CAMBRIA

November 18, 1998

Mr. Scott Seery
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Conduit Study Report**
Shell-branded Service Station
350 Grand Avenue
Oakland, California
WIC #204-5510-0204
Cambria Project #240-0715-012

Dear Mr. Seery:

Cambria Environmental Technology, Inc. (Cambria) on behalf of Equiva Services LLC (Equiva), has prepared this Conduit Study Report as described in Cambria's *Conduit Study Work Plan* dated July 27, 1998 and approved in an Alameda County Department of Environmental Health (ACDEH) letter dated August 4, 1998. Our objective was to investigate the location of underground utilities and local drainage systems which may present preferential pathways for the migration of ground water in this area. The site history, investigation procedures, and results are presented below.

SITE HISTORY

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 is mixed commercial and residential.

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 S-A, located at the southwest corner of the property in the vicinity of the gasoline underground storage tanks (USTs). Levels detected at a depth of 9.5 feet below ground surface (ft bgs) in this area were 2,900 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg), 2,400 mg/kg total petroleum hydrocarbons as diesel (TPHd), and 13 mg/kg benzene.

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1991 Monitoring Well Installation: On January 7, 1991, GSI installed three monitoring wells at the site (Figure 1). The highest hydrocarbon concentrations in soil and ground water were in well S-2, located at the southwest corner of the property in the vicinity of the gasoline USTs. Detected levels were 440 mg/kg TPHg, 360 mg/kg TPHd, and 4.5 mg/kg benzene in soil at 8.5 ft bgs; and 2,500 micrograms per liter (μg/L) TPHg, 1,200 μg/L TPHd, and 550 μg/L benzene in ground water. No TPHg, TPHd, or benzene were detected in the ground water sample from well S-1.

1993 Hydropunch Borings: On January 27, 1993, GSI installed three hydropunch borings off site (Figure 1). The highest hydrocarbon concentrations were detected in boring HP-1, located cross gradient of the USTs. Levels were 1,500 mg/kg TPHg, 18 mg/kg TPHd, and 0.11 mg/kg benzene in soil at 6.5 ft bgs; and 22,000 μg/L TPHg, 14,000 μg/L TPHd, and 2,500 μg/L benzene in ground water. TPHg and benzene were not detected in soil and ground water samples from borings HP-2 and HP-3, located down gradient 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 mg/kg TPHg, 2,800 mg/kg TPHd, and 22 mg/kg 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 one-half mile radius of the site. Three water producing wells are located between three-quarters and one-half mile cross gradient of the site. Lake Merritt is located approximately one-eighth of a mile down gradient of the site, and several underground creeks are located in the survey area. The results of the potential receptor survey were presented to the ACDEH in Cambria's May 31, 1998 *MTBE Investigation Report.*

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

Ground Water Monitoring Program: The three onsite ground water wells have been monitored since January 1991. At the time of the last monitoring event on July 17, 1998, the highest hydrocarbon concentrations were detected in well S-2 at 19,000 μg/L TPHg, 12,000 μg/L TPHd, 1,700 μg/L benzene, and 13,000 μg/L MTBE.

INVESTIGATION PROCEDURES AND RESULTS

Cambria's objective was to evaluate possible preferential pathways for ground water migration. Presented below are a summary of the underground utilities, water, storm drain and sanitary sewer locations and a discussion of possible preferential pathways in the site vicinity.

Utility Location: Cambria contacted Underground Service Alert (USA) to have the utilities near the site vicinity identified. In addition, Cambria contracted a private utility locator to locate utilities, after which Cambria conducted a site visit to verify utility locations. Private utility locations are shown on Figure 1.

Water, Storm Drain, and Sanitary Sewer Location: Cambria contacted the City of Oakland and reviewed city maps and records for Grand Avenue and Perkins Street, adjacent to the site. Research included identifying location, depth, and construction of water, storm drain, and sanitary sewer conduits. All water, storm drain and sanitary sewer locations are shown on Figure 1. Following is a summary of the primary conduits near the site.

Two underground storm drains run north to south along Perkins Street, both of which are graded to flow towards the south. The diameter of the west storm drain within Perkins Street is 30 inches (in) and the diameter for east storm drain is 18 in. The known depth of the west storm drain is 11.77 ft bgs at the manhole near the intersection of Perkins Street and Grand Avenue. The depth of the east storm drain is assumed to be 8-10 ft bgs, as this is a smaller diameter conduit than the west storm drain. Actual depth of the east storm drain was not determined.

