Chevron Environmental Management Company
6001 Bollinger Canyon Rd, K2236
P.O. Box 6012
San Ramon, CA 94583-2324
Tel 925-842-9559
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Dana Thurman
Project Manager

RECEIVED
By lopprojectop at 11:31 am, Nov 07, 2005

ChevronTexaco

November 4, 2005
(date)

Alameda County Health Care Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Chevron Service Station # 9-0917

Address: 5280 Hopyard Road, Pleasanton, CA

I have reviewed the attached report titled Investigation Workplan Addendum and dated November 4, 2005.

I agree with the conclusions and recommendations presented in the referenced report. The information in this report is accurate to the best of my knowledge and all local Agency/Regional Board guidelines have been followed. This report was prepared by Cambria Environmental Technology, Inc., upon whose assistance and advice I have relied.

This letter is submitted pursuant to the requirements of California Water Code Section 13267(b)(1) and the regulating implementation entitled Appendix A pertaining thereto.

I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,

Dana Thurman
Project Manager

Enclosure: Report

CAMBRIA

November 4, 2005

Mr. Jerry Wickham
Alameda County Health Care Services (ACHCS)
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: **Investigation Workplan Addendum**
Chevron Service Station #9-0917
5280 Hopyard Road
Pleasanton, California
Fuel Leak Case #RO439

Dear Mr. Wickham:

On behalf of Chevron Environmental Management Company (Chevron), Cambria Environmental Technology, Inc. (Cambria), is submitting this *Investigation Workplan Addendum* for the site referenced above in response to a letter from the Alameda County Environmental Health Services (ACEHS) dated September 23, 2005. Cambria originally proposed advancing three GeoProbe® borings to further define the lateral extent of hydrocarbons in groundwater and assess any possible human health risk. As directed in the letter from ACEHS, Cambria now proposes advancing a total of five borings to define the lateral and vertical extent of hydrocarbons in groundwater and assess human health risk. Cambria additionally proposes completing a conduit study which will be conducted during investigation activities. The site background and Cambria's proposed scope of work are presented below.

SITE BACKGROUND

The site is located at the southern corner of the intersection of Hopyard Road and Owens Drive in Pleasanton, California (Figure 1). The site is an active Chevron branded station with a station building, car wash facility, four underground storage tanks (USTs), and three dispenser islands (Figure 2).

Local topography is flat and the site is approximately 335 feet above mean sea level (msl). The closest surface water is Chabot Canal approximately 250 feet east of the site. The area surrounding the site is primarily commercial.

Site Geology: Site geology consists of generally silty and sandy clay, and clayey sand to the maximum explored depth of 21.5 feet below grade (fbg).

Site Hydrogeology: The Livermore Valley Groundwater Basin is divided into twelve sub-basins based on fault traces and hydrologic discontinuities. The site is located in the Dublin

Cambria Environmental Technology, Inc.

4111 Citrus Avenue
Suite 12
Rocklin, CA 95677
Tel (916) 630-1855
Fax (916) 630-1856

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Sub-Basin (DSB). Regionally, the upper, unconfined groundwater in the DSB generally flows south. Aquifers in the DSB are generally flat lying, but there is a drop in groundwater elevation of approximately 50 feet across the Parks Fault (*Evaluation of Groundwater Resources: Livermore and Sonol Valleys*, Department of the Water Resources Bulletin Number 118-2, June 1974). The Park Fault trends east-northeast approximately 1 mile south of the site (Pacific Environmental Group, Inc., *Soil and Groundwater Investigation*, dated August 11, 1997).

Historically, site groundwater flow direction has been variable. Recent monitoring data indicates a south-southeast flow direction at an approximate gradient between 0.004 to 0.01. Measured depth to groundwater (DTW) at the site ranges between 7.5 and 10 fbg.

PREVIOUS INVESTIGATIONS

August 1989, Monitoring Well Installation: In August 1989, Groundwater Technology, Inc. (GTI) installed three on-site groundwater monitoring wells (MW-1, MW-2, and MW-3). Soil samples from these well borings do not appear to have been submitted for laboratory analysis based on the information supplied by Chevron.

