CONESTOGA-ROVERS & ASSOCIATES

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TRANSMITTAL

DATE: October 1, 2012

REFERENCE NO.: 240414

PROJECT NAME: 540 Hegenberger Road, Oakland

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	Revised Soil Vapor Mitigation 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)
Victoria Du (property owner), Horizon Energy Ltd., 540 Hegenberger Road, Oakland, CA 94621-1320

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
540 Hegenberger Road
Oakland, California
SAP Code 135694
Incident No. 98995752
ACEH Case No. RO0000223

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

REVISED SOIL VAPOR MITIGATION WORK PLAN

SHELL-BRANDED SERVICE STATION
540 HEGENBERGER ROAD
OAKLAND, CALIFORNIA

SAP CODE 135694
INCIDENT NO. 98995752
AGENCY NO. RO0000223

Prepared by:
Conestoga-Rovers & Associates

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OCTOBER 1, 2012
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1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this revised work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) to mitigate potential soil vapor intrusion to the station kiosk office. Soil vapor samples from sub-slab soil vapor probe SVP-3, located in the kiosk office, have contained up to 17,000,000 micrograms per cubic meter ($\mu g/m^3$) total petroleum hydrocarbons as gasoline (TPHg), and an air sample collected from the floor drain in September 1996 contained 600,000 $\mu g/m^3$ TPHg. This revised work plan was requested in Alameda County Environmental Health's (ACEH's) July 30, 2012 letter.

The subject site is an active Shell-branded service station located on the southeast corner of the Hegenberger Road and Edes Avenue intersection in a commercial area of Oakland, California (Figure 1). The site layout (Figure 2) includes one station building, two dispenser islands, four underground storage tanks, and a car wash.

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

2.0 WORK TASKS

CRA has completed repairs to the kiosk ventilation system. The ventilation system was inoperable prior to the repairs. CRA will conduct an air exchange measurement to verify the effectiveness of the current ventilation system. CRA proposes to plug the floor drain and seal the concrete floor in the station kiosk office to mitigate potential soil vapor intrusion. The kiosk office is located at the south end of the kiosk building shown on Figure 2. Sub-slab soil vapor probes SVP-3 and SVP-4 are located in the kiosk office. We propose to destroy these probes prior to sealing the floor. Specific tasks are described below.

2.1 AIR CHANGE MEASUREMENT

CRA's subcontractor will perform a measurement of air changes within the station kiosk building in conformance with NEBB and ASRAE procedural standards (NEEB 6.5.3 & ASHRAE 62-2001). This air change measurement methodology is considered to be a direct measurement of air changes occurring within a building, and it is used for environmental air balancing within buildings to meet Leadership in Energy and Environmental Design and other building standards. CRA's subcontractor will utilize

an Alnor flow hood to obtain direct supply and return air total flow rates for the three ventilation units located in the convenience store, storeroom, and office of the station kiosk building.

2.2 PERMIT

No permit is needed to seal the floor drain, destroy the sub-slab soil vapor probes, or apply the floor sealant.

2.3 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.

2.4 FLOOR DRAIN

CRA will plug the floor drain by placing an expansion plug in the drain pipe and placing concrete on top of the plug up to the floor grade.

2.5 SOIL VAPOR PROBE DESTRUCTION

CRA proposes to destroy two sub-slab soil vapor probes (SVP-3 and SVP-4) located in the office of the station kiosk building (Figure 2).

A rotary hammer drill will be used to drill out the sub-slab probe seal, the probe tubing will be removed, and the hole in the concrete slab will be backfilled with neat concrete to floor grade. Cuttings will be removed using a towel moistened with distilled water or a portable vacuum cleaner.

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

2.6 FLOOR SEALING

CRA's subcontractor will seal the concrete floor in the kiosk office using Land Science Technologies' Retro-Coat™, a two-part, odorless, 100% solids coating which contains no volatile organic chemicals. Prior to sealing the floor, the new concrete patches on the floor drain and former soil vapor probes will be allowed to cure a minimum of 28 days. The kiosk floor will then be shot blasted to provide a clean, sound substrate on which to bond the sealant. Any holes and cracks wider than 1/8" will be filled and allowed to dry before coating. A 6-mil primer coat will be applied to the prepared floor and allowed to dry followed by two 10-mil coats of sealant. Commercial grade vinyl flooring will be placed over the finished coating to assure its continuing integrity.

