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Ms. Kit Soo
Alameda County Environmental Health
1131 Harbor Parkway, Suite 250
Alameda, CA 94502-6577

RE: 2703 Martin Luther King Jr. Way, Oakland, California
PlaNet Site ID USF04645
PlaNet Project ID 27482
ACEH Case No. RO0000145

Dear Ms. Soo:

I am informed and believe that, based on a reasonably diligent inquiry undertaken by AECOM on behalf of Equilon Enterprises LLC dba Shell Oil Products US, the information and/or recommendations contained in the attached document is true, and on that ground I declare under penalty of perjury in accordance with Water Code section 13267 that this statement is true and correct.

As always, please feel free to contact me directly at (714) 731-1050 with any questions or concerns.

Sincerely,
Shell Oil Products US

Andrea A. Wing
Principal Program Manager

AECOM
300 Lakeside Drive
Suite 400
Oakland, CA 94612
www.aecom.com

510 893 3600 tel
510 874 3268 fax

June 19, 2017

Kit Soo
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: Pilot Test Work Plan
Former Shell-Branded Service Station
2703 Martin Luther King Jr. Way, Oakland, California
Shell PlaNet Site ID: USF04645
Shell PlaNet Project ID: 27482
Agency No. RO0000145

Dear Ms. Soo:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US, AECOM Technical Services, Inc. is pleased to submit this Pilot Test Work Plan for the Former Shell-branded service station located at 2703 Martin Luther King Jr. Way in Oakland, California.

If you have any questions regarding this submittal, please contact Shane Olton at (916) 414-5849 or shane.olton@aecom.com.

Sincerely,

Shane Olton, P.G.
Project Manager

Drew Cannon, P.E.
Senior Environmental Engineer

Enclosure: Pilot Test Work Plan

cc: Andrea Wing, Equilon Enterprises LLC dba Shell Oil Products US
Rodney & Janet Kwan, Auto Tech West (site owner)
2703 Martin Luther King Jr. Way, Oakland, CA 94612
Monique Oatis, 670 27th Street, Oakland CA (off-site property owner)

AECOM

Pilot Test Work Plan

Former Shell-Branded Service Station
2703 Martin Luther King Jr. Way
Oakland, California

June 2017

Pilot Test Work Plan

Former Shell-Branded Service Station
2703 Martin Luther King Jr. Way
Oakland, California

PlaNet Site ID	USF04645
PlaNet Project ID	27482
Agency Case No.	RO0000145

Submitted to:

Kit Soo
Alameda County
Department of Environmental Health
1131 Harbor Bay Parkway Suite 250
Alameda, California 94502

Submitted by:

AECOM Technical Services, Inc.
300 Lakeside Drive, Suite 400
Oakland, California 94612

On Behalf of

Equilon Enterprises LLC dba Shell Oil Products US

June 2017

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List of Acronyms

%	percent
$\%O_2$	percent oxygen
$\%CO_2$	percent carbon dioxide
µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
ACDEH	Alameda County Department of Environmental Health
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CRA	Conestoga-Rovers & Associates
DO	dissolved oxygen
EPA	Environmental Protection Agency (United States)
Equilon	Equilon Enterprises LLC dba Shell Oil Products US
LTCP	State's Low-threat Underground Storage Tank Case Closure Policy
mg/kg	milligrams per kilogram
MTBE	methyl tertiary-butyl ether
ORP	oxidation reduction potential
PAH	polycyclic aromatic hydrocarbons
PVC	polyvinyl chloride
ROI	radius of influence
Site	Former Shell-branded service station at 2703 Martin Luther King Jr. Way, Oakland, California
TPHg	total petroleum hydrocarbons as gasoline
TPHmo	total petroleum hydrocarbons as motor oil
USAN	Underground Service Alert North
UST	underground storage tank
VOC	volatile organic compound

1 Introduction

On behalf of Equilon Enterprises LLC dba Shell Oil Products US (Equilon), AECOM Technical Services, Inc. (AECOM) prepared this Pilot Test Work Plan for the Former Shell-branded service station located at 2703 Martin Luther King Jr. Way in Oakland, California (Site) (Figure 1).

The purpose of this report is to present a pilot test work plan for the proposed remedial approach based on the State Water Resources Control Board (SWRCB) *Low-Threat Underground Storage Tank Case Closure Policy* (LTCP) (SWRCB, 2012). This pilot test work plan was requested by the Alameda County Department of Environmental Health (ACDEH) in a letter dated March 7, 2017 (Appendix A).

1.1 Executive Summary

AECOM will conduct a 30-day pilot test using oxygen injection to enhance biodegradation of petroleum hydrocarbon constituents in the subsurface at the Site. The pilot test will be used to determine if full-scale implementation of this remedial technology is feasible, and to assess the appropriate design parameters for a full-scale system. AECOM will complete the following:

- Obtain the required permits, access agreements, and system utilities.
- Install two oxygen injection wells.
- Provide a trailer or skid-mounted oxygen concentrator/injection unit.
- Install subgrade piping to connect the injection unit to the wells.
- Operate and monitor the system.

AECOM will collect appropriate parameters from nearby groundwater wells and soil vapor probes to allow evaluation of system effectiveness and determine appropriate design parameters for a full-scale system. If enhanced biodegradation using oxygen injection is suitable for the Site, a remedial action plan will be submitted that describes plans for full-scale implementation.

1.2 Site Description

The Site is a former service station located on the northwest corner of Martin Luther King Jr. Way and 27th Street in a commercial and residential area of Oakland, California (Figure 1). A Shell-branded service station operated on the property from approximately 1959 to 1979, with two dispenser islands, three gasoline underground storage tanks (USTs), and a waste oil UST. The fueling equipment was removed after the service station terminated operations at the Site.

In 1979, Acme West Ambulance Company purchased the Site and installed a 2,000-gallon gasoline UST in the same approximate location of the former service station USTs. The property was sold to Auto Tech West in 1986, and the Site is currently used as an automotive repair shop. Auto Tech West reportedly never used the 2,000-gallon UST, which was removed in 1994, although an active 150-gallon aboveground waste oil tank is currently in use in the

northern-central portion of the property. Gasoline constituents were detected in soil samples collected following the removal of a 2,000-gallon UST and separate-phase hydrocarbons were detected at several soil boring locations during October 1994.

Two excavations occurred at the Site (see Figure 2). The gasoline UST pit was over-excavated from 9 feet below ground surface (bgs) to approximately 11 feet bgs during 1996 and then backfilled with clean, imported fill material. A shallow soil (0 to 2 feet bgs) excavation was completed in 2013 behind the former service station building. A small subarea on the northwestern boundary of the property (around soil sample W-2, Figure 2) was over-excavated to 3 feet bgs. The Site currently has one existing building in the northwest corner of the property with open service bays. The remaining portion of the Site is paved with asphalt.

1.3 Regional Geology and Hydrogeology

The Site is within the East Bay Plain basin. Existing beneficial uses of the East Bay Plain basin include municipal and domestic water supply, industrial service supply, industrial process supply, and agricultural water supply. The Site falls within Zone A of the East Bay Plain basin, as defined in the June 1999 *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report for Alameda and Contra Costa Counties, CA* (San Francisco Bay Regional Water Quality Control Board, 1999). Groundwater in Zone A is noted as an existing or potential drinking water resource, with a deep basin ranging from 500 to over 1,000 feet bgs. However, the document also states that the City of Oakland has no plans to "develop local groundwater resources for drinking water purposes because of existing or potential salt water intrusion, contamination, or poor or limited quantity."

1.4 Site Specific Geology and Hydrogeology

The Site is generally underlain by fine-grained soils (clays and silts). A coarser-grained lens may be present at approximately 10 to 25 feet bgs. The coarser-grained lens does not appear to extend beneath the Site to the southeast, nor to the southwest, and appears to become thinner northwest of the Site. Additional non-continuous coarser-grained lenses are shown on geologic cross-sections (Conestoga-Rover & Associates [CRA], 2008) (Appendix B).

Depth to groundwater in the Site monitoring wells has historically ranged from approximately 3 to 10 feet bgs. Groundwater has also been encountered in shallow soil vapor probe screen intervals even when no groundwater is encountered in deeper screen intervals in the same locations (i.e., VP-3 during May 2007), and when groundwater in the nearby monitoring wells is deeper. This may be indicative of perched water along preferential pathways. The sanitary and storm sewer systems in the vicinity, buried at depths ranging from 3.5 to 9 feet bgs, may encounter groundwater. Additional utility lines were identified in the northwest corner of the property, including a potential sewer line deeper than 4 feet bgs, an electrical line traced from the station building to the western property boundary, and an unidentified utility traced from the northwest corner of the building to the southwest (Figure 2).

Groundwater has been first encountered during drilling at depths ranging from approximately 7 to 15 feet bgs. Based on this, groundwater may be semi-confined. Groundwater flow directions on the Site are variable, ranging from northwest through southeast, often showing

flow radially outward from the west-central portion of the Site. Groundwater flow directions on properties west of the Site are typically west or northwest. A Department of Water Resources records search during 2003, as well as door-to-door surveys of properties conducted within 500 feet of the Site in 2003 and within 300 feet of the Site in 2006 did not identify any wells within a one-half mile radius of the Site. The nearest surface water body is Lake Merritt, which is over one-half mile southeast of the Site. Based on the absence of water supply wells within one-half mile radius of the Site, and the City of Oakland having no plans to develop local groundwater resources, groundwater beneath the Site is not considered to be a drinking water source.

1.5 Nature and Extent of Site Impacts

1.5.1 Hydrocarbon Distribution in Groundwater

Groundwater monitoring and sample analysis has been performed since August 1996. The current monitoring well network consists of wells MW-1 through MW-14, V-1, and V-2. Impacts to groundwater are documented in historical groundwater monitoring reports and assessment reports. The monitoring well locations are shown on Figure 3.

Current groundwater data from the groundwater sampling event conducted in the fourth quarter of 2016 (AECOM, 2017) is summarized below:

- SPH was not detected in any of the monitoring wells.
- Total petroleum hydrocarbons as gasoline (TPHg) was detected at concentrations ranging from 380 micrograms per liter (µg/L) (MW-10) to 110,000 µg/L (MW-5).
- Benzene was detected at concentrations ranging from 0.55 µg/L (MW-10) to 5,700 µg/L (MW-5).
- Toluene was detected at concentrations ranging from 0.51 µg/L (MW-8) to 2,900 µg/L (MW-5).
- Ethylbenzene was detected at concentrations ranging from 0.80 µg/L (MW-7) to 5,900 µg/L (MW-5).
- Total xylenes were detected at concentrations ranging from 56 µg/L (MW-7) to 27,000 µg/L (MW-5).
- Fuel oxygenates including methyl tertiary-butyl ether (MTBE) were not detected in any wells.

1.5.2 Gasoline Range Hydrocarbon Distribution in Soil

Soil investigations targeting gasoline constituents have been conducted since 1994, as summarized below (refer to Figures 2 and 3 for sampling locations):

- In October 1994, two soil samples (TP-1-N and TP-2-S) were collected from beneath the 2,000-gallon UST during removal. Benzene ranged from 2.9 milligrams per kilograms (mg/kg) to 100 mg/kg and TPHg ranged from 870 mg/kg to 18,000 mg/kg.
- In May 1995, nine soil borings (B-1 through B-9) were drilled and sampled in the vicinity of the former UST and dispenser islands.

- In 1996, two soil samples (TP-3-W and TP-4-E) were collected after over-excavation of the gasoline tank excavation.
- In July 1996, six exploratory borings (B-10, B-11, B-12, B-13, V-1, and V-2) were drilled and sampled. 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, respectively.
- In November 2000, three soil borings (B-17, B-18, and B-19) and three groundwater monitoring wells (MW-3, MW-4, and MW-5) were installed.
- In April 2002, borings B-20 through B-22 were drilled and sampled.
- In 2005, ten soil borings (GP-1 through GP-10) were drilled and sampled.
- In January 2006, three monitoring wells (MW-6 through MW-8) and one soil boring (B-23), were installed and sampled.
- In February 2006, monitoring wells MW-12 and MW-14 were installed at two off-Site properties.
- In October 2006, on-Site borings CPT-1 through CPT-5 were drilled and sampled, and six soil vapor probes (VP-1 through VP-6) were installed.
- In May and June 2007, off-Site borings CPT-6, CPT-7, and CPT-10 were drilled and off-Site vapor probe pairs VP-7 and VP-8 were installed.
- In July 2008, one off-Site soil vapor probe (VP-9) was installed and one soil sample was collected.
- In August 2010, three off-Site groundwater monitoring wells (MW-9 through MW-11) were installed and sampled, and one soil vapor probe (VP-10) was installed downgradient of the Site.
- In December 2010, 25 on-Site soil borings (B-24 through B-48) were drilled and sampled.
- In March 2015, one off-Site groundwater monitoring well (MW-13), two nested off-Site soil vapor probes (VP-12 and VP-13), and one on-Site nested soil vapor probe (VP-14) were installed and sampled.

