CAMBRIA

December 20, 2001

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

Re: **Subsurface Investigation Work Plan**
Shell-branded Service Station
350 Grand Avenue
Oakland, California
Incident # 98995755
Cambria Project #241-0715

DEC 28 2001

Dear Mr. Seery:

Cambria Environmental Technology, Inc. (Cambria) is submitting this *Subsurface Investigation Work Plan* on behalf of Equiva Services LLC as recommended in our October 25, 2001 *Third Quarter 2001 Monitoring Report*. The purpose of this work plan is to further define the extent of methyl tertiary butyl ether (MTBE) at the site. Presented below are the site summary and the proposed scope of work.

SITE SUMMARY

Site Description: The site is an active Shell-branded Service Station, located at the northeast corner of the intersection of Grand Avenue and Perkins Street in Oakland, California (Figure 1). Lakeside Park is located at the southwest corner of this intersection. The area surrounding the site consists of mixed commercial and residential properties.

Soil Lithology: The site is underlain by silty and sandy clays to an explored depth of 20 feet below grade (fbg).

Groundwater Flow Direction and Depth: Groundwater generally flows in a southerly direction, as illustrated by the rose diagram shown on Figure 2. Depth to water ranges between 7 and 16 fbg.

1990 Soil Borings: On May 11, 1990, GeoStrategies Inc. of Hayward, California (GSI) drilled five exploratory soil borings with a hollow-stem auger drilling rig. The highest hydrocarbon concentration in soil was in boring B-A, located at the southwest corner of the property in the

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vicinity of the gasoline underground storage tanks (USTs). Levels detected at a depth of 9.5 feet below ground surface (fbg) in this area were 2,900 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg), 2,400 ppm total petroleum hydrocarbons as diesel (TPHd), and 13 ppm benzene.

1991 Monitoring Well Installation: On January 7, 1991, GSI installed three monitoring wells at the site (Figure 2). The highest hydrocarbon concentrations in soil and groundwater were in well S-2, located at the southwest corner of the property in the vicinity of the gasoline USTs. Detected levels were 440 ppm TPHg, 360 ppm TPHd, and 4.5 ppm benzene in soil at 8.5 fbg; and 2,500 parts per billion (ppb) TPHg, 1,200 ppb TPHd, and 550 ppb benzene in groundwater. No TPHg, TPHd, or benzene was detected in the groundwater sample from well S-1.

1993 Hydropunch Borings: On January 27, 1993, GSI installed three hydropunch borings off site (Figure 2). The highest hydrocarbon concentrations were detected in boring HP-1, located crossgradient of the USTs. Maximum concentrations in that boring were 1,500 ppm TPHg, 18 ppm TPHd, and 0.11 ppm benzene in soil at 6.5 fbg; and 22,000 ppb TPHg, 14,000 ppb TPHd, and 2,500 ppb benzene in groundwater. TPHg and benzene were not detected in soil and groundwater samples from borings HP-2 and HP-3, located downgradient of the USTs.

1996 Tank Removal: On April 22, 1996, Weiss Associates of Emeryville, California (WA) observed the removal of three 10,000-gallon gasoline USTs and one 10,000-gallon diesel UST and collected soil samples. Up to 4,800 ppm TPHg, 2,800 ppm TPHd, and 22 ppm benzene were detected in samples collected from the UST excavation, product piping trenches, and beneath the product dispensers.

1998 Potential Receptor Survey: In April 1998, Cambria identified wells and surface water bodies within a 1/2 mile radius of the site. Three water producing wells are located between 2,640 feet and 3,960 feet crossgradient of the site. Lake Merritt is located approximately 900 feet downgradient of the site. The results of the potential receptor survey were presented to the Alameda County Health Care Services Agency (ACHCSA) in Cambria's May 31, 1998 *MTBE Investigation Report*.

1998 Geoprobe Well Installation: On April 16, 1998, Cambria installed two ¾-inch diameter pre-packed wells within the Grand Avenue right-of-way, downgradient of the site. No TPHg, benzene, toluene, ethylbenzene, or xylenes (BTEX), or MTBE were detected in soil or groundwater in the borings.