June 1991, UST Replacement and Soil Excavation: In June 1991, Blaine Tech Services, Inc. observed the UST system removal and soil excavation, and collected soil and grab-groundwater samples for chemical analyses. Five fiberglass USTs, consisting of three 10,000-gallon gasoline, one 10,000-gallon diesel, and one 500-gallon used-oil USTs were removed and replaced with four 12,000-gallon double-walled fiberglass gasoline USTs. Total petroleum hydrocarbons as gasoline (TPHg) and benzene were reported in soil samples collected from the bottom of the UST excavation at maximum concentrations of 70 milligrams per kilogram (mg/kg) and 0.64 mg/kg, respectively, at depths of 9.5 fbg to 10 fbg. TPHg and benzene were reported in over-excavation soil samples collected from beneath the fuel product piping at concentrations of 440 mg/kg and 1.1 mg/kg, respectively, at 7 fbg. Total petroleum hydrocarbons as diesel (TPHd) were reported at maximum concentrations of 8.0 mg/kg from 10 fbg in the product piping area. Over-excavation of UST and product piping areas extended to maximum depths of approximately 10 fbg. TPHg and benzene were reported in a grab-groundwater sample collected from the bottom of the UST excavation at concentrations of 24,000 micrograms per liter (µg/L) and 1,000 µg/L, respectively. Depth to water in the excavation was measured at approximately 10 fbg. Approximately 90 cubic yards of soil, not including additional gravel, was removed and approximately 70 cubic yards of soil were removed during product line removal and over-excavation. Additional details are found in Gettler-Ryan's (G-R) *Site Conceptual Model and Closure Request*, dated January 25, 2002.

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July 1991, Monitoring Well Destruction and Well Installation: In July 1991, GTI properly destroyed monitoring wells MW-1 through MW-3, and installed three groundwater monitoring wells (MW-4, MW-5, and MW-6). Based on information provided by Chevron, no soil samples from the well borings were submitted for chemical analyses. Groundwater was encountered in the well borings at a depth of approximately 9 fbg.

May 1997, Monitoring Well Installation: On May 5, 1997, Pacific Environmental Group, Inc. (PEG), installed three off-site groundwater monitoring wells (MW-7, MW-8, and MW-9) to define the extent of petroleum hydrocarbons and methyl tertiary butyl ether (MTBE) in groundwater south of the source area. No TPHg, MTBE, benzene, toluene, ethylbenzene, or xylenes (BTEX) were reported above laboratory detection limits in any soil sample. These compounds were not reported in any of the soil samples. Selected soil samples were sent to Cooper Testing Facilities for physical analysis for moisture, density, porosity, specific gravity, and organic content.

March 1999, Enhanced Bioremediation: Oxygen releasing compound (ORC) socks were installed in wells MW-5 and MW-6 on March 26, 1999, to increase the dissolved oxygen concentrations in groundwater in the areas of known petroleum hydrocarbons to oxidize organic contaminates and enhance biodegradation. A significant decrease in dissolved hydrocarbon concentrations was observed in wells MW-5 and MW-6 after installation of the ORC. A significant decrease in dissolved oxygen (DO) concentrations in wells MW-5 and MW-6 was reported from samples collected from June 19, 2000 to September 18, 2000, suggesting that the ORC socks were spent and oxidation and biodegradation were occurring. DO concentrations stabilized at approximately 3.6 mg/L and 4.3 mg/L in wells MW-5 and MW-6, respectively, for the next five quarters. A second significant decrease in DO was reported from samples collected from September 7, 2001 to December 5, 2001. DO concentrations have stabilized to an average of 1.3 mg/L and 1.4 mg/L in wells MW-5 and MW-6, respectively.

PROPOSED SCOPE OF WORK

To further define the lateral and vertical extent of hydrocarbons in groundwater and assess on-site human health risk, Cambria proposes advancing five soil borings, GP-1 through GP-5 (Figure 2). In accordance with the technical comments from the Alameda County Environmental Health, Cambria proposes that borings GP-1 and GP-2 be advanced into deeper water-bearing zones approximately 45 fbg to 60 fbg. Additionally Cambria proposes completing a conduit study to determine any potential pathways for hydrocarbon migration.