Soil boring/sample locations are shown on Figure 2. The maximum detected concentration of petroleum hydrocarbons and oxygenates in soil are summarized below:

- TPHg was detected at a maximum concentration of 28,000 mg/kg (B-31 at 12 feet bgs in 2010).
- Benzene was detected at a maximum concentration of 100 mg/kg (under-tank sample TP-1-N in 1994).
- Toluene was detected at a maximum concentration of 870 mg/kg (under-tank sample TP-1-N in 1994).

- Ethylbenzene was detected at a maximum concentration of 510 mg/kg (B-31 at 12 feet in 2010).
- Total xylenes were detected at a maximum concentration of 2,600 mg/kg (B-31 at 12 feet in 2010).
- MTBE was detected at a maximum concentration of 7.7 mg/kg (V-2 in 1996). The only other detection of oxygenates in Site soil was 0.007 mg/kg of MTBE (V-2 at 5.5 feet in 1996).

1.5.3 Motor Oil Range Hydrocarbons, Lead, and PAHs in Soil

Total petroleum hydrocarbons as motor oil (TPHmo), lead, and polycyclic aromatic hydrocarbons (PAHs) were historically detected in shallow soil samples collected near the former waste oil AST in the northern portion of the Site. Subsequent shallow soil sampling for these constituents was conducted in the period from 2009 through 2013, and a remedial excavation was performed in early 2013 that addressed the TPHmo impacts. However, it was determined that the PAHs detected are likely from a pyrogenic source, which is consistent with urban soils, soot, and storm water runoff rather than a petrogenic source such as waste oil (CRA, 2013). Additionally, the lead in shallow soils was demonstrated to be a regional issue not associated with the former station operations (CRA, 2013). In their letter dated October 30, 2013, ACDEH acknowledged that the detections of lead and PAHs in shallow soils do not appear to be related to petroleum releases from the Site and did not plan to request further investigation of the shallow lead and PAHs (ACDEH, 2013). As a result, TPHmo, lead, and PAHs are no longer considered constituents of concern for this Site.

2 Pilot Test Work Scope

Oxygen injection sparges oxygen-enriched air (concentrations up to 90%) into the aquifer, typically in pulsed intervals. The oxygen-enriched air provides dissolved oxygen (DO) to increase the activity of aerobic biota in biodegradation of hydrocarbon constituents. The primary purpose of oxygen injection is to remove mass through enhanced aerobic biodegradation, rather than volatilization.

2.1 Pilot Test Objectives

AECOM will conduct a one-month pilot test using oxygen injection to enhance biodegradation of petroleum hydrocarbon constituents in the groundwater at the Site. The primary objectives of the pilot test are to determine if full-scale implementation of this remedial technology is feasible, and to assess the important design criteria for a full-scale system.

The proposed pilot test will further the overall goal for the Site of eliminating the present safety, health and environmental hazards in accordance with the SWRCB's LTCP.

2.2 Pilot Test Design Summary

AECOM proposes to mobilize a portable oxygen injection unit to the Site to deliver oxygen to the subsurface and thereby enhance biodegradation of petroleum hydrocarbon constituents in Site vadose zone and groundwater. For the pilot test, AECOM proposes to inject oxygen into the groundwater in the vicinity of wells MW-4 and MW-5, which are areas of higher petroleum hydrocarbon concentrations. As an integral part of the pilot test, AECOM will collect appropriate parameters from nearby groundwater wells and soil vapor probes to allow evaluation of this technology's effectiveness and determine appropriate design parameters for a full-scale system.

To implement the oxygen injection pilot test, AECOM proposes to:

- Install two groundwater wells for oxygen injection to an estimated depth of 18 feet bgs and a screen interval of 2 feet in the vicinity of existing wells MW-4, MW-5, MW-6, and MW-7.
- Perform trenching, install subgrade piping to connect the injection unit to the wells, and backfill.
- Mobilize a trailer or skid-mounted oxygen concentrator/injection unit to the Site and provide electrical connection/service.
- Operate the system for approximately one month, and collect appropriate evaluative parameters, during, and after operation of the pilot system.
- Use existing nearby groundwater/vapor wells, field instruments, and other equipment to collect appropriate monitoring data and pilot test parameters for evaluation.

The data collected from the pilot test will be used to evaluate this technology's viability for this Site and to determine appropriate design parameters for a full-scale system including

radius of influence (ROI) / injection well spacing, injection pressure/flow, and injection pulse time intervals. If enhanced biodegradation using oxygen injection is suitable for the Site, AECOM will develop a remedial action plan that describes plans for full-scale implementation.

2.3 Pre-Field Activities

AECOM will prepare a Site-specific health and safety plan (HASP) to include specific health and safety procedures for the oxygen injection system installation work. The HASP will be kept on Site during field activities and will be reviewed and signed by each Site worker.

AECOM will obtain well installation permits from Alameda County Public Works Agency – Water Resources. Other permits will be obtained as needed, and notifications regarding the field activities will be made to the appropriate agencies, Site property owner/tenant, and nearby residences as appropriate.

AECOM will mark the proposed trenching locations on the Site and call Underground Service Alert North (USAN) at least 48 hours prior to mobilization. Existing underground utilities will be cleared by USAN and a private utility locating service. Additionally, the upper five feet of each borehole will be cleared using a vacuum truck assisted air knife.

2.4 Construction Activities

Implementation of the oxygen injection pilot system will require installation of new groundwater wells, underground conveyance piping, and mobile (temporary) injection unit connected to Site electrical service.

2.4.1 New Oxygen Injection Wells

Two oxygen injection wells are proposed for installation in the vicinity of MW-4, MW-5, MW-6, and MW-7, which will allow these existing wells to be utilized for the collection of pilot test parameters (Figure 4). Based on existing Site lithological information, a preliminary ROI for enhanced biodegradation has been estimated to be 10 feet. Evaluating the actual effective ROI is a key objective of this pilot test.

2.4.1.1 Well Installation and Soil Sampling

Two wells (OS-1 and OS-2) will be installed with a hollow stem auger drill rig, and soil will be continuously cored. At least one soil sample per boring will be collected and submitted for analysis. Additional samples may be collected and submitted for analysis based on field observations. Submitted soil samples will be analyzed for TPHg and benzene, toluene, ethylbenzene, and xylenes (BTEX) by United States Environmental Protection Agency (EPA) Method 8260B. The proposed well locations are presented in Figure 4.

Wells will be completed with a 2-inch diameter Schedule 40 polyvinyl chloride (PVC) casing and 2-foot 0.02-inch slotted screen intervals for injection. Based on historical data, the injection wells will be installed with a target well screen interval of 15 to 17 feet bgs. The final well screen depths will be determined by visual observations of encountered lithology, as well as field photoionization detector readings.

The proposed scope of work will be performed by a C-57 licensed driller under the supervision of an AECOM professional geologist. Department of Water Resources well completion reports will be submitted following well installation.

2.4.1.2 Well Development

Well development will be conducted by Blaine Tech Services, Inc. Wells will be developed at least 48 hours after well installation. Development will continue until temperature, pH, oxidation-reduction potential (ORP), and electrical conductivity measurements have stabilized to 10 percent (%) across three consecutive purge volumes, and water is relatively non-turbid. If the well becomes dewatered or is slow to recover before five well volumes have been removed, the well may be considered to be adequately developed. Wells will not be sampled until at least 24 hours after well development.

2.4.1.3 Surveying

The new wells will be surveyed for ground surface and top of casing elevation in the 1998 North American Vertical Datum to the nearest 0.01 foot, and for horizontal location in the 1983 North American Datum to the nearest 0.1 foot. Survey data will be uploaded to Geotracker.

2.4.1.4 Waste Disposal

Drill cuttings and any liquids generated during the installation and development of the newly installed wells will be stored in 55-gallon steel drums, labeled, and sealed for temporary on-Site storage pending receipt of analytical data for disposal profiling. Upon approval, the waste will be transported to an appropriate Equilon-approved disposal facility.

2.4.2 Underground Conveyance Piping

The oxygen injection unit will be connected to the injection wells by underground tubing running laterally from the injection unit to each wellhead. The tubing will be appropriate to carry oxygen-enriched air at pressures up to 20 pounds per square inch. These lines will be conveyed within 2-inch diameter Schedule 80 PVC piping to provide additional physical protection. Approximately 90 feet of conveyance piping will be required to connect the two proposed injection wells for the pilot test. The piping will be placed within trenches at least 18 inches bgs. The exact depth will be determined based on other utilities encountered. Sand bedding will be provided for the piping, followed by backfill with flowable, controlled density fill.

2.4.3 Mobile Oxygen Injection Unit and Electrical Service

A mobile oxygen injection unit with a target capability of delivering at least 15 standard cubic feet per hour of 90% purity oxygen is proposed for the pilot test. The oxygen injection unit and controls, together with an appropriate delivery manifold, valving, and gauges, will be staged to the northwest of the station building (Figure 4). AECOM will evaluate the available electrical capacity of the service station and determine if an electrical upgrade (or separate temporary service) will be required to power the injection unit.

2.5 Pilot Test Operation

2.5.1 System Startup

After construction is complete and baseline monitoring parameters have been collected, oxygen injection will begin at the two designated injection wells OS-1 and OS-2. For collection of test data during the initial startup period (1-2 days), operation of one well at a time is planned to help provide the most representative information on ROI. Injection flow rate and pressure may be increased in steps to facilitate equipment testing and evaluation of optimal injection well flow rates and oxygen concentration.

2.5.2 Pilot System Operation and Optimization

Pulsed oxygen injection will be conducted for approximately one month, with the equipment operating 24 hours per day or as required by local noise ordinances and neighboring property concerns. AECOM and/or a subcontractor will conduct weekly Site visits to confirm the system is operating properly, collect pilot test parameters as discussed in the Section 2.6, and make appropriate adjustments as needed.

Based on results from initial operation of the pilot system, adjustments to pulse intervals, oxygen concentration, and/or flow rates will be made to maximize the ROI and distribution of subsurface oxygen available to petroleum-degrading biota. Dilution valving may be used to optimize the concentration and flow rate for Site conditions. The relatively low flow rates typically used for oxygen injection are not expected to result in significant petroleum hydrocarbon vapors. If initial results indicate an increase in, or migration of, hydrocarbon vapors, corrective adjustments can be made, including decreasing the flow rate with a corresponding increase in oxygen concentration.

2.6 Pilot Test Monitoring Plan

2.6.1 Collection of Injection Well Parameters

During pilot test operation of the injection wells, parameters will be obtained for evaluation of system effectiveness and full-scale design parameters. These parameters include wellhead delivery pressure, flow rate, oxygen concentration, and pulse time intervals. During the active parameter measurement periods (continuing to several hours after injection at each well begins), measurements will be obtained at least every 30 minutes. Pulsed operation parameters, including interval and timing, will be evaluated during the subsequent month-long pilot test period. Injection well parameter readings will be recorded at least weekly during this time. The locations for the readings will include injection wells OS-1 and OS-2 as shown in Table 1.

2.6.2 Measurement of Pressure Influence

For the pilot test, resultant well pressure in wells immediately surrounding the injection well(s) is a potentially important parameter for evaluating ROI distance. Differential pressure readings will be obtained using a Dwyer Magnehelic® differential pressure gauge or manometer with a resolution of at least 0.02 inches of water column. The locations targeted and the frequency for well pressure measurement are listed in Table 1.

Prior to startup, pressure readings will be obtained at selected wells to provide representative baseline values. While well pressures prior to startup of the oxygen injection system are expected to be relatively close to zero, known subsurface effects such as diurnal barometric pumping can result in significant subsurface pressure (or vacuum) relative to the aboveground atmosphere. To minimize the effect of normal pressure variations unrelated to the planned oxygen injection, the baseline readings will be obtained within two hours prior to pilot system startup.

During pilot system operation, pressure readings will be obtained at wells in the vicinity of the active injection well(s) to provide information on the distribution of and change in subsurface pressures resulting from active oxygen injection. Specifically, pressure readings will be obtained at MW-5 and MW-7 when injection well OS-1 is active, and at MW-4, MW-6, VP-3, and VP-14 when injection well OS-2 is active. In order to track the expected rapid pressure changes and time to stabilization, measurements will be obtained at least every 30 minutes during the active parameter measurement periods (continuing to several hours after injection at each well begins). Subsequent readings will be obtained at least weekly.