2.7 VERIFICATION AIR SAMPLING

CRA will collect air samples in the station kiosk office, in the kiosk store, and outside the kiosk before and after completing the soil vapor mitigation measures. The samples will be collected in 6-liter Summa™ canisters over a 24-hour time period using flow controllers set to 11.5 milliliters per minute. While sampling, the vacuum of the Summa™ canister will be used to draw air through the flow controller.. The samples will be collected in the breathing zone. After sampling, the Summa™ canisters will be packaged and sent to a State of California-certified laboratory under chain-of-custody for analysis. The air samples will be analyzed for TPHg by EPA Method TO-3 and for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl tertiary-butyl ether by EPA Method TO-15.

The site is an active service station. Indoor air samples collected at active stations may measure BTEX and other petroleum hydrocarbon compounds within or above the concentration ranges commonly seen as background values. In addition, there are many sources of background contamination inside buildings. Materials and substances commonly found in commercial settings, such as paints, paint thinners, gasoline-powered machinery, building materials, cleaning products, dry cleaned clothing, and cigarette smoke, contain volatile organic compounds (VOCs) that may be detected by indoor air testing. Table A presents a summary of BTEX background concentrations reported in several indoor air studies.

TABLE A: SUMMARY OF INDOOR AIR BACKGROUND STUDIES[1]								
	USEPA (2002)							
Chemical of concern	*Brown et al. (1994) (ppbv)*	*Sheldon (1992) (ppbv)*	*EPA IAQ (1991) (ppbv)*	*Shah and Singh (1988) (ppbv)*	*Stolwijk (1990) (ppbv)*	*Foster et al. (2002) (ppbv)*	*Range of values (ppbv)*	*Range of values (µg/m³)*
Benzene	2.51	0.69	4.39	5.16	3.16	1.28	0.69 to 5.16	2.14 to 16.8
Ethylbenzene	1.15	–	3.23	2.89	2.32	–	1.15 to 3.23	5.08 to 14.3
Toluene	9.83	–	16.21	7.39	22.0	–	7.39 to 22.0	26.9 to 80.0
Xylenes, m-p	5.54	–	–	–	4.57	–	4.57 to 5.54	20.0 to 24.2

Notes:
USEPA = United States Environmental Protection Agency
ppbv = parts per billion by volume
$\mu g/m^3$ = micrograms per cubic meter.

For example, the range of normal background concentrations for benzene spans the 1.41 to 14.1 $\mu g/m^3$ range representing 10^{-5} to 10^{-4} incremental risk values published as part of the California Human Health Screening Levels (CHHSLs) by California EPA. Table B lists the Office of Environmental Health Hazard Assessment (OEHHA) hazard quotient concentration values of 1 and excess cancer risk concentrations of 10^{-6}.

[1] T.E. McHugh et. al., *An Empirical Analysis of the Groundwater-to-Indoor-Air Exposure Pathway: The Role of Background Concentrations in Indoor Air*, 2004.

TABLE B: SELECTED CALIFORNIA HUMAN HEALTH SCREENING LEVELS FOR INDOOR AIR		
Chemical	*[1]Indoor Air Human Health Screening Levels (µg/m3)*	
	Residential Land Use	*Commercial/ Industrial Land Use Only*
Benzene	8.40 E-02	1.41 E-01
Ethylbenzene	0.97 E+00[2]	1.60 E+00[2]
Methyl tertiary-Butyl Ether	9.35 E+00	1.57 E+01
Naphthalene	7.20 E-02	1.20 E-01
Tetraethyl Lead	3.65 E-04	5.11 E-04
Toluene	3.13 E+02	4.38 E+02
m-Xylene	7.30 E+02[3]	1.02 E+03[3]
o-Xylene	7.30 E+02[3]	1.02 E+03[3]
p-Xylene	7.30 E+02[3]	1.02 E+03[3]
Reference: Appendix 1, OEHHA Target Indoor Air Concentrations and Soil-Gas Screening Numbers for Existing Buildings under Residential and Industrial/Commercial land uses.		
Notes:		
Commercial/industrial properties should be evaluated using both residential and commercial/industrial CHHSLs. A deed restriction that prohibits use of the property for sensitive purposes may be required at sites that are evaluated and/or remediated under a commercial/industrial land use scenario only.		
Calculation of cumulative risk may be required at sites where multiple contaminants with similar health effects are present.		
Carcinogens: CHHSLS based on target cancer risk of 10-6. Cal/EPA cancer slope factors used when available.		
Noncarcinogens: CHHSLS based on target hazard quotient of 1.0.		
1. "Residential Land Use" screening levels generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.).		
2. Calculation of a screening number for the chemical outlined in OEHHA draft report, *California Human Health Screening Levels for Ethylbenzene* dated November 2009.		
3. Representative Screening Numbers for mixed xylenes. The representative value for mixed xylenes is based on the calculated lowest one amongst the three isomers.		