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Underground Utility Location: Cambria will contact Underground Service Alert to clear the well locations with utility companies. All locations will be cleared to 8 fbg by hand auger prior to drilling.

Site Health and Safety Plan: Cambria will prepare a comprehensive site health and safety plan to inform site workers of known hazards and to provide health and safety guidance. The plan will be kept on-site during field activities and signed by each site worker daily.

Permits: Cambria will obtain well permits from the Alameda County Public Works Agency Water Resources Section and any necessary encroachment permits from the City of Pleasanton prior to beginning field operations/sampling. Notice will be given to ACPWA 48 hours prior to beginning of field work.

Soil Borings: All soil borings will be cleared to 10 fbg by hand auger. GP-1 and GP-2 will be advanced to approximately 60 fbg using Cone Penetration Technology (CPT) direct push rig. Borings GP-3 through GP-5 will be advanced five feet below first encountered groundwater, or approximately 15 fbg, using a direct push rig. Soil samples from GP-1 and GP-2 will be collected for chemical analyses at 3 fbg, 5 fbg, and 10 fbg. Soil samples from GP-3 through GP-5 will be collected for chemical analyses at 5 fbg and 10 fbg. Upon completion of each boring, the borings will be grouted to surface with neat Portland cement.

Soil Sample Selection: Soil samples will be selected for chemical analyses based on field screening for hydrocarbon vapors using a photo-ionization detector (PID), visual observation of soil characteristics such as discoloration, sample depth relative to the capillary fringe, and soil-texture considerations.

Groundwater Sample Selection: Grab-groundwater samples will be collected at approximately 5 feet below first encountered water in all borings. Additional depth-discrete grab-groundwater samples will be collected in GP-1 and GP-2. Grab-groundwater sample depths will be based on the appearance of laterally continuous intervals of higher permeability. Standard field procedures for CPT testing and sampling and hand augering are included as Attachment B.

Chemical Analysis: All soil and grab-groundwater samples will be analyzed for:

- TPHg by EPA Method 8015;
- BTEX, MTBE, di-isopropyl ether (DIPE), ethyl tert-butyl ether (ETBE), tert-amyl methyl ether (TAME), tert-butyl alcohol (TBA), and ethanol by EPA Method 8260.

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Soil and Water Disposal/Recycling: Soil and water produced during field activities will be temporarily stored on-site. Soil cuttings will either be stockpiled on plastic and covered with plastic or placed in 55-gallon drums and stored on site. Following review of analytical results, the soil and water will be transported to a Chevron approved facility for disposal/recycling.

Geotracker Upload: Once all of the necessary data is received, the data will be uploaded to the State Water Resources Control Board GeoTracker database as required in sections 2729 and 2729.1 of the California Code of Regulations for UST sites.

Reporting: After the analytical results are received, a subsurface investigation report will be prepared containing:

- A summary of the site background and history;
- Descriptions of the drilling and soil sampling methods;
- Boring logs;
- Tabulated soil and groundwater analytical results;
- A figure illustrating boring locations;
- Analytical reports and chain-of-custody forms;
- A discussion of lateral and vertical extent of hydrocarbons in soil and groundwater;
- A conduit study of the site and vicinity;
- Tabulate well construction details for all site wells;
- Lithologic cross-sections and;
- Cambria's Conclusions and recommendations

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SCHEDULE FOR WORK

Cambria anticipates submitting the investigation report 6 to 8 weeks after drilling. Work will be scheduled upon written approval of this workplan, or 60 days following submittal of this workplan, whichever is less.

Cambria appreciates the opportunity to work with you on this project. Please call Reijo Ratilainen (ext. 113) or David Herzog (ext. 112) at (916)630-1855 if you have any questions or comments.

Sincerely,

Cambria Environmental Technology, Inc.