2.6.3 Measurement of Dissolved Oxygen

For the pilot test, DO is a key parameter for evaluating ROI distance and determining the system's effectiveness in increasing oxygen available to petroleum-degrading bacteria in the subsurface. These readings will be obtained using a calibrated handheld instrument with a resolution of 0.01 milligrams per liter, after the reading has stabilized. The sampling locations targeted for the field parameter of DO are listed in Table 1.

Prior to startup, DO readings from selected wells will be obtained to provide baseline information about current available oxygen and biotic activity in Site groundwater.

During pilot system operation, DO readings from selected wells will be obtained to evaluate the pilot system's effectiveness in increasing available oxygen in Site groundwater. DO readings will be obtained at least twice daily during the initial startup period, then weekly.

After completion of pilot system operation, additional DO readings will be obtained to provide information about the rate of oxygen consumption in groundwater and facilitate evaluation of optimal flow rates and pulse intervals for a full-scale system. Post-operation DO readings will be collected weekly for the first month, then monthly for three months.

2.6.4 Collection of Vadose Zone Field Parameters

Vadose zone oxygen and carbon dioxide concentrations provide useful information about oxygen available to petroleum-degrading bacteria, biotic activity, and consumption rates. Readings of percent oxygen (%O_2) and percent carbon dioxide (%CO_2) concentrations will be obtained from selected soil vapor wells/probes and groundwater wells (with screen intervals that include the vadose zone). Specifically, these readings will be obtained from VP-3, VP-14, V-1, V-2, MW-4, MW-5, MW-6, and MW-7. The readings will be obtained using a calibrated handheld instrument with a resolution of at least 0.1% by volume, after an appropriate purge volume has been removed and readings have stabilized. The locations and frequency for the parameters of %O_2 and %CO_2 are listed in Table 1.

Prior to startup, one set of $\%O_2$ and $\%CO_2$ readings will be obtained to provide information about current conditions and baseline concentrations for comparison.

During pilot system operation, readings will be obtained to evaluate increases in available oxygen in vadose zone. Readings will be obtained at least twice daily during the initial startup period, then weekly.

After completion of pilot system operation, additional $\%O_2$ and $\%CO_2$ readings will be collected to provide information about biotic respirometry rates. Since consumption of vadose zone oxygen at petroleum-impacted sites with active microbial populations is typically rapid, at least three readings will be obtained within the first 48 hours after the system is shut off. Subsequent readings will be collected weekly for the first month, then monthly for three months.

To provide information about concentrations of volatile hydrocarbons, including potential increases and/or migration, measurement of volatile organic compound (VOC) concentrations will also be obtained from selected on- and off-Site vapor wells/probes. These readings will be obtained using a calibrated handheld photoionization detector with a resolution of at least 1 part per million by volume, after an appropriate purge volume has been removed and readings have stabilized. VOC concentrations will be measured before (baseline), during, and after pilot system operation at the sampling locations and at the frequency listed in Table 1.

2.6.5 Groundwater/Soil Vapor Sampling and Analyses

Groundwater sampling will be used to evaluate the impact of the proposed pilot system on petroleum hydrocarbon concentrations in groundwater. Groundwater samples will be collected and analyzed by EPA Method 8260B for TPHg and BTEX. As part of the groundwater sampling procedure, groundwater depths, and field parameters (pH, conductivity, turbidity, DO, and ORP) will be obtained at all sampled groundwater monitoring wells.

Similarly, soil vapor samples will also be collected and analyzed by EPA Method TO-15 for TPHg and BTEX. Sampling will include the treatment zone well(s) and surrounding groundwater monitoring wells (upgradient and downgradient) to evaluate the effectiveness of the pilot test.

Prior to pilot system startup, baseline groundwater and soil vapor sampling will be conducted at appropriate wells in accordance with the established groundwater monitoring program for the Site. After completion of pilot system operation, post-operation groundwater and soil vapor sampling will be conducted again, within three months. The locations for groundwater and soil vapor sampling are listed in Table 1.

3 Pilot Test Evaluation and Reporting

After completion of the pilot system installation, operation, and post-test parameter monitoring period (three months), AECOM will evaluate the results of the pilot test including operational parameters, field observations, and laboratory results. If the results indicate that full-scale oxygen injection is a technically and economically viable option, AECOM may recommend installation of such a system at the Site for further removal of petroleum constituent concentrations in the groundwater and capillary fringe.

AECOM will prepare a pilot test evaluation report which discusses the effectiveness of the system and whether a full-scale oxygen injection system is appropriate, and makes recommendations for additional remedial action. The report will include the following:

- Documentation of pilot system installation procedures, including subsurface piping installation, well installation, and hookup of mobile oxygen injection unit. Well installation documentation will include including boring logs, tabulated sampling data, and waste disposal documentation.
- Installed system documentation, including drawings showing injection well locations, lateral piping runs, and other details.
- Well completion diagrams.
- Documentation of field procedures used for pilot testing and monitoring.
- Summary of pilot test operation parameters, field readings, and analytical results.
- Discussion and summary of the results of the pilot test evaluation.
- Conclusions and specific recommendations for implementation of a full-scale oxygen injection system, if appropriate.

Semiannual groundwater monitoring sampling events and the associated report submittals will continue in accordance with the established schedule.

4 Schedule

The following is a tentative schedule for the pilot test:

- Three months to evaluate and prepare pilot system design details.
- Six to eight weeks to obtain building, well installation, and other associated permitting, and, if needed, supplemental temporary electrical service.
- Two to four weeks to install two oxygen injection wells, trench, lay underground conveyance piping, and make connections.
- Three weeks to collect baseline groundwater and vapor samples and baseline field parameter readings.
- One month of oxygen injection pilot system operation and concurrent collection of field parameter readings.
- Three months of post-test field parameter monitoring and one post-test groundwater and soil vapor sample collection event.
- Six weeks to evaluate the pilot test results, and provide recommendations for future actions, and prepare the pilot test evaluation report.

5 Limitations

The conclusions, if any, presented in this report are professional opinions based solely upon the data described in this report. They are intended exclusively for the purpose outlined herein and the Site location and project indicated. This report is for the sole use and benefit of the client. The scope of services performed in execution of this effort may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user. No express or implied representation or warranty is included or intended in this report except that the work was performed within the limits prescribed by the client with the customary thoroughness and competence of professionals working in the same area on similar projects.

6 References

AECOM. (2017). *First Quarter 2017 Groundwater Monitoring Report, Shell-Branded Service Station, 9033 Old Redwood Highway, Windsor, California.*

AECOM Technical Services, Inc. (2016). *Third Quarter Groundwater Monitoring Report, Shell-Branded Service Station, 9033 Old Redwood Hwy, Windsor, California.*

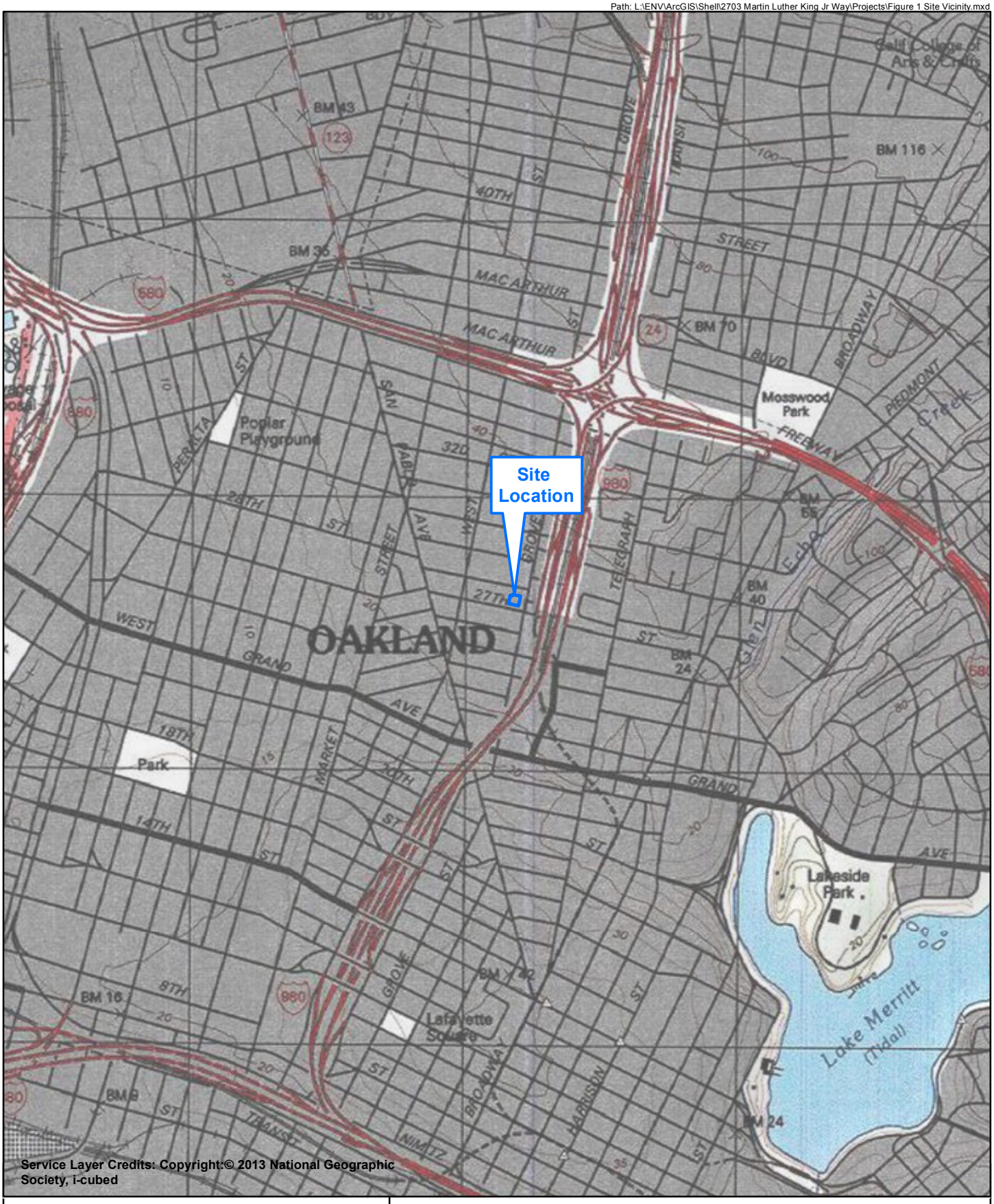
CRA. (2008). *Contestoga Rovers & Associates, Feasibility Study and Corrective Action Plan, Shell-Branded Service Station, 9033 Old Redwood Highway, Windsor, California.*

CRA. (2012). *Potable Water Injection Test Report, Shell-Branded Service Station, 9033 Old Redwood Highway, Windsor, California.*

CRA. (2014). *Conceptual Site Model, Shell-Branded Service Station, 9033 Old Redwood Highway, Windsor, California. .*

Figures

Path: L:\ENV\ArcGIS\Shell\2703 Martin Luther King Jr Way\Projects\Figure 1 Site Vicinity.mxd



N

0 2,000 4,000

Feet

Figure 1
Site Vicinity Map

AECOM

Former Shell Service Station
2703 Martin Luther King Jr. Way, Oakland, California

