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 8, 2012

REFERENCE NO.: 240612

PROJECT NAME: 1784 150th Avenue, San Leandro

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

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Alameda County
Environmental Health

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QUANTITY	DESCRIPTION
1	Subsurface Investigation Work Plan

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

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

Copy to: Denis Brown, Shell Oil Products US (electronic copy)
Bansal, Inc. (property owner), 1784 150th Avenue, San Leandro, CA 94578-1826

Completed by: Peter Schaefer Signed: Peter Schaefer

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 Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: Shell-branded Service Station
1784 150th Avenue
San Leandro, California
SAP Code 136019
Incident No. 98996068
ACEH Case No. RO0000367

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
Senior Program Manager

SUBSURFACE INVESIGATION WORK PLAN

SHELL-BRANDED SERVICE STATION
1784 150TH AVENUE
SAN LEANDRO, CALIFORNIA

SAP CODE	136019
INCIDENT NO.	98996068
AGENCY NO.	RO0000367

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 8, 2012
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1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) to assess potential for soil vapor intrusion on and near the site as requested in Alameda County Environmental Health's (ACEH's) December 19, 2011 letter.

The site is an operating Shell-branded service station located at the southern corner of the 150th Avenue and Freedom Avenue intersection in San Leandro, California (Figure 1). The area surrounding the site is mixed commercial and residential. The site layout (Figure 2) includes a station building, two dispenser islands, and three fuel underground storage tanks (USTs). One waste oil UST was removed from the site on May 25, 2006.

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

2.0 WORK TASKS

CRA proposes to install one nested soil vapor probe (SVP-8) and one shallow soil vapor probe (SVP-5A) off site to assess soil vapor concentrations down gradient near residential properties located across 150th Avenue from the site. In addition, CRA proposes to install one shallow soil vapor probe (SVP-4A) on site to assess soil vapor concentrations adjacent to the station building. The proposed probe locations are shown on Figure 2. Specific tasks are described below.

2.1 PERMITS

CRA will obtain the appropriate permits to install the soil vapor probes from Alameda County Public Works Agency (ACPWA) and an encroachment permit from the City of San Leandro.

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 SOIL VAPOR PROBE INSTALLATION

CRA proposes to install one nested soil vapor probe (SVP-8) and one shallow soil vapor probe (SVP-5A) off site and to install one shallow soil vapor probe (SVP-4A) on site at the locations shown on Figure 2.

Assuming the absence of subsurface obstructions, CRA will advance the soil borings for SVP-4A and SVP-5A to 2.5 feet below grade (fbg) and the boring for SVP-8 to 5.5 fbg using an air-knife rig. The shallow vapor probes (SVP-4A and SVP-5A) will be installed with one screened interval at 2 fbg, and the nested soil vapor probe (SVP-8) will be installed with two screen intervals (2 fbg and 5 fbg) to assess the vertical attenuation of soil vapors.

A CRA geologist will supervise the drilling and describe the encountered soils using the Unified Soil Classification System and Munsell Soil Color Charts. Soil cuttings will be collected at depths corresponding to each screened interval for soil description and field screening for organic vapors using a photo-ionization detector (PID). CRA will prepare a boring log for each soil vapor probe boring, and PID measurements will be recorded on the boring logs.

After the borings are advanced, fixed vapor-sampling points will be installed in each boring using ¼-inch-diameter Teflon® tubing. Each point will use a 1-inch screen interval attached to the Teflon® tubing. To ensure the tubing does not curl or kink during installation, CRA will first straighten out each length of tubing prior to installation, and then use a small-diameter PVC guide pipe to hold the tubing in place within the boring while packing the annulus with sand.

For SVP-8, a clean, fine-grained silica sand filter pack will be installed approximately 6 inches below and above the deepest sampling point (5 fbg), and the guide pipe will be lifted as the sand pack is installed to ensure the pack stabilizes the tubing within the boring. The annulus will then be sealed to 6 inches below the 2 fbg sample point, using hydrated granular bentonite, set atop a 1-foot base of dry granular bentonite. A clean, fine-grained silica sand filter pack will be installed approximately 6 inches below and

above the 2 fbg sample point, and the guide pipe will be lifted as the sand pack is installed in the same process as described for the deepest sample point. The annulus will then be sealed to the surface using hydrated granular bentonite, set atop a 1-foot base of dry granular bentonite.

For SVP-4A and SVP-5A, a single sample point will be installed at 2 fbg following the procedure detailed above. Each soil vapor probe will be completed at the surface using a traffic-rated well box at grade.

CRA will perform this work under the supervision of a professional geologist or engineer.

