CONESTOGA-ROVERS & ASSOCIATES

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

TRANSMITTAL

DATE: July 22, 2011

REFERENCE NO.: 240933

PROJECT NAME: 15275 Washington Avenue, San Leandro

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

RECEIVED
1:17 pm, Jul 26, 2011
Alameda County
Environmental Health

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- ☒ Final
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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 contents of this document, please call Peter Schaefer at (510) 420-3319.

Copy to: Denis Brown, Shell Oil Products US (electronic copy)
Salel Enterprises, c/o Foothill Hardware, 6733 Foothill Boulevard, Oakland, CA 94605
Mike Bakaldin, City of San Leandro, 835 East 14th Street, San Leandro, CA 94577
Johnny Vierra, Big O Tire, 2201 Washington Avenue, San Leandro, CA 94577

Completed by: Peter Schaefer Signed: Aubrey Cool

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

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

Re: Former Shell Service Station
15275 Washington Avenue
San Leandro, California
SAP Code 129460
Incident No. 97093412
ACEH No. RO0000372

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

FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE
SAN LEANDRO, CALIFORNIA

SAP CODE	129460
INCIDENT NO.	97093412
AGENCY NO.	RO0000372

Prepared by:
Conestoga-Rovers & Associates

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

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JULY 22, 2011
REF. NO. 240933 (2)
This report is printed on recycled paper.

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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 adjacent to the site as requested in Alameda County Environmental Health's (ACEH's) May 16, 2011 letter.

The site is a former Shell service station located on the northwest corner of Washington Avenue and Lewelling Boulevard in a mixed commercial and residential area of San Leandro, California (Figure 1). The site is currently occupied by an automotive emission testing facility (Speedy Smog) and a tire sales and repair facility (Big O Tire). Salel's Mobile Home Park is located to the southwest of the site. Arco Service Station No. 0601 is located on the southwest corner of the intersection at 712 Lewelling Boulevard, San Leandro. The former Shell service station layout included a building, three dispenser islands, a waste oil tank, and a gasoline underground storage tank (UST) complex (Figure 2). In June 1987, the fuel and waste oil USTs, piping, and dispensers were removed from the site. Reports indicate that the waste oil UST was replaced at that time, and another UST was found and removed during November 1987.

A summary of previous work performed at the site and additional background information is contained in Appendix A. Historical soil vapor sampling locations are shown on Figure 2, and historical soil vapor data is presented on Table 1.

2.0 WORK TASKS

CRA proposes the following investigations to further evaluate the potential for soil vapor intrusion:

- Install a minimum of four sets of temporary shallow soil vapor probes (P-30 through P-33) within the upper 3 feet of the vadose zone to obtain shallow soil vapor profiles to document attenuation of soil vapor concentrations.
- Conduct surface flux testing adjacent to P-30 through P-33 to evaluate actual soil vapor discharge to ambient air. Because the mobile homes are not directly on the ground, comparisons with San Francisco Bay Regional Water Quality Control Board's environmental screening levels[1] do not give an accurate estimation of the potential risk of vapor intrusion to the mobile homes.
- Re-sample existing soil vapor wells (SVG-1 through SVG-9).

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]

- Drill four soil borings (SB-15 through SB-18) to collect vadose-zone soil samples for physical parameter analyses to further refine our vapor intrusion model.

Soil vapor probe and soil boring locations are shown on Figure 2. CRA may select additional temporary shallow soil vapor probes and surface flux testing locations in the field based on the initial results to be provided by an on-site mobile laboratory. Specific tasks are described below.

2.1 PERMITS

CRA will obtain the appropriate permits to install the soil vapor probes and soil borings from 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 drilling 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 four sets of soil vapor probes (P-30 through P-33) into the subsurface at the off-site locations shown on Figure 2. The probes are proposed on the Salel's Mobile Home Park property located southwest and down gradient of the subject site.

Assuming the absence of subsurface obstructions, CRA will advance the soil borings to 3 feet below grade (fbg) using a direct-push rig. We will install three temporary soil vapor probes at each location with screen intervals at 0.5 fbg, 1.5 fbg, and 2.5 fbg to evaluate the vertical profile of shallow soil vapor concentrations. 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 to the surface using bentonite slurry, set atop a 2-inch base of bentonite pellets. Following soil vapor sample collection described below, the soil vapor probe will be removed and the boreholes will be backfilled with neat cement grout.

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

2.5 SOIL VAPOR PROBE SAMPLING

Following temporary probe (P-30 through P-33) installation, CRA will collect soil vapor samples from each sampling point for analysis by an on-site mobile laboratory. In addition, CRA will collect soil vapor samples from each depth of the permanent soil vapor probes (SVG-1 through SVG-9) for analysis by an off-site laboratory.

CRA will sample all soil vapor probes 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 either immediately transferred to the on-site mobile laboratory or placed into a protective box at room temperature for transport to a State of California-certified laboratory for analysis within 72 hours.

2.5.1 LEAK TESTING

To check the system for leaks, CRA will cover the soil vapor probe tool and sampling equipment with a containment unit (or shroud). Prior to soil vapor 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 vapor probe purging and sampling.

All samples will be analyzed in the field for helium using the helium meter. In the event that a soil vapor sample contains 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 vapor sample will be considered invalid and recollected.

2.6 SURFACE FLUX TESTING

CRA will use surface flux chambers to isolate the asphalt ground surface from ambient air and collect soil vapor emanating from the subsurface at locations adjacent to the temporary soil vapor probes. Soil vapor and the constituents of concern build up over time in the static chamber headspace. CRA will then collect air samples from the chamber.

2.6.1 CHAMBER DEPLOYMENT

The flux chambers are constructed of stainless steel and are cylindrical, measuring approximately 12 inches in diameter and approximately 5 inches tall. Reflective shields constructed of aluminum foil will be secured to the chambers to minimize extreme variations in temperature. Nominal volume of the chambers is 7,500 cubic centimeters. CRA will place the chambers on the asphalt ground surface and cover the flanges with a bentonite slurry to seal the chambers. After sealing the chambers, CRA will flush them with 4 volumes (30 liters) of petroleum hydrocarbon-free air. A sample will be collected from each chamber after flushing and analyzed to ensure the chamber is clean of contaminants at the start of the incubation. CRA will allow the chambers to incubate for a minimum of 4 hours prior to sampling to average out temporal effects on fluxes (wind, barometric pressure, etc.).

2.6.2 CHAMBER SAMPLING

Following the selected deployment duration, CRA will collect a vapor sample from the chamber through a sampling port using a gas-tight syringe connected via an on-off valve. The small-calibrated syringes will allow for careful monitoring of sample flow and volume. This procedure ensures that the chamber air is well mixed prior to

collection without introducing excessive airflow, which could cause disturbance of the natural flux from the ground surface. The sample will be entered onto a chain-of-custody and immediately transferred to an on-site mobile laboratory for analysis.

2.7 SOIL BORINGS

CRA proposes to drill four soil borings (SB-15 through SB-18) to collect undisturbed vadose-zone soil samples (Figure 2). The samples will be submitted for physical parameter analysis to further refine our vapor intrusion model.

