CONESTOGA-ROVERS & ASSOCIATES

5900 Hollis Street, Suite A
Emeryville, California 94608
Telephone: (510) 420-0700 Fax: (510) 420-9170
www.CRAworld.com

TRANSMITTAL

DATE: February 25, 2009

REFERENCE NO.: 240897

PROJECT NAME: 4411 Foothill Boulevard, Oakland

TO: Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RECEIVED
10:55 am, Feb 27, 2009
Alameda County
Environmental Health

Please find enclosed:
- ☐ Draft
- ☐ Originals
- ☐ Prints
- ☒ Final
- ☐ Other

Sent via:
- ☐ Mail
- ☐ Overnight Courier
- ☐ Same Day Courier
- ☒ Other Geotracker and Alameda County FTP

QUANTITY	DESCRIPTION
1	Sub-Slab Soil Vapor Probe Installation and Soil Vapor Sampling Work Plan

- ☐ As Requested
- ☐ For Your Use
- ☒ For Review and Comment
- ☐
- ☐

COMMENTS:
If you have any questions regarding the contents of this document, please call Peter Schaefer at (510) 420-3319.

Copy to: Denis Brown
Bill Phua

Completed by: Peter Schaefer [Please Print]

Signed: Aubrey Cool

Filing: **Correspondence File**

Denis L. Brown
Shell Oil Products US
HSE – Environmental Services
20945 S. Wilmington Ave.
Carson, CA 90810-1039
Tel (707) 865 0251
Fax (707) 865 2542
Email denis.l.brown@shell.com

Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: Former Shell Service Station
4411 Foothill Boulevard
Oakland, California
SAP Code 135686
Incident No. 98995746
Agency Site No. RO0000415

Dear Mr. Wickham:

The attached document is provided for your review and comment. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

If you have any questions or concerns, please call me at (707) 865-0251.

Sincerely,

Denis L. Brown
Project Manager

SUB-SLAB SOIL VAPOR PROBE INSTALLATION AND SOIL VAPOR SAMPLING WORK PLAN

FORMER SHELL SERVICE STATION
4411 FOOTHILL BOULEVARD
OAKLAND, CALIFORNIA

SAP CODE	135686
INCIDENT NO.	98995746
AGENCY NO.	RO0000415

Prepared by:
Conestoga-Rovers & Associates

5900 Hollis Street, Suite A
Emeryville, California
U.S.A. 94608

Office: (510) 420-0700
Fax: (510) 420-9170

web: http:\\www.CRAworld.com

FEBRUARY 25, 2009
REF. NO. 240897 (3)
This report is printed on recycled paper.

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF APPENDICES

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) to propose sub-slab soil vapor sampling and soil vapor probe sampling as requested in Alameda County Health Care Services Agency's (ACHCSA's) December 19, 2008 letter.

The site is a former Shell service station located on the southern corner of the intersection of Foothill Boulevard and High Street in Oakland, California (Figure 1). The former station layout included three first-generation underground storage tanks (USTs) (1958 to 1971), three second-generation USTs (1971 to 1984), three third-generation gasoline USTs (1984 to 2002), a waste oil UST (removed 1992), and four product dispensers (Figure 2). Land use in the vicinity of the site is a mix of commercial and residential, with gasoline service stations occupying the northern and western corners of the intersection. The subject property is currently developed as a strip mall with a variety of commercial and retail uses.

A summary of previous work performed at the site and additional background information is contained in Appendix A.

2.0 SUB-SLAB SOIL VAPOR PROBE INSTALLATION

CRA proposes to install two soil vapor probes beneath the slab of the current buildings as shown on Figure 2. Data from this investigation will provide better understanding of overall site conditions and assist in development of a risk assessment. Specific tasks are described below.

2.1 PERMITS

CRA will obtain boring permits to install the soil vapor probes from the Alameda County Public Works Agency (ACPWA).

2.2 HEALTH AND SAFETY PLAN (HASP)

CRA will prepare a HASP to protect site workers. The plan will be kept on site during field activities and will be reviewed and signed by each site worker.

2.3 UTILITY CLEARANCE

CRA will mark the proposed probe locations, and the locations will be cleared by Underground Service Alert and a private utility locator service prior to drilling.