As a result, it is not possible to interpret whether vapor intrusion is occurring by simply comparing indoor air concentration against the most conservative screening values, since these values do not account for background concentrations. Instead, evaluation of any vapor intrusion through the kiosk floor will be made by comparing the kiosk concentrations to the store concentrations and to the outdoor air concentrations.

2.8 REPORT PREPARATION

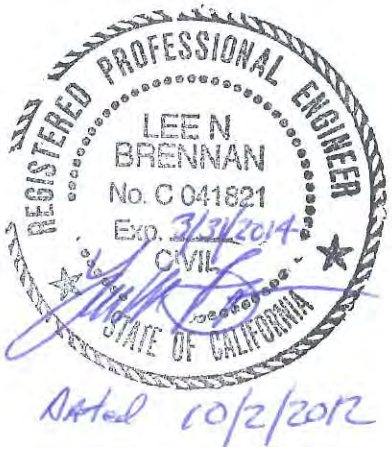
CRA will prepare a written report documenting the work performed, which will include field procedures performed and analytical results obtained.

3.0 SCHEDULE

CRA will implement this mitigation plan upon receiving ACEH's written approval of this work plan.

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

Peter Schaefer, CEG, CHG

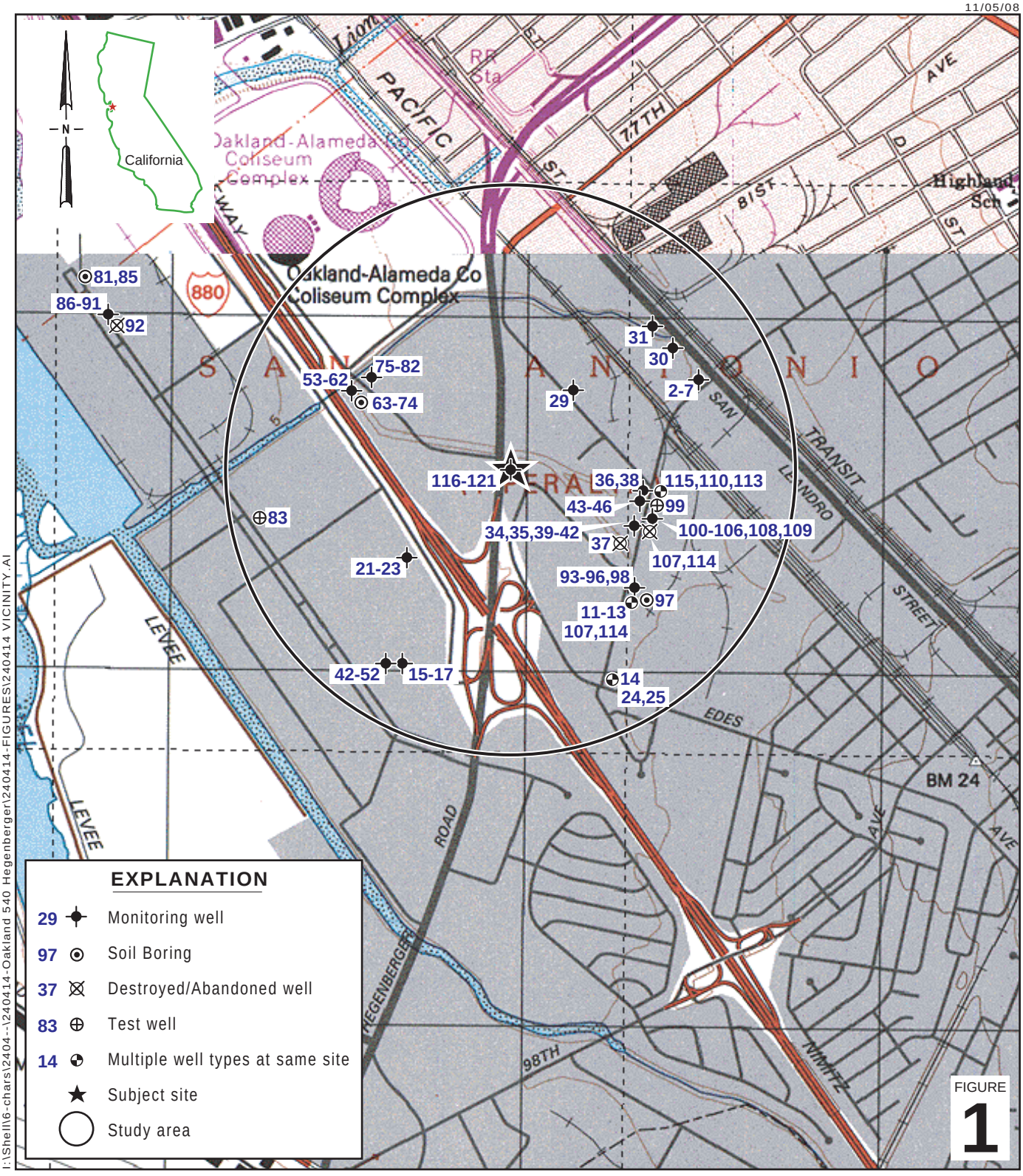


Lee Brennan, P.E.

Dated 10/2/2012

FIGURES

11/05/08



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0 1/8 1/4 1/2 1

SCALE 1:1/4 MILES

FIGURE 1

Shell-branded Service Station

540 Hegenberger Road

Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

03/08/2012

Site Plan

EXPLANATION

SVP-1	⌖	Sub-slab soil vapor probe location (Shell)
MW-2	●	Monitoring well location (Shell)
BW-A	▲	Tank backfill well location (Shell)
MW-1	⊕	Groundwater extraction well location (Shell)