The borings will be advanced to 5 fbg using direct-push drilling equipment. Shelby tube samples will be collected continuously for physical parameter analysis. The ends of each tube will be covered with plastic end caps and sealed with electrical tape. Soil samples will be labeled, entered onto a chain-of-custody record, and transported to a reputable physical testing laboratory for analysis.

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

2.8 CHEMICAL ANALYSES

The soil vapor samples collected from the temporary soil vapor probes and the soil vapor wells and vapor samples collected from the surface flux chambers will be analyzed for two fractions of total petroleum hydrocarbons (TPHg; carbon range C_6-C_{12}), benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl tertiary-butyl ether (MTBE) by EPA Method 8260B and for oxygen, carbon dioxide, methane, and helium by ASTM D Method 1946 (M). Quality control samples collected from the flux chambers prior to the incubation period will be analyzed for TPHg, BTEX, and MTBE by EPA Method 8260B.

2.9 PHYSICAL ANALYSES

The soil samples will be analyzed for specific gravity by ASTM D Method 584, for sieve analysis by ASTM D Method 422, and for soil dry bulk density, soil total porosity, air and water porosity, soil vapor permeability, and moisture content by API Method RP40.

2.10 REPORT PREPARATION

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

3.0 SCHEDULE

CRA will implement the proposed activities upon receiving ACEH's written approval of this work plan and the appropriate permits from ACPWA.

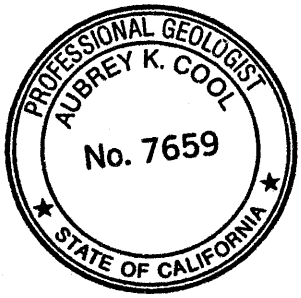
All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

for:

Peter Schaefer, CEG, CHG

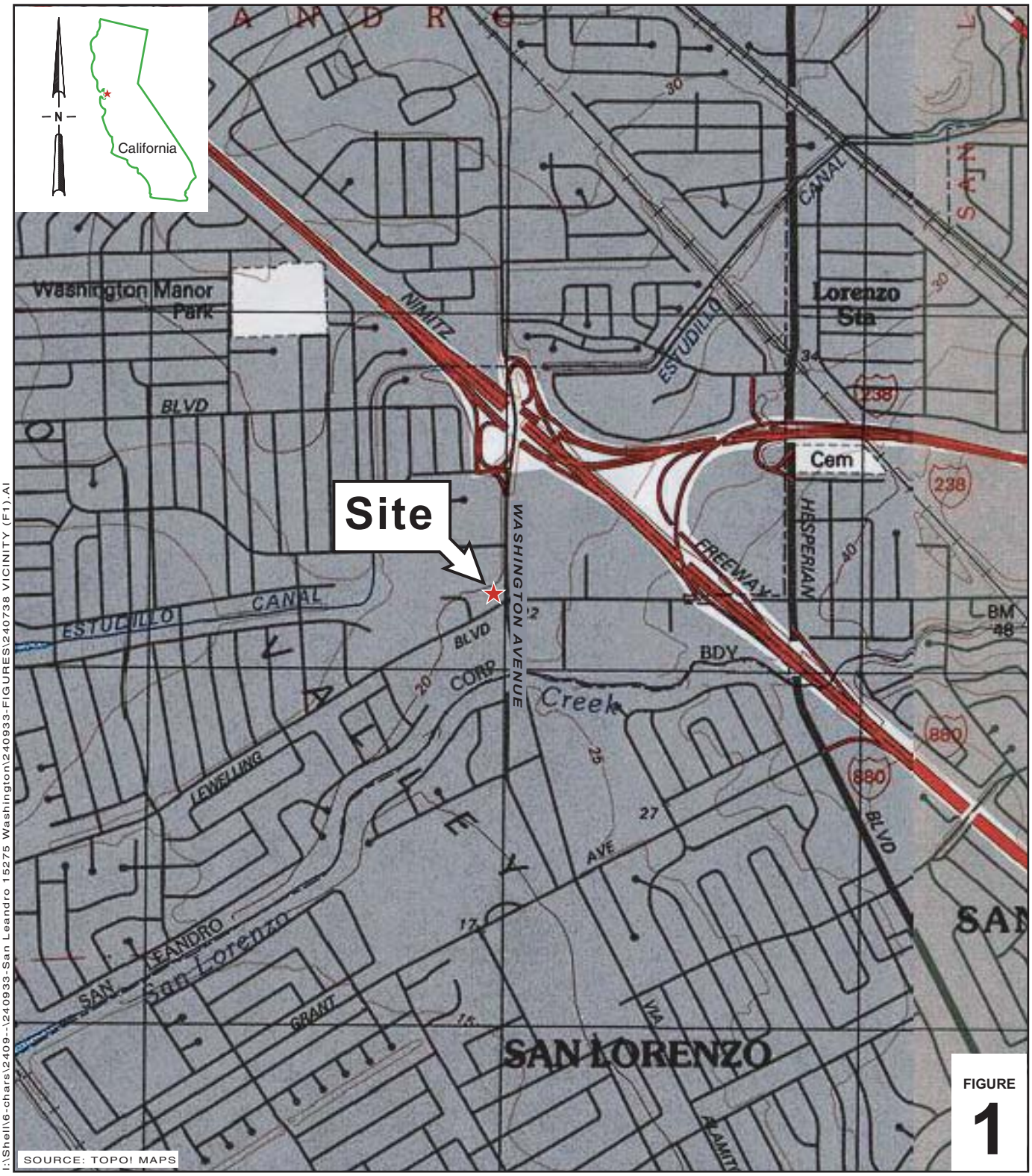
Aubrey K. Cool

Aubrey K. Cool, PG



FIGURES

04/04/2011



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SOURCE: TOPO! MAPS

FIGURE
1

0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

Former Shell Service Station

15275 Washington Avenue

San Leandro, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

EXPLANATION

- SB-15 — Proposed soil boring location (Shell)
- P-30 — Proposed soil vapor probe location (Shell)
- S-3 — Monitoring well location (Shell)
- S-1 — Monitoring well modified for soil vapor extraction (Shell)
- SV-1 — Soil vapor extraction well location (Shell)
- SVG-1 — Soil vapor well location (Shell)
- P-10 — Soil vapor probe location (Shell)
- SG-01 — Soil vapor probe location (Shell, 1997)
- SG-1 — Soil vapor probe location (Shell, 1988)
- MW-1 — Monitoring well location (Arco)
- RW-1 — Soil vapor extraction well location (Arco)
- B-1 — Soil vapor probe location (Arco)

