CONESTOGA-ROVERS & ASSOCIATES

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

TRANSMITTAL

DATE: October 20, 2010

REFERENCE NO.: 240524

PROJECT NAME: 4255 MacArthur Boulevard, Oakland

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

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8:51 am, Oct 21, 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 contents of this document, please call Peter Schaefer at (510) 420-3319.

Copy to: Denis Brown, Shell Oil Products US *(electronic copy)*
Roland C. Malone, Jr., PO Box 2744, Castro Valley, CA 94546
Kenneth Williams, MacArthur/High Trailer Park, c/o Bookkeeping, 332 Peyton Drive, Hayward, CA 94544
Terry L. Grayson, ConocoPhillips Risk Management & Remediation, 76 Broadway, Sacramento, CA 95818

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: Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California
SAP Code 135701
Incident No. 98995758
ACEH Case No. RO0000486

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

FORMER SHELL SERVICE STATION
4255 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SAP CODE 135701
INCIDENT NO. 98995758
AGENCY NO. RO0000486

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

OCTOBER 20, 2010
REF. NO. 240524 (8)
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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 to buildings on adjacent properties as discussed during a February 4, 2010 meeting with Alameda County Environmental Health (ACEH).

The site is former Shell Service Station located on the western corner of MacArthur Boulevard and High Street in Oakland, California (Figure 1). Currently the site is a vacant lot. The former site layout consisted of a kiosk, three underground storage tanks, 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 six soil vapor probes on site to assess soil vapor concentrations adjacent to neighboring properties 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 and a private utility locating service prior to drilling.

2.4 PROBE INSTALLATION

CRA proposes to install six soil vapor probes (SVP-1 through SVP-6) into the subsurface in the west portion of the property (Figure 2). SVP-1 through SVP-6 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 six soil borings (SVP-1 through SVP-6) 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 at 5 fbg. Each point will use a ¾-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 32 inches below ground to the surface using bentonite slurry, set atop a 2-inch base of bentonite pellets. Each nested 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 2 weeks following probe installation, CRA will collect soil vapor samples from each sampling point. 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 through SVP-6 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 methyl tertiary-butyl ether by EPA Method 8260B and oxygen and argon, 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.

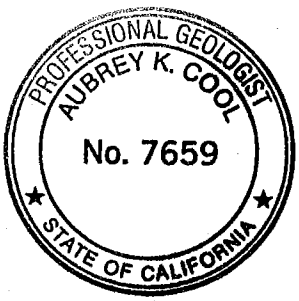
5.0 SCHEDULE

CRA will implement the soil vapor probe installation activities upon receiving ACEH's written approval of this work plan and the drilling permit from ACPWA.

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

Peter Schaefer, CEG, CHG

Aubrey K. Cool, PG



FIGURES

12/16/08

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FIGURE
1

0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California

CONESTOGA-ROVERS
& ASSOCIATES

Vicinity Map

06/18/10

EXPLANATION

- SVP-1 — Proposed soil vapor probe location (Shell)
- MW-1 — Monitoring well location (Shell)
- MW-1 — Monitoring well location (Tosco)
- TB-1 — Destroyed tank backfill well location (Shell)
- STM — Storm drain line (STM)
- SAN — Sanitary sewer line (SAN)
- W — Water line (W)

MW-8
MW-5
MW-1
MW-6
MW-4
MW-2
MW-3
MW-8
SVP-4
MW-3 (BH-C)
SVP-3
SVP-5
MW-7
SVP-6
MW-9
SVP-2
MW-2 (BH-B)
SVP-1
TB-1
TB-2
MW-6
MW-1 (BH-A)
MW-7
MW-5
MW-4 (BH-F)

Pharmacy
Wall
Building
76 Station #1156
4276 MacArthur
Driveway
Dispenser
Dispenser
USTs
Sidewalk
Driveway
Driveway
Foot Clinic
Church Structures
MACARTHUR BOULEVARD
Former Dispenser Island (removed 1/03)
Former Dispenser Island (removed 11/95)
Former Shell
4255 MacArthur
Former Dispenser Island (removed 1/03)
Former Storage Building
Former USTs
Trailer Park
Francaline
Storm Drain
HIGH STREET
Former Chevron Service Station
580 ON-RAMP
Steep Embankment
HIGHWAY 580

N

0 20 40 80
Scale (ft)

FIGURE
2

Site Plan

Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

I:\Shell\6-chars\2405--\240524-Oakland 4255 MacArthur\240524-FIGURES\240524 SITE PLAN.DWG

APPENDIX A

SITE HISTORY

SITE HISTORY

1985 Subsurface Investigation: In June 1985, Emcon Associates (Emcon) drilled two soil borings (S-A and S-B) and installed one groundwater monitoring well (S-1) adjacent to the underground storage tanks (USTs). Up to 15,800 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg) were detected in the shallow soil samples from inside the UST area. In July 1992, GeoStrategies, Inc. performed a site reconnaissance and verified that the original monitoring well had been destroyed during the 1985 UST replacement. Emcon's July 26, 1985 letter to Gettler-Ryan, Inc. presents details of the investigation.

