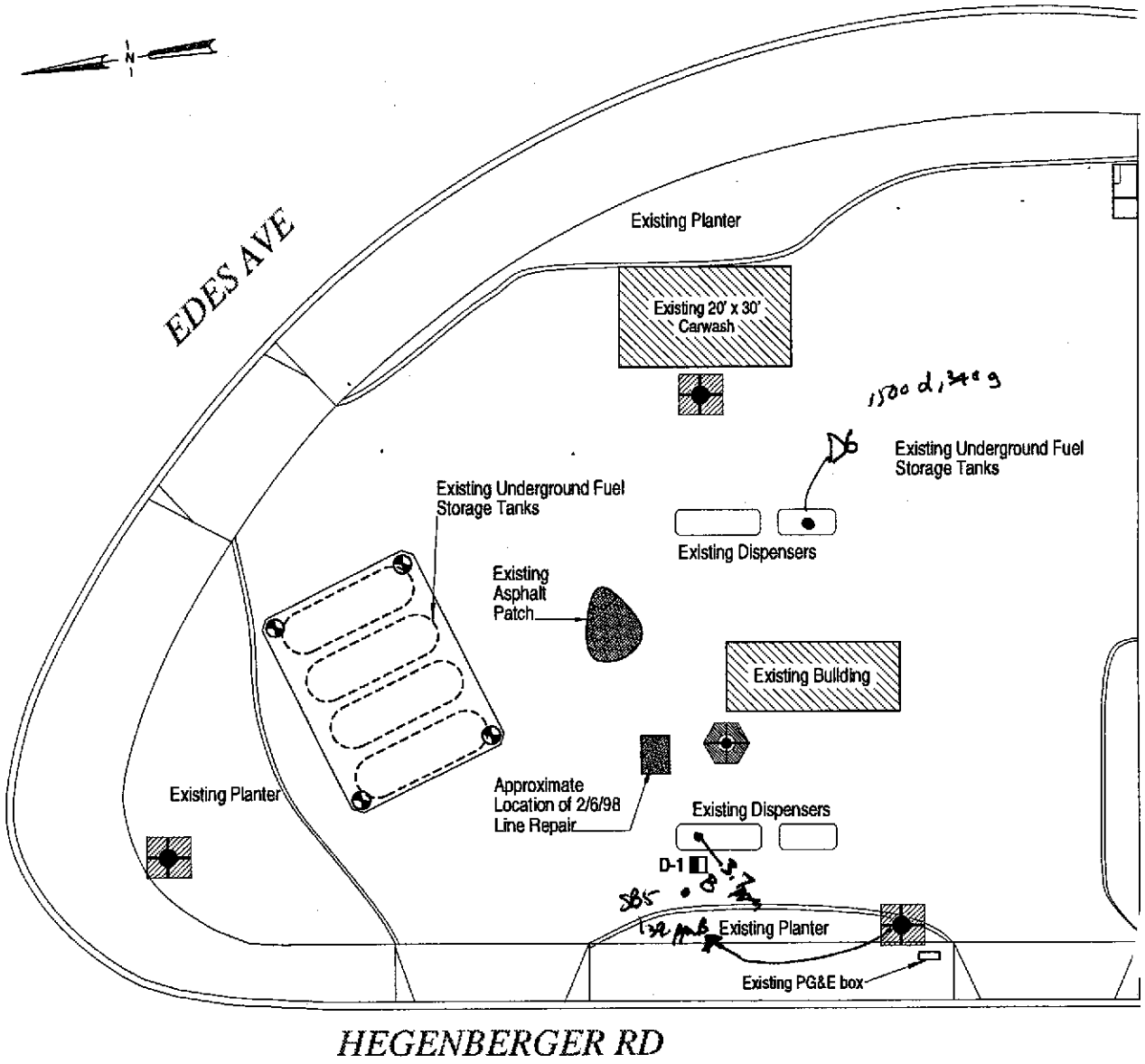

EXPLANATION

- Proposed Ground Water Monitoring Well Location
- Proposed Soil Boring Location
- Existing Underground Storage Tank Backfill Well Location
- D-1 Soil Sample Location

0 15 30

Scale (ft)

Base Map by R.H. Lee & Assoc.

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Shell Service Station
540 Hegenberger Road
Oakland, California

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Proposed Well and Boring Locations Map

FIGURE
1

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Attachment A

Standard Field Procedures for Monitoring Well Installation

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling ground water 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 ground water 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 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. 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

Ground water monitoring wells are installed to monitor ground water quality and determine the ground water elevation, flow direction and gradient. Well depths and screen lengths are based on ground water 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 ground water surging and extraction. Surging agitates the ground water and dislodges fine sediments from the sand pack. After about ten minutes of surging, ground water 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 ground water are extracted and the sediment volume in the ground water 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.

Ground Water Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of ground water are purged prior to sampling. Purging continues until ground water pH, conductivity, and temperature have stabilized. Ground water 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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