MW-1	■	Monitoring well location (ARCO)
RW-1	◐	Recovery well location (ARCO)
MW-2	⊘	Destroyed well location (ARCO)
D-1-5'	◖	Soil sample location (2004)
C-1	▲	Canal sampling location (2001)
SB-E	●	Soil boring location (2000)
SB-D	◉	Soil boring location (1998)
SB-1	◐	Soil boring location (1998)
D-1	○	Soil sample location (1998)
D-1	□	Soil sample location (1996)
INF	•	GWE system sample location

- Electrical line (E)
- Telecommunication line (T)
- Storm drain line (STM)
- Sanitary sewer line (SAN)
- Water line (W)
- Unknown utility line (?)
- FH ◇ Fire hydrant

HEGENBERGER ROAD
COLISEUM WAY
Canal
C-1
FH
Median
Median
PG&E
Planter
SB-1
SB-5
MW-3
SB-2
P-4-5'
P-5-5'
P-6-5'
D-1
D-4-5'
D-2
D-5-5'
D-6-5'
Dispensers
Remediation piping
SVP-2
SVP-1
SVP-4
SVP-3
RR
Kiosk
SB-D
SVP-5
SB-4
SB-3
Dispensers
D-3-5'
D-2-5'
D-1-5'
D-6
P-3-5'
P-2-5'
P-1-5'
MW-1
SB-F
MW-5
SS Cleanout
Car Wash
Planter
Remediation Compound
INF
EFF
Storage
Planter
SB-G
Jack in the Box Restaurant
Shell Station
540 Hegenberger
BW-D
Planter
BW-A
BW-C
USTs
MW-2
SD-2
SB-E
BW-B
Jill
SD-1
Planter
Driveway
Sidewalk
Driveway
Canopy
Dispenser Islands
MW-7
USTs
Driveway
Former W/O UST
MW-1
MW-3
Sidewalk
AM/PM Mini-Mart
Planter
ARCO Station #4494
566 Hegenberger
MW-2
(Destroyed 12/92)
RW-1
MW-4
Trash
MW-4
MW-6
MW-5
Burger King Restaurant
12" SS
EDES AVENUE
ENTERPRISE WAY
Days Inn
Laborers' International Union