1999 Geoprobe Boring Installation: In March 1999, Cambria installed three Geoprobe borings to evaluate whether utility conduit trenches serve as preferential pathways for the migration of

impacted groundwater. Two borings (HP-4 and HP-5) were advanced within the sanitary sewer conduit trench along the north sidewalk on Grand Ave, and the third boring (HP-6) was advanced within Perkins Street. The maximum TPHg concentration detected in soil was 408 ppm in soil sample HP-4-10. The maximum MTBE concentration reported in soil (by EPA Method 8020) was 2.52 ppb in soil sample HP-4-10. Grab groundwater samples collected from HP-4 contained 100,000 ppb TPHg, 83,000 ppb TPHd, and 2,000 ppb MTBE (by EPA Method 8020). Grab groundwater samples from HP-5, near the diesel UST complex, contained 160 ppb TPHg. TPHg, BTEX, and MTBE were below detection limits in grab groundwater samples from HP-5 and HP-6.

2001 Dual-Phase Vapor Extraction (DVE) Pilot Test: In June 2001, Cambria conducted an 8-hour DVE pilot test on groundwater monitoring well S-2. DVE is the process of applying high vacuum through an airtight well seal to simultaneously extract soil vapors from the vadose zone and enhance groundwater extraction from the saturated zone. Approximately 50 gallons of groundwater were extracted during the 8-hour test. This data is consistent with the low permeability soil (sandy silt and silt) encountered at this site. Estimated mass removal through groundwater extraction of TPHg, benzene and MTBE was 0.008 pounds, 0.0004 pounds and 0.009 pounds, respectively. Estimated mass removal through vapor extraction of TPHg, benzene and MTBE was 2.44 pounds, 0.002 pounds and 0.005 pounds, respectively. Based on this data, DVE from monitoring well S-2 does not appear to effectively recover hydrocarbons and MTBE from the subsurface.

PROPOSED SCOPE OF WORK

Previous groundwater monitoring results at the site indicate that the highest hydrocarbon and MTBE concentrations are located in the vicinity of the USTs at the site. In order to better define the source area, Cambria recommends installing wells in the tank backfill material (pea gravel) in the southeastern and southwestern corners of the USTs. Not only will the tank backfill wells provide further plume definition, but these wells are also an effective remediation tool for both groundwater and vapor extraction, depending on total depth. In addition to the tank backfill wells, Cambria also proposes to install one soil boring downgradient of the western-most dispenser island at the approximate location shown on Figure 2. Our scope of work for this investigation will include the following tasks:

Utility Location: Cambria will notify Underground Service Alert (USA) of our drilling activities. USA will identify utilities in the site vicinity. Due to the proximity to product piping at the site, Cambria will also attempt to obtain as-built diagrams of the UST piping.

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

Permits: We will obtain the required permits for boring and tank backfill well installation from ACHCSA.

Soil Boring: Assuming the absence of subsurface and overhead obstructions, Cambria will advance one soil boring in the approximate location shown on Figure 2 using a Geoprobe rig. The boring will be advanced to approximately 15 fbg. Soil samples will be collected at 5-foot intervals and in the capillary fringe zone, and a grab groundwater sample will be collected at first encountered groundwater. All collected soil and grab groundwater samples will be transported to a State-approved analytical laboratory. Our standard field procedures for soil borings are included as Attachment A.

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

Tank Backfill Well Installation: The tank backfill wells will be installed using a vacuum truck to advance a temporary 12-inch diameter conductor casing. In this procedure, the tank backfill material is vacuumed from the bottom of the conductor casing as it is pushed downward. When the guide casing has been advanced to total depth (approximately 12 fbg), a 4-inch diameter PVC well casing will be installed. The guide casing will then be removed and the pea gravel of the tank pit will be allowed to collapse around the casing to provide filter pack. The two proposed tank backfill wells will be screened from approximately 5 to 12 fbg with 0.020-inch machined slots. A traffic-rated vault-box will be installed to protect the wells.

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

- A summary of the site background and history;
- Descriptions of the soil boring installation and sampling methods;
- Boring and well logs;
- Tabulated soil and grab groundwater analytical results;
- Analytical reports and chain-of-custody forms;
- Descriptions of tank backfill well installations; and
- Cambria's conclusions and recommendations.

Schedule: Upon receiving written work plan approval, permits will be acquired and the field activities will be scheduled. An investigation report will be submitted approximately 60 days after completing the field activities.

CLOSING

Please call Jacquelyn Jones at (510) 420-3316 if you have any questions or comments. Thank you for your assistance.

Sincerely,
Cambria Environmental Technology, Inc.