2.4 PROBE INSTALLATION

To further assess soil vapor concentrations beneath the site, CRA proposes to install two soil vapor probes (SSV-1 and SSV-2) into the subsurface beneath the laundromat's building footprint (Figure 2). SSV-1 is to be installed above the former third-generation USTs, and SSV-2 is to be installed in the vicinity of the former dispenser islands.

A rotary hammer drill will be used to drill a "shallow" (approximately 1-inch deep) outer borehole (approximately 7/8-inch diameter) that partially penetrates the floor slab. Cuttings will be removed using a towel moistened with distilled water or portable vacuum cleaner.

The rotary hammer drill will then be used to drill a smaller diameter inner borehole, within the center of the outer borehole, approximately 3/8-inch diameter through the

floor material and approximately 3 inches into the sub-slab bedding material to create an open cavity. The outer borehole will be cleaned a second time with a moistened towel or portable vacuum cleaner.

Stainless steel tubing will be cut to a length that allows the probe to float within the slab thickness to avoid obstruction of the probe with sub-slab bedding material. The tubing will be approximately 1/4-inch diameter. Where necessary, the compression fittings will be stainless steel (approximately 1/4-inch outside diameter and 1/8-inch National Pipe Thread) Swagelok® female thread connectors. The probes will be constructed prior to drilling to minimize exposure time, or venting, of the sub-slab bedding material through the open borehole.

Each sub-slab soil gas probe will be placed in the borehole so that the top of the probe is flush with the top of the floor. The top of the probe will have a recessed stainless steel plug. A quick-drying, portland cement slurry will be injected or pushed into the annular space between the probe and the outer borehole. The cement will be allowed to dry for at least 24 hours prior to sampling.

3.0 SOIL VAPOR PROBE SAMPLING

Following the sub-slab vapor probe installation, CRA will sample the two sub-slab probes (SSV-1 and SSV-2) and six of the 11 existing soil vapor probes (V-1 through V-6).

3.1 SUB-SLAB VAPOR PROBE SAMPLING

Sub-slab soil vapor sampling and leak testing will be performed following Department of Toxic Substances Control's January 28, 2003 *Advisory-Active Soil Gas Investigation* guidelines.

During sampling, the stainless steel tubing for each sub-slab vapor probe will be connected to a control valve, and then to a flow regulator attached to a lab-supplied sampling manifold connecting two 1-liter summa canisters (one purge canister and one sampling canister) with flow regulators and pressure gauges. Prior to sampling, a vacuum test will be conducted between the summa canisters, the sampling manifold, and the valves by closing the valves and opening the purge summa canister for approximately 10 minutes. Additionally, CRA will conduct a leak test using helium, as discussed below. At least three tubing volumes of air will be purged into the purge canister prior to sampling. Immediately after purging, soil vapor samples will be collected using the second 1-liter Summa canister. Each sample will be labeled, documented on a chain-of-custody, and submitted to a California State-Certified laboratory for analysis.

3.2 SUB-SLAB VAPOR PROBE LEAK TESTING

To check the system for leaks, a containment unit (or shroud) will be placed to cover the soil gas probe surface casing and sampling manifold. Prior to soil gas probe purging, helium will be introduced into the containment unit to obtain a minimum 50 percent helium content level. The helium content within the containment unit will be confirmed using a helium meter. The helium meter readings will be recorded in CRA's field notes. Helium will continue to be introduced to the containment unit during soil gas probe purging and sampling.

All samples will be analyzed in a laboratory for helium. In the event that the helium meter measures a helium content of greater than 10 percent of the source concentration (i.e., 10 percent of the helium content measured within the containment unit), the soil gas sample will be considered invalid.

3.3 SOIL VAPOR PROBE SAMPLING

Sampling of soil vapor probes V-1 through V-6 will be performed using a vacuum pump and Tedlar bags. Prior to sampling, the probes will be purged of at least three tubing volumes of air using a vacuum pump. A sealed "lung sampler" containing a 1-liter Tedlar bag will be attached to the probe and the vacuum pump will be attached to the box. The vacuum pump will lower the pressure in the "lung sampler" and draw air from the probe into the Tedlar bag. To avoid breakage, bags will be filled no more than two-thirds full. Each sample will be labeled, documented on a chain-of-custody, placed in a protective box at room temperature, and submitted to a California State-Certified laboratory for analysis.

3.4 CHEMICAL ANALYSES

Vapor samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes by EPA Method TO-15. In addition, samples from the sub-slab vapor probes will be analyzed for helium by ASTM D 1946 (M).