8-in diameter sanitary sewer conduits run along the west and south sides of the site within Perkins Street and Grand Avenue. A 10-in diameter sanitary sewer is located south of the site within Grand Avenue. The Perkins Street sanitary sewer and the 8-in Grand Avenue sanitary sewer intersect at a depth of 8.67 ft bgs near the intersection of Perkins and Grand. The depth of the 10-in Grand Avenue sanitary sewer is 8.97 ft bgs near the intersection of Perkins and Grand. The Perkins Street sanitary sewer flows south and the Grand Avenue sewers are graded to flow east.

The water main conduits run along Perkins Street and Grand Avenue. The water main located in Perkins Street is a 6-in diameter conduit. The water main located within Grand Avenue is a 36-in diameter conduit. The depths of the water main trenches are assumed to be 3 - 5 ft bgs.

Watershed Map Review: Cambria reviewed the *Watershed Map of the Oakland-Berkeley Area* for buried creeks, underground culverts, storm drains, and engineered channels. Lake Merritt is located approximately one-eighth of a mile down gradient of the site. The two underground storm drain conduits running north to south along Perkins Street appear to terminate at Lake Merritt.

CONCLUSIONS

Based on the findings of this conduit study, potential preferential pathways for the migration of ground water appear to present in the vicinity of the site. However, it is unlikely that the nearest receptor, Lake Merritt, is being impacted from ground water emanating from the site. The sanitary sewer conduit trenches, located in the down gradient direction to the south of the site, are the deepest trenches in closest proximity to the site and would likely have the greatest potential as a preferential pathway for ground water to flow. However, these sanitary sewer trenches are graded to flow east, away from Lake Merritt.

It is unlikely that the storm drain conduits located within Perkins Street are acting as a preferential pathway for the migration of ground water emanating from the site. Both storm drain lines are located west of the site in a historically cross gradient ground water direction. Ground water historically flows south to southeast from the site. Also, the proximity of the sanitary sewer trenches discussed above may divert ground water to the east in the direction the sewer trenches are graded.

Additionally, analysis of soil and ground water samples from hydropunch HP-3 provides further evidence that preferential pathway migration towards Lake Merritt is not occurring. This boring was located in close proximity to the water line trench, which runs adjacent to and south from the site, no TPHg or benzene were detected in soil or ground water samples collected from this boring.

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RECOMMENDATIONS

Cambria proposes to conduct another phase of soil and ground water investigation to evaluate potential migration of petroleum hydrocarbons and MTBE in the sanitary sewer trench located south of the site. Three soil borings will be completed down gradient of the site within 5 feet (ft)of the sanitary sewer trench and spaced 100 feet apart (Figure 1). Following is a summary of the specific scope of work proposed.

lower

Soil Borings: Cambria proposes using a Geoprobe® direct-push rig to drive the three soil borings. The proposed borings shown on Figure 1 are subject to review for subsurface and overhead obstructions. Each of the proposed borings (B-1, B-2, and B-3) will be driven and sampled to a depth of 15 feet. Soil samples will be collected in each boring at 5 foot intervals and one grab ground water sample will be collected from each boring. Cambria's Standard Field Procedures for the Geoprobe® are included as Attachment C.

Chemical Analysis: Soil and ground waters samples will be analyzed for TPHg and TPHd by modified EPA Method 8015; and benzene, toluene, ethylbenzene, and xylenes (BTEX) and MTBE by EPA Method 8020;

Schedule: Upon written approval of our recommendations, Cambria will begin permitting and pre-field activities for the Geo-probe investigation.

