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TRANSMITTAL

DATE: July 19, 2012

REFERENCE NO.: 240781

PROJECT NAME: 2703 Martin Luther King Jr. Way, Oakland

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

RECEIVED
5:17 pm, Jul 25, 2012
Alameda County
Environmental Health

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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 contact Peter Schaefer at (510) 420-3319.

Copy to: Denis Brown, Shell Oil Products US (electronic copy)

Rodney & Janet Kwan, Auto Tech West (property owner), 2703 Martin Luther King Jr. Way, Oakland, CA 94612

Scott Merillat (adjacent property owner), 664 27th Street, Oakland, CA 94612

Monique Oatis (adjacent property owner), 670 27th Street, Oakland, CA 94612

Jack Chang (adjacent property owner), 559 9th Avenue, San Francisco, CA 94118-3716

Teresa M. Miller and Ruth E. Waterman (adjacent property owners), 491 65th Street, #A, Oakland, CA 94609

David Pankratz (adjacent property owner), 668 27th Street, Oakland, CA 94612

Completed by: Peter Schaefer Signed: Peter Schaefer

Filing: **Correspondence File**

Denis L. Brown
Shell Oil Products US
HSE – Environmental Services
20945 S. Wilmington Ave.
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Jerry Wickham
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California
SAP Code 129449
Incident No. 97093397
ACEH Case No. RO0000145

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

FORMER SHELL SERVICE STATION
2703 MARTIN LUTHER KING JR. WAY
OAKLAND, CALIFORNIA

SAP CODE	129449
INCIDENT NO.	97093397
AGENCY NO.	RO0000145

Prepared by:
Conestoga-Rovers & Associates

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TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
2.0	WORK TASKS	1
2.1	PERMITS	1
2.2	HEALTH AND SAFETY PLAN (HASP)	1
2.3	UTILITY CLEARANCE	1
2.4	SUBSURFACE INVESTIGATION	2
2.5	MONITORING WELL INSTALLATION	2
2.6	WELL DEVELOPMENT AND SAMPLING	3
2.7	NESTED SOIL VAPOR PROBE INSTALLATION	3
2.8	SOIL VAPOR PROBE SAMPLING	3
2.9	LEAK TESTING	4
2.10	CHEMICAL ANALYSES	4
2.11	WELLHEAD SURVEY	5
2.12	REPORT PREPARATION	5
3.0	SCHEDULE	5

LIST OF FIGURES
(Following Text)

FIGURE 1 VICINITY MAP

FIGURE 2 SITE PLAN

LIST OF APPENDICES

APPENDIX A SITE HISTORY

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this work plan on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), as discussed in Shell's and CRA's March 28, 2012 meeting with Alameda County Environmental Health (ACEH).

The subject site is a former service station located on the northwest corner of Martin Luther King Jr. Way and 27th Street in a mixed commercial and residential area of Oakland, California (Figure 1). Currently, the site is occupied by Auto Tech West and is used as an automotive repair shop (Figure 2).

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

2.0 WORK TASKS

2.1 PERMITS

CRA will obtain drilling permits from the Alameda County Public Works Agency (ACPWA) and access agreements from the property owners of 668 27th Street, 690 and 692 27th Street, and 673 28th Street, Oakland, California. CRA has an access agreement in place with the property owner of 670 27th Street, Oakland, California.

2.2 HEALTH AND SAFETY PLAN (HASP)

CRA will prepare a HASP which provides information 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 through Underground Service Alert and a private line locator service prior to drilling.

2.4 SUBSURFACE INVESTIGATION

To further investigate the extent of petroleum hydrocarbon and fuel oxygenate impact to groundwater and to evaluate the potential for vapor intrusion, two borings will be drilled using hollow-stem augers and converted to groundwater monitoring wells, and five borings will be drilled using air-knife equipment and converted to nested soil vapor probes. Wells MW-13 and MW-15 and soil vapor probes VP-11 through VP-14 will be installed down gradient of the site, and soil vapor probe VP-15 will be installed on site (Figure 2).

A CRA geologist will supervise the drilling and describe encountered soils using the Unified Soil Classification System and Munsell Soil Color Charts. After clearing the boring to 5 feet below grade (fbg) with an air- or water-knife, soil samples will be collected at 5-foot intervals for soil description, screening in the field for organic vapors using a photo-ionization detector (PID), and possible laboratory analyses. Soil sample selection will be based on field observations (including PID readings and soil types). CRA will prepare a boring log for each well boring, and PID measurements will be recorded on the boring logs.