Jacquelyn L. Jones
Project Geologist

Stephan Bork, C.E.G., C.HG.
Associate Hydrogeologist

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STEPHAN A. BORK
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Figures 1 - Vicinity/Area Well Survey Map
2 - Proposed Boring and Tank Backfill Well Locations

Attachment: A - Standard Field Procedures for Soil Borings

cc: Karen Petryna, Equiva Services LLC, P.O. Box 7869, Burbank, California 91510-7869
Gursharnjeet Cheema, 1060 St. Raphael Drive, Bay Point, CA 94565

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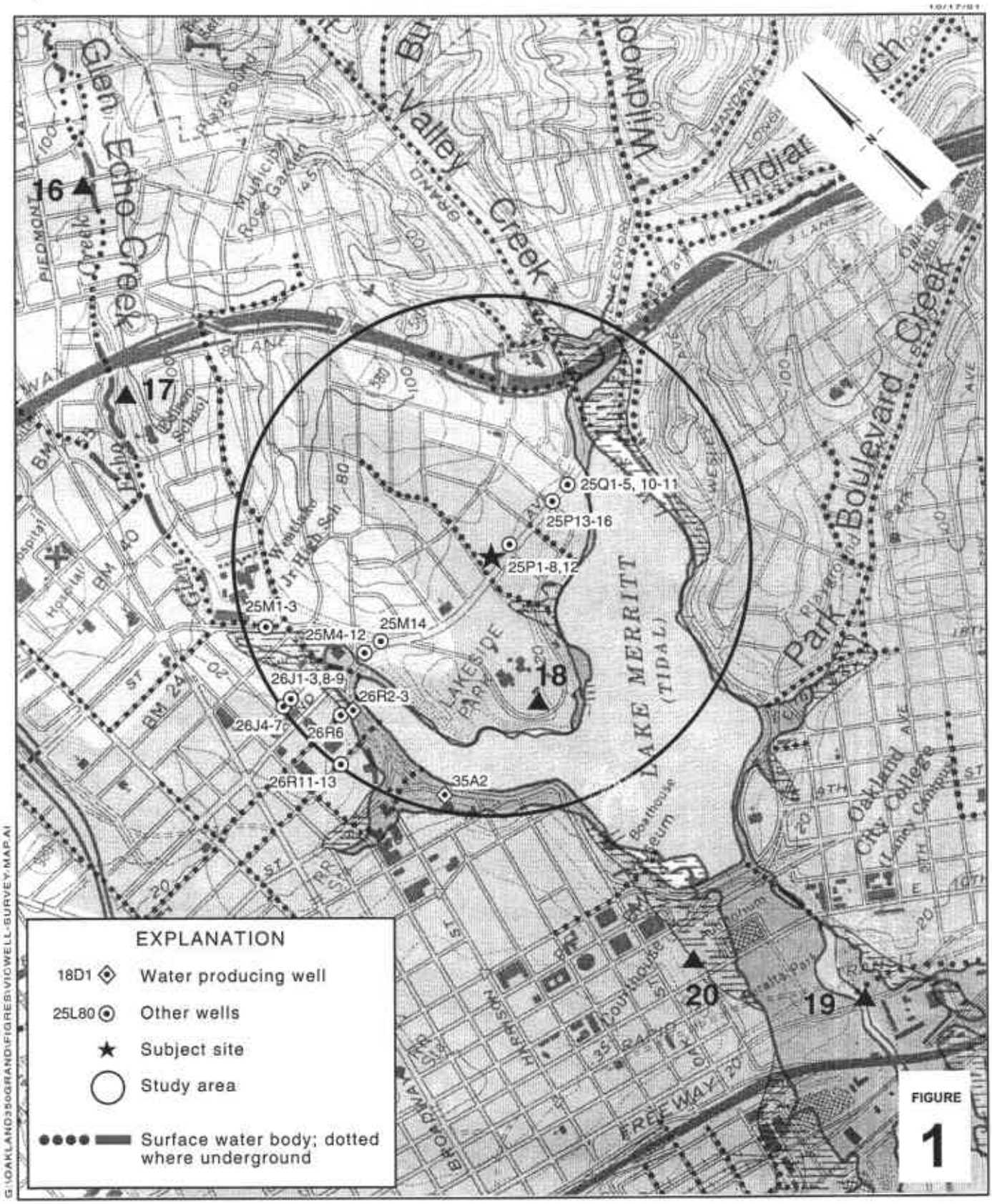

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Vicinity / Area Well Survey Map

