CONESTOGA-ROVERS & ASSOCIATES

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TRANSMITTAL

DATE: April 22, 2010

REFERENCE NO.: 240472

PROJECT NAME: 105 Fifth Street, Oakland

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

RECEIVED
9:23 am, Apr 26, 2010
Alameda County
Environmental Health

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QUANTITY	DESCRIPTION
1	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 content of this document, please contact Peter Schaefer at (510) 420-3319.

Copy to: Denis Brown, Shell Oil Products US, 20945 S. Wilmington Avenue, Carson, CA 90810
Arthur R. and Mary A. Hansen, 820 Loyola Drive, Los Altos, CA 94024

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
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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: Shell-branded Service Station
105 Fifth Street
Oakland, California
SAP Code 135700
Incident No. 98995757
ACHCSA Case No. RO0000487

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

SOIL VAPOR PROBE INSTALLATION AND SOIL VAPOR SAMPLING WORK PLAN

SHELL-BRANDED SERVICE STATION
105 FIFTH STREET
OAKLAND, CALIFORNIA

SAP CODE	135700
INCIDENT NO.	98995757
AGENCY NO.	RO0000487

Prepared by:
Conestoga-Rovers & Associates

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APRIL 22, 2010
REF. NO. 240472 (8)
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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 assess potential for soil vapor intrusion to the service station kiosk prior to obtaining case closure as requested in Alameda County Environmental Health's (ACEH's) February 11, 2010 letter.

The site is an active Shell-branded Service Station located on the western corner of Fifth Street and Oak Street in Oakland, California (Figure 1). Currently, the site layout consists of a kiosk, four underground storage tanks (USTs), and two dispenser islands (Figure 2). The area surrounding the site is of mixed commercial and residential use.

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

2.0 SOIL VAPOR PROBE INSTALLATION

CRA proposes to install three soil vapor probes on site to assess soil vapor concentrations adjacent to the service station kiosk at the locations shown on Figure 2. Specific tasks are described below.

2.1 PERMITS

CRA will obtain a boring permit 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 (USA) and a private utility locating service prior to drilling.

2.4 PROBE INSTALLATION

CRA proposes to install three soil vapor probes (SVP-6 through SVP-8) into the subsurface adjacent to the service station kiosk (Figure 2). SVP-6 through SVP-8 will be installed with nested screens at 3 and 5 feet below grade (fbg) in order to assess vertical attenuation of soil vapors.

Assuming the absence of subsurface obstructions, CRA will advance three soil borings (SVP-6 through SVP-8) to 5 fbg using an air-knife rig in the approximate locations shown on Figure 2. 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. A clean, fine-grained silica sand filter pack will be installed approximately 3 inches below and above the screened interval, and the guide pipe will be lifted as the sand pack is installed to ensure the pack stabilizes the tubing within each boring. The annulus will then be sealed with a bentonite slurry set atop a 2-inch base of bentonite pellets up to the next probe interval at 3 fbg and another probe will be installed in a similar manner. The probe will completed from 18 inches below ground to the surface using bentonite slurry, set atop a 2-inch base of bentonite pellets. Each soil vapor probe will be completed at the surface using a traffic-rated well box at grade.

3.0 SOIL VAPOR PROBE SAMPLING

At least two weeks following probe installation, CRA will collect soil vapor samples from sampling points SVP-1, SVP-3, and from both probes installed in SVP-6 through SVP-8. 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.

3.1 PROBE SAMPLING

CRA will sample soil vapor probes SVP-1, SVP-3, and from both probes installed in SVP-6 through SVP-8 using a vacuum pump and Tedlar® bags. 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.

3.2 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 in 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 the soil vapor samples contain 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 CHEMICAL ANALYSES

Vapor samples will be analyzed for total petroleum hydrocarbons as gasoline, benzene, toluene, ethylbenzene, xylenes, and naphthalene by EPA Method 8260B and oxygen, carbon dioxide, methane, and helium by ASTM D Method 1946 (M).