1985 UST Replacement: In December 1985, the USTs were replaced, and approximately 938 cubic yards of hydrocarbon-bearing soil were transported to a disposal facility. Up to 22,000 mg/kg total volatile hydrocarbons and 500 mg/kg benzene were detected in the soil samples from the excavation.

1993 Subsurface Investigation: In November 1993, Weiss Associates (WA) drilled three soil borings (BH-A, BH-B, and BH-C), which were converted into monitoring wells (MW-1, MW-2, and MW-3). Soil samples contained up to 1,700 mg/kg TPHg, 3.3 mg/kg benzene, 5.7 mg/kg toluene, 33 mg/kg ethylbenzene, and 44 mg/kg xylenes. WA's March 14, 1994 *Subsurface Investigation* report presents details of the investigation.

1994 Subsurface Investigation: In November 1994, WA drilled two on-site soil borings (BH-D and BH-E) and one off-site boring (BH-F), which was subsequently completed as a monitoring well (MW-4). Soil samples contained up to 5,900 mg/kg TPHg, 23 mg/kg benzene, 160 mg/kg toluene, 120 mg/kg ethylbenzene, and 430 mg/kg xylenes (BH-E at 5 feet below grade [fbg]). WA's January 26, 1995 *Subsurface Investigation* report presents details of the investigation.

1994-1997 Separate-Phase Hydrocarbon (SPH) Removal: SPHs were observed periodically in wells MW-2 and MW-3 between 1994 and 1997. During that time, an estimated total of 19.6 pounds of SPHs was removed from monitoring wells by bailing.

1995 Dispenser and Piping Removal and Sampling: In November 1995, WA collected 15 soil samples during dispenser and piping replacements. The soil samples contained up to 7,800 mg/kg TPHg, 0.85 mg/kg benzene, 51 mg/kg toluene, 71 mg/kg ethylbenzene, and 540 mg/kg xylenes. During the dispenser replacements, horizontal wells HW-1 through HW-4 were installed in the vadose zone approximately 5 fbg and adjacent to the former piping and dispensers to facilitate future removal of petroleum hydrocarbons from the impacted soil. WA's April 1, 1996 *Dispenser Replacement Sampling* report presents details of the investigation.

1997 Soil Vapor Extraction (SVE) Test: In August 1997, Cambria Environmental Technology, Inc. (Cambria) performed short-term SVE tests using an internal combustion engine on horizontal vapor extraction wells HW-1 through HW-4 and monitoring wells MW-2 and MW-3. Cambria measured vapor extraction flow rates, the vacuum applied to the wellheads, and the vacuum influence in nearby wells. Cambria calculated an effective radius of influence of 35 to 50 feet during testing of wells MW-2 and MW-3. Cambria concluded that the relatively high TPHg removal rates measured in horizontal wells HW-1 through HW-4 were most likely temporary and were not representative of site conditions due to extensive well screen in permeable fill material and that the low hydrocarbon removal rates in wells MW-2 and MW-3 were likely more representative of native soil conditions. Cambria's February 23, 1997 *Soil Vapor Extraction Test Report* presents details of the SVE test.

1998 Subsurface Investigation: In February 1998, Cambria drilled two off-site borings (SB-1 and SB-2) in the trailer park adjacent to the Shell site. No TPHg or benzene was detected in the soil samples. Soil samples contained up to 1.4 mg/kg methyl tertiary-butyl ether (MTBE) and 7,210 mg/kg total organic carbon. Grab groundwater samples contained up to 7,700 micrograms per liter (µg/l) TPHg, 210 µg/l benzene, and 46,000 µg/l MTBE (SB-2). Two soil samples (SB-1 and SB-2 at 5.5 fbg) were analyzed for physical parameters: total porosity was 35.2 percent (%) and 37.4% and specific permeability was 181 millidarcies (md) and 71 md, respectively; however, the laboratory noted that due to fine fractures that developed in the samples upon drying, the measured specific permeability values were an order of magnitude or more too high. Cambria's March 19, 1998 *Subsurface Investigation* report presents results of this investigation.

1999-2003 Groundwater Extraction (GWE): From April 1999 until September 2003, Cambria conducted monthly GWE using a vacuum truck. An estimated 15.1 pounds of liquid-phase hydrocarbons and 26.8 pounds of liquid-phase MTBE have been removed from the site. GWE was discontinued at the site after September 2003 due to low pumping volumes. GWE results are presented in the quarterly groundwater monitoring reports during this period.

2000-2003 Dual-Phase Vapor Extraction (DVE): From November 2000 to June 2001, from April 2002 through September 2003, and from July 2003 through September 2003, Cambria conducted mobile DVE using a vacuum truck. DVE was discontinued after September 2003 due to decreased mass removal. DVE removed an estimated 26.4 pounds of vapor-phase hydrocarbons. DVE results are presented in the quarterly groundwater monitoring reports during this period.