4.0 REPORT PREPARATION

Following installation and sampling of the soil vapor probes, CRA will submit a report documenting the installation activities and sampling results.

Results of vapor analyses will be used for evaluation of environmental risks at the site. Risk associated with reported levels of soil vapors will be quantified. The evaluation of risks will be summarized in a separate document and submitted under separate cover.

5.0 SCHEDULE

CRA will implement the sub-slab soil vapor probe installation activities upon approval of this work plan by the ACHCSA and receipt of a drilling permit from ACPWA.

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

for:

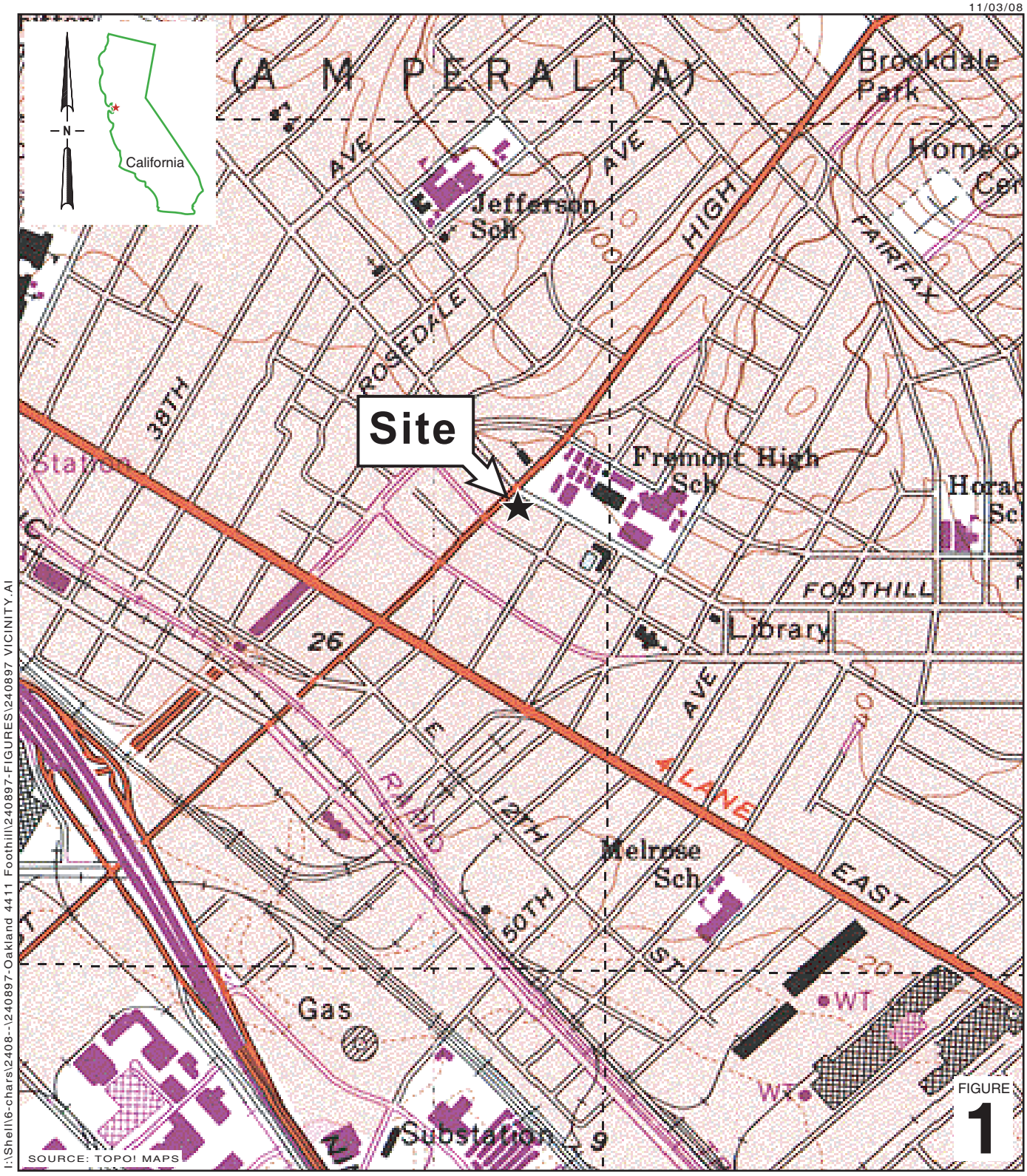
Peter Schaefer, CEG, CHG

Aubrey K. Cool

Aubrey K. Cool, PG

FIGURES

11/03/08



I:\Shell\6-chars\2408--\240897-Oakland 4411 Foothill\240897-FIGURES\240897 VICINITY.AI