4.0 REPORT PREPARATION

Following receipt of the 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.

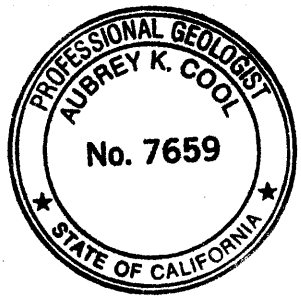
5.0 SCHEDULE

CRA will implement the soil vapor probe installation activities upon approval of this work plan by the ACEH and receipt of a drilling permit from ACPWA. CRA will submit a report detailing the results of the investigation within 60 days of receiving the final laboratory report.

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

Peter Schaefer, CEG, CHG

Aubrey K. Cool, PG



FIGURES

11/03/08

FIGURE
1

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SCALE : 1" = 1/4 MILE

Shell-branded Service Station
105 Fifth Street
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

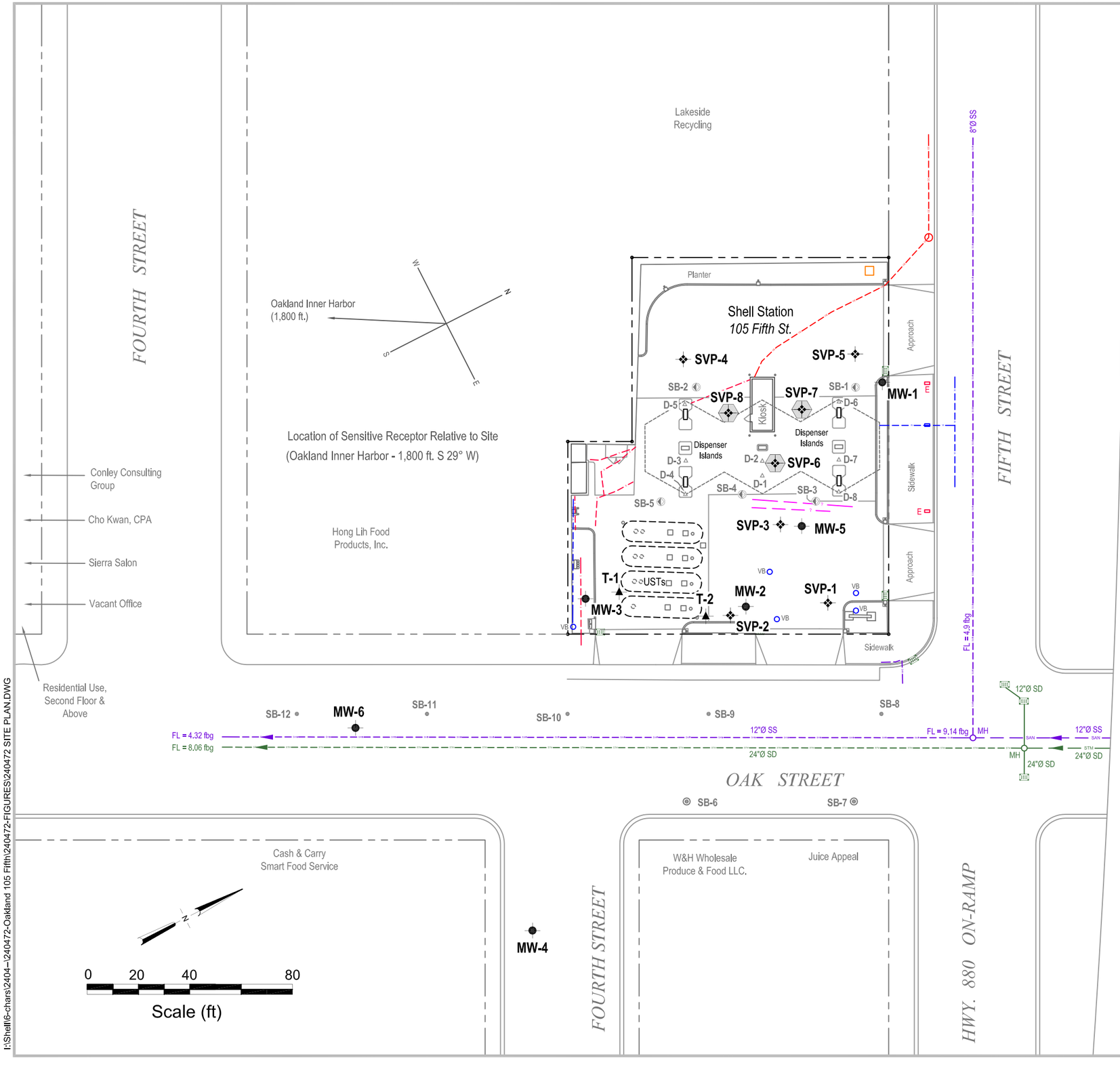
04/12/10

Site Plan

EXPLANATION

- SVP-6 — Proposed soil vapor probe location
- SVP-1 — Soil vapor probe location (8/09)
- MW-1 — Monitoring well location
- T-1 — Tank backfill well location
- SB-8 — Soil boring location (3/02)
- SB-6 — Soil boring location (2/01)
- SB-1 — Soil boring location (7/98)
- D-1 — Soil sample location
- OE — Overhead electrical line (OE)
- E — Electrical line (E)
- T — Telecommunication line (T)
- ? — Unknown utility line
- W — Water line (W)
- STM — Storm drain line (STM)
- SAN — Sanitary sewer line (SAN)
- Flow direction
- MH — Manhole
- VB — Vault Box
- Storm drain inlet
- fbg — Feet below grade

Note: All utility locations are approximate



I:\Shell\6-chars\2404--\240472-Oakland 105 Fifth\240472-FIGURES\240472 SITE PLAN.DWG

CONESTOGA-ROVERS & ASSOCIATES

Shell-branded Service Station
105 Fifth Street
Oakland, California

FIGURE
2

APPENDIX A

SITE HISTORY

SITE HISTORY