Soil samples designated for chemical analyses will be retained in stainless steel or brass sample tubes. The tubes will be covered on both ends with Teflon® sheets and plastic end caps. Soil samples will be labeled, entered onto a chain-of-custody record, and placed into a cooler with ice for transport to a State of California certified laboratory for analyses. CRA will request a standard 2-week turn around time for laboratory results. CRA will perform this work under the supervision of a professional geologist or engineer.

2.5 MONITORING WELL INSTALLATION

Assuming the absence of subsurface obstructions, wells MW-13 and MW-15 will be completed to approximately 10 feet below first-encountered groundwater and will be screened from approximately 5 feet above to 10 feet below groundwater. Based on groundwater monitoring data, depth to groundwater ranges from approximately 5 to 10 fbg. The wells will be constructed using 2-inch-diameter Schedule 40 PVC casing, a filter pack that will be placed from the bottom of the well screen up to 1 foot above the top of the well screen, followed by a 1-foot-thick bentonite seal, and cement grout to grade. Actual well construction details will be based on soil types and field conditions encountered during drilling. The wells will be secured with a locking cap under a traffic-rated well box.

2.6 WELL DEVELOPMENT AND SAMPLING

Upon waiting at least 72 hours after well installations, Blaine Tech Services, Inc. (Blaine) of San Jose, California will develop the new groundwater monitoring wells. At least 72 hours after well development, Blaine will sample the site's groundwater monitoring wells according to the existing sampling schedule and chemical analysis protocol.

2.7 NESTED SOIL VAPOR PROBE INSTALLATION

Assuming the absence of subsurface obstructions, CRA will advance five soil borings (VP-11 through VP-15) to approximately 5.5 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 6 inches below and above the deepest sampling point (5 fbg), 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 6 inches below the 3 fbg sample point, using hydrated granular bentonite, set atop a 1-foot base of dry granular bentonite. A clean, fine-grained silica sand filter pack will be installed approximately 6 inches below and above the 3 fbg sample point, and the guide pipe will be lifted as the sand pack is installed in the same process as described for the deepest sample point. The annulus will then be sealed to the surface using hydrated granular bentonite, set atop a 1-foot base of dry granular bentonite. Each soil vapor probe will be completed at the surface using a traffic-rated well box at grade.

2.8 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.

CRA will sample new soil vapor probes VP-11 through VP-15 and existing soil vapor probes VP-2 and VP-3 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.

2.9 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% of the source concentration (i.e., 10% of the helium content measured within the containment unit), the soil gas sample will be considered invalid.

2.10 CHEMICAL ANALYSES

The groundwater samples from new wells MW-13 and MW-15 and selected soil samples will be analyzed for total petroleum hydrocarbons as gasoline (TPHg; carbon range C_6-C_{12}) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8260B. Groundwater samples from the existing wells will be analyzed per the existing protocol. Vapor samples will be analyzed for TPHg (carbon range C_6-C_{12}) and BTEX by EPA Method 8260B, for oxygen, carbon dioxide, and methane by ASTM D Method 1946, and for helium by ASTM D Method 1946 (M).

2.11 WELLHEAD SURVEY

A licensed surveyor will survey the wellhead elevations relative to mean sea level and the wells' and soil vapor points' latitudes and longitudes.

2.12 REPORT PREPARATION

Following the receipt of analytical results from the laboratory, CRA will prepare a written report which will include field procedures, laboratory results, and boring logs.

3.0 SCHEDULE

CRA will begin work upon receiving ACEH's written approval of this work plan, receiving appropriate drilling permits from ACPWA, and receiving access agreements from the owners of 668 27th Street, 690 and 692 27th Street, and 673 28th Street, Oakland, California.