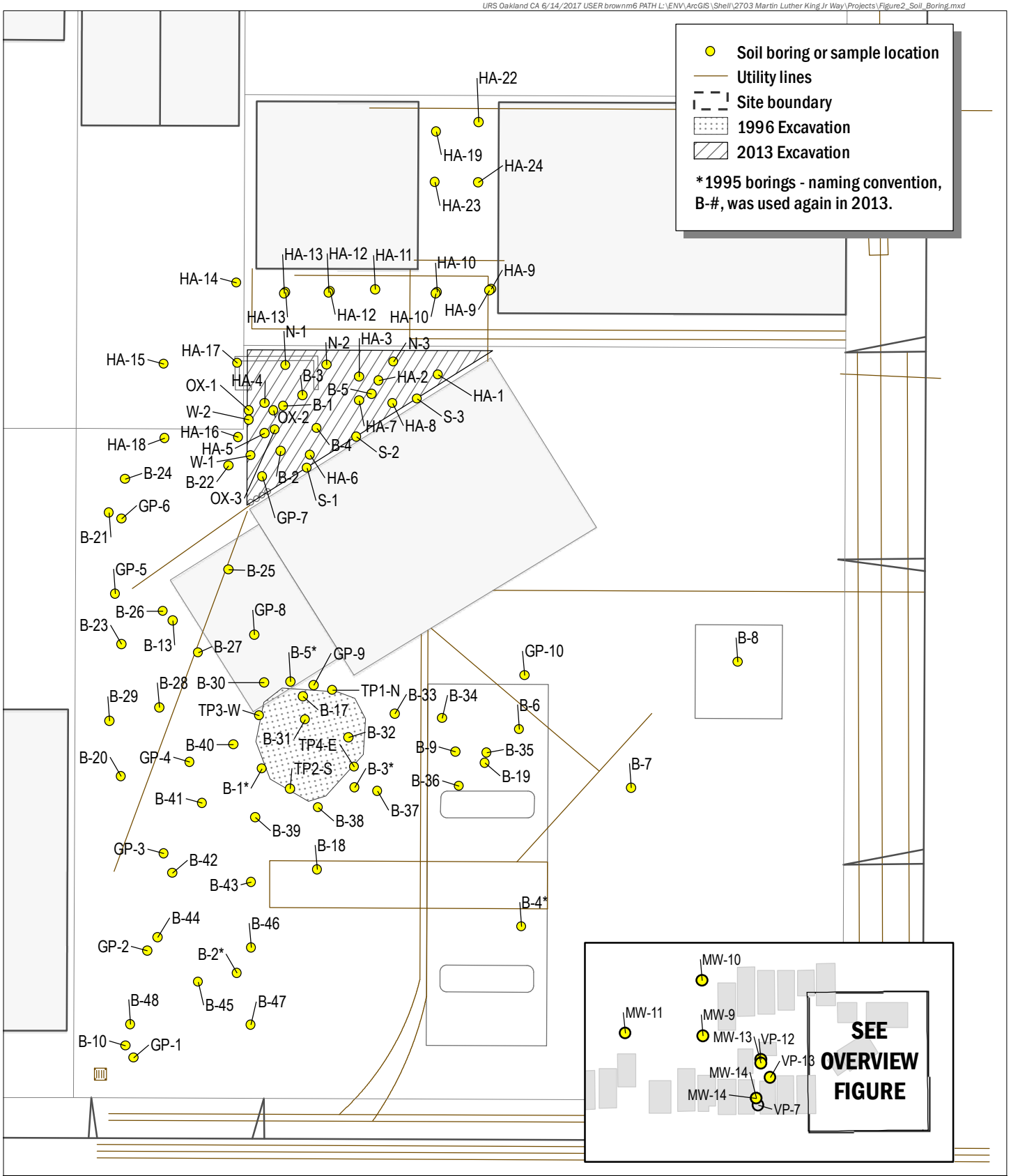


Figure 2
Soil Boring Locations

AECOM

Former Shell Service Station
2703 Martin Luther King Jr. Way, Oakland, California

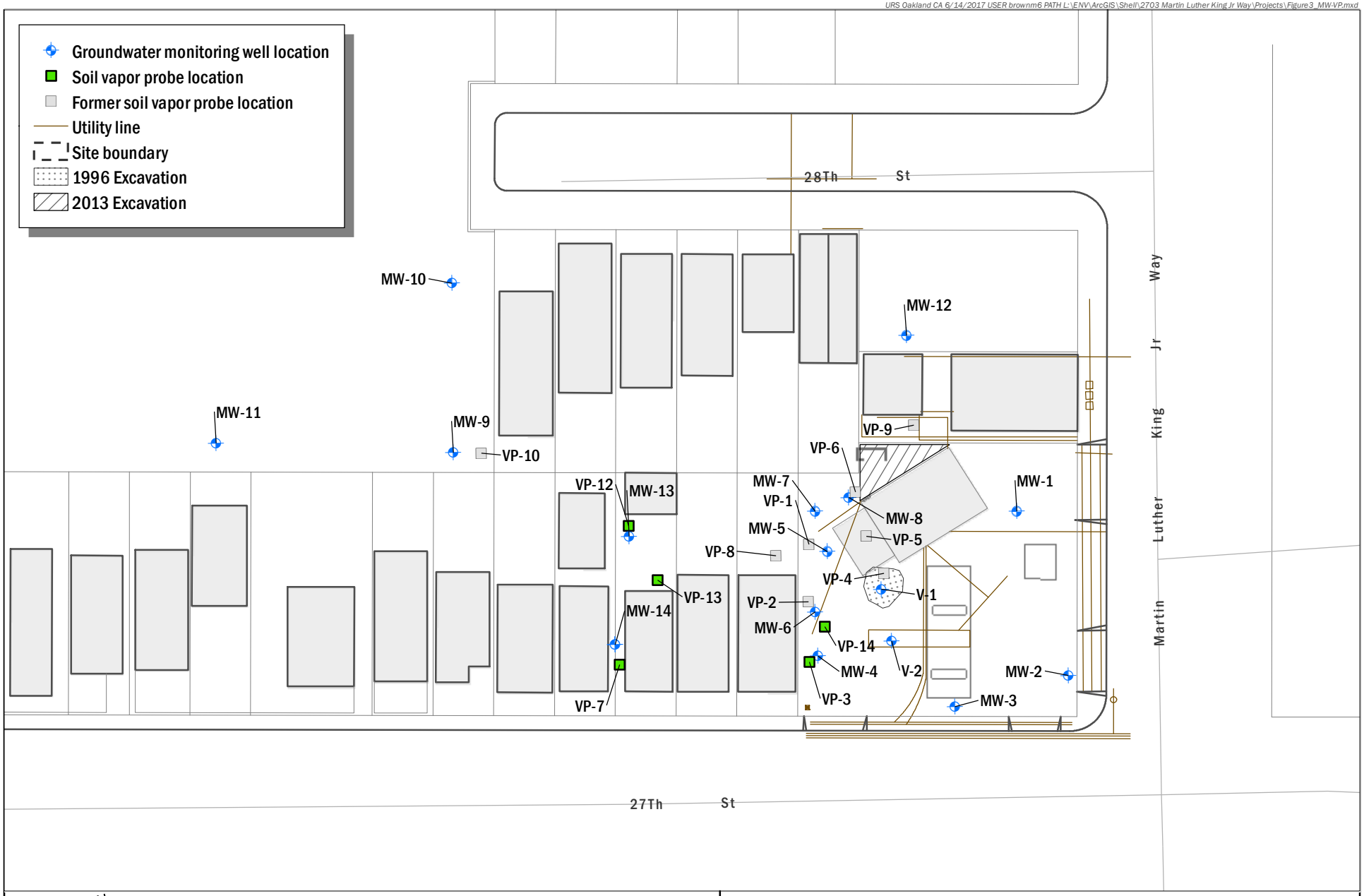


Figure 3
Groundwater Monitoring and Soil Vapor Locations

AECOM

Former Shell Service Station
2703 Martin Luther King Jr. Way, Oakland, California

EXPLANATION

- MW-1 — Monitoring well location
- V-1 — Soil vapor well location
- VP-1 — Soil vapor probe location
- OS-1 — Proposed sparge well
- Estimated radius of influence
- Sparge unit
- Underground conveyance piping
- 1996 Excavation (UST area)
- E — Electrical line (E)
- T — Telecommunication line (T)
- G — Gas line (G)
- SAN — Sanitary sewer line (SAN)
- W — Water line (W)
- ? — Unknown utility line (?)

28TH STREET

1.9' fbg

Residential
673 28th St.

Residential
669 28th St.

Residential
665 28th St.

Residential
663 28th St.

Vacant Lot
2727-29 Martin Luther King

MW-12

Residential
2719-23 Martin Luther King

Former
W/O AST

Sparge
Unit

MW-8

MW-7

Former
Vent Lines

Building

MW-1

Gate

Driveway

OS-1

Wooden
Carport

MW-5

V-1

Former
UST
Area

Former
Dispensers

MW-6

VP-14

OS-2

MW-4

V-2

Former Shell Station
2703 Martin Luther King

Residential
668 27th St.

Residential
664 27th St.

Former
Dispensers

MW-2

MW-3

Gate

Driveway

27TH STREET

MARTIN LUTHER KING JR. WAY

N

0 10 20
Feet

SOURCE: BASE MAP GHD

Figure 4
Proposed Pilot Test Layout
Former Shell Service Station
AECOM **2703 Martin Luther King Jr. Way, Oakland, California**

L:\ENV\ARCGIS\SHELL\2703 MARTIN LUTHER KING JR WAY\PROJECTS\FIGURE 4 PROPOSED PILOT TEST LAYOUT.DWG - 14 Jun 2017

Table

Table 1
Pilot Test Monitoring Plan
Former Shell-Branded Service Station, 2703 Martin Luther King Jr. Way, Oakland, California

Evaluation Parameter(s) to be Collected	Type of Sample Point	Sample Point IDs	Baseline (pre-startup)	Pilot Test Startup Period (1-2 days)	Pilot System Operation (1 month)	Post-Test (system off)
Injection Well Parameters: Pressure, Flow Rate, and Pulse Interval	Active Injection Well	OS-1, OS-2	--	30-minute intervals	Weekly	--
Wellhead Pressure (measure of pressure influence from injection)	Groundwater and Soil Vapor Wells associated with Active Injection Wells	MW-5, MW-7 (for OS-1) MW-4, MW-6, VP-3, VP-14 (for OS-2)	Once	30-minute intervals	Weekly	--
Dissolved Oxygen (Groundwater)	Groundwater Well(s)	MW-4, MW-5, MW-6, MW-7, OS-1, OS-2 [1]	Once	Twice/day	Weekly	Monthly
$\%O_2$ and $\%CO_2$ (vadose zone soil vapor)	Soil Vapor Probe / Well	VP-3, VP-14, V-1, V-2	Once	Twice/day	Weekly	3+ Readings in first 48 hours, then Weekly/Monthly
$\%O_2$ and $\%CO_2$ (vadose zone soil vapor)	Groundwater Well	MW-4, MW-5, MW-6, MW-7	Once	Twice/day	Weekly	3+ Readings in first 48 hours, then Weekly/Monthly
PPMv VOCs (vadose zone soil vapor)	Soil Vapor Probe / Well	VP-3, VP-14, V-1, V-2	Once	Twice/day	Weekly	Monthly
TPHg, BTEX, MTBE, and groundwater field parameters	Groundwater Well	According to established semiannual groundwater monitoring schedule for Site	Once	--	--	Once, then according to established semiannual groundwater monitoring schedule for Site
TPHg and BTEX	Soil Vapor Well / Point	According to established semiannual groundwater monitoring schedule for Site	Once	--	--	Once, then according to established semiannual groundwater monitoring schedule for Site

Abbreviations:

-- = parameter will not be collected during the period indicated.
$\%CO_2$ = percent carbon dioxide by volume.
$\%O_2$ = percent oxygenb by volume.
PPMv = parts per million by volume.
VOCs = Field volatile organic compound (VOC) readings taken by photoionization detector or organic vapor analyzer.
TPHg = total petroleum hydrocarbons as gasoline in groundwater will be analyzed by EPA Method 8260. In soil vapor, TPHg will be analyzed by TO-15.
BTEX = benzene, toluene, ethylbenzene, xylenes in groundwater will be analyzed by EPA Method 8260. In soil vapor, BTEX will be analyzed by TO-15.
MTBE = methyl tertiary butyl ether in groundwater will be analyzed by EPA Method 8260.
Groundwater field parameters = temperature, pH, conductivity, turbidity, dissolved oxygen, and oxidation reduction potential.

Notes:

1. Parameter will not be obtained from well(s) OS-1 and/or OS-2 when connected to the system and being actively sparged (applies to OS-1 and/or OS-2).

Appendix A.

Regulatory Correspondence

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
REBECCA GEBHART, Interim Director

DEPARTMENT OF ENVIRONMENTAL HEALTH
LOCAL OVERSIGHT PROGRAM (LOP)
For Hazardous Materials Releases
1131 HARBOR BAY PARKWAY, SUITE 250
ALAMEDA, CA 94502
(510) 567-6700
FAX (510) 337-9335

March 17, 2017

Ms. Andrea Wing
Shell Oil Products US
20945 S. Wilmington Ave.
Carson, CA 90810
(*Sent via E-mail to:* mailto:andrea.wing@shell.com)

Rodney and Janet Kwan
1834 Alameda Ave.
Alameda, CA

Subject: Approval to prepare a Pilot Study Work Plan, and Request for Additional Documents - Fuel Leak Case No. RO0000145 and GeoTracker Global ID T06000101876, Shell/Auto Tech West, 2703 Martin Luther King Jr., Oakland, CA 94612

Dear Responsible Parties:

Alameda County Department of Environmental Health (ACEH) staff has reviewed the fuel leak case files for the above referenced sites including the *Revised Corrective Action Plan* (Revised CAP), dated May 27, 2016; the *Second Quarter 2016 Groundwater Monitoring Report*, dated July 18, 2016; and the *Second Semiannual 2016 Groundwater Monitoring Report,* dated January 17, 2017, prepared by AECOM on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Equilon). The Revised CAP summarizes the site conditions and evaluated five currently applicable remedial approaches (no action, monitored natural attenuation [MNA], excavation, bio-sparge system, and pulsed oxygen injection) for addressing the petroleum hydrocarbon and oxygenate impacts identified beneath the site. Note that in the previous Site Conceptual Model and Feasibility Study/Corrective Action Plan (SCM/FS/CAP), dated February 5, 2008, prepared by CRA, excavation was recommended with a bio-sparge component. Based on the comparative analysis of the five remedial alternatives, AECOM recommends a pilot study to evaluate pulsed oxygen injection to remediate the impacted capillary fringe and groundwater. The pilot study data will be used to characterize the oxygen generation and determine design parameters including radium of influence (ROI), injection pressure and oxygen injection interval. The proposed pilot study location will be in the vicinity of MW-4 and MW-5 where one of the highest concentrations of benzene and TPH-gasoline and benzene reside. The proposal to prepare a Pilot Study Work Plan is acceptable.