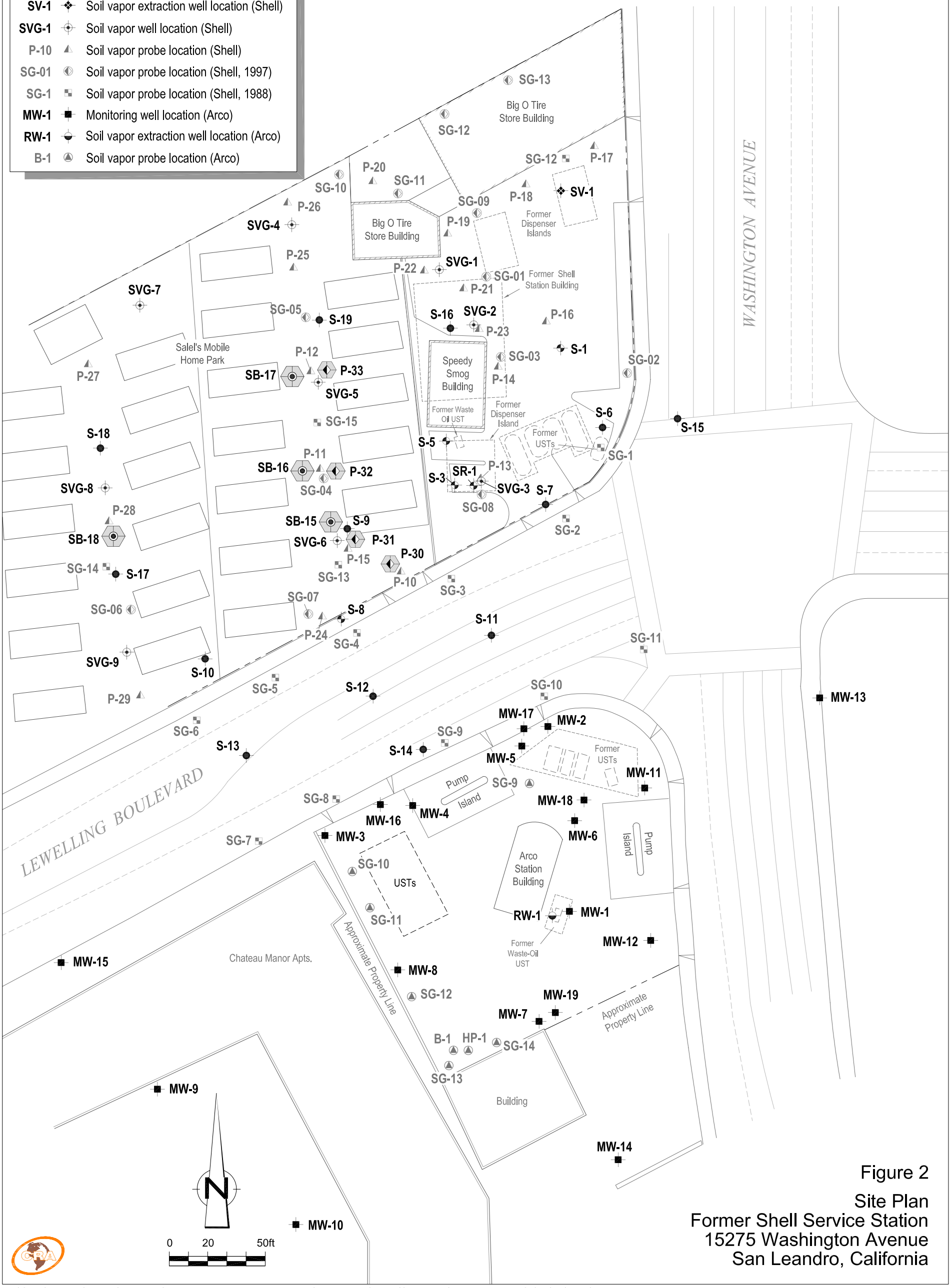

Figure 2

Site Plan
Former Shell Service Station
15275 Washington Avenue
San Leandro, California

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TABLE

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	Date	Depth (fbg)	TPHg	B	T	E	X	MTBE	TBA	Methane (%v)	Carbon Dioxide (%v)	Oxygen + Argon (%v)	Nitrogen (%v)	1,1-Difluoroethane	Isopropanol
SG-01	10/4/1988	UNK	**460,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-02	10/4/1988	UNK	**90,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-03	10/4/1988	UNK	**45,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-04	10/4/1988	UNK	**2,400,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-05	10/4/1988	UNK	**1,800,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-06	10/4/1988	UNK	**820,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-07	10/4/1988	UNK	**690,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-08	10/4/1988	UNK	**5,800,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-09	10/4/1988	UNK	**3,700,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-10	10/4/1988	UNK	**5,600,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-11	10/4/1988	UNK	22,000 a	---	---	---	---	---	---	---	---	---	---	---	---
SG-12	10/4/1988	UNK	**810,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-13	10/4/1988	UNK	**1,100,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-14	10/4/1988	UNK	630 a	---	---	---	---	---	---	---	---	---	---	---	---
SG-15	10/4/1988	UNK	**2,000,000 a**	---	---	---	---	---	---	---	---	---	---	---	---
SG-1	5/5/1997	4	**100,000,000**	**750,000 b**	**280,000 b**	**370,000 b**	**1,300,000 b**	**700,000 b**	---	---	---	---	---	---	---
SG-1 c	5/5/1997	4	**76,000,000**	**910,000**	110,000	**70,000**	**200,000**	---	---	7.8	19.7	3.9	68.6	---	---
SG-2	5/5/1997	2	**46,000**	250 b	96 b	250 b	880 b	73 b	---	---	---	---	---	---	---
SG-2 c	5/5/1997	2	<5,000	<1,000	<1,000	<1,000	<2,000	---	---	<0.1	9.2	11.3	79.5	---	---
SG-3	5/5/1997	2	**54,000,000**	**390,000 b**	**190,000 b**	**370,000 b**	**310,000 b**	**260,000 b**	---	---	---	---	---	---	---
SG-3 c	5/5/1997	2	**20,000,000**	**280,000**	57,000	**44,000**	49,000	---	---	1.6	15.8	3.8	78.9	---	---
SG-3	5/5/1997	4	**33,000,000**	**230,000 b**	110,000 b	**210,000 b**	**330,000 b**	**150,000 b**	---	---	---	---	---	---	---
SG-3 c	5/5/1997	4	**3,700,000**	**49,000**	12,000	**7,400**	4,300	---	---	<0.1	1.6	18.1	80.3	---	---
SG-3	5/5/1997	6	**5,000,000**	**39,000 b**	18,000 b	**71,000 b**	**190,000 b**	16,000 b	---	---	---	---	---	---	---
SG-3 c	5/5/1997	6	**44,000,000**	**79,000**	88,000	**400,000**	**247,000**	---	---	<0.1	4.7	16.4	78.9	---	---
SG-4	5/5/1997	2	**220,000**	**420 b**	150 b	1,700 b	3,200 b	310 b	---	---	---	---	---	---	---
SG-4 c	5/5/1997	2	**110,000**	**1,600**	<1,000	<1,000	<12,000	---	---	<0.1	0.7	19.8	79.4	---	---
SG-4	5/5/1997	4	**350,000**	**1,000 b**	2,300 b	2,600 b	4,400 b	550 b	---	---	---	---	---	---	---