Reijo Ratilainen
Staff Geologist

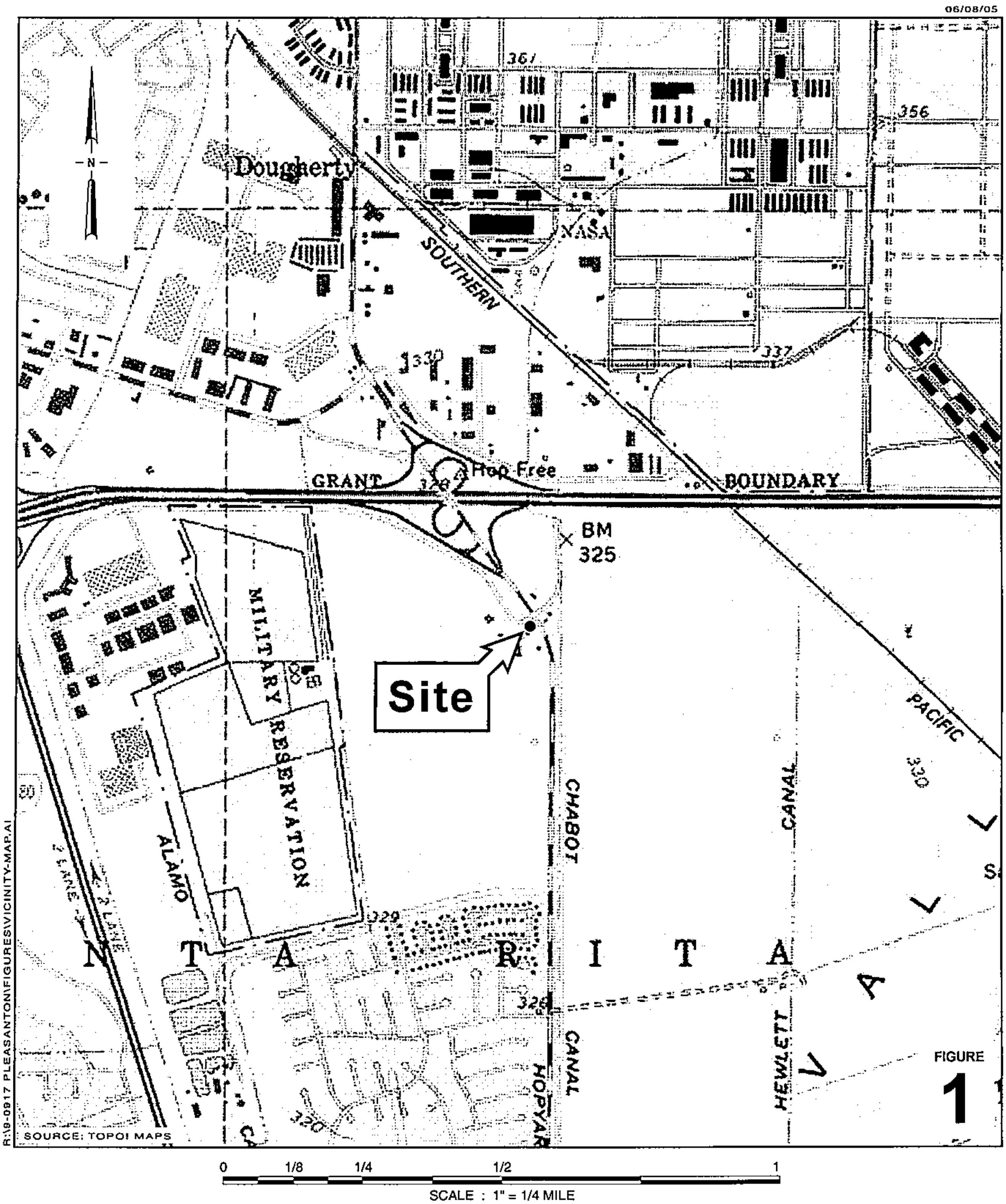
David W. Herzog, P. G. #7211
Senior Project Geologist