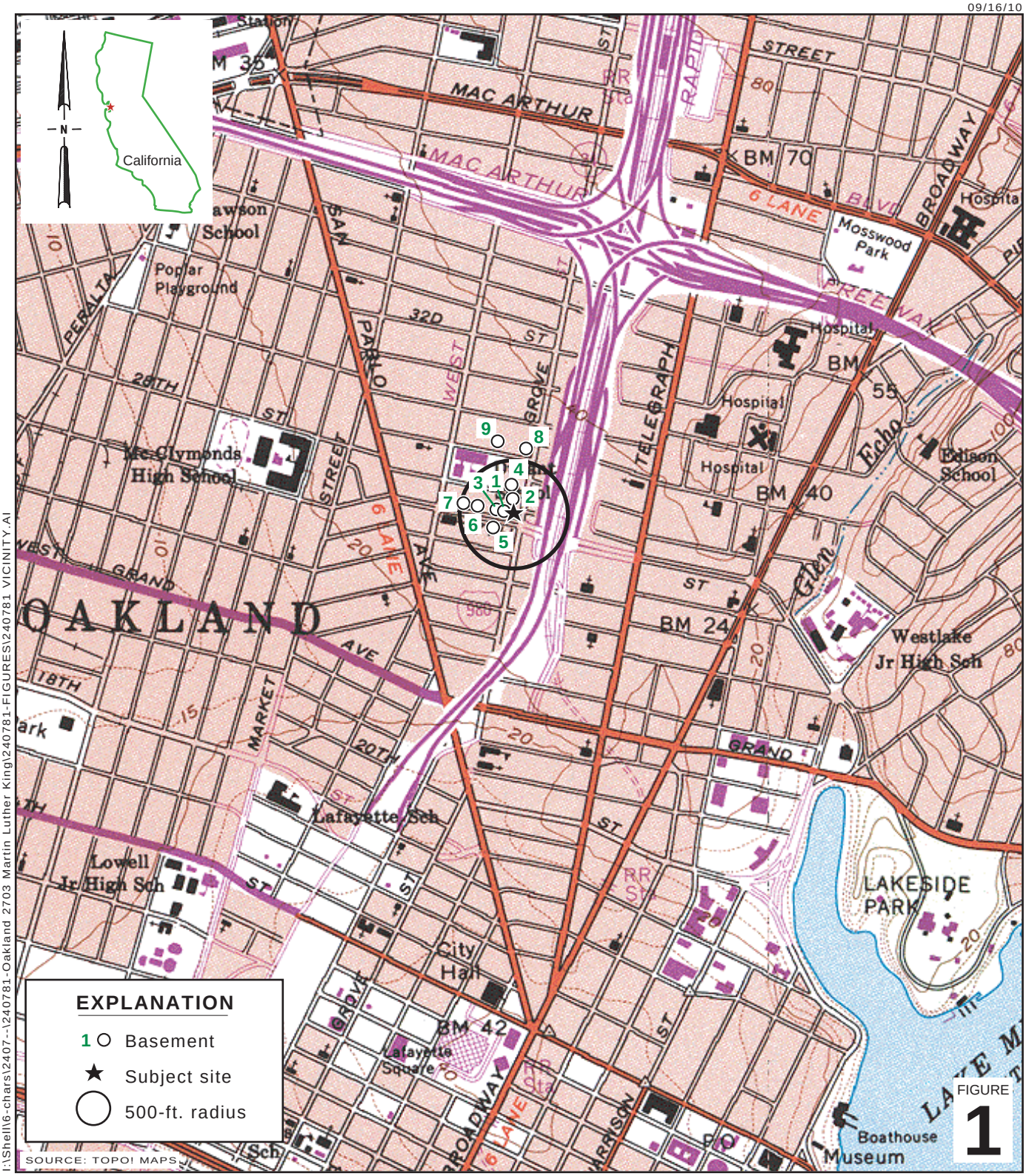
All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

Peter Schaefer, CEG, CHG

Aubrey K. Cool, PG

FIGURES

09/16/10



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0 1/8 1/4 1/2 1

SCALE (MILES)