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	*Date*	*Depth (fbg)*	*TPHg*	*B*	*T*	*E*	*X*	*MTBE*	*TBA*	*Methane (%v)*	*Carbon Dioxide (%v)*	*Oxygen + Argon (%v)*	*Nitrogen (%v)*	*1,1-Difluoroethane*	*Isopropanol*
SG-4 c	5/5/1997	4	**370,000**	**2,900**	<1,000	**25,000**	2,000	---	---	<0.1	1.4	19.2	79.4	---	---
SG-4	5/5/1997	6	**310,000**	**1,000 b**	2,200 b	**4,000 b**	4,800 b	200 b	---	---	---	---	---	---	---
SG-4 c	5/5/1997	6	**490,000**	**2,800**	3,400	**7,100**	9,400	---	---	<0.1	1.2	19.5	79.3	---	---
SG-4 (duplicate) c	5/5/1997	6	**500,000**	**3,000**	4,000	**7,200**	7,500	---	---	<0.1	1.0	19.2	79.8	---	---
SG-5	5/5/1997	4	**8,700,000**	**20,000 b**	42,000 b	**75,000 b**	**13,000 b**	6,200 b	---	---	---	---	---	---	---
SG-5 c	5/5/1997	4	26,000	<1,000	<1,000	<1,000	<2,000	---	---	<0.1	0.3	20.3	79.4	---	---
SG-6	5/5/1997	4	**66,000**	8 b	150 b	380 b	790 b	22 b	---	---	---	---	---	---	---
SG-6 c	5/5/1997	4	<5,000	<1,000	<1,000	<1,000	<2,000	---	---	<0.1	0.5	19.9	79.6	---	---
SG-7	5/5/1997	2	**62,000,000**	**220,000 b**	**210,000 b**	**230,000 b**	**110,000 b**	**330,000 b**	---	---	---	---	---	---	---
SG-7 c	5/5/1997	2	**700,000**	**38,000**	1,400	**14,000**	<2,000	---	---	<0.1	0.9	19.7	79.4	---	---
SG-7	5/5/1997	4	**130,000,000**	**450,000 b**	**420,000 b**	**440,000 b**	**180,000 b**	**510,000 b**	---	---	---	---	---	---	---
SG-7 c	5/5/1997	4	**38,000,000**	**18,000**	40,000	**43,000**	17,000	---	---	9.3	13.4	9.5	67.9	---	---
SG-7	5/5/1997	6	**3,000,000**	**19,000 b**	6,500 b	**20,000 b**	6,600 b	17,000 b	---	---	---	---	---	---	---
SG-7 c	5/5/1997	6	**2,000,000**	**13,000**	7,400	<10,000	<20,000	---	---	1.0	1.9	18.7	78.5	---	---
SG-7 (duplicate)	5/4/1993	6	**3,400,000**	**21,000 b**	7,300 b	**22,000 b**	7,500 b	19,000 b	---	---	---	---	---	---	---
SG-8	5/6/1997	2	15,000	10 b	38 b	190 b	220 b	22 b	---	---	---	---	---	---	---
SG-8 c	5/6/1997	2	<5,000	<1,000	<1,000	<1,000	<2,000	---	---	<0.1	0.1	20.6	79.3	---	---
SG-8	5/6/1997	4	**7,100,000**	**15,000 b**	46,000 b	**44,000 b**	**62,000 b**	3,000 b	---	---	---	---	---	---	---
SG-8 c	5/6/1997	4	**2,400,000**	<1,000	64,000	**7,400**	14,300	---	---	<0.1	12.6	4.8	82.7	---	---
SG-8	5/6/1997	6	**20,000,000**	**49,000 b**	130,000 b	**140,000 b**	**290,000 b**	8,400 b	---	---	---	---	---	---	---
SG-8 c	5/6/1997	6	**1,000,000**	<1,000	35,000	**3,500**	10,800	---	---	<0.1	0.3	20.0	79.7	---	---
SG-8 (duplicate) c	5/6/1997	6	**1,100,000**	<1,000	36,000	**4,000**	11,500	---	---	<0.1	0.2	20.0	79.8	---	---
SG-9	5/5/1997	4	**540,000**	**18,000 b**	610 b	17,000 b	15,000 b	1,600 b	---	---	---	---	---	---	---
SG-9 c	5/5/1997	4	**1,800,000**	**87,000**	10,000	**28,000**	21,300	---	---	<0.1	0.9	20.0	79.1	---	---
SG-10	7/31/1997	4	1,700 d	<7.0 e	11 e	<9.5 e	22 e	11 e	---	---	---	---	---	---	---

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	*Date*	*Depth (fbg)*	*TPHg*	*B*	*T*	*E*	*X*	*MTBE*	*TBA*	*Methane (%v)*	*Carbon Dioxide (%v)*	*Oxygen + Argon (%v)*	*Nitrogen (%v)*	*1,1-Difluoroethane*	*Isopropanol*
SG-11	7/31/1997	4	660 d	<6.7 e	<7.9 e	<9.0 e	<9.0 e	<7.5 e	---	---	---	---	---	---	---
SG-12	7/31/1997	4	5,000 d	16 e	8.3 e	13 e	22 e	29 e	---	---	---	---	---	---	---
SG-13	7/31/1997	4	5,000 d	<71 e	<84 e	<97 e	<97 e	<81 e	---	---	---	---	---	---	---
P-10 f	6/11/2008	5.5	**100,000**	<2.7	14	3.9	12	<3.0	43	---	---	---	---	---	<8.2
P-11 f	6/11/2008	5.5	**8,000,000**	**1,100**	240	<180	<180	<150	<520	---	---	---	---	---	<420
P-12 f	6/11/2008	5.5	**7,800,000**	**810**	<630	<730	<730	<600	<5,100	---	---	---	---	---	<1,600
P-13 f	6/11/2008	5.5	5,300	<2.5	5.6	<3.4	3.6	<2.8	<24	---	---	---	---	---	<7.8
P-14 f	6/11/2008	5.5	**2,100,000**	**1,400**	<130	**4,700**	280	<120	<1,000	---	---	---	---	---	<340
P-15 f	6/11/2008	5.5	**160,000**	<54	<63	<73	<73	<60	<150	---	---	---	---	---	<160
P-16 f	6/11/2008	5.5	**130,000**	<13	<15	26	<17	<14	<120	---	---	---	---	---	<120
P-17 f	6/11/2008	5.5	450	<2.5	5.4	<3.4	3.6	<2.8	<23	---	---	---	---	---	<7.6
P-17 (duplicate) f	6/11/2008	5.5	1,100	<2.5	4.0	<3.4	<3.4	<2.8	<24	---	---	---	---	---	<7.8
P-18 f	6/11/2008	5.5	13,000	3.2	6.0	<3.6	4.0	<3.0	36	---	---	---	---	---	<8.2
P-19 f	6/11/2008	5.5	**9,000,000**	**600**	270	<180	<180	<510	<410	---	---	---	---	---	<410
P-20 f	6/11/2008	5.5	26,000	<2.5	240	<3.4	<3.4	<2.8	55	---	---	---	---	---	27
P-20 (lab duplicate) f	6/11/2008	5.5	26,000	<2.5	230	<3.4	<3.4	<2.8	52	---	---	---	---	---	29
P-21 f	6/11/2008	5.5	**8,200,000**	**6,400**	280	**27,000**	3,500	<100	<340	---	---	---	---	---	<280
P-22 f	6/11/2008	5.5	**8,200,000**	**1,400**	<320	**14,000**	<360	<300	<1,000	---	---	---	---	---	<820
P-23 f	6/11/2008	5.5	**6,500,000**	**12,000**	190	**46,000**	25,120	<56	<190	---	---	---	---	---	<150
P-23 (lab duplicate) f	6/11/2008	5.5	**6,500,000**	**11,000**	180	**44,000**	23,110	<56	<190	---	---	---	---	---	<150