CLOSING

We appreciate your continued assistance with this project. Please contact Darryk Ataide at (510) 420-3339 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

D. Ataide

Darryk Ataide
Project Environmental Scientist

Diane M. Lundquist, P.E.
Principal Engineer

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Underground Utility and Proposed Boring Locations

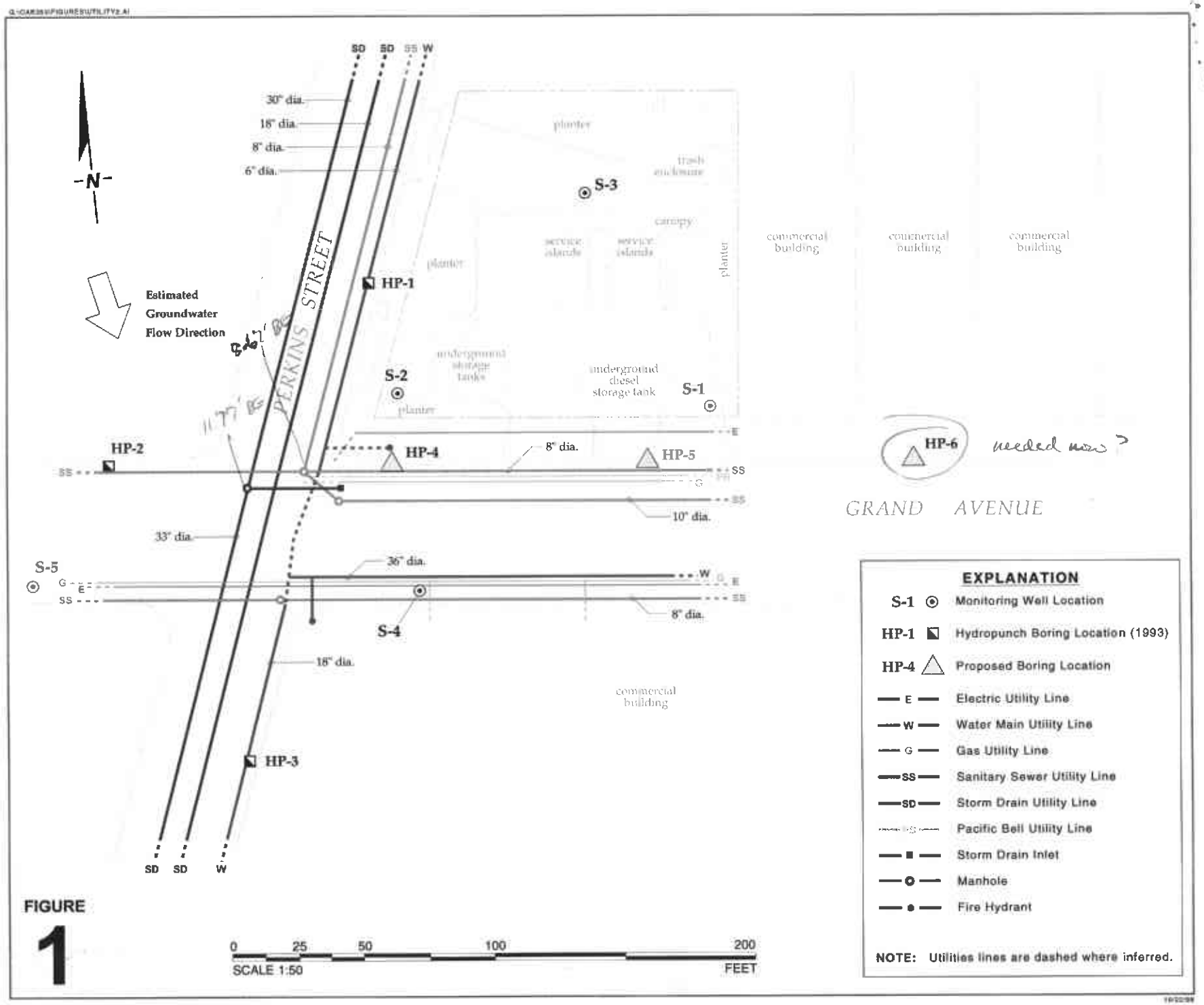

FIGURE 1

EXPLANATION

- S-1 — Monitoring Well Location
- HP-1 — Hydropunch Boring Location (1993)
- HP-4 — Proposed Boring Location
- E — Electric Utility Line
- W — Water Main Utility Line
- G — Gas Utility Line
- SS — Sanitary Sewer Utility Line
- SD — Storm Drain Utility Line
- Pacific Bell Utility Line
- Storm Drain Inlet
- Manhole
- Fire Hydrant

NOTE: Utilities lines are dashed where inferred.