PROFESSIONAL GEOLOGIST
DAVID W. HERZOG
No. 7211
STATE OF CALIFORNIA

Figures: 1 – Vicinity Map
2 – Site Plan

Attachments: A – Regulatory Correspondence
B – Standard Field Procedures

cc: Mr. Dana Thurman, Chevron Environmental Management Company, P.O. Box 6012, Room K2236, San Ramon, CA 94583
Mr. Eddie So, RWQCB – San Francisco Bay Region, 1515 Clay Street, Suite 1400, Oakland, CA 94612
Mr. Dan Christopoulos, Christopoulos Properties, 43 Panaramic Way, Walnut Creek, CA 94595
Lamorinda Development and Investment, 89 Davis Road, Suite 160, Orinda, CA 94563
Mr. Bill Hurtido, Accor North America, 4001 International Parkway, Carrollton, TX 75007



Chevron Service Station 9-0917

5280 Hopyard Road

Pleasanton, California

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Vicinity Map

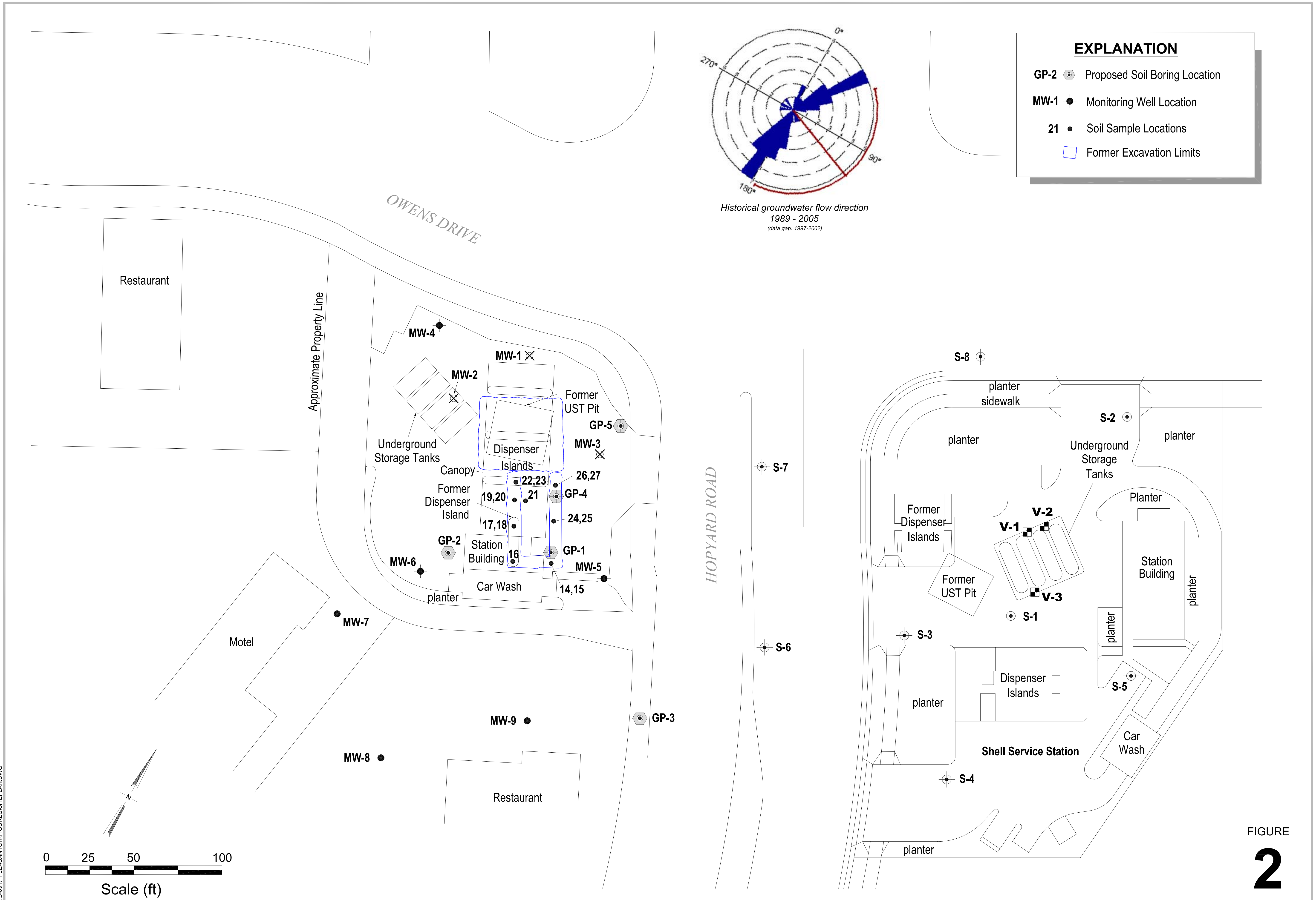

FIGURE
2

Site Plan

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Chevron Service Station 9-0917
5280 Hopyard Road
Pleasanton, California

ATTACHMENT A
Regulatory Correspondence

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

SEP 27 2005

SG

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

September 23, 2005

Mr. Dana Thurman
Chevron Environmental Management Company
6001 Bollinger Canyon Road
P.O. Box 6012
San Ramon, CA 94583-2324

Lamorinda Development and Investment
89 Davis Road, Suite 160
Orinda, CA 94563

C & H Development Company
P.O. Box 7611
San Francisco, CA 94120

Subject: Fuel Leak Case No. RO0000439, Chevron #9-0917, 5280 Hopyard Road, Pleasanton, CA – Work Plan

Dear Mr. Thurman:

I was recently assigned as the new case worker for the above referenced site. Please send future correspondence for this site to my attention. Alameda County Environmental Health (ACEH) staff has reviewed the fuel leak case file for the above-referenced site and the documents entitled, "Request for Reduction in Groundwater Sampling," dated May 3, 2005 and "Investigation Work Plan," dated June 14, 2005. The Work Plan proposes to advance three shallow borings to 15 feet below ground surface to define the lateral extent of petroleum hydrocarbons in groundwater and assess human health risk. Based on our review of the case file and Investigation Work Plan, we request some revisions to the work plan, which are described in the technical comments below. Therefore, we request that you address the technical comments below and submit a revised work plan to ACEH **by November 8, 2005.**

TECHNICAL COMMENTS