2.5 SOIL VAPOR PROBE SAMPLING

At least 2 weeks following probe installation, CRA will collect soil vapor samples from each new sampling point and will attempt to collect samples from existing probes SVP-4 and SVP-5. Sampling is affected by rain. CRA's standard procedure is to allow 2 days or more after a heavy rain event prior to collecting soil vapor samples.

CRA will sample soil vapor probes SVP-4, SVP-4A, SVP-5, SVP-5A, and SVP-8 using a vacuum pump and Tedlar® bags. Soil vapor samples will be collected from all screened intervals in each of the soil vapor probes listed above. Prior to sampling, CRA will purge at least three tubing volumes of air from the probes using a vacuum pump. Then CRA will attach a sealed "lung sampler" containing a 1-liter Tedlar® bag to the probe and attach the vacuum pump 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, CRA will fill the bags no more than two-thirds full. Each sample will be labeled, entered onto a chain-of-custody, and placed into a protective box at room temperature for transport to a State of California-certified laboratory for analysis within 72 hours.

2.6 LEAK TESTING

To check the system for leaks, CRA will cover the soil gas probe surface casing and sampling equipment with a containment unit (or shroud). Prior to soil gas probe purging, CRA will introduce helium into the containment unit to obtain a minimum 50 percent helium content level. CRA will confirm the helium content within the containment unit using a helium meter and will record the helium meter readings our

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 a soil vapor sample contains a helium content of greater than 10 percent (%) of the source concentration (i.e., 10% of the helium content measured within the containment unit), the soil gas sample will be considered invalid.

2.7 CHEMICAL ANALYSES

The soil vapor samples collected from each of the probes will be analyzed for total petroleum hydrocarbons as gasoline, benzene, toluene, ethylbenzene, total xylenes, and methyl tertiary-butyl ether by EPA Method 8260B and for oxygen and argon, carbon dioxide, methane, and helium by ASTM D Method 1946 (M).

2.8 REPORT PREPARATION

Following receipt of analytical results from the laboratory, CRA will prepare a written report, which will include field procedures, tabulated analytical data, boring logs, and analytical laboratory reports.

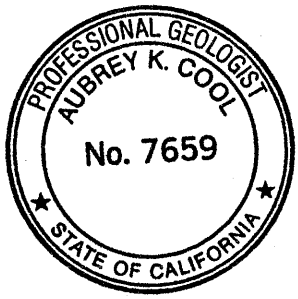
3.0 SCHEDULE

CRA will implement the soil vapor probe installations upon receiving ACEH's written approval of this work plan, receiving a drilling permit from ACPWA, and receiving an encroachment permit from the City of San Leandro.