Additionally, ACDEH has evaluated the data and recommendations presented in the above-mentioned reports, in conjunction with the case files, to determine if the site is eligible for closure as a low risk site under the State Water Resources Control Board's (SWRCBs) Low Threat Underground Storage Tank Case Closure Policy (LTCP). Based on ACDEH staff review, we have determined that the site fails to meet the LTCP General Criteria e (Site Conceptual Model); and the Media-Specific Criteria for Groundwater and the Media-Specific Criteria for Vapor Intrusion to Indoor Air.

Additional data may be available that ACDEH is not aware of, or may not have been submitted, and therefore has not been incorporated in to ACDEH's review. If additional data is made available, the data can be incorporated in future LTCP reviews. The evaluation of the site under the LTCP that is presented below is intended to initiate further discussions, submittal of other available documents, or the collection of additional data in order to determine if or when the site can be closed under the LTCP and to document current LTCP data gaps.

Therefore, at this juncture ACEH requests that you perform additional activities as presented in the Technical Comments Section provided below.

TECHNICAL COMMENTS

1. **LTCP General Criteria (e) (Site Conceptual Model) –** According to the LTCP, the SCM is a fundamental element of a comprehensive site investigation. The SCM establishes the source and attributes of the unauthorized release, describes all affected media (including soil, groundwater, and soil vapor as appropriate), describes local geology, hydrogeology and other physical site characteristics that affect contaminant environmental transport and fate, and identifies all confirmed and potential contaminant receptors (including water supply wells, surface water bodies, structures and their inhabitants). The SCM is relied upon by practitioners as a guide for investigative design and data collection. All relevant site characteristics identified by the SCM shall be assessed and supported by data so that the nature, extent and mobility of the release have been established to determine conformance with applicable criteria in this policy.

   Our review of the case files indicates that a conceptual model was submitted in February 2008 (*Site Conceptual Model and Feasibility Study/Corrective Action Plan*, dated February 5, 2008, prepared by Conestoga-Rovers and Associates). Since 2008, several investigation have been performed and this data has not been included in the February 2008 site conceptual model. As referenced in the ACDEH directive dated January 19, 2016, ACDEH concur with the *Human Health Risk Assessment (HHRA),* dated November 30, 2015, and prepared by AECOM, where resampling of soil vapor proves VP-07 and VP-13 are recommended to confirm the results from the August 27, 2015 soil vapor sampling event. In addition, insufficient data collection and analysis exists and additional data has not been presented to assess the nature, extent, and mobility of the release and to support compliance with General Criteria e as discussed in Technical Comment 1; and Media Specific Criteria for Vapor Intrusion to Indoor Air and Groundwater as discussed in Technical Comments 2 and 3, respectively. Please submit a revised site conceptual model (SCM) to include all new data once the additional data have been collected and compiled, as requested in the Technical Report Request Section below. In order to expedite review, ACDEH requests the focused SCM be presented in a tabular format that highlights the major SCM elements and associated data gaps, which need to be addressed to progress the site to case closure under the LTCP. Please see Attachment A "Site Conceptual Model Requisite Elements".

2. **LTCP Media Specific Criteria for Groundwater –** To satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds water quality objectives must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites listed in the policy.

   Our review of the case files indicates that insufficient data collection and analysis has been presented to support the requisite characteristics of plume stability or plume classification as follows:

   The Revised CAP, as referenced in Section 3.2.1 indicates that the criteria "contaminant plume exceeds water quality objectives and is less than 1,000 feet long" is satisfied. ACDEH does not agree with the evaluation. This criteria is not satisfied because the groundwater plume is not delineated offsite to the west/southwest and south. Although we understand that it is not practical to install a well on a busy street such as 27th Street, borings or monitoring wells can still be installed on the north and south sides of 27th Street, along the sidewalk or curb to satisfy delineation activities. ACDEH requests that additional borings and/or monitoring wells be advanced as appropriate to delineate the plume to the southwest and south and assess the off-site extent of contamination in this area. Please consider using a transect of borings on approximately thirty foot centers to determine appropriate locations for future monitoring wells and provide adequate coverage of the downgradient extent of contamination.

Therefore, please present a strategy in a Data Gap Investigation Work Plan, as requested in the Technical Report Request Section below. Please support the scope of work in the Additional Offsite Investigation Work Plan with a focused SCM and Data Quality Objectives (DQOs) that relate the data collection to each LTCP criteria, as mentioned in item no. 1. For example please clarify which scenario within each Media-Specific Criteria a sampling strategy is intended to apply to. Please sequence activities in the proposed data gap investigation scope of work, including the work proposed in item no. 3 below to enable efficient data collection in the fewest mobilizations possible.

3. **LTCP Media Specific Criteria for Vapor Intrusion to Indoor Air –** The LTCP describes conditions, including bio-attenuation zones, which if met will assure that exposure to petroleum vapors in indoor air will not pose unacceptable health risks to human occupants of existing or future site buildings, and adjacent parcels. Appendices 1 through 4 of the LTCP criteria illustrate four potential exposure scenarios and describe characteristics and criteria associated with each scenario.

   Our review of the case files indicates that the site data collection and analysis fail to support the requisite characteristics of one of the four scenarios presented in the LTCP which has been chosen for the site (Appendix 4 – Scenario 4 – Direct Measurement of Soil Gas Concentrations.) Specifically, the soil gas criteria with no bio-attenuation zone was used for comparing measured benzene, ethylbenzene and naphthalene soil gas concentrations due to lack of measured oxygen concentrations at each soil vapor collection location. Based on the comparison of the latest measurements collected in 2015, two onsite locations, VP-3-5 and VP-14-3 and VP-14-5 (at two depths) had elevated detection limits or above the residential and commercial soil gas criteria. A site-specific risk assessment for the vapor intrusion pathway was also performed for this site and the November 30, 2015 HHRA concluded that on-site sources may potentially pose unacceptable risk for vapor intrusion health risks to future commercial/industrial workers, and there appears to be no significant direct contact risk to current or future receptors. There also appears to be no significant vapor intrusion risk to current or future off-site residents or current on-site commercial/industrial workers. As referenced in the ACDEH directive dated January 19, 2016, ACDEH concur with the *Human Health Risk Assessment (HHRA),* dated November 30, 2015, and prepared by AECOM, where resampling of offsite soil vapor probes VP-07 and VP-13 are recommended for further confirmation of its historical results. Please submit a report summarizing the results of the resampling of the vapor probes, as requested in the Technical Report Request Section below.

SUBMITTAL ACKNOWLEDGEMENT STATEMENT

Please note that ACDEH has updated its Attachment 1 with regards to report submittals to ACDEH. ACDEH will now be requiring a Submittal Acknowledgement Statement, replacing the Perjury Statement, as a cover letter signed by the Responsible Party (RP). The language for the Submittal Acknowledgement Statement is as follows:

"I have read and acknowledge the content, recommendations and/or conclusions contained in the attached document or report submitted on my behalf to ACDEH's FTP server and the State Water Resources Control Board's GeoTracker website."

Please note this change to your submittals to ACDEH.

TECHNICAL REPORT REQUEST

Please upload technical reports to the ACDEH ftp site (Attention: Kit Soo), and to the State Water Resources Control Board's Geotracker website, in accordance with the specified file naming convention below, according to the following schedule:

- **May 17, 2017** – Resampling Results from Vapor Probes VP-07 and VP-13

  File to be named: RO145 SWI_R_yyyy-mm-dd

- **May 17, 2017** – Data Gap Investigation Work Plan, and Focused Site Conceptual Model

  File to be named: RO145 WP_R_yyyy-mm-dd

- **June 19, 2017** – Pilot Test Design and Work Plan

  File to be named: RO145 WP_R_yyyy-mm-dd

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

Online case files are available for review at the following website: http://www.acgov.org/aceh/index.htm.

Thank you for your cooperation. If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at kit.soo@acgov.org.

Sincerely,

Kit Soo

Digitally signed by Kit Soo
DN: cn=Kit Soo, o=ACDEH, ou, email=Kit.Soo@acgov.org, c=US
Date: 2017.03.17 13:11:31 -07'00'

Kit Soo, PG 8957
Senior Hazardous Materials Specialist

Enclosures: Attachment 1 – Responsible Party (ies) Legal Requirements / Obligations
Electronic Report Upload (ftp) Instructions

Attachment A – Site Conceptual Model Requisite Elements

cc: Shane Olton, AECOM, 300 Broadway, Suite 400, Oakland, CA 94612 (*Sent via E-mail to: Shane.Olton@aecom.com*)

Sara Heikkila, AECOM, 300 South Grand Avenue, Suite 200, Los Angeles, CA 90071 (*Sent via E-mail to: Sara.Heikkila@aecom.com*)

Scott Merillat, 664 27th Street, Oakland, CA 94612 (Parcel #9-691-7)

Jack Chang, 559 9th Avenue, San Francisco, CA 94118-3716

Frank Bailey, 672 27th Street, Oakland, CA 94612 (Parcel #9-691-10)

Rafael Catapang, 668 27th Street, Oakland, CA 94612 (Parcel #9-691-8)

Monique Oatis, 670 27th Street, Oakland, CA 94612 (Parcel #9-691-9)

Wilfrid Kintonouza, 721 31st Street, Oakland, CA 94598 (Parcel #9-691-1-1)

Solomon Tesfa, 484 Lake Park Avenue #288, Oakland, CA 94610 (Parcel #9-691-2)

Novella Carpenter, 6645 28th Street, Oakland, CA 94609 (Parcel #9-691-1-2)

Teresa Miller, 673 28th Street, Oakland, CA 94609 (Parcel #9-691-42)

Thanh and Pham Phung, 2535 East 24th Street, Oakland, CA 94601 (Parcel #9-691-43)

Resident, 663 28th Street, Oakland, CA 94609 (Parcel #9-691-1)

Resident, 669 28th Street, Oakland, CA 94609 (Parcel #9-691-43)

Dilan Roe, ACDEH, (Sent via electronic mail to: *dilan.roe@acgov.org*)
Paresh Khatri, ACDEH, (Sent via electronic mail to: *paresh.khatri@acgov.org*)
Kit Soo, ACDEH, (Sent via electronic mail to: *kit.soo@acgov.org*)

Electronic File, GeoTracker

Attachment 1

Responsible Party(ies) Legal Requirements / Obligations

REPORT REQUESTS

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

Alameda County Department of Environmental Health's (ACDEH) Environmental Cleanup Oversight Programs, Local Oversight Program (LOP) and Site Cleanup Program (SCP) require submission of reports in electronic form. The electronic copy replaces paper copies and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program File Transfer Protocol (FTP) site are provided on the attached "Electronic Report Upload Instructions." Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) GeoTracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the GeoTracker database over the Internet. Beginning July 1, 2005, these same reporting requirements were added to SCP sites. Beginning July 1, 2005, electronic submittal of a complete copy of all reports for all sites is required in GeoTracker (in PDF format). Please visit the SWRCB website (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/) for more information on these requirements.

ACKNOWLEDGEMENT STATEMENT

All work plans, technical reports, or technical documents submitted to ACDEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I have read and acknowledge the content, recommendations and/or conclusions contained in the attached document or report submitted on my behalf to ACDEH's FTP server and the SWRCB's GeoTracker website." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6731, 6735, and 7835) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately licensed or certified professional. For your submittal to be considered a valid technical report, you are to present site-specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this case meet this requirement. Additional information is available on the Board of Professional Engineers, Land Surveyors, and Geologists website at: http://www.bpelsg.ca.gov/laws/index.shtml.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, late reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

Alameda County Environmental Cleanup Oversight Programs (LOP and SCP)	**REVISION DATE:** December 1, 2016
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010, July 25, 2010; May 15, 2014, November 29, 2016
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (LOP and SCP) require submission of all reports in electronic form to the county's ftp site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities.