November 1996 Dispenser Soil Sampling: During November and December 1996, contractors Armer/Norman & Associates of Walnut Creek, California (Armer/Norman) removed five gasoline dispensers, two diesel dispensers, associated active piping, and inactive piping to a former diesel fuel dispenser. All dispensers and associated active piping were replaced with additional secondary containment. On November 27, 1996, Cambria Environmental Technology, Inc. (Cambria) collected eight soil samples. Total petroleum hydrocarbons as gasoline (TPHg) was detected in all eight soil samples at a maximum concentration of 3,500 milligrams per kilogram (mg/kg) in sample D-8 at 5 feet below grade (fbg). Total petroleum hydrocarbons as diesel (TPHd) was detected in three soil samples at a maximum concentration of 14,000 mg/kg in sample D-7 at 5 fbg. Benzene was detected in four soil samples at a maximum concentration of 21 mg/kg in sample D-1 at 5 fbg. Methyl tertiary-butyl ether (MTBE) was detected in two soil samples at maximum concentrations of 26 mg/kg in sample D-1 at 5 fbg. Detailed results are presented in Cambria's August 7, 1997 *Dispenser Soil Sampling and Stockpile Disposal Report*. Based on the dispenser soil sampling results, Cambria filed a December 5, 1996 *Underground Storage Tank Unauthorized Release Site Report* with the Alameda County Health Care Services Agency (ACHCSA), on Shell's behalf.

February 1998 Upgrade Activities: In February 1998, contractors Paradiso Mechanical of San Leandro, California installed secondary containment around the underground storage tank (UST) turbine sumps. Since the dispensers had previously been upgraded with secondary containment, no additional dispenser upgrade activities were performed. Cambria inspected the UST pit on February 26, 1998, and did not observe any field indications of hydrocarbon impact (such as staining or odors). No soil samples were collected. This information was presented in the site summary section of Cambria's May 26, 1998 *Subsurface Investigation Workplan*.