N

0 20 40 80

Scale (ft)

FIGURE

2

Shell-branded Service Station

540 Hegenberger Road
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

I:\Shell\6-chars\2404--\240414-Oakland 540 Hegenberger\240414-FIGURES\240414 SITE PLAN.DWG

APPENDIX A

SITE HISTORY

SITE HISTORY

1996 Piping Repair and Air Sampling: In August 1996, Cambria Environmental Technology, Inc. (Cambria) collected one soil sample beneath the piping at Dispenser 1 and collected one air samples from the southeastern tank backfill well and two air samples from a drain in the office of the station kiosk building. The soil sample contained 3,400 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg), 17 mg/kg benzene, and 720 mg/kg methyl tertiary-butyl ether (MTBE). The vapor sample from the tank backfill well contained 3,700,000 µg/m^3 TPHg, 250,000 µg/m^3 benzene, and 1,500,000 µg/m^3 MTBE. The air samples from the kiosk office drain contained up to 600,000 µg/m^3 TPHg. Benzene and MTBE were not detected in air samples collected from the drain. Cambria's November 8, 1996 *Soil and Air Sampling Report* presents details of this investigation.

1998 Station Upgrade: In January and February 1998, Paradiso Mechanical of San Leandro, California (Paradiso) added secondary containment beneath the existing dispensers and submersible turbine pumps. Cambria collected soil samples beneath the dispensers. Soil samples contained up to 340 mg/kg TPHg and 3.7 mg/kg benzene. Cambria's March 23, 1998 *Dispenser Soil Sampling Report* presents details of this investigation.

1998 Subsurface Investigation: On March 6, 1998, Cambria drilled five on-site soil borings (SB-1 through SB-5) up to 20 feet below grade (fbg). Soil samples contained up to 3,400 mg/kg TPHg, 39 mg/kg benzene, and 170 mg/kg MTBE (all in boring SB-5 at 6 fbg). Boring SB-5 also contained the maximum grab groundwater concentrations, which were 200,000 micrograms per liter (µg/L) TPHg, 11,000 µg/L benzene, and 1,300,000 µg/L MTBE. Cambria's April 15, 1998 *Subsurface Investigation Report* presents details of this investigation.

1998 Subsurface Investigation: On July 14 and 15, 1998, Cambria installed three groundwater monitoring wells (MW-1 through MW-3) and drilled one soil boring (SB-D) at the site. Soil samples contained up to 460 mg/kg TPHg, 4.7 mg/kg benzene, and 240 mg/kg MTBE (all in boring SB-D at a depth of 5.5 fbg). Cambria's November 9, 1998 *Well Installation Report* presents details of this investigation.

1999-2003 Interim Remediation Efforts: Beginning in July 1999, Cambria conducted weekly groundwater extraction (GWE) events from selected site wells using a vacuum truck. Between June of 2000 and September 2001, Cambria added extraction and treatment of soil vapors in addition to dissolved-phase hydrocarbons (dual-phase vacuum extraction). Cambria discontinued interim remediation efforts in February 2003. Interim GWE removed 83,063 gallons of groundwater containing an estimated 1.68 pounds of TPHg, 0.088 pounds of benzene, and 13.0 pounds of MTBE. Soil vapor extraction removed an estimated 19.3 pounds of TPHg, 0.107 pounds of benzene, and 0.720 pounds of MTBE.

2000 Subsurface Investigation: In August and September 2000, Cambria drilled three soil borings (SB-E, SB-F, and SB-G) and installed one groundwater monitoring well (MW-4). Soil samples contained up to 108 mg/kg total petroleum hydrocarbons as diesel (TPHd), 468 mg/kg TPHg, and 1.86 mg/kg MTBE. Grab groundwater samples contained up to 5,780 µg/L TPHd, 51,100 µg/L TPHg, 2,080 µg/L benzene, and 76,400 µg/L MTBE. Cambria's February 15, 2001 *Offsite Subsurface Investigation Report* presents details of this investigation.

2002 Subsurface Investigation: In June 2002, Cambria installed one groundwater monitoring well (MW-5). TPHg and benzene, toluene, ethylbenzene, and total xylenes (BTEX) were not detected in soil samples from the well boring. Up to 13 mg/kg MTBE (MW-5-14.0) was detected in soil samples. Cambria's August 14, 2002 *Well Installation Report* presents details of this investigation.