REQUIREMENTS

- **Please do not submit reports as attachments to electronic mail.**
- Entire report including cover letter must be submitted to the ftp site as **a single portable document format (PDF) with no password protection**.
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- **Signature pages and perjury statements must be included and have either original or electronic signature.**
- **Do not password protect the document**. Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted**.
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

  RO#_Report Name_Year-Month-Date (e.g., RO#5555_WorkPlan_2005-06-14)

Submission Instructions

1) Obtain User Name and Password
   a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
      i) Send an e-mail to deh.loptoxic@acgov.org.
   b) In the subject line of your request, be sure to include **"ftp PASSWORD REQUEST"** and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for**.

2) Upload Files to the ftp Site
   a) Open File Explorer using the Windows  key + E keyboard shortcut.
      i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
   b) On the address bar, type in ftp://alcoftp1.acgov.org.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive)
   d) Click Log On.
   e) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   f) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.

3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
   a) Send email to deh.loptoxic@acgov.org notify us that you have placed a report on our ftp site.
   b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
   c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
   d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

ATTACHMENT A

Site Conceptual Model Requisite Elements

ATTACHMENT A

Site Conceptual Model

The site conceptual model (SCM) is an essential decision-making and communication tool for all interested parties during the site characterization, remediation planning and implementation, and closure process. A SCM is a set of working hypotheses pertaining to all aspects of the contaminant release, including site geology, hydrogeology, release history, residual and dissolved contamination, attenuation mechanisms, pathways to nearby receptors, and likely magnitude of potential impacts to receptors.

The SCM is initially used to characterize the site and identify data gaps. As the investigation proceeds and the data gaps are filled, the working hypotheses are modified, and the overall SCM is refined and strengthened until it is said to be "validated". At this point, the focus of the SCM shifts from site characterization towards remedial technology evaluation and selection, and later remedy optimization, and forms the foundation for developing the most cost-effective corrective action plan to protect existing and potential receptors.

For ease of review, Alameda County Environmental Health (ACEH) requests utilization of tabular formats to (1) highlight the major SCM elements and their associated data gaps which need to be addressed to progress the site to case closure (see Table 1 of attached example), and (2) highlight the identified data gaps and proposed investigation activities (see Table 2 of the attached example). ACEH requests that the tables presenting the SCM elements, data gaps, and proposed investigation activities be updated as appropriate at each stage of the project and submitted with work plans, feasibility studies, corrective action plans, and requests for closures to support proposed work, conclusions, and/or recommendations.

The SCM should incorporate, but is not limited to, the topics listed below. Please support the SCM with the use of large-scaled maps and graphics, tables, and conceptual diagrams to illustrate key points. Please include an extended site map(s) utilizing an aerial photographic base map with sufficient resolution to show the facility, delineation of streets and property boundaries within the adjacent neighborhood, downgradient irrigation wells, and proposed locations of transects, monitoring wells, and soil vapor probes.

a. Regional and local (on-site and off-site) geology and hydrogeology. Include a discussion of the surface geology (e.g., soil types, soil parameters, outcrops, faulting), subsurface geology (e.g., stratigraphy, continuity, and connectivity), and hydrogeology (e.g., water-bearing zones, hydrologic parameters, impermeable strata). Please include a structural contour map (top of unit) and isopach map for the aquitard that is presumed to separate your release from the deeper aquifer(s), cross sections, soil boring and monitoring well logs and locations, and copies of regional geologic maps.

b. Analysis of the hydraulic flow system in the vicinity of the site. Include rose diagrams for depicting groundwater gradients. The rose diagram shall be plotted on groundwater elevation contour maps and updated in all future reports submitted for your site. Please address changes due to seasonal precipitation and groundwater pumping, and evaluate the potential interconnection between shallow and deep aquifers. Please include an analysis of vertical hydraulic gradients, and effects of pumping rates on hydraulic head from nearby water supply wells, if appropriate. Include hydraulic head in the different water bearing zones and hydrographs of all monitoring wells.

c. Release history, including potential source(s) of releases, potential contaminants of concern (COC) associated with each potential release, confirmed source locations, confirmed release locations, and existing delineation of release areas. Address primary leak source(s) (e.g., a tank, sump, pipeline, etc.) and secondary sources (e.g., high-

concentration contaminants in low-permeability lithologic soil units that sustain groundwater or vapor plumes). Include local and regional plan view maps that illustrate the location of sources (former facilities, piping, tanks, etc.).

d. Plume (soil gas and groundwater) development and dynamics including aging of source(s), phase distribution (NAPL, dissolved, vapor, residual), diving plumes, attenuation mechanisms, migration routes, preferential pathways (geologic and anthropogenic), magnitude of chemicals of concern and spatial and temporal changes in concentrations, and contaminant fate and transport. Please include three-dimensional plume maps for groundwater and two-dimensional soil vapor plume plan view maps to provide an accurate depiction of the contaminant distribution of each COC.

e. Summary tables of chemical concentrations in different media (i.e., soil, groundwater, and soil vapor). Please include applicable environmental screening levels on all tables. Include graphs of contaminant concentrations versus time.

f. Current and historic facility structures (e.g., buildings, drain systems, sewer systems, underground utilities, etc.) and physical features including topographical features (e.g., hills, gradients, surface vegetation, or pavement) and surface water features (e.g. routes of drainage ditches, links to water bodies). Please include current and historic site maps.

g. Current and historic site operations/processes (e.g., parts cleaning, chemical storage areas, manufacturing, etc.).

h. Other contaminant release sites in the vicinity of the site. Hydrogeologic and contaminant data from those sites may prove helpful in testing certain hypotheses for the SCM. Include a summary of work and technical findings from nearby release sites, including the two adjacent closed LUFT sites, (i.e., Montgomery Ward site and the Quest Laboratory site).

i. Land uses and exposure scenarios on the facility and adjacent properties. Include beneficial resources (e.g., groundwater classification, wetlands, natural resources, etc.), resource use locations (e.g., water supply wells, surface water intakes), subpopulation types and locations (e.g., schools, hospitals, day care centers, etc.), exposure scenarios (e.g. residential, industrial, recreational, farming), and exposure pathways, and potential threat to sensitive receptors. Include an analysis of the contaminant volatilization from the subsurface to indoor/outdoor air exposure route (i.e., vapor pathway). Please include copies of Sanborn maps and aerial photographs, as appropriate.

j. Identification and listing of specific data gaps that require further investigation during subsequent phases of work. Proposed activities to investigate and fill data gaps identified.

TABLE 1

INITIAL SITE CONCEPTUAL MODEL

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Geology and Hydrogeology	Regional	The site is in the northwest portion of the Livermore Valley, which consists of a structural trough within the Diablo Range and contains the Livermore Valley Groundwater Basin (referred to as "the Basin") (DWR, 2006). Several faults traverse the Basin, which act as barriers to groundwater flow, as evidenced by large differences in water levels between the upgradient and downgradient sides of these faults (DWR, 2006). The Basin is divided into 12 groundwater basins, which are defined by faults and non-water-bearing geologic units (DWR, 1974). The hydrogeology of the Basin consists of a thick sequence of fresh-water-bearing continental deposits from alluvial fans, outwash plains, and lacustrine environments to up to approximately 5,000 feet bgs (DWR, 2006). Three defined fresh-water bearing geologic units exist within the Basin: Holocene Valley Fill (up to approximately 400 feet bgs in the central portion of the Basin), the Plio-Pleistocene Livermore Formation (generally between approximately 400 and 4,000 feet bgs in the central portion of the Basin), and the Pliocene Tassajara Formation (generally between approximately 250 and 5,000 or more feet bgs) (DWR, 1974). The Valley Fill units in the western portion of the Basin are capped by up to 40 feet of clay (DWR, 2006).	None	NA
	Site	***Geology:*** Borings advanced at the site indicate that subsurface materials consist primarily of finer-grained deposits (clay, sandy clay, silt and sandy silt) with interbedded sand lenses to 20 feet below ground surface (bgs), the approximate depth to which these borings were advanced. The documented lithology for one on-site boring that was logged to approximately 45 feet bgs indicates that beyond approximately 20 feet bgs, fine-grained soils are present to approximately 45 feet bgs. A cone penetrometer technology test indicated the presence of sandier lenses from approximately 45 to 58 feet bgs and even coarser materials (interbedded with finer-grained materials) from approximately 58 feet to 75 feet bgs, the total depth drilled. The lithology documented at the site is similar to that reported at other nearby sites, specifically the Montgomery Ward site (7575 Dublin Boulevard), the Quest laboratory site (6511 Golden Gate Drive), the Shell-branded Service Station site (11989 Dublin Boulevard), and the Chevron site (7007 San Ramon Road). ***Hydrogeology:*** Shallow groundwater has been encountered at depths of approximately 9 to 15 feet bgs. The hydraulic gradient and groundwater flow direction have not been specifically evaluated at the site.	As noted, most borings at the site have been advanced to approximately 20 feet bgs, and one boring has been advanced and logged to 45 feet bgs; CPT data was collected to 75 feet bgs at one location. Lithologic data will be obtained from additional borings that will be advanced on site to further the understanding of the subsurface, especially with respect to deeper lithology. The on-site shallow groundwater horizontal gradient has not been confirmed. Additionally, it is not known if there may be a vertical component to the hydraulic gradient.	Two direct push borings and four multi-port wells will be advanced to depth (up to approximately 75 feet bgs) and soil lithology will be logged. See items 4 and 5 on Table 2. Shallow and deeper groundwater monitoring wells will be installed to provide information on lateral and vertical gradients. See Items 2 and 5 on Table 2.
Surface Water Bodies		The closest surface water bodies are culverted creeks. Martin Canyon Creek flows from a gully west of the site, enters a culvert north of the site, and then bends to the south, passing approximately 1,000 feet east of the site before flowing into the Alamo Canal. Dublin Creek flows from a gully west of the site, enters a culvert approximately 750 feet south of the site, and then joins Martin Canyon Creek approximately 750 feet southeast of the site.	None	NA
Nearby Wells		The State Water Resources Control Board's GeoTracker GAMA website includes information regarding the approximate locations of water supply wells in California. In the vicinity of the site, the closest water supply wells presented on this website are depicted approximately 2 miles southeast of the site; the locations shown are approximate (within 1 mile of actual location for California Department of Public Health supply wells and 0.5 mile for other supply wells). No water-producing wells were identified within 1/4 mile of the site in the well survey conducted for the Quest Laboratory site (6511 Golden Gate Drive; documented in 2009); information documented in a 2005 report for the Chevron site at 7007 San Ramon Road indicates that a water-producing well may exist within 1/2 mile of the site.	A formal well survey is needed to identify water-producing, monitoring, cathodic protection, and dewatering wells.	Obtain data regarding nearby, permitted wells from the California Department of Water Resources and Zone 7 Water Agency (Item 11 on Table 2).