2001 Sensitive Receptor Survey (SRS), Conduit Study, and Site Conceptual Model (SCM): Cambria's SRS identified 25 monitoring wells, 4 cathodic protection wells, and 1 domestic well within ½ mile of the site. Cambria's conduit study concluded that nearby sewer, storm drain, and water lines located between 8 to 13 fbg could serve as preferential pathways for petroleum

hydrocarbon and MTBE migration. However, Cambria did not identify any nearby conduits down gradient from the site. The SRS, conduit study, and SCM are included in Cambria's May 31, 2001 *First Quarter 2001 Monitoring Report, Sensitive Receptor Survey, and Site Conceptual Model.*

2001 Subsurface Investigation: In November 2001, Cambria installed one down-gradient monitoring well (MW-5) approximately 200 feet southwest of the site, on the Caltrans right-of-way adjacent to the I-580 on-ramp. No TPHg, benzene, toluene, ethylbenzene, xylenes (BTEX), or MTBE was detected in the soil sample collected during the investigation. Cambria's January 10, 2002 *Off-Site Monitoring Well Installation Report* presents results of this investigation.

2003 Tank Removal and Soil Excavation: In January and February 2003, L.A. Perks Plumbing and Heating removed all surface features, USTs, fuel dispensers, and associated product piping. Cambria collected 31 soil samples and 1 grab groundwater sample and supervised over-excavation of hydrocarbon-impacted soils. Approximately 875 cubic yards of soil were removed from the site during the tank pull and over-excavation activities. Approximately 4,600 gallons of groundwater were pumped to dewater the UST excavation prior to removing the tanks. Soil samples from the former UST area contained up to 380 mg/kg TPHg, 1.7 mg/kg benzene, and 1.2 mg/kg MTBE (TP-5). The grab groundwater sample (TP-1-Water) from the former tank pit area contained 11,000 µg/l TPHg, 410 µg/l benzene, and 5,200 µg/l MTBE. Soil samples from soil remaining in soil in the former dispenser areas contained up to 980 mg/kg TPHg, 1.2 mg/kg benzene, and 0.9 mg/kg MTBE. Following over-excavation, approximately 720 pounds of oxygen-releasing compound were mixed in the excavation base before backfilling with 1.5-inch drain rock to 4 fbg. The remainder of the tank pit and the over-excavation was backfilled and compacted with Class II road base material. Cambria's April 28, 2003 *Tank Closure and Soil Excavation Report* provides details of these activities.

2003-2010 SPH Removal: SPHs were observed periodically in wells MW-2 and MW-3 between 2003 and 2010. An estimated total of 6.82 pounds of SPHs was removed from monitoring wells by manual bailing and an estimated 0.82 pounds of SPHs have been removed from MW-2 with a skimmer bailer. In September 2009, Conestoga-Rovers & Associates (CRA) conducted mobile GWE on wells MW-2 and MW-3, which yielded approximately 44 gallons of water from each well with negligible SPHs.

April 2005 Subsurface Investigation: In April 2005, Cambria drilled 11 cone penetrometer test (CPT) borings (CPT-1 through CPT-11) and 2 Geoprobe® borings (SB-3 and SB-4). At each CPT location, an ultraviolet-induced florescence module was used to identify hydrocarbons in the subsurface. No soil samples were submitted for laboratory analysis. Based on the data collected during this investigation, it appeared that no SPHs were present at these locations, but that dissolved-phase hydrocarbons are present at most locations at two distinct depths: a shallow zone in the silt and clay above 17 fbg and a deeper zone in the silt, clay, and sand from

approximately 19 to 20 fbg to the bottom of the borings at 25 fbg. Cambria's June 6, 2005 *Subsurface Investigation Report* presents details of this investigation.

October 2005 Subsurface Investigation: In October 2005, Cambria drilled four soil borings (SB-5 through SB-8). Soil samples contained up to 2,600 mg/kg TPHg, 13 mg/kg benzene, 17 mg/kg toluene, 45 mg/kg ethylbenzene, 270 mg/kg xylenes, 1.2 mg/kg MTBE, and 1.6 mg/kg tertiary-butyl alcohol. Cambria's December 14, 2005 *Subsurface Investigation Report presents* details of the investigation.

2006 Subsurface Investigation: In June 2006, Cambria installed four groundwater monitoring wells (MW-6 through MW-9). Soil samples from the well borings contained up to 552 mg/kg TPHg, 1.4 mg/kg benzene, and 3.1 mg/kg MTBE. Cambria's September 6, 2006 *Well Installation Report* presents details of the investigation.

Groundwater Monitoring Program: Groundwater sampling began in November 1993. Historically, SPHs have been observed intermittently in wells MW-2 and MW-3; however, since the December 2008 sampling event, no SPHs have been observed in MW-3. Groundwater is currently monitored and sampled semiannually during the first and third quarters.