CONESTOGA-ROVERS & ASSOCIATES

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

TRANSMITTAL

DATE: August 29, 2011

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

RECEIVED
4:22 pm, Sep 02, 2011
Alameda County
Environmental Health

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

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

QUANTITY	DESCRIPTION
1	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)
Victoria Du, 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

SUBSURFACE INVESTIGATION 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

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

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

web:http://www.CRAworld.com

AUGUST 29, 2011
REF. NO. 240414 (10)
This report is printed on recycled paper.

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF APPENDICES

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) to further assess potential for soil vapor intrusion prior to obtaining case closure as requested in Alameda County Environmental Health's June 16, 2011 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 proposes to install two sub-slab soil vapor probes (SVP-4 and SVP-5) to further assess soil vapor concentrations beneath the station building at the locations shown on Figure 2. Specific tasks are described below.

2.1 PERMIT

Alameda County Public Works Agency does not require a permit to install sub-slab soil vapor probes.

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 SOIL VAPOR PROBE INSTALLATION

CRA proposes to install two sub-slab soil vapor probes (SVP-4 and SVP-5) into the concrete slab beneath the station building (Figure 2).

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

The rotary hammer drill will then be used to drill a smaller diameter inner borehole within the center of the outer borehole (approximately 3/8-inch diameter) through the floor material and approximately 3 inches into the sub-slab bedding material to create an open cavity. The outer borehole will be cleaned a second time with a moistened towel or a portable vacuum cleaner.

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

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

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 the two new sub-slab soil vapor probes (SVP-4 and SVP-5) and the three existing sub-slab soil vapor probes (SVP-1 through SVP-3). 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-1 through SVP-5 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.

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 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.

2.7 CHEMICAL ANALYSES

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

2.8 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.

3.0 SCHEDULE

CRA will implement the soil vapor probe installations upon receiving ACEH's written approval of this work plan.

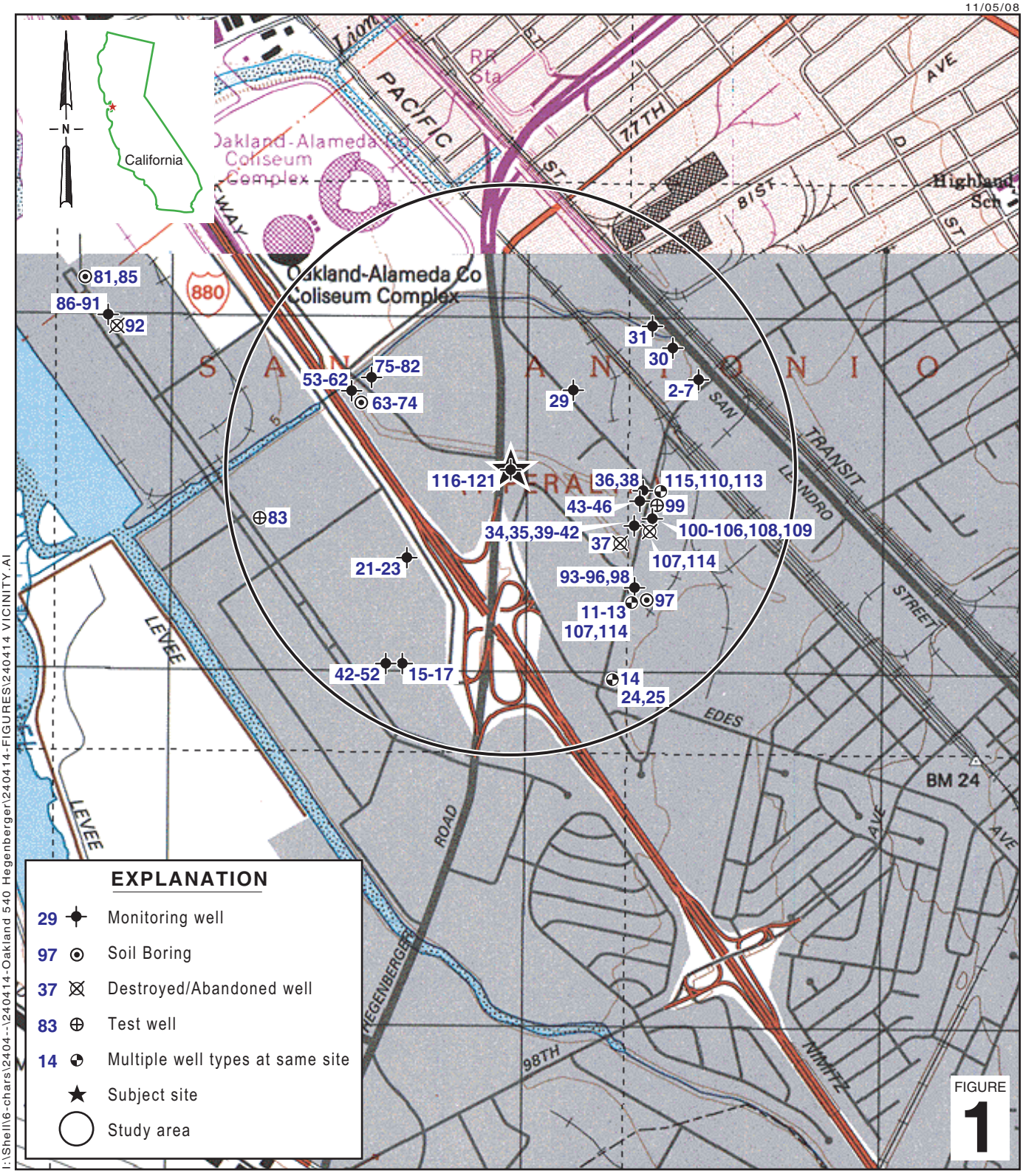
All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

Peter Schaefer, CEG, CHG

Aubrey K. Cool, PG

FIGURES

11/05/08



I:\Shell\6-chars\2404-\240414-Oakland 540 Hegenberger\240414-FIGURES\240414 VICINITY.AI

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

08/15/2011

Site Plan

EXPLANATION

- SVP-4 — Proposed sub-slab soil vapor probe location
- 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 (04/04)
- C-1 — Canal sampling location (2001)
- SB-E — Soil boring location (08/00)
- SB-D — Soil boring location (07/98)
- SB-1 — Soil boring location (03/98)
- D-1 — Soil sample location (01/98)
- D-1 — Soil sample location (08/96)
- INF — GWE system sample location
- Electrical line (E)
- Telecommunication line (T)
- Storm drain line (STM)
- Sanitary sewer line (SAN)
- Water line (W)
- 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-5

SVP-1

SVP-4

SVP-3

Kiosk

SVP-2

SB-D

SB-4

SB-3

BW-D

BW-A

BW-C

USTs

MW-2

SD-2

SB-E

BW-B

Jack in the Box Restaurant

Shell Station
540 Hegenberger

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

12" SS

EDES AVENUE

MW-4

Days Inn

ENTERPRISE WAY

Laborers' International Union

SD-1

Planter

Driveway

Sidewalk

Driveway

MW-7

Canopy

Dispenser Islands

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-6

MW-5

Burger King Restaurant

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: On August 8, 1996, Cambria Environmental Technology, Inc. (Cambria) collected one soil sample beneath the piping at Dispenser 1. This 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). 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 micrograms per cubic meter (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.

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]