FIGURE 1

Former Shell Service Station

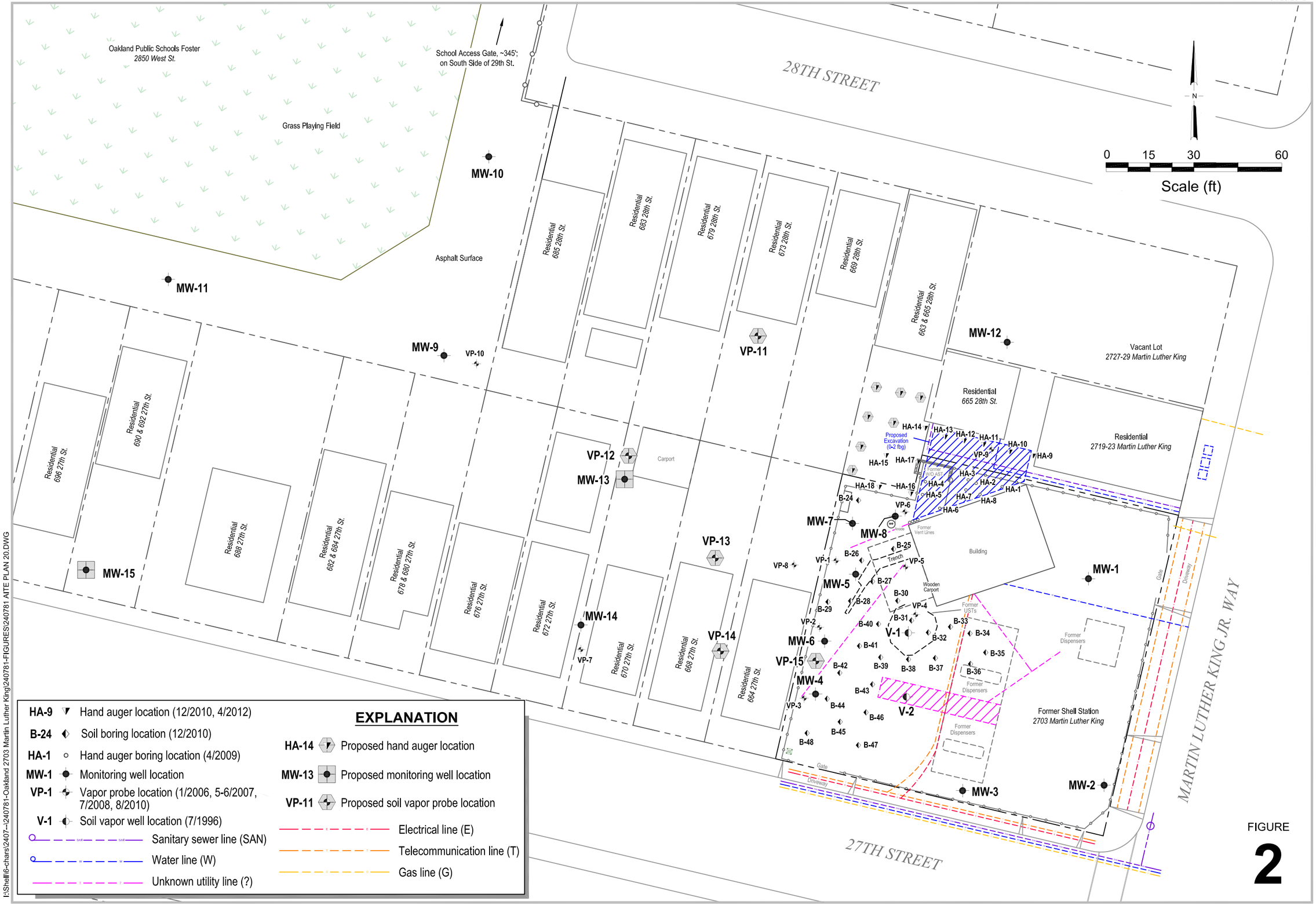
2703 Martin Luther King Jr. Way
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

04/25/2012

Site Plan



EXPLANATION

HA-9	Hand auger location (12/2010, 4/2012)
B-24	Soil boring location (12/2010)
HA-1	Hand auger boring location (4/2009)
MW-1	Monitoring well location
VP-1	Vapor probe location (1/2006, 5-6/2007, 7/2008, 8/2010)
V-1	Soil vapor well location (7/1996)
	Sanitary sewer line (SAN)
	Water line (W)
	Unknown utility line (?)
HA-14	Proposed hand auger location
MW-13	Proposed monitoring well location
VP-11	Proposed soil vapor probe location
	Electrical line (E)
	Telecommunication line (T)
	Gas line (G)

FIGURE

2

Former Shell Service Station

2703 Martin Luther King Jr. Way

Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

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APPENDIX A

SITE HISTORY

SITE HISTORY

1979 Underground Storage Tank (UST) Removal: Prior to vacating the property in 1979, Shell Oil Products US (Shell) reportedly removed three fuel USTs and a waste oil storage tank.