FIGURE 1

0 1/6 1/3 1/2 1

SCALE : 1" = 1/6 MILE

Former Shell Service Station
4411 Foothill Boulevard
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

11/03/08

Site Plan

EXPLANATION

- SSV-1 — Proposed sub-slab soil vapor probes
- V-12 — Proposed soil vapor probe
- S-10 — Proposed monitoring well location
- S-6 — Monitoring well location
- S-1 — Destroyed monitoring well location
- BW-A — Destroyed tank backfill well location
- Electrical line (E)
- Telecommunications line (T)
- Gas line (GAS)
- Water line (W)
- Sanitary Sewer line (SAN)
- Storm drain line (STM)
- FH — Fire hydrant
- CB — Catch basin
- Manhole
- Power pole
- Flow direction

HIGH STREET

FOOTHILL BOULEVARD

4411 Foothill

Former Shell Station
4411 Foothill

BLDG. A

Wood Moulding & Doors
4413 Foothill

Laundromat

Third Generation USTs
(1984 to 2002)

Former Dispenser Islands

4415 Foothill

4417 Foothill

BLDG. B

4419 Foothill

parking

Jackson & Hewitt Tax Services
4421 Foothill

Nails & Spa
4423 Foothill

Former Building

Restaurant

Former W/O UST
(removed 2002)

Residential
1724 High St.

Residential
4320 Bond St.

First and Second Generation USTs
(~1958 to 1984)

Trash Encl.

planter

Unknown Utility

S-1 S-2 S-3 S-4 S-5 S-6 S-7 S-8 S-9 S-10 S-11 S-12 S-13

SSV-1 SSV-2

V-1 V-2 V-3 V-4 V-5 V-6 V-7 V-8 V-9 V-10 V-11 V-12

N

0 10 20 40

Scale (ft)

FIGURE

2

Former Shell Service Station
4411 Foothill Boulevard
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

I:\Shell\6-chars\2408--\240897-Oakland 4411 Foothill\240897-FIGURES\240897 SITE PLAN.DWG

APPENDIX A

SITE HISTORY

SITE HISTORY

1958 UST Piping Leak: On April 19, 1958, a gasoline shortage was discovered at the operating Shell station. It was determined that there was a piping leak into a concrete pump pit and then into the soil in the vicinity of the storage tanks. Separate phase hydrocarbons (SPHs) were found in an irrigation well located at 4320 Bond Street, adjacent to the Shell site. Shell installed 22 8-inch wells to depths of 15 feet below grade (fbg) along the property boundary and 1 well within the tank complex. Groundwater was pumped from the wells, and the extracted water was transported to a separator. Though the volume of the release is not known, Shell reported in a June 2, 1958 letter to Traveler's Insurance Company that they recovered 650 gallons of gasoline from the wells.

1971 UST Removal and Replacement: A Shell document dated July 15, 1971 notes plans to remove the existing 6,000-gallon underground storage tanks (USTs). An invoice dated September 17, 1971 indicates the delivery of one 10,000-gallon UST, one 8,000-gallon UST, and one 550-gallon underground waste oil tank.

1977 Dispenser Piping Leak: A Shell Oil Company Spill Report dated October 19, 1977 documents the release of 2,000 gallons of gasoline from a leaking pipe that ran from the USTs to the dispenser located closest to High Street. The report noted that the damaged section of pipe was replaced and that leak detectors were installed on all systems.

1984 UST Removal and Replacement: A Shell purchase order dated October 1, 1984 indicates the removal of the then-existing USTs and installation of three 10,000-gallon fiberglass USTs.

1991 Waste Oil Tank Leak: On June 5, 1991, Shell submitted to Alameda County Health Care Services Agency (ACHCSA) an Underground Storage Tank Unauthorized Release Report detailing a release from the 550-gallon waste oil tank at the site. The report stated that the release was caused by tank failure, that the volume of release was unknown, and that the contents of the tank had been removed.