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

Peter Schaefer, CEG, CHG

Aubrey K. Cool, PG



FIGURES

11/03/08

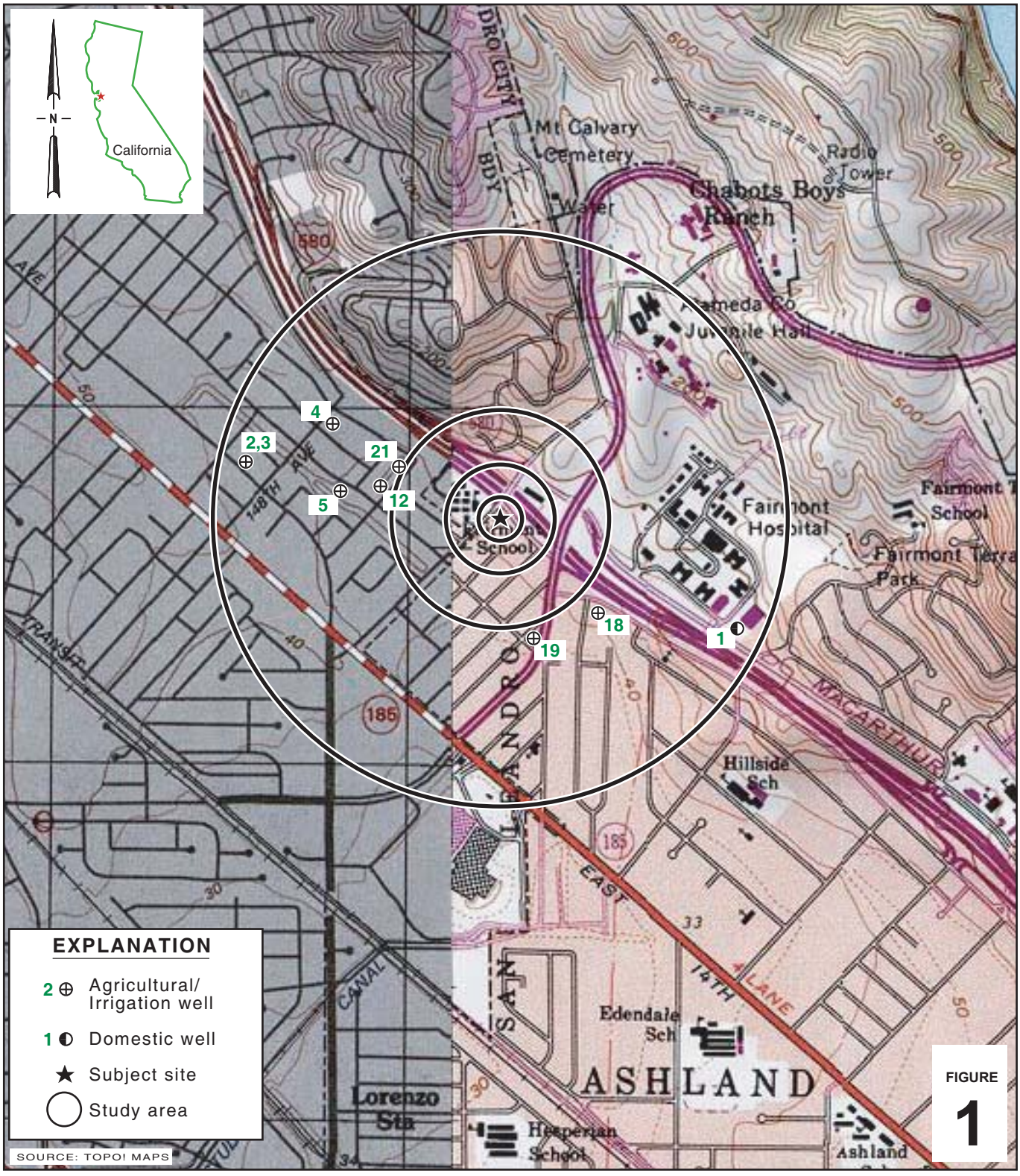


FIGURE 1

0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

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Shell-branded Service Station

1784 150th Avenue

San Leandro, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

02/07/2012

EXPLANATION

- SVP-4A — Proposed soil vapor probe location
- SVE-1 — Soil vapor extraction well location
- SVP-6 — Soil vapor probe location
- AS-1 — Air sparge well location
- P-1A — Piezometer location
- P-1B — Deeper piezometer location
- EW-1 — Extraction well location
- MW-3 — Monitoring well location
- MW-1B — Deeper monitoring well location
- MW-1 — Destroyed well location
- SVP-1 — Soil vapor probe location (08/2007 & 10/2010)
- B-1 — Soil boring location (09/2007)
- CPT-1 — CPT location (08/2007)
- S-23 — Soil boring location (Cambria, 05/2006)
- SB-17 — Soil boring location (Cambria, 09/2004)
- SB-11 — Soil boring location (Cambria, 10/2002)
- BH-7 — Soil boring location (Weiss, 03/1995)
- BH-1 — Soil boring location (Weiss, 06/1994)
- 1 — Dispenser number
- Product piping (P)
- Water line (W)

PORTOFINO CIRCLE
PORTOFINO DRIVE
150TH AVENUE
FREEDOM AVENUE
I-580
Brick Sound Wall
Residential
Residential (Townhouses)
Private (Gated Driveway)
Storm Drain
Manhole (MH, typ.)
Shell Station
1784 150th Ave.
Former Dispenser Island
Dispenser Islands
Station Building
USTs
Former W/O UST
Air Comp.
Storage
Parking Lot
Denny's Restaurant
15015 Freedom Ave.

SB-12, BH-5, SB-13, MW-9, SB-25/MW-13, SB-11, MW-7, SVP-5, SVP-5A, SB-24/MW-12, SVP-8, MW-8, MW-4, MW-10, CPT-3, MW-2B, P-4B, P-4A, AS-1, MW-2, P-3A, CPT-2, P-3B, MW-11, EW-2, SVP-1, SVE-1, SVP-6, SVP-7, SVP-2, EW-1, CPT-1, P-1B, P-1A, MW-1, P-2B, SVP-3, P-2A, MW-1B, MW-1A, B-1, SVP-4A, SB-23, SVP-4, MW-3, SB-18, BH-7, MW-5, SB-17, CPT-5, CPT-6, MW-6

0 20 40 80
Scale (ft)

FIGURE
2

Shell-branded Service Station
1784 150th Avenue
San Leandro, California

CONESTOGA-ROVERS & ASSOCIATES

Site Plan

I:\Shell\6-chars\2406--\240612-San Leandro 1784 150th\240612-FIGURES\240612 SITE PLAN.DWG