July 1998 Subsurface Investigation: On July 23, 1998, Cambria advanced two soil borings northwest of the existing dispensers (SB-1 and SB-2) and three borings southeast of the dispensers (SB-3 through SB-5) to depths of between 11 and 12 fbg. TPHg was detected in two soil samples at a maximum concentration of 2.8 mg/kg in sample SB-3-5.0 at 5 fbg. TPHd was detected in soil samples from all five borings at a maximum concentration of 15 mg/kg in SB-3-5.0 at 5 fbg. No benzene was detected in any of the soil samples collected from borings SB-1 through SB-5. MTBE was detected in two soil samples at a maximum concentration of 0.48 mg/kg in SB-5-5.0 at 5 fbg.

Groundwater was first encountered at depths between 6 and 9 fbg. TPHg was detected in grab groundwater samples collected from four of the soil borings at a maximum

concentration of 90,000 micrograms per liter (µg/l) in sample SB-3. TPHd was detected in all of the grab groundwater samples at a maximum concentration of 27,000 µg/l in SB-4. Benzene was detected in all of the grab groundwater samples at a maximum concentration of 1,300 µg/l in SB-3. MTBE was detected in three of the grab groundwater samples at a maximum concentration of 4,100 µg/l in SB-4. Complete investigation results are presented in Cambria's November 18, 1998 *Subsurface Investigation Report.*

May 1999 Monitoring Well Installations: On May 14, 1999, Cambria installed groundwater monitoring wells MW-1, MW-2, and MW-3 to depths of between 24 and 25 fbg. Soil samples from the well borings contained MTBE at a maximum concentration of 20.4 mg/kg, TPHg up to 1,700 mg/kg, and benzene up to 0.0369 mg/kg. Site investigation results are presented in Cambria's October 7, 1999 *Monitoring Well Installation Report.*

2000-2001 Periodic Dual-phase Vacuum Extraction (DVE): Periodic DVE was performed at the site from April to October 2000 and once in March 2001. Mobile DVE is the process of applying a high vacuum through and airtight well seal to simultaneously extract soil vapors from the vadose zone and enhance groundwater extraction (GWE) from the saturated zone. Between April 2000 and March 2001, the DVE process removed an estimated 14.59 pounds of TPHg, 0.048 pounds of benzene, and 14.50 pounds of MTBE from monitoring wells MW-2 and MW-3. DVE events were discontinued due to limited chemical recovery.

February 2001 Off-Site Investigation: On February 12, 2001, Cambria advanced three soil borings (SB-6, SB-7, and MW-4) to 25 fbg and converted MW-4 to a monitoring well. Soil and grab groundwater samples were analyzed for TPHg, BTEX, and MTBE, and grab groundwater samples were additionally analyzed for TPHd. No analytes were detected in soil samples collected from borings SB-6, SB-7 or MW-4. No TPHg, BTEX or MTBE were detected in grab groundwater samples collected from SB-6, SB-7, or MW-4. 1,400 µg/l TPHd was detected in grab groundwater collected from SB-7 at approximately 10 fbg. Cambria's June 7, 2001 *Offsite Subsurface Investigation* report presents the results of this investigation.