1. **Proposed Sampling Locations.** We concur with the proposed sampling locations for borings GP-1, GP-2, and GP-3. However, we request that one additional boring be advanced north of GP-1 along the eastern side of the former piping trench and one additional boring be advanced on the western side of the station building. We request that proposed boring GP-1 and the additional requested boring on the western side of the station building be extended to a sufficient depth to assess whether petroleum hydrocarbons have affected a lower water-bearing zone. Please incorporate this expanded scope of work in the revised Work Plan requested below.

2. **Soil Sampling.** The proposed depths for collecting shallow soil samples are acceptable. In addition, we request that soil samples be collected from the capillary fringe in each boring and from any interval where staining, odor, or elevated photoionization readings are observed. The use of air knife excavation within the upper 8 feet for borehole clearance will affect data quality due to stripping of volatile components during advancement of the air knife boreholes. Analytical results for all soil samples that are collected from shallow intervals

affected by air knife excavation must be clearly marked in subsequent investigation reports as "disturbed." Therefore, the usefulness of these shallow soil samples to assess human health risk is questionable. Please address this issue in the revised Work Plan.

3. **Depth-discrete Groundwater Sampling.** ACEH concurs with the collection of a groundwater sample approximately 5 feet below first encountered groundwater in each of the proposed borings. For the two deeper sampling locations (GP-1 and the additional requested boring on the western side of the station building), we request that a pilot boring with continuous soil sampling or a cone penetrometer boring be used to select intervals for depth-discrete groundwater sampling below first encountered groundwater. Potential water-bearing layers below first encountered groundwater are to be targeted for groundwater sampling in the two deeper borings. Please include plans for depth-discrete groundwater sampling in the revised Work Plan requested below.

4. **Well Construction.** Please include a table of well construction details in all future documents for the site. For all wells on site, the well construction details table is to describe the well diameter, screen slot size, total depth of the boring, depths of the screened interval, depths of the filter pack, and other well construction details that may be relevant.