1994 UST Removal: In October 1994, KTW & Associates removed a 2,000-gallon UST on behalf of Auto Tech West (ATW). Two soil samples (TP-1-N and TP-2-S) collected from beneath the tank contained up to 18,000 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg) and 100 mg/kg benzene.

1995 Phase I Environmental Site Assessment (ESA): In August and September 1995, Enviros Inc. (Enviros) performed a Phase I ESA. The Phase I ESA indicated that the site was occupied by housing prior to approximately 1959.

During a site survey conducted in conjunction with the Phase I ESA, an excavation was observed near the southwest corner of the service building. The excavation's location was consistent with the location of the 2,000-gallon UST removed in 1994 by ATW, with a large concrete slab observed in aerial photographs taken in 1971 and 1973, and with a smaller concrete slab observed in aerial photographs taken in 1981 and 1985. The concrete slabs observed in the aerial photographs were likely covering the USTs operated by Shell from 1959 to 1979, and after 1979 by Acme Ambulance Company (Acme).

1995 Phase II ESA: On May 23, 1995, ACC Environmental Consultants (ACC) drilled nine soil borings (B-1 through B-9) using a pneumatic sampling tool in the vicinity of the UST excavation and the product dispenser islands. Soil samples contained up to 830 mg/kg TPHg and 1.8 mg/kg benzene. Separate phase hydrocarbons (SPHs) were identified in grab groundwater samples collected from four of the soil borings (B-1, B-5, B-6, and B-9). Grab groundwater samples collected from borings without SPH contained up to 89,000 micrograms per liter (µg/L) TPHg and 21,000 µg/L benzene. Results of the investigation are presented in ACC's June 1995 *Phase II- Environmental Site Investigation* report.

1996 Over-Excavation: On March 19, 1996, Acme's former UST excavation was over-excavated and backfilled. The excavation, originally left open to 9 feet below grade (fbg), was over-excavated to approximately 11 fbg. Two soil samples (TP-3-W and TP-4-E) were collected after over-excavation was completed. The soil samples contained up to 2,700 mg/kg TPHg and 3.1 mg/kg benzene. Soil sampling and backfilling are documented in Enviros' May 10, 1996 correspondence.

1996 Subsurface Investigation: In July 1996, Enviros drilled six exploratory borings (B-10, B-11, B-12, B-13, V-1, and V-2). Borings B-11 and B-12 were completed as groundwater monitoring wells MW-1 and MW-2, and borings V-1 and V-2 were completed as soil vapor extraction wells V-1 and V-2. TPHg and benzene were not detected in soil samples collected from B-11, B-12, and B-13. Soil samples collected from B-10 and V-2 contained up to 110 mg/kg TPHg and 0.29 mg/kg benzene. Grab groundwater samples collected from borings B-10, B-12, and B-13 contained up to 290,000 µg/L TPHg and 34,000 µg/L benzene. Enviros' October 30, 1996 *Soil Boring and Well Installation Report* details the investigation results.

1997 Modified Phase I ESA: In February 1997, Enviros performed a modified Phase I ESA for the subject facility. A review of aerial photographs (1952 to 1994), city directories (1967 to 1993) and Sanborn maps (1912 to 1970) did not reveal evidence of an off-site source of petroleum hydrocarbons which would have impacted groundwater on site. The properties located north and west of the subject facility appear to have been occupied by residential houses from at least 1912 to the present. The nearest gasoline stations identified in the vicinity of the subject facility were a former Chevron station (740 27th Street at West Street) approximately 450 feet to the west, a former station (26th Street and Martin Luther King Jr. Way) approximately 300 feet to the south, and a former Mobil station (554 27th Street) approximately 950 feet to the east.

2000 Sensitive Receptor Survey (SRS): In 2000, Cambria Environmental Technology, Inc. (Cambria) performed an SRS to identify wells and underground utility conduits. Cambria identified the local sanitary and storm sewer systems as the only utility conduits which may act as preferential pathways for groundwater and soil vapor migration. Conduits identified in the area are located at depths of approximately 3.5 to 9 fbg. Cambria concluded that the potential does exist for groundwater to flow within these conduit trenches since groundwater depth on site historically ranges from approximately 4.5 to 10 fbg. However, since the typical groundwater flow direction on site has generally been to the south, it is likely that any contaminant migration within the utility conduits would be limited, since the utility conduits located to the south of the site are the shallowest of all the conduits identified adjacent to the site at depths of 3.5 to 5.5 fbg.