APPENDIX A

SITE HISTORY

SITE HISTORY

1986 Waste Oil Tank Removal: In November 1986, Petroleum Engineering of Santa Rosa, California removed a 550-gallon waste-oil tank. Blaine Tech Services, Inc. (Blaine) of San Jose, California collected soil samples (Soil #1 and Soil #2) beneath the former tank at 8 and 11 feet below grade (fbg). The soil samples contained up to 196 milligrams per kilogram (mg/kg) oil and grease. The tank pit was over-excavated to a total depth of 16 fbg, but no additional soil samples were collected. Groundwater was not encountered in the tank excavation. A new 550-gallon fiberglass waste-oil tank was installed in the same location. Details of the tank removal and sampling are summarized in Weiss Associates' (Weiss') October 13, 1989 letter to Shell Oil Products US (Shell).

1990 Well Installation: In March 1990, Weiss drilled one soil boring (BH-A) adjacent to the waste-oil tank which was completed as groundwater monitoring well MW-1. A soil sample collected at 29 fbg contained 35 mg/kg total petroleum hydrocarbons as gasoline (TPHg) and 0.23 mg/kg benzene. Details of this investigation are presented in Weiss' July 31, 1990 letter.

1992 Well Installations: In February 1992, Weiss drilled two soil borings (BH-B and BH-C), which were completed as monitoring wells (MW-2 and MW-3). A soil sample collected near the water table from boring BH-B (21.5 fbg) contained 79 mg/kg TPHg. Soil samples from boring BH-C, located over 100 feet cross-gradient of the tanks, contained up to 68 mg/kg TPHg at 31.5 fbg. Details of this investigation are presented in Weiss' April 27, 1992 letter report.

1992 Well Survey: In 1992, Weiss reviewed the California Department of Water Resources (DWR) and Alameda County records to identify water wells within a ½-mile radius of the site. A total of 21 wells were identified: 12 monitoring wells, 8 irrigation wells, and 1 domestic well. No municipal wells were identified. The eight irrigation wells and one domestic well are more than 1,000 feet from the site.

1994 Subsurface Investigation: In June 1994, Weiss advanced six soil borings (BH-1 through BH-6) on and off site. No hydrocarbons were detected in soil samples, with the exception of 0.013 mg/kg benzene in boring BH-3 at 16 fbg. No hydrocarbons were detected in grab groundwater samples from borings BH-1, BH-4, BH-5, and BH-6. The grab groundwater sample collected from boring BH-3 contained 20,000 micrograms per liter (µg/L) TPHg and 25,000 µg/L benzene. Details of this investigation are presented in Weiss' October 13, 1994 *Subsurface Investigation Report.*

1995 Well Installation: In February and March 1995, Weiss drilled four soil borings (BH-7 through BH-10) and converted BH-10 to monitoring well MW-4. No petroleum hydrocarbons were detected in soil samples from the borings. Grab groundwater samples from BH-7 and BH-9 contained up to 100 µg/L TPHg and 1.0 µg/L benzene. No TPHg or benzene was detected in the grab groundwater sample from BH-10. Groundwater was not encountered in soil boring BH-8. Details of this investigation are presented in Weiss' June 13, 1995 *Subsurface Investigation Report and First Quarter 1995 Monitoring Results.*

1996 Soil Vapor Survey and Soil Sampling: In July 1996, Weiss conducted a subsurface investigation to obtain site-specific data for a risk-based corrective action (RBCA) evaluation of the site. Soil vapor and soil samples were collected from the vadose zone at 10 on- and off-site locations (SVS-1 through SVS-10). The highest soil vapor hydrocarbon concentrations were detected near the northwest corner of the UST complex (sample SVS-5 at 3.0 fbg, which contained 24,000 micrograms per cubic meter [µg/m^3] benzene). No TPHg, benzene, toluene, ethylbenzene, and total xylenes (BTEX), or methyl tertiary-butyl ether (MTBE) were detected in soil samples, with the exception for 1.1 mg/kg TPHg detected in sample SVS-5 at 18 to 20 fbg. Weiss concluded that depleted oxygen concentrations and elevated carbon dioxide and methane concentrations in the vadose zone indicated that biodegradation was occurring. Details of the investigation are presented in Weiss' February 7, 1997 *Soil Vapor Survey Report.*

1997 RBCA Evaluation: In 1997, Weiss prepared a RBCA evaluation which indicated that BTEX, MTBE, 1,2-dichloroethane, and tetrachloroethylene concentrations detected in soil and groundwater beneath the site did not exceed a target risk level of 10^{-5} for residential indoor or outdoor air exposure pathways. However, a risk threshold exceedance was identified associated with ingestion of groundwater from a hypothetical well 25 feet down gradient of the source. Details of this evaluation are presented in Weiss' October 13, 1994 *RBCA Summary Report.*