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	*Date*	*Depth (fbg)*	*TPHg*	*B*	*T*	*E*	*X*	*MTBE*	*TBA*	*Methane (%v)*	*Carbon Dioxide (%v)*	*Oxygen + Argon (%v)*	*Nitrogen (%v)*	*1,1-Difluoroethane*	*Isopropanol*
P-24	9/23/2009	3	**160,000**	1.9 b	25 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	570,000	---
P-24	9/23/2009	5	**340,000**	<3.2 b	<38 b	<4.3 b	<15 b	<14 b	<30 b	---	---	---	---	1,000,000	---
P-24	9/23/2009	8	**48,000**	1.7 b	<19 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	3,900,000	---
P-25	9/23/2009	3	**2,900,000**	<64 b	<750 b	<87 b	<350 b	<290 b	<610 b	---	---	---	---	2,600,000	---
P-25	9/23/2009	5	<5,700	<1.6 b	<19 b	<2.2 b	<8.7 b	<19 b	<15 b	---	---	---	---	4,300	---
P-25	9/23/2009	8	<5,700	<1.6 b	<19 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	210	---
P-26	9/23/2009	3	<5,700	2 b	21 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	28	---
P-26	9/23/2009	5	**610,000**	<6.4 b	<75 b	<8.7 b	<35 b	<29 b	<61 b	---	---	---	---	1,300,000	---
P-26	9/23/2009	8	**2,600,000**	<64 b	<750 b	<87 b	<350 b	<350 b	<610 b	---	---	---	---	4,800,000	---
P-27	9/24/2009	3	**410,000**	<4 b	<47 b	<5.4 b	<22 b	<18 b	<38 b	---	---	---	---	710,000	---
P-27	9/24/2009	5	**120,000**	<1.6 b	<19 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	14,000	---
P-27	9/24/2009	8	**570,000**	<4 b	<47 b	<5.4 b	<22 b	<18 b	<38 b	---	---	---	---	860,000	---
P-28	9/24/2009	3	**1,200,000**	<8 b	<94 b	<11 b	<43 b	<36 b	<76 b	---	---	---	---	2,200,000	---
P-28	9/24/2009	5	**58,000**	2 b	<19 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	11,000	---
P-28	9/24/2009	8	**270,000**	<3.2 b	<38 b	<4.3 b	<17 b	<14 b	<30 b	---	---	---	---	42,000	---
P-29	9/24/2009	3	**1,200,000**	<8 b	<94 b	<11 b	<43 b	<36 b	<76 b	---	---	---	---	2,000,000	---
P-29	9/24/2009	5	**660,000**	<6.4 b	<75 b	<8.7 b	<35 b	<29 b	<61 b	---	---	---	---	1,300,000	---
P-29	9/24/2009	8	**46,000**	<1.6 b	<19 b	<2.2 b	<8.7 b	<7.2 b	<15 b	---	---	---	---	83,000	---
SVG-1	3/18/2010	3	**8,700,000**	<8,000	<9,400	**11,000**	<22,000	<18,000	<15,000	---	0.971	2.32	---	---	<6,100
SVG-1	9/9/2010	3	**15,000,000**	**3,400**	<2,400	<2,700	<5,400	<4,500	<3,800	---	---	---	---	---	<1,500
SVG-1	3/18/2010	5	**8,200,000**	<8,000	<9,400	<11,000	<22,000	<18,000	<15,000	---	4.22	2.06	---	---	<6,100
SVG-2	3/18/2010	3	**11,000,000**	**21,000**	<19,000	**62,000**	<43,000	<36,000	<30,000	---	0.519	2.31	---	---	<12,000
SVG-2	9/9/2010	3	**17,000,000**	**32,000**	<19,000	**150,000**	<43,000	<36,000	<30,000	1.33	13.9	2.66	---	---	<12,000
SVG-2	3/18/2010	5	**7,500,000**	<8,000	<9,400	**54,000**	<22,000	<18,000	<15,000	---	4.91	11.2	---	---	<6,100
SVG-2	9/9/2010	5	**18,000,000**	**17,000**	<19,000	**200,000**	44,000	<36,000	<30,000	1.19	16.9	2.22	---	---	<12,000

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	Date	Depth (fbg)	TPHg	B	T	E	X	MTBE	TBA	Methane (%v)	Carbon Dioxide (%v)	Oxygen + Argon (%v)	Nitrogen (%v)	1,1-Difluoroethane	Isopropanol
SVG-3	3/18/2010	3	**39,000**	<51	<60	460	230	<120	<97	---	3.38	15.1	---	---	<39
SVG-3	9/9/2010	3	**86,000**	<80	<94	1,100	220	<180	<150	---	---	---	---	---	<61
SVG-3	3/18/2010	5	**49,000**	<64	<75	520	250	<140	<120	---	3.43	15.0	---	---	<49
SVG-4	3/18/2010	3	28,000	<16	<19	420	250	<36	<30	---	7.63	6.75	---	---	100
SVG-4	9/9/2010	3	**50,000**	<16	<19	610	160	<36	<30	---	---	---	---	---	<12
SVG-5	3/18/2010	3	**27,000,000**	<32,000	<38,000	<43,000	<87,000	<72,000	<61,000	---	2.22	2.74	---	---	<25,000
SVG-5	9/9/2010	3	**37,000,000**	**2,700**	<2,400	**9,300**	<5,400	<4,500	<3,800	1.20	7.63	2.28	---	---	<1,500
SVG-5	3/18/2010	5	**13,000,000**	<16,000	<19,000	<22,000	<43,000	<36,000	<30,000	---	<0.500	21.5	---	---	<12,000
SVG-5	9/9/2010	5	**32,000,000**	<4,800	<5,700	<6,500	<13,000	<11,000	<9,100	1.11	16.5	1.97	---	---	<3,700
SVG-6	3/18/2010	3	**110,000,000**	<130,000	<150,000	<170,000	<350,000	<290,000	<240,000	---	3.64	2.36	---	---	<98,000
SVG-6	9/9/2010	3	**140,000,000**	**44,000**	<30,000	<35,000	<69,000	<58,000	<49,000	1.89	8.57	2.11	---	---	<20,000
SVG-6	3/18/2010	5	**75,000,000**	<8,000	<94,000	<11,000	<22,000	<18,000	<15,000	---	6.36	2.27	---	---	<6,100
SVG-6	9/9/2010	5	**160,000,000**	**46,000**	<30,000	<35,000	<69,000	<58,000	<49,000	1.87	9.09	2.43	---	---	<20,000
SVG-7	3/18/2010	3	**170,000**	<160	<190	<220	<430	<360	<300	---	0.816	16.7	---	---	<120
SVG-7	9/9/2010	3	**97,000**	<80	<94	300	<220	<180	<150	---	---	---	---	---	<61
SVG-8	3/18/2010	3	**70,000**	<80	<94	170	<220	<180	<150	---	8.28	2.12	---	---	<61
SVG-8	9/9/2010	3	**100,000**	<80	<94	300	<220	<180	<150	<0.500	12.4	1.97	---	---	<61
SVG-8	3/18/2010	5	**140,000**	<80	<94	300	<220	<180	<150	---	7.93	2.45	---	---	210
SVG-8	9/9/2010	5	**81,000**	<80	<94	240	<220	<180	<150	<0.500	12.6	1.97	---	---	<61
SVG-8	9/9/2010	7.5	**62,000**	<51	<60	230	<140	<120	<97	<0.500	12.5	1.97	---	---	<39
SVG-9	3/18/2010	3	**67,000**	<80	<94	300	<220	<180	<150	---	10.7	4.25	---	---	<61
SVG-9	9/9/2010	3	**57,000**	<51	<60	230	<140	<120	<97	<0.500	15.1	7.01	---	---	<39