2003-2005 GWE System: In March 2003, Cambia installed a GWE system and operated the system between April 2003 and November 2005. The GWE system removed 361,511 gallons of groundwater containing an estimated 4.75 pounds of TPHg, 0.062 pounds of benzene, and 18.4 pounds of MTBE.

2004 Fuel System Upgrade and Soil Disposal: In June and July 2004, Paradiso upgraded fuel dispensers, piping, under-dispenser containment, and underground storage tank fuel fill-port sumps. Cambria collected soil samples from beneath the dispensers and piping at 5 fbg. Soil samples contained up to 1,200 mg/kg TPHd, 1,400 mg/kg TPHg, 4.3 mg/kg benzene, 3.4 mg/kg toluene, 14 mg/kg ethylbenzene, 3.3 mg/kg xylenes, and 43 mg/kg MTBE. The laboratory noted that the hydrocarbons reported as diesel were in the early diesel range and did not match the laboratory's diesel standard. The facility upgrades generated approximately 50 tons of soil for disposal. Cambria's June 28, 2004 *Dispenser and Piping Upgrade Sampling Report* presents details of this investigation.

2011 Subsurface Investigation: In February 2011, Conestoga-Rovers & Associates (CRA) installed three sub-slab soil vapor probes (SVP-1 through SVP-3) within the station kiosk. In March 2011, CRA collected two rounds of soil vapor samples from these sub-slab soil vapor probes. The highest constituent of concern (COC) concentrations were detected in SVP-3, which contained up to 17,000,000 µg/m^3 TPHg, 640 µg/m^3 ethylbenzene, and 1,400 µg/m^3 xylenes. Benzene, toluene, MTBE, tertiary-butyl alcohol (TBA), and naphthalene were not detected in the samples. All soil vapor COC concentrations in SVP-2 were below San Francisco Bay Regional Water Quality Control Board's (RWQCB's) environmental screening levels (ESLs) for

commercial land use,[1] and all BTEX, MTBE, TBA, and naphthalene detections were below ESLs in all sub-slab probes. TPHg concentrations exceeded ESLs in SVP-1 and SVP-3. It should be noted that RWQCB ESL guidance advises "TPH ESLs must be used in conjunction with ESLs for related chemicals (e.g. BTEX, polynuclear aromatic hydrocarbons, oxidizers, etc.)." In this case, BTEX, MTBE, TBA, and naphthalene would be the appropriate related chemicals, and they were not detected at concentrations above ESLs. The laboratory reporting limits were above ESLs for benzene and naphthalene in SVP-3 due to the presence of other hydrocarbons in the soil vapor sample. CRA's May 2, 2011 *Soil Vapor Probe Installation and Sampling Report* presents these investigation results.

2012 Subsurface Investigation: In January 2012, CRA installed two sub-slab soil vapor probes (SVP-4 and SVP-5) in the station kiosk. In February 2012, CRA collected soil vapor samples from the two new sub-slab soil vapor probes and the three existing sub-slab soil vapor probes (SVP-1 through SVP-3) which contained up to 13,000,000 µg/m^3 TPHg (SVP-3), 670 µg/m^3 ethylbenzene (SVP-3), 93 µg/m^3 total xylenes, and 75 µg/m^3 TBA (SVP-5). Benzene, toluene, MTBE, and naphthalene were not detected in the samples. All soil vapor COC concentrations in SVP-1, SVP-2, SVP-4, and SVP-5 were below ESLs, and all BTEX, MTBE, and naphthalene detections were below ESLs in SVP-3. The TPHg concentration exceeded the ESL in SVP-3. Investigation details are presented in CRA's April 27, 2012 *Subsurface Investigation Report.*

Groundwater Monitoring: Groundwater was monitored quarterly between August 1998 and September 2009. Groundwater monitoring was coordinated with the ARCO service station to the north between December 2001 and March 2007. Depth to groundwater generally ranges from 4 to 10 fbg, and historical groundwater flow direction has varied from north to east. In the most recent groundwater monitoring event (September 23, 2009), monitoring wells contained up to 250 µg/L TPHg, 24 µg/L benzene, 170 µg/L MTBE, and 7,700 µg/L TBA.

[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]