1997 Dispenser and Turbine Sump Upgrade: In December 1997, Paradiso Mechanical upgraded dispensers and turbine sumps. Cambria Environmental Technology, Inc. (Cambria) collected soil samples Disp-A through Disp-D from beneath the dispenser islands during upgrade activities. Soil samples contained up to 590 mg/kg TPHg (Disp-C at 4.5 fbg), 1.8 mg/kg benzene (Disp-C at 2.0 fbg), and 1.4 mg/kg MTBE (Disp-C at 2.0 fbg). Details of this investigation are presented in Cambria's March 17, 1998 *Dispenser Soil Sampling* report.

1998 Soil Vapor Survey and Soil Sampling: In November 1998, Cambria conducted a subsurface investigation to obtain site-specific data for an updated RBCA evaluation of the site. Soil samples, soil vapor samples, and grab groundwater samples were collected from the vadose zone at three on-site and three off-site locations (SVS-11 through SVS-16). Soil vapor samples contained up to 2.7 parts per million by volume (ppmv) TPHg (C5+ hydrocarbons; SVS-14) and 0.17 ppmv TPHg (C2-C4 hydrocarbons; SVS-15), and 32 µg/m^3 benzene (SVS-16 at 5 fbg). Soil samples from boring SVS-11 at 19.5 fbg contained 1.6 mg/kg TPHg and 0.0050 mg/kg benzene. No TPHg or benzene was detected in other soil samples. Grab groundwater samples contained up to 130,000 µg/L TPHg and 18,000 µg/L benzene. Details of the investigation are presented in Cambria's September 17, 1999 *Risk-Based Corrective Action* report.

1999 RBCA Evaluation: In September 1999, Cambria prepared a RBCA evaluation for the site. Cambria analyzed the following potential exposure pathways: off-site ingestion of groundwater, on-site ingestion of surficial soil, volatilization of benzene from soil or groundwater into on-site or off-site indoor air, and migration of benzene soil vapor to on-site or off-site outdoor air. Results of Tier 1 and Tier 2 RBCA analyses indicated that contaminants within soil and groundwater did not present significant health risks. Details of this evaluation are presented in Cambria's September 17, 1999 *Risk-Based Corrective Action Report.*

2001 Off-Site Monitoring Well Installation: In October 2001, Cambria installed two monitoring wells (MW-5 and MW-6) off site to the southwest. No TPHg, BTEX, or MTBE was detected in soil samples from well boring MW-5. Soil samples from well boring MW-6 contained up to 0.012 mg/kg MTBE with no TPHg or BTEX. This data corroborated Cambria's 1998 subsurface investigation results, which found no TPHg or benzene and only low MTBE concentrations in soil from three borings (SVS-14 through SVS-16) along the private driveway. Details of this investigation are presented in Cambria's December 20, 2001 *Offsite Monitoring Well Installation Report.*

2002-2004 Mobile Groundwater Extraction (GWE): From July 2002 to March 2004, Cambria conducted semi-monthly GWE using monitoring well MW-2. Beginning in March 2004, Cambria conducted semi-monthly GWE alternating between wells MW-2 and MW-11. Beginning in May 2004, Cambria increased the GWE frequency to weekly from both MW-2 and MW-11. Mobile GWE suspended on August 24, 2004. Approximately 19.6 pounds of TPHg, 3.45 pounds of benzene, and 5.12 pounds of MTBE were removed during these activities. The mobile GWE activities are summarized in Cambria's groundwater monitoring reports for this period.

2002 Off-Site Monitoring Well Installation: In October 2002, Cambria drilled one soil boring (SB-9) and installed two monitoring wells (MW-7 and MW-8) in 150th Avenue northwest of the site. Soil samples contained up to 68 mg/kg TPHg (MW-7@30') and 0.072 mg/kg benzene (MW-8@25'). Grab groundwater samples contained up to 83,000 µg/L TPHg (MW-8) and 2,200 µg/L benzene (MW-9). Details of this investigation are presented in Cambria's November 18, 2002 *Offsite Monitoring Well Installation Report.*