TABLE 1

HISTORICAL SOIL VAPOR ANALYTICAL DATA
FORMER SHELL SERVICE STATION
15275 WASHINGTON AVENUE, SAN LEANDRO, CALIFORNIA

Sample ID	*Date*	*Depth (fbg)*	*TPHg*	*B*	*T*	*E*	*X*	*MTBE*	*TBA*	*Methane (%v)*	*Carbon Dioxide (%v)*	*Oxygen + Argon (%v)*	*Nitrogen (%v)*	*1,1-Difluoroethane*	*Isopropanol*
SVG-9	3/18/2010	5	**55,000**	<64	<75	220	<170	<140	<120	---	10.4	4.27	---	---	<49
SVG-9	9/9/2010	5	7,900	<16	32	32	<43	<36	<30	<0.500	1.54	20.4	---	---	99
SVG-9	9/9/2010	7.5	**36,000**	<64	<75	95	<170	<140	<120	<0.500	16.8	5.52	---	---	<49
ESLs [g]			*29,000*	*280*	*180,000*	*3,300*	*58,000*	*31,000*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Notes:
All results in micrograms per cubic meter ($\mu g/m^3$) unless otherwise indicated.
TPHg = Total petroleum hydrocarbons as gasoline analyzed by EPA Method TO-3M unless otherwise noted.
BTEX = Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8260B (M) unless otherwise noted.
MTBE = Methyl tertiary-butyl ether analyzed by EPA Method 8260B (M) unless otherwise noted.
TBA = Tertiary-butyl alcohol analyzed by EPA Method 8260B (M) unless otherwise noted.
Methane, carbon dioxide, and oxygen + argon analyzed by ASTM D-1946 unless otherwise noted.
Isopropanol analyzed by EPA Method 8260B (M) unless otherwise noted.
1,1-Difluoroethane analyzed by EPA Method TO-15M
fbg = Feet below grade
%v = Percent by volume
<x = Not detected at reporting limit x
--- = Not analyzed
UNK = Unknown
ESL = Environmental screening level
NA = No applicable ESL
Results in **bold** exceed environmental screening level

a = Analytical method unknown
b = Analyzed by EPA Method TO-15M
c = Analysis by mobile laboratory. TPHg analyzed by EPA Method 8015, and BTEX and MTBE analyzed by EPA Method 8020. Fixed/biogenic gases analyzed on a thermal conductivity detector.
d = Analyzed by GC/FID
e = Analyzed by EPA Method TO-3
f = Analyzed by EPA Method TO-14A
g = San Francisco Bay Regional Water Quality Control Board (RWQCB) shallow soil gas screening level for evaluation of potential vapor intrusion concerns - commercial/industrial land use from RWQCB's *Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater*, California Regional Water Quality Control Board, Interim Final - November 2007 (Revised May 2008).

APPENDIX A

SITE HISTORY

SITE HISTORY

1985 Subsurface Investigation: In June 1985, EMCON Associates (EMCON) installed four groundwater monitoring wells (S-1 through S-4). Initially, 0.5 feet of separate phase hydrocarbons (SPHs) were measured in well S-3. Soil samples from the well borings contained up to 3,900 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg), 6 mg/kg benzene, 170 mg/kg toluene, and 840 mg/kg ethylbenzene and total xylenes. EMCON's August 12, 1985 report provides investigation details.

1985-1988 SPH Removal: Gettler-Ryan, Inc.'s (G-R's) September 28, 1988 site summary states that approximately 60 gallons of SPH have been removed from the site.

1986 Subsurface Investigations: In August 1986, EMCON drilled three borings (S-A, S-C, and S-D) and installed one monitoring well (S-B) to obtain soil and groundwater samples in the area of the waste oil underground storage tank (UST) and fuel USTs. Initially, 0.1 feet of SPHs were measured in well S-B. Soils from the area of the waste oil UST were analyzed for waste oil. No waste oil was detected; however, EMCON states that unidentified volatile compounds (likely gasoline) were present. Soil samples from the area of the fuel USTs (S-B through S-D) contained up to 1,700 mg/kg TPHg, 5.6 mg/kg benzene, 37 mg/kg toluene, and 130 mg/kg ethylbenzene and total xylenes. EMCON's September 12, 1986 report describes the investigation. Based on these concentrations, Shell Oil Products US submitted an Underground Storage Tank Unauthorized Release (Leak)/Site Contamination Report (Unauthorized Release Report) on November 6, 1986.

In December 1986, EMCON installed one groundwater monitoring well (S-5) adjacent to the waste oil UST. Well installation details are provided in EMCON's January 28, 1987 report.

1987 Well Survey: In February 1987, EMCON conducted a well survey. The survey identified 11 domestic wells, 97 irrigation wells, and 7 wells of unknown use within one mile of the site. The nearest down-gradient domestic well is approximately 4,200 feet southwest of the site. No well construction information is listed for this well. The nearest irrigation well is approximately 360 feet to the southwest and is screened from 100 to 120 feet below grade (fbg). The status of these wells is unknown. GeoStrategies July 13, 1989 *Quarterly Monitoring Report* provides the well survey results.

1987 Unauthorized Release Report: On March 18, 1987, the City of San Leandro Fire Department filed an Unauthorized Release Report for a gasoline release of unknown source or quantity.

1987 Waste Oil UST Replacement: In June 1987, a waste oil UST was removed and replaced with a double-walled tank. Soils were over-excavated to a depth of approximately 13 fbg and horizontally approximately 2 to 4 feet beyond the dimensions of the tank. Soil samples collected from beneath the waste oil tank contained 280 mg/kg TPHg and 14 mg/kg benzene. No total petroleum hydrocarbons as diesel (TPHd) or volatile organic compounds (VOCs) were detected in the soil samples. Blaine Tech Services June 22, 1987 report provides soil sampling details.

1987 Fuel UST Removal: In June 1987, two 5,000-gallon, one 7,500-gallon, and one 8,000-gallon fuel USTs and tank backfill well S-B were removed. Kaprelian Engineering, Inc. (Kaprelian) collected four soil samples (A through D) from the UST excavation walls. The soil samples contained up to 910 mg/kg TPHg, 7.4 mg/kg benzene, 43 mg/kg toluene, and 43 mg/kg total xylenes. No TPHg, benzene, toluene, or total xylenes were detected in a grab water sample collected from the fuel UST excavation. Kaprelian's June 8, 1987 *Soil Sampling Investigation* report presents details of the soil sampling.