1992 Waste Oil Tank Removal: A 550-gallon waste oil tank was removed on February 5, 1992. A soil sample was collected at the bottom of the excavation at a depth of approximately 11 fbg. No total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), benzene, toluene, ethylbenzene and xylenes (BTEX), oil and grease, halogenated volatile organic compounds, or metals were detected in the sample. Total lead was detected at 6.7 milligrams per kilogram (mg/kg).

Details of the waste oil tank removal and sampling activities are presented in a March 26, 1992 GeoStrategies Inc. (GeoStrategies) report.

1992 Monitoring Well Installation: A single monitoring well (S-1) was installed in the vicinity of the waste oil tank location. Details of this well installation are presented in the GeoStrategies' January 19, 1993 *Monitoring Well Installation Report.*

1993 Monitoring Well Installation: Hydro Environmental Technologies, Inc. (HETI) installed monitoring wells S-2 and S-3 on May 21, 1993. Well installation details are presented in HETI's July 22, 1993 report.

1995 Soil and Groundwater Investigation: Pacific Environmental Group (PEG) of San Jose, California conducted a Geoprobe® investigation in June 1995. The investigation consisted of advancing eight on-site soil borings and two off-site borings to collect soil and groundwater samples. PEG's September 12, 1995 *Site Investigation* report presents investigation details.

1998 Product Equipment Upgrades: In November 1998, Paradiso Mechanical (Paradiso) of San Leandro, California upgraded the service station by adding secondary containment to the gasoline turbines and dispensers. Details of dispenser upgrade and sampling activities are presented in Cambria Environmental Technology Inc.'s (Cambria's) November 30, 1998 *Dispenser Soil Sampling Report.*

September 1999 Oxygen Releasing Compound (ORC) remediation: ORC socks were installed in wells S-1, S-2, and BW-A.

December 1999 Site Conceptual Model (SCM) and Conduit Study: A subsurface conduit study identified several conduits, which may provide limited preferential groundwater flow at times of shallow groundwater depth.

January 2000 Monitoring Well Installation: Cambria installed one well (S-4) adjacent to the southeast corner of the station building. The maximum TPHd and TPHg concentrations were 27.2 mg/kg and 28.2 mg/kg, respectively. Investigation details are contained in Cambria's November 17, 2000 *Site Investigation Report.*

February 2000 Sensitive Receptor Survey (SRS): A SRS conducted by Cambria identified 58 monitoring, test, or industrial wells located within a ½-mile radius of the site. No municipal, domestic, or irrigation wells were identified.

November 2001 Corrective Action Plan (CAP): On November 12, 2001, Cambria submitted a CAP in preparation for impending site demolition and fueling facility removal. In the CAP, Cambria discussed remedial alternatives and made remedial action recommendations. Cambria recommended additional on-site over-excavation, following removal of the underground facilities, to substantially remove residual impacted soils from within the property boundaries. Cambria also recommended removing groundwater from the excavation, and placing ORC at the base of the excavation to enhance biological degradation of residual-impacted soil and groundwater. Continued quarterly groundwater monitoring was recommended to track the subsequent natural attenuation process.

February 2002 UST Removal: Paradiso removed the gasoline USTs and hydraulic hoists, and over-excavated approximately 1,250 cubic yards of impacted soil around and beneath the USTs, product dispenser islands, and hydraulic hoists. Phillips Services Corporation extracted approximately 16,000 gallons of groundwater from the excavation pits. Following over-excavation, Paradiso placed 810 pounds of ORC powder on the bottom of the excavation. Details of the fuel facilities removal and corrective action are presented in Cambria's February 25, 2002 Underground Storage Tank Closure Report.

May 2002 Well Installation: In May 2002, Cambria installed one groundwater monitoring well (S-5). The well installation is described in Cambria's July 2, 2002 Monitoring Well Installation Report.

2005 Subsurface Investigation Work Plan and SCM: In response to a request in a June 10, 2005 letter from ACHCSA, Cambria submitted a Subsurface Investigation Work Plan and Site Conceptual Model on August 16, 2005. In anticipation of site redevelopment, Cambria recommended destroying all on-site wells, and replacing them after site development was completed.

2005 Well Destructions: In anticipation of redevelopment of the site, Cambria destroyed wells S-1 through S-5 on July 14, 2005. The well destructions were completed in accordance with Alameda County Public Works Agency and San Francisco Regional Water Quality Control Board guidelines. The well destructions are described in Cambria's August 19, 2005 Well Destruction Report.