Cambria also obtained well installation and destruction records from the California Department of Water Resources (DWR) to identify any active water-producing wells within one-half mile of the site. DWR records did not identify any existing wells within the search area. Cambria's May 16, 2001 *Subsurface Investigation Report* provides SRS details.

2000 Subsurface Investigation: In November 2000, Cambria drilled three soil borings (B-17, B-18, and B-19) and installed three groundwater monitoring wells (MW-3, MW-4, and MW-5). Soil samples contained up to 2,100 mg/kg TPHg and 3.3 mg/kg benzene. Methyl tertiary-butyl ether (MTBE) was detected in one soil sample at a concentration of 0.0070 mg/kg. Tertiary-butyl alcohol (TBA) was detected in two soil samples at concentrations up to 0.0079 mg/kg. No SPHs were observed during the investigation. Grab groundwater samples collected from borings B-17 through B-19 contained up to 190,000 µg/L TPHg, 13,000 µg/L benzene, and 300 µg/L MTBE. TBA was detected at a concentration of 240 µg/L in B-19. Investigation results are presented in Cambria's May 16, 2001 *Subsurface Investigation Report.*

2001 Oxygen Releasing Compound (ORC) Installation: On May 2, 2001, Blaine Tech Services, Inc. (Blaine) installed ORC socks in wells V-1 and V-2. The ORC socks were removed during the fourth quarter 2001 monitoring event. Details of the ORC installation activities are presented in Cambria's quarterly groundwater monitoring reports for the second through the fourth quarter of 2001.

2002 Subsurface Investigation: In April 2002, Cambria drilled borings B-20 through B-22. MTBE was not detected in any of the soil or grab groundwater samples. Soil samples contained up to 380 mg/kg TPHg and 0.17 mg/kg benzene. Grab groundwater samples contained up to 160,000 µg/L TPHg and 18,000 µg/L benzene. Results of the investigation are presented in Cambria's June 21, 2002 *Site Investigation Report.*

2003 - 2005 ORC Installation: Blaine installed ORC socks in wells MW-5 and V-2 during first quarter of 2003. The ORCs were replaced on a semiannual basis. The use of ORC was discontinued during the first quarter 2005. Details of the ORC installation activities are presented in Cambria's quarterly groundwater monitoring reports for the first quarter 2003 through the first quarter of 2005.

2005 Subsurface Investigation: In August 2005, Cambria drilled 10 soil borings (GP-1 through GP-10). Soil samples contained up to 3,300 mg/kg TPHg and 15 mg/kg benzene. Grab groundwater samples contained up to 140,000 µg/L TPHg and 17,000 µg/L benzene. Soil vapor samples contained up to 71,000,000 micrograms per cubic meter (µg/m^3) TPHg and 170,000 µg/m^3 benzene. Details of these activities are included in Cambria's November 15, 2005 *Site Investigation Report.*

2005 Doo- to-Door Survey: Cambria conducted a door-to-door survey within 300 feet of the subject site for wells, basements, and foundation type to identify building construction and potential vapor receptors. Questionnaires were sent to 110 properties and responses for 25 properties were received as of January 13, 2006. Of the 25 responses received, none of the properties had basements. Three properties were

denoted as vacant; nine properties contained buildings constructed with slab-on-grade foundations; three contained buildings constructed with perimeter foundations. Tabulated data and a list of properties included in the survey are included in Cambria's January 15, 2006 *Door to Door Survey Report, Access Agreement Update, and Status/Schedule Update.*

2006 Subsurface Investigation: In January 2006, Cambria installed three monitoring wells (MW-6 through MW-8), drilled one soil boring (B-23), and installed six soil vapor probes (VP-1 through VP-6). Soil samples contained up to 3,800 mg/kg TPHg and 33 mg/kg benzene. Cambria's April 14, 2006 *Site Investigation Report, and First Quarter 2006 – Groundwater Monitoring Report* presents investigation results.