2003 Soil and Groundwater Investigation: In June 2003, Cambria drilled six soil borings (SB-10 through SB-14 and SB-16) to the northwest of the site in both 150th Avenue and Portofino Circle and one boring (SB-15) on site. Grab groundwater samples contained up to 67,000 µg/L TPHg (SB-14-W), 530 µg/L benzene (SB-15-W), and 40 µg/L MTBE (SB-15-W). TPHg was detected in only two soil samples (SB-11-30' and SB-15-36') at concentrations up to 650 mg/kg. Benzene was detected in only one soil sample (SB-15-35') at 0.10 mg/kg. Based on typical groundwater depths in nearby well MW-7, it was determined that samples SB-11-30' and SB-15-36' were saturated, and results may be more indicative of chemical concentrations in groundwater. Details of this investigation are presented in Cambria's August 28, 2003 *Soil and Water Investigation Report and Work Plan.*

2003 Sensitive Receptor Survey (SRS): In October 2003, Cambria completed an SRS. The SRS targeted the following as potential sensitive receptors: basements within 200 feet, surface water and sensitive habitats within 500 feet, hospitals, residential care, and childcare facilities within 1,000 feet, and water wells within ½-mile. No basements, surface water, sensitive habitats, or educational and childcare facilities were identified within the search radius. The Fairmont Hospital campus, located at 15400 Foothill Boulevard, is located approximately 1,100 feet from the site, just outside the target radius of 1,000 feet.

To update the 1992 well survey performed by Weiss, Cambria researched DWR records in September 2003 and located no additional well records for locations within ½-mile of the site. The closest identified water well potentially used for drinking water was a well installed in 1952 and listed as a "domestic well." This well is located at Fairmont Hospital, approximately 2,445 feet east-southeast of the site. The well is reportedly 138 feet deep and has a screened interval between 62 and 95 fbg. The well's status and operation frequency are unknown. Due to the well's distance from the site and the site's observed groundwater flow directions, it is unlikely that this well would be impacted by groundwater from the site.

2003 Monitoring Well Installation: In November 2003, Cambria installed two on-site (MW-10 and MW-11) and one off-site groundwater monitoring wells (MW-9). MTBE was detected in two soil samples (MW-11-20' and MW-11-24.5') at concentrations up to 1.4 mg/kg. TPHg was detected in four soil samples (MW-10-30', MW-10-31.5', MW-11-20', and MW-11-24.5') at concentrations up to 330 mg/kg. All soil samples with detectable petroleum hydrocarbon and MTBE concentrations were saturated soil samples, so identified results appeared more indicative of chemical concentrations in groundwater than soil. Details of this investigation are presented in Cambria's January 12, 2004 *Soil and Water Investigation and Monitoring Well Installation Report.*

2004 Off-Site Investigation: In September 2004, Cambria drilled two soil borings (SB-17 and SB-18) southeast of the site to further delineate the extent of soil and groundwater impacts. No TPHg, BTEX, or fuel oxygenates were detected in soil samples from the borings. Grab groundwater samples collected contained up to 55 µg/L TPHg with no benzene or fuel oxygenates. Results of the investigation are reported in Cambria's December 17, 2004 *Soil and Water Investigation Report.*

2004 Temporary GWE System Installation: From September to November 2004, Cambria operated of a temporary GWE system from wells MW-1, MW-2, and MW-11 as an interim remedial measure to address the elevated petroleum hydrocarbon and MTBE concentrations in groundwater near the west corner of the site. In November 2004, Cambria suspended temporary GWE operations to conduct interim remediation by dual-phase extraction (DPE). During these temporary GWE activities approximately 0.448 pounds of TPHg, 0.036 pounds of benzene, and 0.121 pounds of MTBE were removed. Temporary GWE details are provided in Cambria's June 23, 2005 *Interim Remediation Report.*

2004 DPE: In November 2004, Cambria conducted DPE in on-site wells MW-2 and MW-11 as an interim remedial action to reduce hydrocarbon concentrations in groundwater near the western corner of the site and to progress the site. Based on operating parameters and vapor sample analytical results, vapor-phase mass removed was approximately 165 pounds TPHg, 0.291 pounds benzene, and 0.063 pounds MTBE. The total liquid-phase mass removed was approximately 5.31 pounds TPHg, 0.193 pounds benzene, and 0.143 pounds MTBE. DPE details are provided in Cambria's June 23, 2005 *Interim Remediation Report.*

2005 Temporary GWE System: Between January 10 and April 13, 2005, Cambria operated a temporary GWE system from MW-11. During these activities, approximately 19.04 pounds of TPHg, 1.69 pounds of benzene, and 3.94 pounds of MTBE were

removed from the subsurface. Results of the remediation are reported in Cambria's June 23, 2005 *Interim Remediation Report.*