5. **Conduit Study.** Please evaluate the potential for free product or dissolved fuel hydrocarbons to migrate from the piping trenches to other on-site utility trenches. The location and depth of on-site utility trenches that potentially intersect the fuel piping trenches are to be plotted on a site map. Please include these results in the Soil and Groundwater Investigation Report requested below.

6. **Hydrogeologic Cross Sections.** Please incorporate data from the soil borings into one or more hydrogeologic cross sections that depict the soil layers encountered, all soil and groundwater samples collected in the borings, and analytical results for the samples. Please present the cross sections in the Soil and Groundwater Investigation Report requested below.

7. **Chemical Analysis.** ACEH concurs with the proposed chemical analyses for all soil and groundwater samples.

8. **Reduction in Groundwater Monitoring Frequency.** Wells MW-4, 8, and 9 may be sampled annually rather than quarterly. Wells MW-5, 6, and 7 are to be sampled on a quarterly basis. Please present the results in the Groundwater Monitoring Reports requested below.

TECHNICAL REPORT REQUEST

Please submit technical reports to Alameda County Environmental Health (Attention: Jerry Wickham), according to the following schedule:

- **November 8, 2005** – Revised Work Plan
- **February 15, 2006** - Quarterly Report for the Fourth Quarter 2005

- **120 days after ACEH approval of Revised Work Plan** – Soil and Groundwater Investigation Report

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) now request submission of reports in electronic form. The electronic copy is intended to replace the need for a paper copy and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program FTP site are provided on the attached "Electronic Report Upload Instructions." Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) Geotracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the Geotracker database over the Internet. Beginning July 1, 2005, electronic submittal of a complete copy of all reports is required in Geotracker (in PDF format). Please visit the State Water Resources Control Board for more information on these requirements (http://www.swrcb.ca.gov/ust/cleanup/electronic_reporting).

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

If you have any questions, please call me at (510) 567-6791.

Sincerely,

Jerry Wickham
Hazardous Materials Specialist

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Bill Hurtido
Accor North America
4001 International parkway
Carrollton, TX 75007

David Herzog
Cambria Environmental Technology, Inc.
4111 Citrus Avenue, Suite 12
Rocklin, CA 95677

Donna Drogos, ACEH
Jerry Wickham, ACEH
File

ATTACHMENT B
Standard Field Procedures

STANDARD FIELD PROCEDURES FOR CONE PENETROMETER TESTING AND SAMPLING

This document describes Cambria's standard field methods for Cone Penetrometer Testing (CPT) and direct-push soil and groundwater sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines.

Use of CPT for logging and soil and groundwater sampling requires separate borings. Typically an initial boring is advanced to estimate soil and groundwater characteristics as described below. To collect soil samples a separate boring must be advanced using a soil sampling device. If groundwater samples are collected, another separate boring must be advanced using a groundwater sampling device. Specific field procedures are summarized below.

Cone Penetrometer Testing (CPT)

CPT is performed by a trained geologist or engineer working under the supervision of a California Professional Geologist (PG) or a Certified Engineering Geologist (CEG). CPT is carried out by pushing an integrated electronic piezocone into the subsurface. The piezocone is pushed using a specially designed CPT rig with a force capacity of 20 to 25 tons. The piezocone is capable of recording the following parameters:

Tip Resistance (Qc)
Sleeve Friction (Fs)
Pore Water Pressure (U)
Bulk Soil Resistivity (rho) - with an added module

A compression cone is used for each CPT sounding. Piezocones with rated load capacities of 5, 10 or 20 tons are used depending on soil conditions. The 5 and 10 ton cones have a tip area of 10 sq. cm. and a friction sleeve area of 150 sq. cm. The 20 ton cones have a tip area of 15 sq. cm. and a friction sleeve area of 250 sq. cm. A pore water pressure filter is located directly behind the cone tip. Pore Pressure Dissipation Tests (PPDT) are recorded at 5 second intervals during pauses in penetration. The equilibrium pore water pressure from the dissipation test can be used to identify the depth to groundwater.