2006 Dual-Phase Extraction (DPE) Pilot Test: In January 2006, Cambria conducted a 5-day DPE pilot test on wells V-1, V-2, MW-6, MW-7, MW-4, MW-5, and MW-8 and a constant vacuum DPE test on well MW-6. The report concluded 1) the absence of vapor-phase concentrations (and groundwater concentrations) from well V-1 indicates that the former UST excavation does not contain residual source material; 2) high sustained and increasing vapor concentrations suggest source material is present in the vicinity of wells V-2, MW-5, and MW-8; 3) variability in extraction flow rates across the site may reflect heterogeneities in subsurface soils or may suggest preferential pathways; and 4) the extremely high effective radius of influence calculated for wells MW-5 and MW-8 during DPE testing on well MW-7 supports the presence of a preferential pathway in the vicinity of these wells. The data from the DPE pilot test suggests that DPE is feasible at this site. The groundwater table was effectively drawn down by DPE, and moderate vapor extraction flow rates were yielded from some of the extraction points. Although DPE is deemed feasible, Cambria did not recommend implementing DPE at this site. The extraction points that yielded the highest vapor concentrations did not yield an effective vapor extraction flow rate. Conversely, low vapor concentrations were yielded from the extraction point that did yield an effective vapor extraction flow rate. Therefore, DPE is not considered feasible in the target areas at this site. The pilot test details and results are presented in Cambria's March 14, 2006 *Pilot Test Report.*

2006 Subsurface Investigation: In February 2006, Cambria installed two monitoring wells (MW-12 and MW-14) on off-site properties. TPHg, benzene, toluene, ethylbenzene, and total xylenes (BTEX) were not detected in soil samples from well boring MW-12. Soil samples from MW-14 contained up to 970 mg/kg TPHg and 2.3 mg/kg benzene. Cambria's May 25, 2006 *Subsurface Investigation Report* documents the well installations.

2006 Site Visit: During the site visit in April 2006, Cambria identified two bathrooms inside the former station building. A floor drain was observed in the northern-most

bathroom. Standing liquid was present in the floor drain and automotive parts and cleaners were stored in this area. A water sample from the floor drain contained carbon disulfide (3.69 µg/L), ethylbenzene (0.610 µg/L), and toluene (0.770 µg/L). This information is reported in Cambria's May 25, 2006 *Subsurface Investigation Report.*

2006 Geophysical Survey: In May 2006, Norcal Geophysical Consultants, Inc. (Norcal) conducted a geophysical survey to determine if a waste oil UST was present in the northwest portion of the property and to evaluate the presence of subsurface utilities in this area that could act as preferential pathways. This included the mapping of the sewer line from the floor drain found inside the northwest corner of the building during the April 19, 2006 site inspection. Norcal did not locate a UST in the northwest corner of the site, but did find a vent line located behind the northeast corner of the station building. A subsurface electric line was traced from the station building to the western property boundary, and an unidentified subsurface utility was traced from the northwest corner of the station building to the southwest, near MW-5 and toward MW-6. The presence of the unknown utility line in the northwest corner confirms the observations of a possible preferential pathway in this area based on the DPE pilot test performed in January 2006. Based on a ground-penetrating radar (GPR) survey that was performed to try to locate a non-metallic sewer line, Norcal concluded that the sewer line from the bathroom could be more than 4 fbg since the GPR was unable to identify the line. Cambria's July 25, 2006 *Status Update, Report of Geophysical Survey, and Request for Agency Meeting* documents this survey.

2006 Subsurface Investigation and Vapor Probe Installation: In October 2006, Cambria drilled five cone-penetrometer test (CPT) borings (CPT-1 through CPT-5) and installed six soil vapor probes (VP-1 through VP-6). Grab groundwater samples contained up to 25,000 µg/L TPHg and 1,100 µg/L benzene (both in CPT-5 at 16 to 20 fbg). Grab groundwater sample results from between 31-37 fbg confirmed significant attenuation of contaminants by at least one order of magnitude from the interval monitored by the site wells (5-20 fbg). Comparison of data from 1995, 2000, and 2006 in similar locations (B-6, B-9, B-19, and CPT-5) demonstrated attenuation of contaminant concentrations over time was occurring. These activities are documented in Cambria's January 31, 2007 *CPT Investigation and Vapor Probe Installation Report.*

2007 Subsurface Investigation and Vapor Probe Installation: In May and June 2007, Conestoga-Rovers & Associates (CRA) drilled two CPT borings (CPT-6 and CPT-7) within 27th Street southwest of the site, drilled one CPT boring (CPT-10) on the Marcus-Foster school property northwest of the site, and installed two soil vapor probes (VP-7 and VP-8) on private properties west-northwest of the site. Three soil samples from the borings contained up to 0.0020 mg/kg benzene, and TPHg was not detected in the samples. Grab groundwater samples contained up to 38,000 µg/L TPHg and

1,600 µg/L benzene (both in CPT-10 at 13 to 17 fbg). Results of the investigation are presented in CRA's August 27, 2007 *Plume Delineation and Soil Vapor Sampling Report.*

2007-2010 Soil Vapor Monitoring: Vapor monitoring was conducted between May 2007 and September 2010. BTEX concentrations in off-site soil vapor samples were consistently below residential environmental screening levels (ESLs).