March 2001 DVE Test: On March 20, 2001, Cambria performed individual short-term DVE testing on MW-2 and MW-3. Groundwater was also extracted from tank backfill well T-1, using a vacuum truck, on March 21, 2001. DVE was performed for approximately 3 hours on each well, at two different extraction rates. The total estimated groundwater-phase mass removed from MW-2, MW-3, and T-1 was 0.132 pounds TPHg, 0.001 pounds benzene, and 4.84 pounds MTBE. The total estimated

vapor-phase mass removed from MW-2 and MW-3 was 3.24 pounds TPHg, 0.006 pounds benzene, and 0.476 pounds MTBE. Vacuum influence and groundwater influence were monitored, but not detected, in surrounding wells during DVE testing. The groundwater yield during DVE testing was approximately 769 gallons, which equates to an average flow rate of 2.14 gallons per minute (gpm). Based on the DVE test results, Cambria concluded that vapor-phase petroleum hydrocarbon recovery would be possible, but not cost-effective. Cambria also concluded that liquid-phase petroleum hydrocarbon recovery was feasible, and recommended semi-monthly GWE from T-1, using a vacuum truck. Cambria's July 17, 2001 *Dual-phase Vacuum Extraction Test Report* documents the test procedures and results.

2001 Area Well Survey: Cambria identified two potential receptor wells through California Department of Water Resources (DWR) records. One well of unknown use is located within a ½-mile radius of the subject site, and one irrigation well is located just outside the ½-mile study area. Well number one is of unknown use, and is located approximately 2,400 feet north (up-gradient) of the site. Although no proposed use was indicated on the well driller's log, the well is labeled "MW-6" by the driller, and it is located next to an automobile dealership. It appears likely that this well is used for groundwater monitoring. Well number two is used for irrigation, and is located approximately 3,000 feet northwest (up-gradient) of the site. Given the observed groundwater flow direction and the distance to potential receptor wells, they are highly unlikely to be impacted by the relatively minor petroleum hydrocarbon constituents remaining in soil and groundwater at the site. Cambria's June 7, 2001 report entitled *Offsite Subsurface Investigation* presents the results of the well survey, including the DWR reports.

2001 Conduit Study: Cambria performed a site reconnaissance and reviewed City of Oakland engineering maps to identify utility conduits down-gradient of the site. A 12-inch diameter sanitary sewer main is located beneath Oak Street at approximately 6 fbg, and slopes to the southwest. An 8-inch diameter sanitary sewer main is located beneath Fifth Street, is sloped to the southeast, and joins the 12-inch sanitary sewer main at the intersection of Oak Street and Fifth Street. A 24-inch diameter storm drain conduit is also located beneath Oak Street, at approximately 6 fbg, and is sloped to the southwest. Since static groundwater levels at the site are shallow, permeable backfill material in sewer and storm drain trenches may be acting as preferential pathways for groundwater flow. Cambria's June 7, 2001 report entitled *Offsite Subsurface Investigation* presents the results of the conduit study.

November 2001 - June 2006 Periodic GWE: Beginning in November 2001, Phillips Services Corporation of Benicia, California conducted semi-monthly mobile GWE

events from tank backfill well T-1. Mobile GWE vacuum operations consist of lowering dedicated stingers into selected monitoring wells and extracting fluids using a vacuum truck. The volume of extracted fluid is recorded and used to calculate the quantity of aqueous-phase hydrocarbon removed from the subsurface. These events were temporarily discontinued in April 2002 in anticipation of installing a fixed GWE system, and then resumed in May 2002 using vacuum trucks provided by Onyx Industrial Services of Benicia, California. Well MW-3 was added to the extraction program in June 2003, and well MW-2 was added in July 2003. Cambria obtained an encroachment permit from the City of Oakland and began including off-site well MW-6 in the extraction program on August 21, 2003. Extraction from well MW-6 was discontinued after the October 2, 2003 event due to low groundwater production. Due to minimal remaining MTBE concentrations, well T-1 was removed from the extraction program after the September 18, 2003 event and well MW-2 was removed after the November 20, 2003 event. Based on the low MTBE concentration in MW-3 during the second quarter 2005 (180 µg/l on April 15, 2005), Cambria reduced periodic GWE frequency from semi-monthly to monthly in July 2005. T-1 was added to the program again as of October 17, 2005. Periodic GWE was discontinued in June 2006, with concurrence from the Alameda County Health Care Services Agency (ACHCSA). As of June 6, 2006, a total of 197,294 gallons of water was extracted by periodic GWE, resulting in the removal of an estimated 8.57 pounds of TPHg, 0.23 pounds of benzene, and 66.23 pounds of MTBE.