2005 Fuel System Upgrade: Between March and May 2005, Armer Norman replaced the fuel dispensers and piping and upgraded UST sumps. On March 22 and April 4, 2005, Cambria collected soil samples from beneath each of the four dispensers and the product piping joints. Up to 4,100 mg/kg TPHg (P-4-5.0) was detected in 11 samples, 11 mg/kg benzene (P-4-2.5) was detected in 6 samples, 0.18 mg/kg MTBE (D-1-3.5) was detected in 5 samples, and 75.7 mg/kg lead (D-1-3.5) was detected in 4 samples. Tertiary-butyl alcohol (TBA) was detected in sample D-3-3.5 at a concentration of 0.023 mg/kg. Results of the investigation are reported in Cambria's June 1, 2005 *Dispenser and Piping Upgrade Sampling Report.*

2005 Periodic GWE Restart: In September 2005, Cambria re-instated monthly GWE using monitoring well MW-11, and because of the observed presence of separate-phase hydrocarbons (SPHs) in well MW-1, bimonthly extraction from MW-1 was initiated in September 2006. These activities are continued through August 2007 and are reported in the quarterly groundwater monitoring reports for this period.

2006 Waste Oil Tank Removal: On May 25, 2006, Wayne Perry, Inc. removed one 550-gallon, dual-wall fiberglass waste oil UST. Cambria collected one soil sample (WO-1-6.5) from the sidewall of the UST excavation at a depth of 6.5 fbg. The soil sample contained 45 mg/kg oil and grease, 4.3 mg/kg TPHd, 25.4 mg/kg chromium, 7.09 mg/kg lead, 19.0 mg/kg nickel, and 58.4 mg/kg zinc. Based on these concentrations, Shell submitted an Underground Storage Tank Unauthorized Release (Leak)/Site Contamination Report (Unauthorized Release Report) on June 6, 2006. All detections were below San Francisco Bay Regional Water Quality Control Board environmental screening levels (ESLs) for shallow soil (fewer than 3 meters below grade) where groundwater is a current or potential drinking water source with residential land use. [1] Based on these results, no further investigation of waste oil UST excavation was conducted. Results of the investigation are reported in Cambria's August 4, 2006 *Underground Storage Tank Removal Report.*

2006 Subsurface Investigation: In May 2006, Cambria drilled seven soil borings (SB-19 through SB-25) and installed groundwater monitoring wells (MW-12 & MW-13) in two of the borings to further investigate the vertical and horizontal extent of soil and groundwater impacts. Shallow soil samples collected from borings SB-19, SB-20, SB-21,

1 Screening for Environmental Concerns at Site With Contaminated Soil and Groundwater, California Regional Water Quality Control Board, Interim Final – November 2007 [Revised May 2008]

SB-22, and SB-24 did not contain TPHg or BTEX concentrations exceeding ESLs. Up to 1,060 mg/kg TPHg and 1.38 mg/kg benzene were detected in soil samples collected from the capillary fringe zone in borings SB-19, SB-20, SB-21, SB-23, and SB-24. These detections are considered to be more indicative of groundwater conditions. Fuel oxygenate concentrations were near or below their respective reporting limits in all soil samples collected, and none of the low detections exceeded applicable ESLs. Based on this, the horizontal extent of petroleum hydrocarbons has been adequately defined at the site, and the vertical extent has been defined to the typical groundwater table. TPHg, BTEX, and fuel oxygenate concentrations in grab groundwater samples collected from approximately 20 and 31 fbg in boring SB-25 were below ESLs. Based on this, the vertical extent of petroleum hydrocarbons in groundwater northwest of the site is adequately defined. Results of the investigation are reported in Cambria's July 26, 2006 *Subsurface Investigation Report.*

2007 Agency Response with Proposed Future Actions: In February 2007, Cambria responded to Alameda County Environmental Health's August 29, 2006 letter which requested updated cross-sections and discussion of other issues. Cambria provided revised cross-sections A-A' and C-C', a discussion of delineation of the extent of petroleum hydrocarbons in soil and groundwater, and a risk evaluation based on these delineations. In addition, Cambria proposed delineation of the vertical extent of petroleum hydrocarbons in groundwater and a shallow soil vapor investigation at the site. The complete report is provided in Cambria's February 17, 2007 *Agency Response with Proposed Future Actions.*