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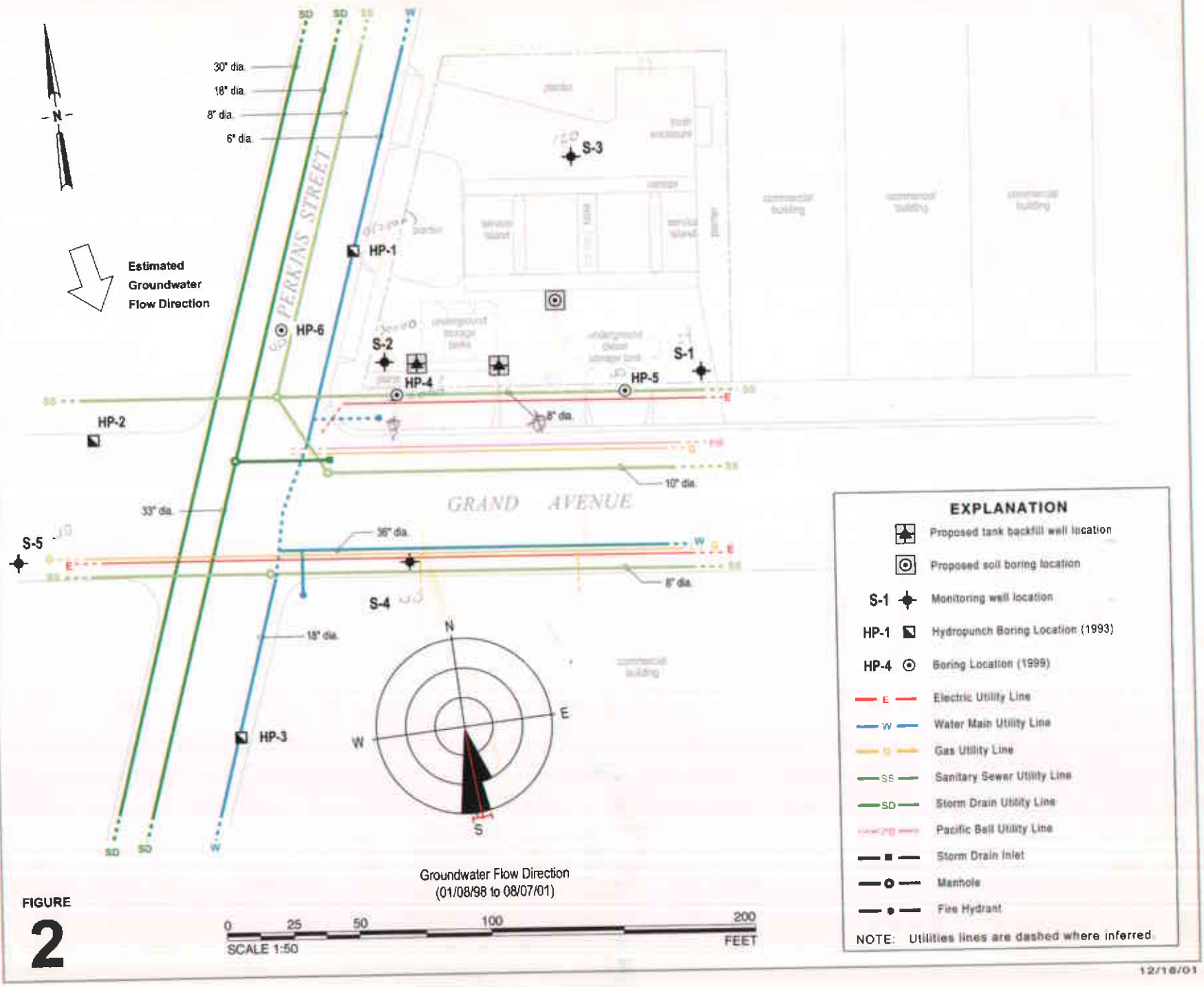
Proposed Soil Boring and Tank Backfill Well Locations



FIGURE
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ATTACHMENT A

Standard Field Procedures for Soil boring

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STANDARD FIELD PROCEDURES FOR SOIL BORINGS

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

Objectives

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

Soil Classification/Logging

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

- Principal and secondary grain size category (i.e. sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or 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

Soil borings are typically drilled using hollow-stem augers or hydraulic push technologies. At least one and one half ft of the soil column is collected for every five ft of drilled depth. 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 beyond the bottom of the borehole. The vertical location of each soil sample is determined by measuring the distance from the middle of the soil sample tube to the end of the drive rod used to advance the split barrel sampler. 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.

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 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 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.

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

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.

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.

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