TABLE 2

DATA GAPS AND PROPOSED INVESTIGATION

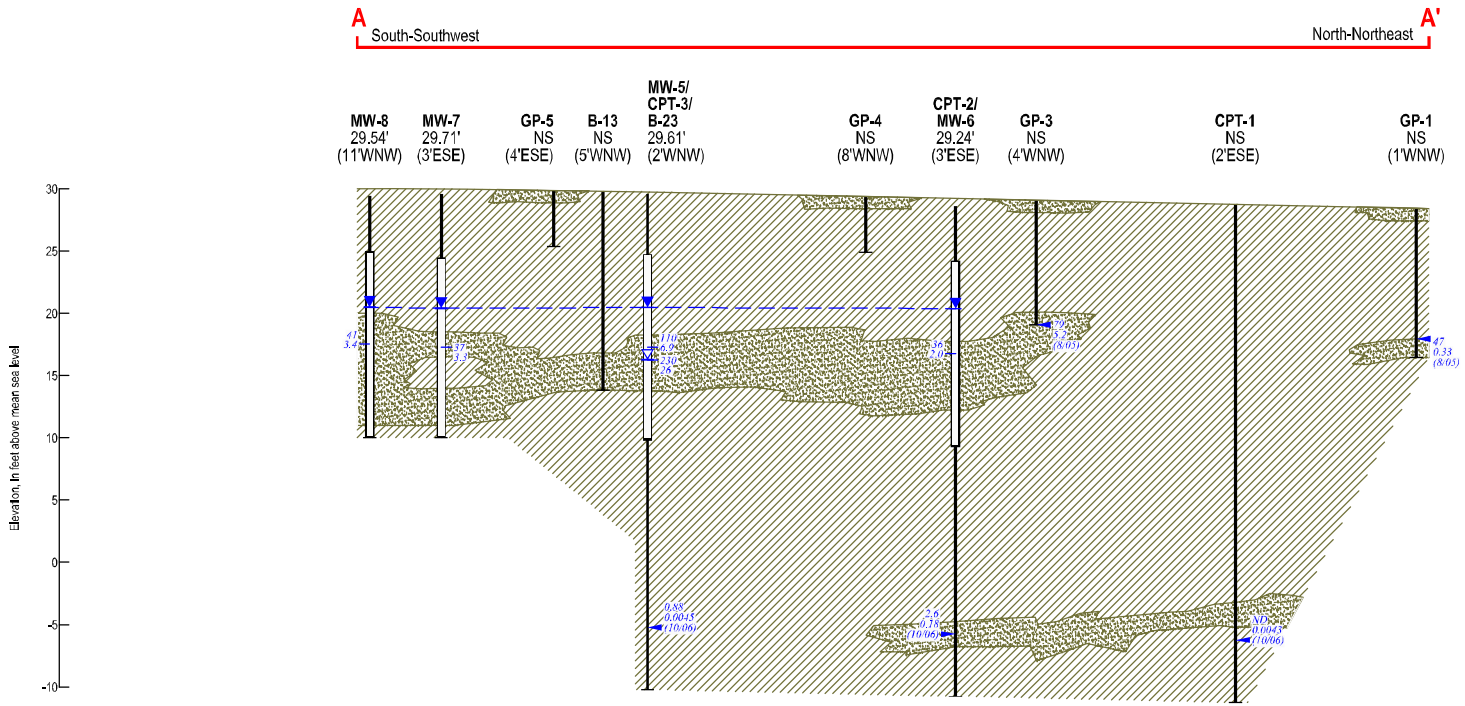
Item	Data Gap	Proposed Investigation	Rationale	Analysis
5	Evaluate the possible presence of impacts to deeper groundwater. Evaluate deeper groundwater concentration trends over time. Obtain data regarding the vertical groundwater gradient. Obtain more lithological data below 20 feet bgs.	Install four continuous multichannel tubing (CMT) groundwater monitoring wells (aka multi-port wells) to approximately 65 feet bgs in the northern parking lot with ports at three depths (monitoring well locations may be adjusted pending results of shallow grab groundwater samples; we will discuss any potential changes with ACEH before proceeding). Groundwater monitoring frequency to be determined. Soil samples will be collected only if there are field indications of impacts. Soil lithology will be logged. However, information regarding the moisture content of soil may not be reliable using sonic drilling technology (two borings will be logged using direct push technology; see Item 4, above).	One well is proposed at the western (upgradient) property boundary to confirm that there are no deeper groundwater impacts from upgradient. Two wells are proposed near the center of the northern parking lot to evaluate potential impacts in an area where deeper impacts, if any, would most likely to be found. One well is proposed at the eastern (downgradient) property boundary to confirm that there are no impacts extending off-site. Port depths will be chosen based on the locations of saturated soils (as logged in direct push borings; see Item 4, above), but are expected at approximately 15, 45, and 60 feet bgs.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance.
6	Evaluate possible off-site migration of impacted soil vapor in the downgradient direction (east). Evaluate concentration trends over time.	Install 4 temporary nested soil vapor probes at approximately 4 and 8 feet bgs along the eastern property boundary. Based on the results of the sampling, two sets of nested probes will be converted to vapor monitoring wells to allow for evaluation of VOC concentration trends over time.	Available data indicate that PCE and TCE are present in soil vapor in the eastern portion of the northern parking lot. Samples are proposed on approximately 50-foot intervals along the eastern property boundary to provide a transect of concentrations through the vapor plume. The depths of 4 and 8 feet bgs are chosen to provide data closest to the source (i.e., groundwater) while avoiding saturated soil, and also provide shallower data to help evaluate potential attenuation within the soil column. Two sets of nested vapor probes will be converted into vapor monitoring wells (by installing well boxes at ground surface); the locations of the permanent wells will be chosen based on the results of samples from the temporary probes.	*Soil vapor* : VOCs by EPA Method TO-15.
7	Evaluate potential for off-site migration of impacted groundwater in the downgradient direction (east).	Advance two borings to approximately 20 feet bgs in the parking lot of the property east of the Crown site for collection of grab groundwater samples.	Two borings are proposed off-site, on the property east of the Crown site, just east of the building in the expected area of highest potential VOC concentrations.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance.
8	Evaluate VOC concentrations just north of the highest concentration area.	Advance two borings to approximately 20 feet bgs north of Building A for collection of soil and grab groundwater samples. Soil samples will be collected at two depths in the vadose zone. Soil samples will be collected based on field indications of impacts (PID readings, odor, staining) or, in the absence of field indications of impacts, at 5 and 10 feet bgs.	The highest concentrations of PCE in groundwater were detected at boring NM-B-32, just north of Building A. The nearest available data to the north are approximately 75 feet away. One of the borings will be advanced approximately 20 feet north of NM-B-32 to provide data close to the highest concentration area. A second boring will be advanced approximately halfway between the first boring and former boring NM-B-33 to provide additional spatial data for contouring purposes. These borings will be part of a transect in the highest concentration area.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance. *Soil:* VOCs by EPA Method 8260 (soil samples to be collected using field preservation in accordance with EPA Method 5035).
9	Evaluate VOC concentrations in soil vapor in the south parcel of the site.	Install four temporary soil vapor probes at approximately 5 feet bgs around boring SV-25, where PCE was detected in soil vapor at a low concentration.	PCE was detected in soil vapor sample SV-25 in the southern parcel, although was not detected in groundwater in that area. Three probes will be installed approximately 30 feet from of boring SV-25 to attempt to delineate the extent of impacts. A fourth probe is proposed west of the original sample, close to the property boundary and the location of mapped utility lines, which may be a potential conduit, to evaluate potential impacts from the west.	*Soil vapor* : VOCs by EPA Method TO-15.
10	Obtain additional information regarding subsurface structures and utilities to further evaluate migration pathways and sources.	Ground penetrating radar (GPR) and other utility locating methodologies will be used, as appropriate, to further evaluate the presence of unknown utilities and structures at the site.	Utilities have been identified at the site that include an on-site sewer lateral and drain line, and shallow water, electric, and gas lines. Given the current understanding of the distribution of PCE in groundwater at the site, it is possible that other subsurface utilities, and specifically sewer laterals, exist that may act as a source or migration pathway for distribution of VOCs in the subsurface.	NA

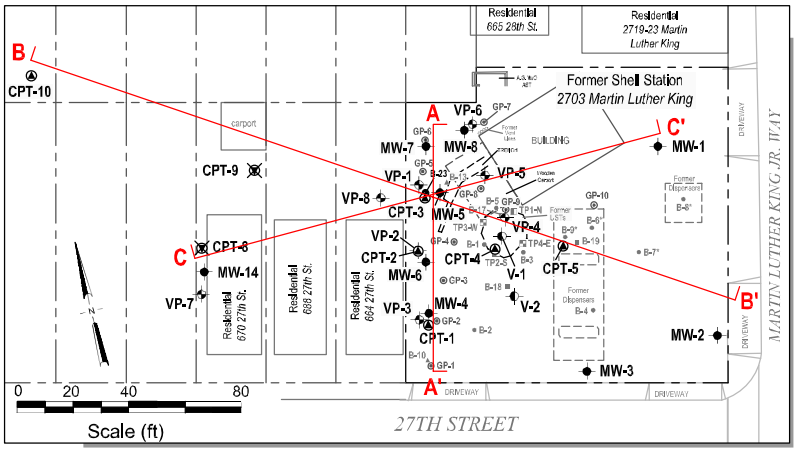
Appendix B.

Geologic Cross-Sections

12/18/07

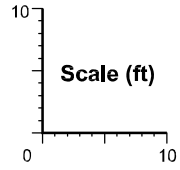
Geologic Cross Section A-A'
- Grab and QM Groundwater Results





EXPLANATION

- = Fine-Grained Soils
- = Coarse-Grained Soils
- TPHg / Benzene — Concentrations in Groundwater, in ppm (08/27/07)
- Depth of Groundwater (08/27/07)
- Inferred Groundwater Depth
- TPHg / Benzene (DATE) — Grab Groundwater Sample Depth
- Well ID / Elev. — Well Designation; TOC Elevation, in feet above msl (NS = Not Surveyed)
- (offset) — Offset distance and direction to cross-section line
- Groundwater Monitoring Well or Soil Boring
- Well Screen Interval
- Bottom of boring



FIGURE

3A

Former Shell Service Station

2703 Martin Luther King Jr. Way

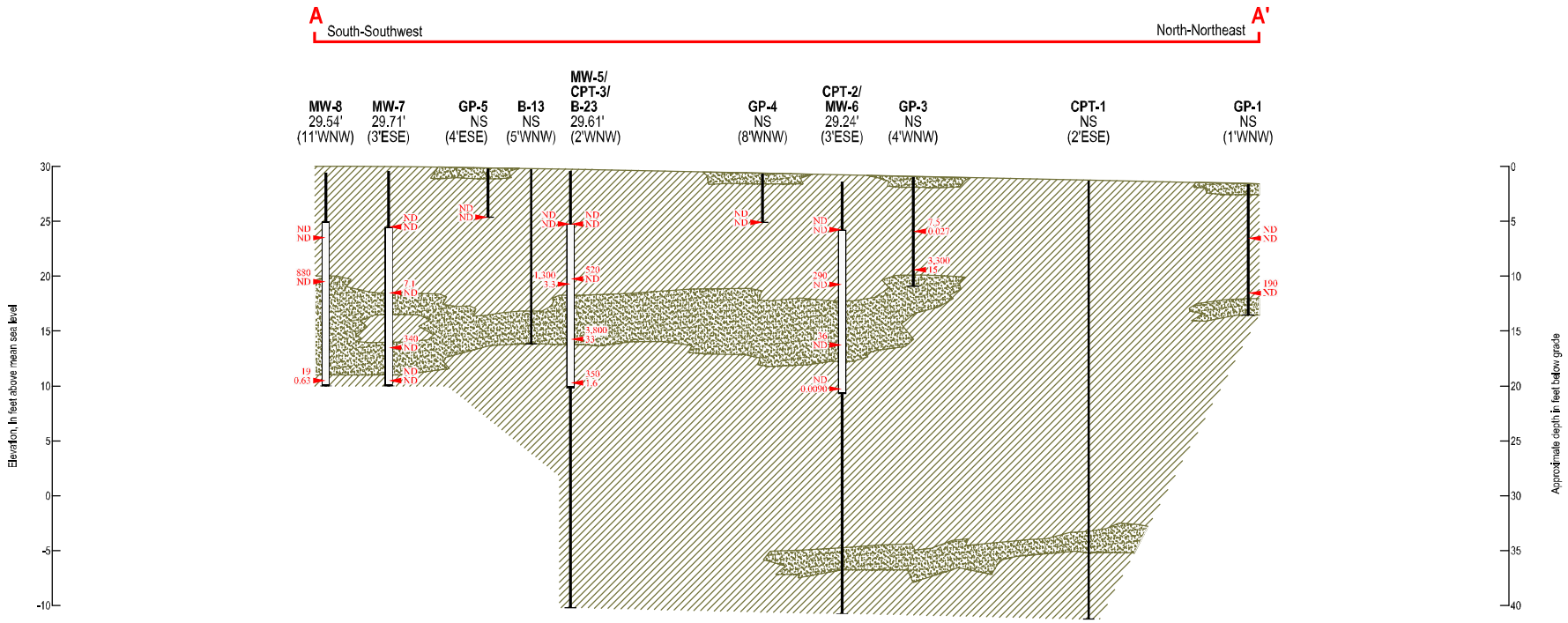
Oakland, California

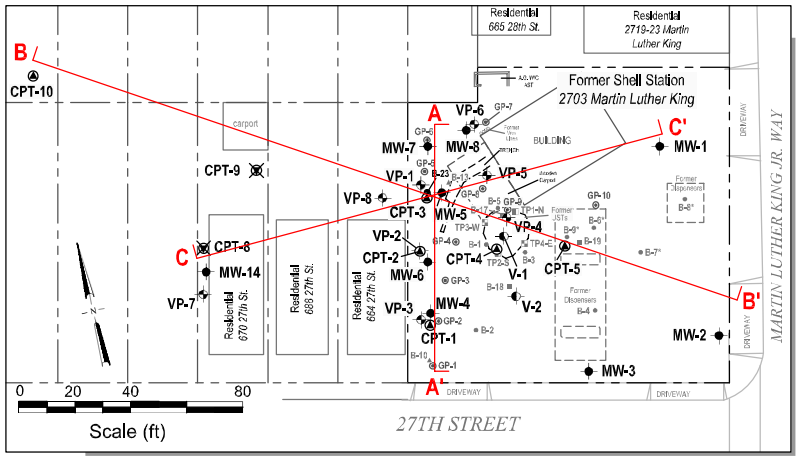
CONESTOGA-ROVERS & ASSOCIATES

I:\SONOMA\SHELL\OAKLAND 2703 MLK JR WAY\FIGURES\X-SECT A-A'.DWG

12/18/07

Geologic Cross Section A-A' - Soil Results





EXPLANATION

= Fine-Grained Soils

= Coarse-Grained Soils

Approximate Soil Sample Location

NA Not Analyzed

ND Not Detected

TPHg / Benzene — Concentrations in Soil, in mg/kg; (MTBE analyzed by EPA Method 8020 in parentheses, all others by EPA Method 8260 or NA)