2007 Subsurface Investigation: In August and September 2007, Conestoga-Rovers & Associates (CRA) drilled five cone penetrometer test borings (CPT-1 through CPT-3, CPT-5, and CPT-6) to delineate the vertical extent of petroleum hydrocarbons in groundwater, drilled one hollow-stem auger boring (B-1) to delineate the vertical extent of petroleum hydrocarbons in soil adjacent to the UST complex, and installed and sampled five soil vapor probes (SVP-1 through SVP-5). Soil samples from SVP-1 through SVP-3, and SVP-5 did not contain detectable levels of TPHg, BTEX, or MTBE. Soil samples from SVP-4 and B-1 contained concentrations below ESLs for shallow and deep soil where groundwater is not a potential source of drinking water with residential land use. Groundwater grab sample results were all below the ESLs. Based on the results from this investigation, the horizontal extent of petroleum hydrocarbons was adequately defined to below ESLs, and the vertical extent was found to be confined to the shallower groundwater intervals. All soil vapor sample results for TPHg, BTEX, and MTBE were below ESLs for residential land use, with the exception of TPHg in SVP-1, SVP-4, and SVP-5. The result from SVP-5 also exceeded the commercial ESL. Details of

this investigation are presented in CRA's December 19, 2007 *Supplemental Subsurface Investigation Report.*

2008-2011 Soil Vapor Probe Sampling: CRA resampled soil vapor probes SVP-1 through SVP-3 and SVP-5 in March, May, and September 2008 and in January 2009 and resampled soil vapor probe SVP-5 in July, and October 2009. SVP-4 could not be sampled due to water in the probe's tubing during the March, May, and September 2008 and January 2009 events; SVP-5 contained water during the July 2009 event. In October 2010, CRA installed two soil vapor probes (SVP-6 and SVP-7) and reinstalled SVP-4. During a November 2010 sampling event, SVP-6 and SVP-7 were sampled, and SVP-4 again contained water. In May 2011, CRA sampled soil vapor probes SVP-1 through SVP-3, SVP-6, and SVP-7. Soil vapor probes SVP-4 and SVP-5 could not be sampled in May or June 2011 due to water in the sampling tubing. In August 2011, CRA sampled soil vapor probes SVP-6 and SVP-7. Soil vapor probes SVP-4 and SVP-5 could not be sampled in August or November 2011 due to water in the sampling tubing. Historically, all soil vapor sample concentrations of BTEX and MTBE were below ESLs for residential and commercial land use, with the exception of benzene, ethylbenzene, and total xylenes in the sample from SVP-5 in September 2008. Cumulative soil vapor sampling results are presented in CRA's November 10, 2011 *Soil Vapor Sampling Report.*

2008 Subsurface Investigation: In September and October 2008, CRA destroyed two groundwater monitoring wells (MW-1 and MW-2) because their excessive screen length provided a potential conduit to deeper groundwater, installed three groundwater monitoring wells (MW-1A, MW-1B, and MW-2B) to replace MW-1 and MW-2, and installed two DPE wells (EW-1 and EW-2) and eight piezometers (P-1A through P-4A and P-1B through P-4B) for use in groundwater pump tests and a DPE pilot test. Soil samples did not contain benzene, MTBE, or TBA concentrations above ESLs. Four soil samples contained TPHg, ethylbenzene, and total xylenes concentrations which exceed ESLs (P-3B at 27 fbg, EW-1 at 30 fbg, EW-2 at 27 fbg, and P-1B at 30 fbg). Toluene was detected at a concentration above the ESL in one sample (P-3B at 27 fbg). Based on the sample depths, these detections were likely related to groundwater. This investigation is detailed in CRA's February 5, 2009 *Subsurface Investigation Report.*

2008 Multi-Phase Extraction Pilot Test: In November 2008, CRA performed an aquifer pumping test and a multi-phase extraction test to assist in the selection of an appropriate remedial option to address dissolved-phase petroleum hydrocarbons detected in groundwater. This investigation is detailed in CRA's February 5, 2009 *Aquifer Pumping Test and Multi-Phase Extraction Pilot Test Report.*

2010 Well Installation and Air Sparge (AS)/Soil Vapor Extraction (SVE) Pilot Test: In March 2010, CRA installed an AS well (AS-1) and conducted an AS/SVE pilot test. During the test, shallow soil hydrocarbon vapor concentrations up to 3,500 ppmv were detected in SVP-1 (screened at 5 fbg). and the test was immediately stopped. In October 2010, CRA installed one SVE well (SVE-1) and two soil vapor probes (SVP-6 and SVP-7) to monitor shallow soil vapor and in November 2010 conducted a second AS/SVE pilot test. The minimum feasible sparge flow rate was not achieved, and the pilot test data demonstrated that AS/SVE is not feasible. CRA's January 31, 2011 *Air Sparge and Soil Vapor Extraction Well Installation and Pilot Test Report* provides details of this investigation and testing.

Groundwater Monitoring Program: Groundwater sampling began in March 1990. Historically, SPHs were observed intermittently in wells MW-1, MW-2, MW-3, and MW-11; however, since the July 2008 sampling event, no SPHs have been observed. Groundwater is currently monitored and sampled semiannually during the first and third quarters.