2005 Subsurface Investigation and Over-Excavation: In August 2005, Cambria advanced two soil borings to investigate the extent of petroleum-hydrocarbon-impacted soil and groundwater from the 1958 piping leak. Borings TB-1 and TB-3 contained concentrations of up to 1,600 mg/kg TPHg in soil and 180,000 micrograms per

liter (µg/l) TPHg, 22,000 µg/l benzene, 9,700 µg/l toluene, 5,200 µg/l ethylbenzene, 25,000 µg/l total xylenes, and 13.4 µg/l lead in groundwater. Because the former UST area was located within the proposed footprint of a new building to be constructed at the site, Cambria excavated soil to the extent feasible in order to remove hydrocarbon-impacted soil beneath the building prior to site redevelopment. The excavation was completed to dimensions of 20 feet long by 25 feet wide by 20 feet deep. Following excavation, Cambria collected one confirmation soil sample from each sidewall and two soil samples from the excavation base. The maximum concentrations in the excavation samples were 0.050 mg/kg benzene, 0.0083 mg/kg ethylbenzene, 0.040 mg/kg xylenes, and 0.023 mg/kg di-isopropyl ether. TPHg, toluene, MTBE and tertiary-butyl alcohol (TBA) were not detected in the excavation samples. No water was observed in the bottom of the excavation. The activities are described in their entirety in Cambria's November 16, 2005 *Subsurface Investigation and Over-Excavation Report.*

2006 Subsurface Investigation for Replacement Wells: In May 2006, Cambria advanced five soil borings (SB-5 through SB-8, and SB-12) at the site to assess the vertical profile of subsurface contamination. Petroleum hydrocarbons were found in soils in the vicinity of the former USTs, dispensers, and product piping, to depths above approximately 15 fbg. Historical maximum concentrations of petroleum constituents in soils are 3,100 mg/kg TPHg, 244 mg/kg TPHd, 9.6 mg/kg benzene, and 2.5 mg/kg MTBE. The vertical extent of petroleum constituents in groundwater at the site was defined by the groundwater results from boring SB-12, located just down gradient of the first- and second-generation USTs. The results from the groundwater sample from 31 to 35 fbg in this boring indicated that the petroleum constituent concentrations attenuate by one to two orders of magnitude with depth. The activities are described in Cambria's July 25, 2005 *Subsurface Investigation Report and Monitoring Well Installation Work Plan.*

2007 Subsurface Investigation to Install Replacement Wells: Conestoga-Rovers & Associates (CRA) installed four replacement wells (S-6 through S-9) at locations determined by the findings of Cambria's July 25, 2005 Subsurface Investigation Report and Monitoring Well Installation Work Plan. Low concentrations of TPHd, TPHg, benzene, MTBE, and TBA were found in soils extending into the groundwater interface. Concentrations of TPHd, TPHg, BTEX, and MTBE were reported in the groundwater samples from all four wells. Additionally, concentrations of TBA and 1,2-dichlorethane (1,2-DCA) were reported in all wells except S-9. The maximum concentrations of TPHg and benzene were detected in the sample from well S-7 (March 2007) at 100,000 and 32,000 µg/l, respectively. The activities are described in CRA's April 19, 2007 *Site Investigation and First Quarter 2007 Groundwater Monitoring Report.*

2007 Soil Vapor Investigation: CRA installed nine on-site soil vapor probes (V-1 through V-7, V-10, and V-11) at depths of approximately 5 fbg. The probe installation details are presented in CRA's March 13, 2008 *Soil Vapor Probe Installation and Sampling Report.*

2008 Soil Vapor Monitoring: CRA conducted three rounds of soil vapor monitoring utilizing the on-site soil vapor probes. TPHg, benzene, and ethylbenzene were detected at concentrations exceeding San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for shallow soil gas with commercial land use. The monitoring results are presented in CRA's November 10, 2008 *Soil Vapor Probe Installation and Sampling Report.*

Groundwater Monitoring Program: Groundwater has been monitored at the site since December 1992. Groundwater depths have ranged from approximately 6 to 12 fbg. The calculated groundwater gradient typically trends southwesterly at approximately 0.12 feet per foot (ft/ft). During the third quarter 2008 sample event, maximum concentrations were 120,000 µg/l TPHg (S-7), 7,100 µg/l TPHd (S-6), 25,000 µg/l benzene (S-7), and 210 µg/l MTBE (S-8).