1987 Subsurface Investigation and UST Removal: In October 1987, three trenches were excavated adjacent to the former UST excavation area to a depth of approximately 8.5 fbg. Soil samples from the trenches contained up to 730 mg/kg TPHg, 10 mg/kg benzene, 2.9 mg/kg toluene, and 79 mg/kg total xylenes. In November 1987, an additional 1,000-gallon UST discovered during the trenching investigation was removed. A soil sample (A-1) collected by Kaprelian from beneath the UST contained 950 mg/kg TPHg, 21 mg/kg benzene, 1.4 mg/kg toluene, and 17 mg/kg total xylenes. Kaprelian's December 7, 1987 *Additional Subsurface Investigation* report provides details of these activities. Approximately 500 cubic yards of material were removed from the UST excavation, and an additional 200 cubic yards were removed from the trenches for off-site disposal. Enviros, Inc.'s (Enviros') June 24, 1997 *Corrective Action Plan* discusses soil disposal conducted during the UST removal activities.

1987 Well Destructions: In 1987, wells S-B, S-2, and S-4 were destroyed or covered during on-site construction activities.

1988 Soil Vapor Survey: In October 1988, Tracer Research Corporation (TRC) performed a soil vapor survey at 15 off-site locations on Lewelling Boulevard and in the adjacent mobile home park. Soil vapor samples contained up to 5,800 milligrams per liter TPHg,

with highest concentrations in Lewelling Boulevard south of the site. TRC's October 17, 1988 report presents the survey results.

1988 Subsurface Investigation: In November 1988, Woodward Clyde Consultants (WCC) installed seven monitoring wells (S-6 through S-12). WCC's April 7, 1989 report presents well installation details.

1989 Subsurface Investigations: In March 1989, GeoStrategies, Inc. (GeoStrategies) installed five groundwater monitoring wells (S-13 through S-17). Soil samples from the well borings contained up to 1,100 mg/kg TPHg, 3 mg/kg benzene, 12 mg/kg toluene, 24 mg/kg ethylbenzene, and 110 mg/kg total xylenes. GeoStrategies July 13, 1989 *Quarterly Monitoring Report* presents monitoring well installation details.

In October 1989, GeoStrategies installed one recovery well (SR-1). Soil samples from the well boring contained up to 770 mg/kg TPHg, 0.8 mg/kg benzene, 3.1 mg/kg toluene, 5 mg/kg ethylbenzene, and 33 mg/kg total xylenes. GeoStrategies January 9, 1990 *Quarterly Report* presents recovery well installation details.

1990 Aquifer Testing: In March 1990, GeoStrategies conducted a variable discharge pumping test on well SR-1 and slug tests on wells S-1, S-3, S-5, S-7, S-9, S-10, S-13, S-14, and S-16. Calculated transmissivity values ranged from 408 to 11,000 gallons per foot per day and hydraulic conductivity ranged from 7.3 to 100 feet per day. GeoStrategies' June 29, 1990 *Aquifer Test Report* details these activities.

1991 Subsurface Investigation: In May 1991, GeoStrategies installed one monitoring well (S-18) down gradient to the west of the site. A soil sample collected from the well boring at 4.5 fbg contained 0.06 mg/kg toluene. No TPHg, benzene, ethylbenzene, or total xylenes were detected in the soil sample. Well installation details are presented in GeoStrategies June 24, 1991 *Site Update/Well Installation Report.*

1993 Street Resurfacing: Between July and October 1993, wells S-11 through S-15 were paved over by the City of San Leandro. In May 1994, EMCON uncovered the wells, raised the well boxes, and had the wells resurveyed.

1995 Groundwater Risk Assessment: In April and November 1995, Enviros submitted results for a FATE2 groundwater model developed for the site which concluded that impacted groundwater would not reach the nearest potential groundwater receptor. Groundwater modeling results are presented in Enviros' April 17, 1995 *Corrective Action Plan* and November 29, 1995 *Corrective Action Plan – Addendum.*

1996 Tier 1 Risk Based Corrective Action (RBCA) Evaluation: On December 9, 1996, Weiss Associates (WA) submitted a *Tier 1 RBCA Evaluation*. Historical petroleum hydrocarbon concentrations in soil and groundwater did not meet conservative Tier 1 risk based screening levels for several chemicals of concern (COCs) and potentially completed pathways.

March 1997 Soil Vapor Survey: In March 1997, WA conducted a soil vapor survey on site and within the adjacent mobile home park property. Soil vapor samples were collected using Geoprobe® direct-push soil vapor sampling equipment at nine locations (SG-01 through SG-09). At four locations (SG-01, SG-05, SG-06, and SG-09) soil vapor samples were collected at a depth of 4 fbg and at one location (SG-02) a soil vapor sample was collected at a depth of 2 fbg. At four locations (SG-03, SG-04, SG-07, and SG-08) soil vapor samples were collected at depths of 2, 4, and 6 fbg. An ambient air sample (AMB-01) was collected at a location between the service station and the mobile home park. Soil vapor samples contained up to 130,000,000 micrograms per cubic meter ($\mu g/m^3$) TPHg (SG-07) and 750,000 $\mu g/m^3$ benzene (SG-01). Soil samples collected at four locations (SG-03, SG-04, SG-07, and SG-08) contained up to 4,200 mg/kg TPHg (SG-03 at 4 to 6 fbg) and 10 mg/kg benzene (SG-03 at 4 to 6 fbg). WA's June 23, 1997 *Vadose Zone Characterization Report and RBCA Evaluation* details the investigation results.

1997 Tier 2 RBCA Evaluation: In June 1997, WA submitted a Tier 2 RBCA evaluation, which considered historical data and results from the March 1997 soil vapor investigation. The Tier 2 evaluation showed that the number of completed pathways was reduced. Only benzene concentrations exceeded site specific target levels (SSTLs) for volatilization to indoor air from soil and groundwater pathways. The SSTL for benzene was also exceeded for on-site groundwater ingestion; however, on-site consumption of groundwater appears to be unlikely. WA proposed to remediate the site to levels below the SSTLs. WA's June 23, 1997 *Vadose Zone Characterization Report and RBCA Evaluation* presents the risk evaluation.

July 1997 Soil Vapor Survey: In July 1997, Enviros drilled four soil vapor sample points (SG-10 through SG-13) in the northeastern portion of the site. Soil samples from the borings contained up to 30 mg/kg TPHg, 0.11 mg/kg benzene, and 0.67 mg/kg methyl tertiary-butyl ether (MTBE). Soil vapor samples collected at 4 fbg contained up to 5,000 $\mu g/m^3$ TPHg (SG-12 and SG-13) and 16 $\mu g/m^3$ benzene (SG-12). Enviros' August 13, 1997 *Site Investigation Report* details the investigation results.