The measured parameters are printed simultaneously on a printer and stored on a computer disk for future analysis. All CPTs are carried out in accordance with ASTM D-3441. A complete set of baseline readings is taken prior to each sounding to determine any zero load offsets.

The inferred stratigraphic profile at each CPT location is included on the plotted CPT logs. The stratigraphic interpretations are based on relationships between cone bearing (Qc) and friction ratio (Rf). The friction ratio is a calculated parameter (Fs/Qc) used in conjunction with the cone bearing to identify the soil type. Generally, soft cohesive soils have low cone bearing pressures and high friction ratios. Cohesionless soils (sands) have high cone bearing pressures and low friction ratios. The classification of soils is based on correlations developed by Robertson et al (1986). It is not always possible to clearly identify a soil type based on Qc and Rf alone. Correlation with existing soils information and analysis of pore water pressure measurements should also be used in determining soil type.

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

Soil Sampling

Soil samples obtained with a CPT rig are collected from a soil boring with a piston type soil-sampling device fitted with 1-inch-diameter, 8-inch-long, clean stainless steel sampling tubes. The CPT rig drives the sampling device to the desired sampling depth, then retracts the inner cone tip portion of the sampler and drives the sampling device 10 inches to retrieve the soil sample, and the filled sampler is then retrieved from the boring.

After removal from the sampling device, soil samples for chemical analysis are covered on both ends with teflon sheeting, capped, labeled, and placed in a cooler with ice for preservation to 4°C ± 2°C. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to a California state-certified hazardous material testing laboratory. Samples are selected for chemical analysis based in part on:

a. depth relative to underground storage tanks and existing ground surface
b. depth relative to known or suspected groundwater
c. depth relative to areas of known hydrocarbon impact at the site
d. presence or absence of contaminant migration pathways
e. presence or absence of discoloration or staining
f. presence or absence of obvious gasoline hydrocarbon odors
g. presence or absence of organic vapors detected by headspace analysis

Discrete Groundwater Sampling

Discrete samples of groundwater are collected from a boring using a peristaltic pump or micro-bailer. With the peristaltic pump, new Teflon tubing is placed in the pump prior to collection of each sample. The tubing is lowered into the boring through the CPT drive rod after groundwater has been allowed to collect. The peristaltic pump is used to evacuate water from the boring where it is discharged to laboratory-supplied containers appropriate for the anticipated analyses. With the micro-bailer, the cleaned bailer is lowered through the CPT drive rod into the groundwater. The bailer is allowed to fill, then is brought to the surface where the water is decanted into the sample container.

Following collection of the groundwater sample, the sample bottles are then labeled and placed in chilled storage for transport to the analytical laboratory. A chain-of-custody form is initiated in the field and accompanies the groundwater samples to the analytical laboratory.

Grouting

After the CPT probes are removed, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe, and the surface is finished to match existing material.

STANDARD FIELD PROCEDURES FOR HAND-AUGER SOIL BORINGS

This document describes Cambria Environmental Technology's standard field methods for drilling and sampling soil borings using a hand-auger. 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 Professional Geologist (PG) 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 product saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e. cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Boring and Sampling

Hand-auger borings are typically drilled using a hand-held bucket auger to remove soil to the desired sampling depth. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments beyond the bottom of the augered hole. The vertical location of each soil sample is determined using a tape measure. All sample depths use the ground surface immediately adjacent to the boring as a datum. The horizontal location of each boring is measured in the field from an onsite permanent reference using a measuring wheel or tape measure.

Augering 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 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 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 photoionization detector (PID) measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. PID 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 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.

Duplicates and Blanks

Blind duplicate water samples are collected 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 QA/QC blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

The borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

Waste Handling and Disposal

Soil cuttings from drilling activities are usually stockpiled onsite on top of and covered by plastic sheeting. At least four individual soil samples are collected from the stockpiles for later compositing at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Ground water removed during sampling and/or rinsate generated during decontamination procedures are stored onsite in sealed 55-gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Disposal of the water is based on the analytic results for the well samples. The water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.

11/3/05

F:\TEMPLATE\SOPs\Hand Auger Borings.doc