March 2002 Subsurface Investigation: On March 7, 2002, Cambria advanced off-site Geoprobe® borings SB-8 through SB-12, to depths ranging from 14 to 22 fbg. On March 8, 2002, Cambria installed on-site groundwater monitoring well MW-5 to a total depth of 24 fbg. No analytes were detected in soil samples from off-site borings SB-8, SB-10, SB-11, or SB-12. TPHg and MTBE were detected in soil samples at concentrations of up to 300 and 5.4 mg/kg, respectively. Grab groundwater samples were collected from all off-site soil borings. TPHg was detected in two samples at a maximum concentration of 170 µg/l in SB-8. Benzene was not detected in any of the grab groundwater samples. MTBE was detected in four samples at a maximum concentration of 7,900 µg/l in the sample from SB-10. Cambria's May 6, 2002 *Subsurface Investigation Report/Second Quarter 2002 Monitoring Report/Groundwater Extraction Evaluation Report* presents the results of this investigation and the mass transport estimate discussion.

August 2002 Well Installation: On August 1, 2002, Cambria installed groundwater monitoring well MW-6 to a depth of 24 fbg. Soil samples collected from MW-6 did not contain any TPHg, BTEX, or MTBE at concentrations above the laboratory reporting

limits. Site investigation results are presented in Miller Brooks Environmental, Inc.'s (Miller Brooks) September 16, 2002 *Well Installation Report.*

2005 Sensitive Receptor Survey Update: Delta Environmental Consultants, Inc. (Delta) conducted a sensitive receptor survey in 2005. They did not identify any additional potential receptor wells within a ½-mile radius of the site. Delta's study area was larger, however, and they identified a drinking water well and an industrial well approximately 4,488 and 5,546 feet north of the site, respectively. Based on the distance and location relative to the site, these wells are extremely unlikely to be impacted by petroleum hydrocarbon constituents in soil and groundwater originating at the site.

2009 Soil Vapor Investigation: In August 2009, Conestoga-Rovers & Associates (CRA) installed five soil vapor probes (SVP-1 through SVP-5). Benzene and ethylbenzene concentrations in soil vapor samples from probes SVP-1 and SVP-3 exceeded San Francisco Bay Regional Water Quality Control Board[1] (RWQCB) environmental screening levels (ESLs) for commercial land use. All soil vapor sample detections for toluene and xylenes are below the commercial land use ESLs, and no soil vapor detections from soil vapor probes SVP-2, SVP-4, and SVP-5 exceed ESLs. Results of this investigation are presented in CRA's September 29, 2009 *Soil Vapor Probe Installation and Sampling Report.* In October 2009, CRA re-sampled soil vapor probes SVP-1 and SVP-3 and confirmed the initial results. Re-sampling results are presented in CRA's February 11, 2010 *Soil Vapor Sampling Report.*

1999 - Present Groundwater Monitoring: Quarterly groundwater monitoring has been conducted at the site since July 1999. Maximum historical groundwater concentrations are 13,800 µg/l TPHg (well MW-2/July 23, 1999), 3,700 µg/l TPHd (T-1/July 10, 2002), 1,790 µg/l benzene (MW-2/July 23, 1999), 324,000 µg/l MTBE by EPA Method 8260B (MW-3/July 23, 1999), and 24,000 µg/l tertiary-butyl alcohol (TBA) (MW-3/April 30, 2003). In the most recent groundwater monitoring event (October 2, 2008), maximum groundwater concentrations were 1,200 µg/l TPHg in MW-6, 380 µg/l TPHd in T-1, 36 µg/l benzene in T-1, 740 µg/l MTBE in MW-6, and 200 µg/l TBA in MW-2.

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