1997 Soil Vapor Extraction (SVE) Pilot Test: In July 1997, Enviros conducted an SVE pilot test from wells S-1, S-3, S-5, S-7, and S-8. Initial influent hydrocarbon concentrations were up to 51,000 parts per million by volume TPHg. Due to the short

duration of the test, Enviros could not predict how quickly TPHg concentrations would decline. The average SVE flow rate was less than 10 cubic feet per minute, and the calculated radius of influence was less the 10 feet. Enviros' August 13, 1997 *Site Investigation Report* details the pilot test results.

1998-1999 SVE: In April 1998, Cambria Environmental Technology, Inc. (Cambria) installed one SVE well (SV-1). From May 1998 to October 1999, Cambria conducted SVE from two horizontal vapor trenches completed on the east and west sides of the existing Speedy Smog building, SVE well SV-1, and monitoring wells S-1, S-3, S-5, S-7, S-8 and SR-1. This SVE system removed approximately 1,410 pounds of TPHg and was shut down due to low influent concentrations. Cambria's September 1, 2000 *Second Quarter 2000 Monitoring and Remediation Report* presents a summary of the SVE system operations.

1998 Subsurface Investigation: In July 1998, Cambria installed one groundwater monitoring well (S-19) at the location of soil boring SG-05. Soil samples from the well boring contained up to 12 mg/kg TPHg, 0.0099 mg/kg ethylbenzene, and 0.012 mg/kg total xylenes. No benzene, toluene, or MTBE was detected in the soil samples. Cambria's December 2, 1998 *Well Installation Report* provides well installation details.

2008 Soil Vapor Survey: In June 2008, Delta Consultants (Delta) conducted a soil vapor survey on site and in the adjacent mobile home park. Soil vapor samples (P-10 through P-23) contained up to 9,000,000 µg/m^3 TPHg, 12,000 µg/m^3 benzene, 280 µg/m^3 toluene, 46,000 µg/m^3 ethylbenzene, 25,120 µg/m^3 total xylenes, and 55 µg/m^3 tertiary-butyl alcohol (TBA). No MTBE was detected in the soil vapor samples. Delta's October 7, 2008 *Soil Vapor Investigation Report* presents investigation results.

2009 Horizontal SVE Well Installation and SVE Pilot Test: In August 2009, Delta installed two horizontal SVE wells (ET-1 and ET-2) in 5-fbg trenches to target residual hydrocarbons in the shallow vadose zone. The trenches are approximately 12 feet in length and were screened 10 feet along the length of the trench. After the installation of ET-1 and ET-2, Delta conducted an SVE pilot test to evaluate the effectiveness of SVE at the site. The pilot test consisted of one step test and one extended test on extraction well ET-1. Results of the testing indicate that SVE may be effective, but difficult to maintain. SVE vapor flow rates were 180 standard cubic feet per minute, the radius of influence was between approximately 23 to 33 feet, and mass removal rates were adequate (96.4 pounds per day [lb/day] for TPHg and 0.05 lb/day for benzene). Based on a rapid decline in inlet vapor concentrations, soil lithology, and the limited depth of impact, Delta concluded that system operation might be difficult to sustain. Delta's November 19, 2009 *SVE Pilot Test Report* details the pilot test procedures and results.

2009 Soil Vapor Sampling: In September 2009, Delta conducted a second soil vapor survey that focused on portions of the adjacent mobile home park not surveyed during the 2008 investigation. Soil vapor samples (P-24 through P-29) contained up to 2,900,000 µg/m³ TPHg, 1.8 µg/m³ benzene, and 21 µg/m³ toluene. No ethylbenzene, total xylenes, MTBE, or TBA were detected in the soil vapor samples. Fifteen of the eighteen soil vapor samples reported concentrations of the tracer gas 1,1-difluoroethane, at levels that indicated a potential concern with sampling integrity. The tracer gas concentrations indicate that leaks in the sampling system may have resulted in dilute samples. Delta's October 16, 2009 *2009 Soil Vapor Gas Investigation Report* details the investigation.

2009 Soil Vapor Probe Installation: In December 2009, Delta installed nine soil vapor wells (SVG-1 through SVG-9) on site and on the adjacent property with screens set at 3, 5, and 7.5 fbg. A 1-inch diameter polyvinyl chloride casing screened from 7 to 8 fbg with 0.010-inch machine-slotted well screen was installed within the vapor wells in order to collect soundings to determine whether groundwater elevations are impacting the deeper vapor wells. Delta's April 19, 2010 *First Quarter 2010 Soil Gas Investigation Report* presents details of the vapor well installations.

2010 Soil Vapor Sampling: In March and September 2010, soil vapor samples were collected from soil vapor wells SVG-1 through SVG-9. Soil vapor samples collected during these events contained up to 160,000,000 µg/m³ TPHg, 46,000 µg/m³ benzene, 200,000 µg/m³ ethylbenzene, and 44,000 µg/m³ total xylenes. No toluene, MTBE, or TBA was detected in the soil vapor samples. Delta stated that the TPHg soil vapor plume appears to be centered off site, with the highest concentrations of TPHg reported from samples collected at vapor well SVG-6 (in close proximity to monitoring well S-9, which is the center of the small dissolved-phase groundwater plume that persists at the site). Delta's April 19, 2010 *First Quarter 2010 Soil Gas Investigation Report* and November 17, 2010 *Third Quarter 2010 Soil Gas Investigation Report* summarize the soil vapor sampling activities.

2010 Subsurface Investigation: In June 2010, Delta drilled 14 soil borings (SB-1 through SB-14) to determine the vertical and horizontal extent of remaining soil impacts in the vicinity of the former UST complex, former dispenser islands, and adjacent property. Soil samples from the borings contained up to 110 mg/kg TPHd, (SB-5 at 8 fbg), 1,100 mg/kg TPHg (SB-12 at 8 fbg), 0.0061 mg/kg ethylbenzene (SB-6 at 8 fbg) No benzene, toluene, total xylenes, MTBE, TBA, di-isopropyl ether, ethyl tertiary-butyl ether, tertiary-amyl methyl ether, ethanol, 1,2-dibromoethane or 1,2-dichloroethane

were detected in the soil samples. Delta's August 11, 2010 *2010 Soil Assessment Report* presents the investigation results.

2011 Risk Assessment: In April 2011, Conestoga-Rovers & Associates (CRA) submitted a memorandum proposing site-specific soil vapor criteria for COCs. CRA determined that recent soil vapor detections of benzene and ethylbenzene from probes located in the mobile home park exceeded the calculated site-specific soil vapor criteria for residential land use and proposed an additional soil vapor investigation to further evaluate the potential for soil vapor intrusion to the mobile homes. CRA's April 27, 2011 *Development of Site Specific Soil Vapor Criteria for Volatile Constituents of Concern* details the site-specific soil vapor criteria calculations.

Groundwater Monitoring: Groundwater monitoring has been conducted at the site since July 1985. Since the third quarter of 2009, coordinated monitoring and sampling has been conducted with the adjacent Arco Service Station No. 0601 located at 712 Lewelling Boulevard, San Leandro. The depth to groundwater at the site has ranged from 0.97 and 9.95 fbg and is generally 5 to 8 fbg. Groundwater flow direction is variable, but overall is generally westerly to southerly.