2008 Site Conceptual Model (SCM) and Feasibility Study/Corrective Action Plan (FS/CAP): CRA submitted a February 2, 2008 SCM and FS/CAP for the site. Excavation of source material followed by installation of a bio-sparge curtain to assist biodegradation was the recommended remedial action for the site. CRA's May 28, 2008 *Remedial Action Plan* details plans for conducting the excavation and installing the bio-sparge system.

2008 Subsurface Investigation: In June 2008, CRA installed one off-site soil vapor probe (VP-9) at 2721 Martin Luther King Jr. Way. No TPHg, benzene, or MTBE was detected in a soil sample from the probe boring at 4.5 fbg. CRA's September 16, 2008 *Site Investigation Report and Soil Vapor Monitoring Report – Third Quarter 2008* provides soil vapor probe installation details.

2009 Subsurface Investigation: In April 2009, CRA drilled eight hand-auger borings (HA-1 through HA-8) behind the former station building to assess the extent hydrocarbon and lead concentrations in the vicinity of a former waste oil aboveground storage tank (AST) located behind the former station building. Up to 1,060 mg/kg total lead, 4,500 mg/kg total petroleum hydrocarbons as diesel (TPHd), and 11,000 mg/kg total petroleum hydrocarbons as motor oil (TPHmo) were detected in soil samples from the hand-auger borings. Maximum concentrations were all detected in samples from less than 2 fbg. Results of the investigation are presented in CRA's May 12, 2009 *Subsurface Investigation Report.*

2010 Door- to-Door Survey Addendum: CRA conducted a door-to-door survey of four properties near the site, which did not respond to the previous door to door surveys for wells, basements, or sumps. Questionnaires were sent to the four properties, and CRA received responses for three of the properties. Of the three responses received, two of the properties had basements. None reported wells or sumps. CRA's September 22, 2010 *Door to Door Survey Report Addendum* provides details of the survey responses.

2010 Subsurface Investigations and Remedial Action Plan (RAP): In August 2010, CRA installed three off-site groundwater monitoring wells (MW-9 through MW-11) and one soil vapor probe (VP-10) down gradient of the site. No benzene was detected in any soil

samples. Soil samples contained up to 1,200 mg/kg TPHg. CRA's October 27, 2010 *Subsurface Investigation and Third Quarter 2010 Groundwater Monitoring Report* presents well installation details and our October 27, 2010 *Soil Vapor Probe Installation and Soil Vapor Sampling Report* provides vapor probe Installation details.

In December 2010, CRA drilled 25 soil borings (B-24 through B-48) on site to evaluate soil conditions in the area of the former UST complex and fuel delivery system. Five soil borings (HA-9 through HA-13) were drilled off site to evaluate soil conditions near the former waste oil AST. Soil samples from the on-site soil borings contained up to 28,000 mg/kg TPHg and 72 mg/kg benzene. Soil samples from the off-site borings contained up to 1,200 mg/kg TPHmo, 430 mg/kg TPHd, 4,550 mg/kg total lead, and 0.26 mg/kg benzo(a)pyrene. No other polycyclic aromatic hydrocarbons were detected at concentrations exceeding San Francisco Bay Regional Water Quality Control Board ESLs for soil where groundwater is not a drinking water source with residential land use[1]. CRA's March 4, 2011 *Subsurface Investigation Report and Revised Remedial Action Plan* presents these investigation results and includes a revised RAP which recommended a shallow excavation to remove residual petroleum hydrocarbon and lead impacts in soils in the northern portion of the subject site and the adjacent property to the north.

Groundwater Monitoring: Groundwater monitoring has been conducted since August 1996. Fuel oxygenates are not a significant component of the groundwater plume. Generally, groundwater flow direction is to the west, with some components to the northwest and southwest. Historically, monitoring wells MW-1, MW-2, MW-3, MW-11, and MW-12 have shown little or no impact from petroleum hydrocarbons.

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]