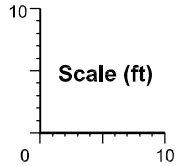
Well ID / Elev. — Well Designation / TOC Elevation, in feet above msl (NS = Not Surveyed)

(offset) — Offset distance and direction to cross-section line

Groundwater Monitoring Well or Soil Boring

Well Screen Interval

Bottom of boring



FIGURE

3B

Former Shell Service Station

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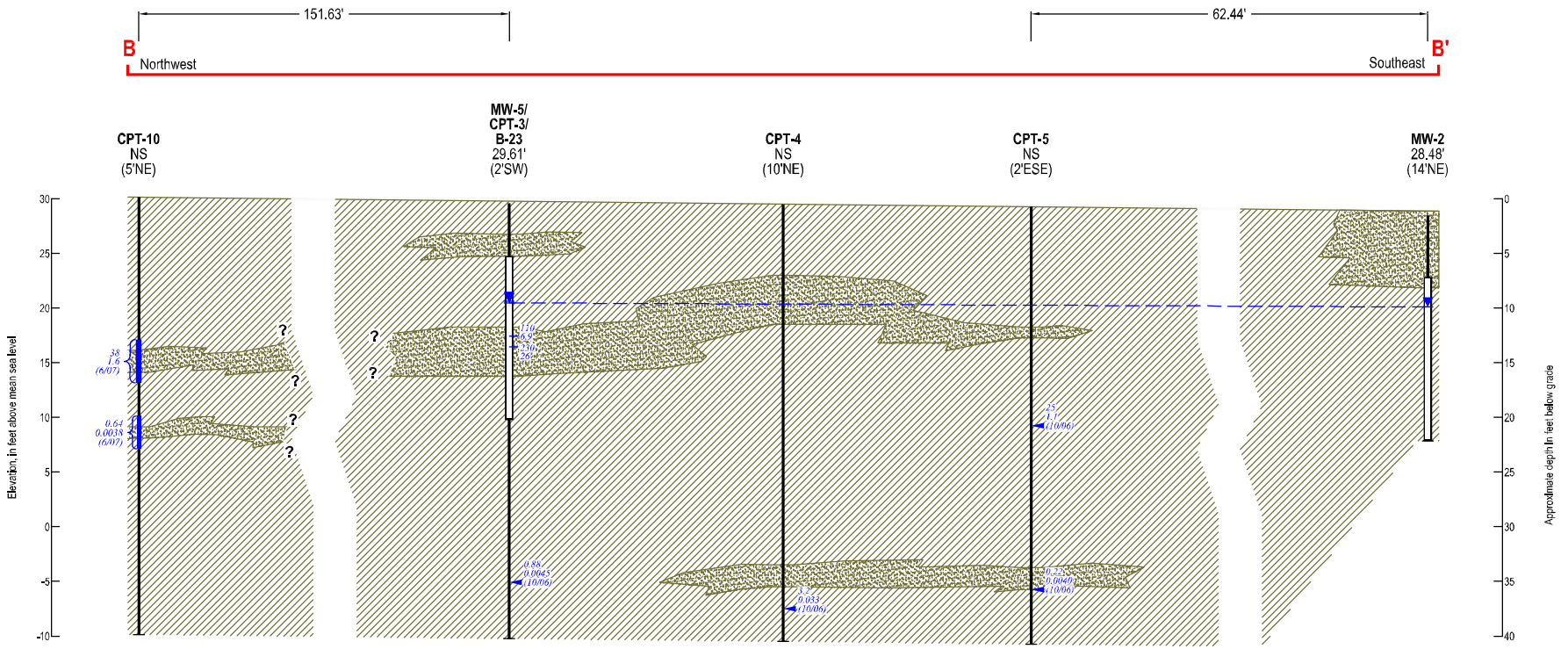
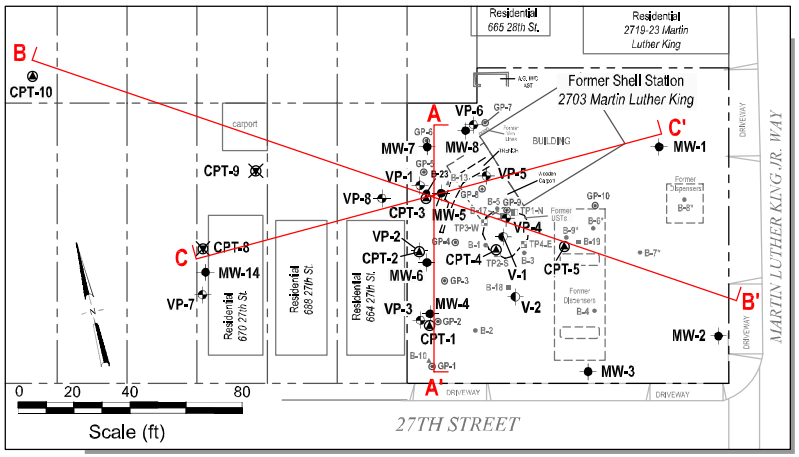
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

I:\SONOMA\SHELL\OAKLAND 2703 MLK JR WAY\FIGURES\X-SECT A-A'.DWG

12/18/07





EXPLANATION

- = Fine-Grained Soils
- = Coarse-Grained Soils
- TPHg / Benzene — Concentrations in Groundwater, in ppm (08/27/07)
- Depth of Groundwater (08/27/07)
- Inferred Groundwater Depth
- TPHg / Benzene (DATE) — Grab Groundwater Sample Depth
- TPHg / Benzene (DATE) — CPT Groundwater Sampling Interval and Concentrations, in ppm (DATE)

Well ID — Well Designation
Elev. — TOC Elevation, in feet above msl (NS = Not Surveyed)
(offset) — Offset distance and direction to cross-section line
Groundwater Monitoring Well or Soil Boring
Well Screen Interval
Bottom of boring

10
Scale (ft)
0
10

FIGURE
4A

Geologic Cross Section B-B'
- Grab and QM Groundwater Results

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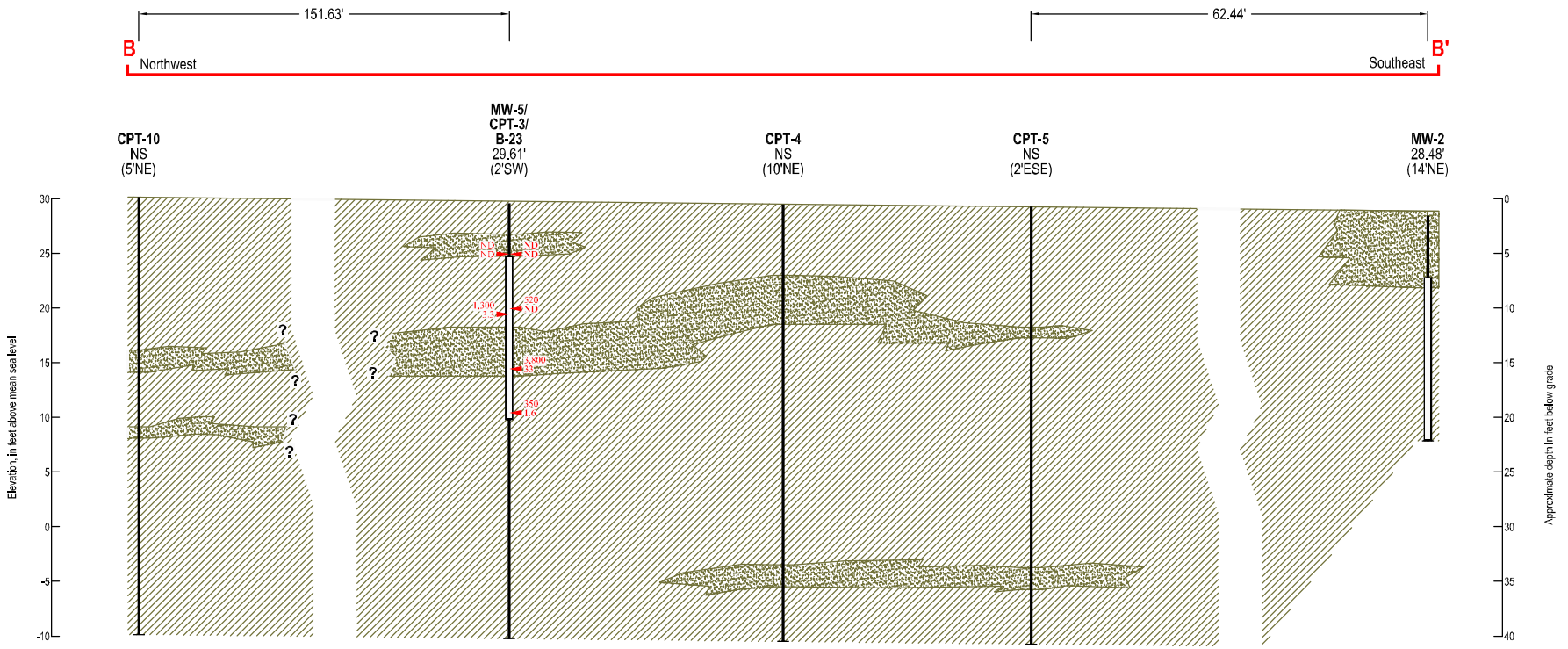
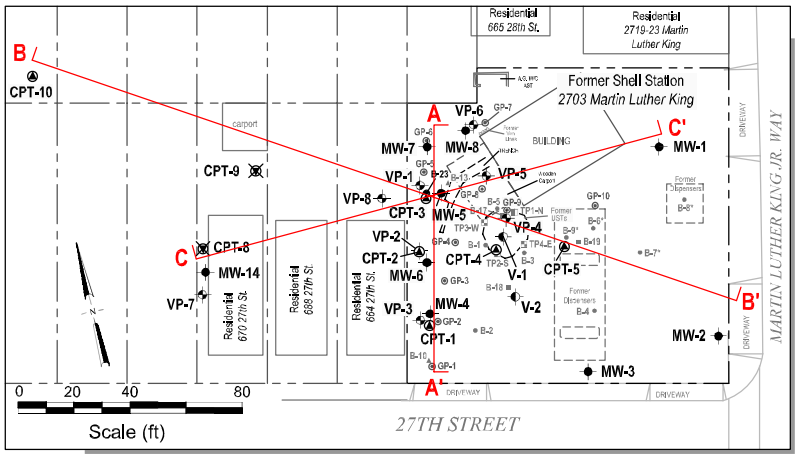
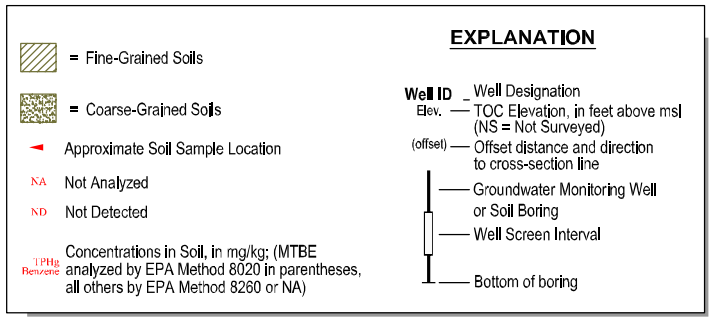
I:\SONOMA\SHELL\OAKLAND 2703 MLK JR WAY\FIGURES\X-SECT B-B'.DWG

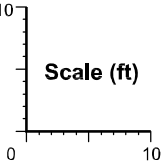
12/18/07

Geologic Cross Section B-B' - Soil Results









FIGURE

4B

Former Shell Service Station

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Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

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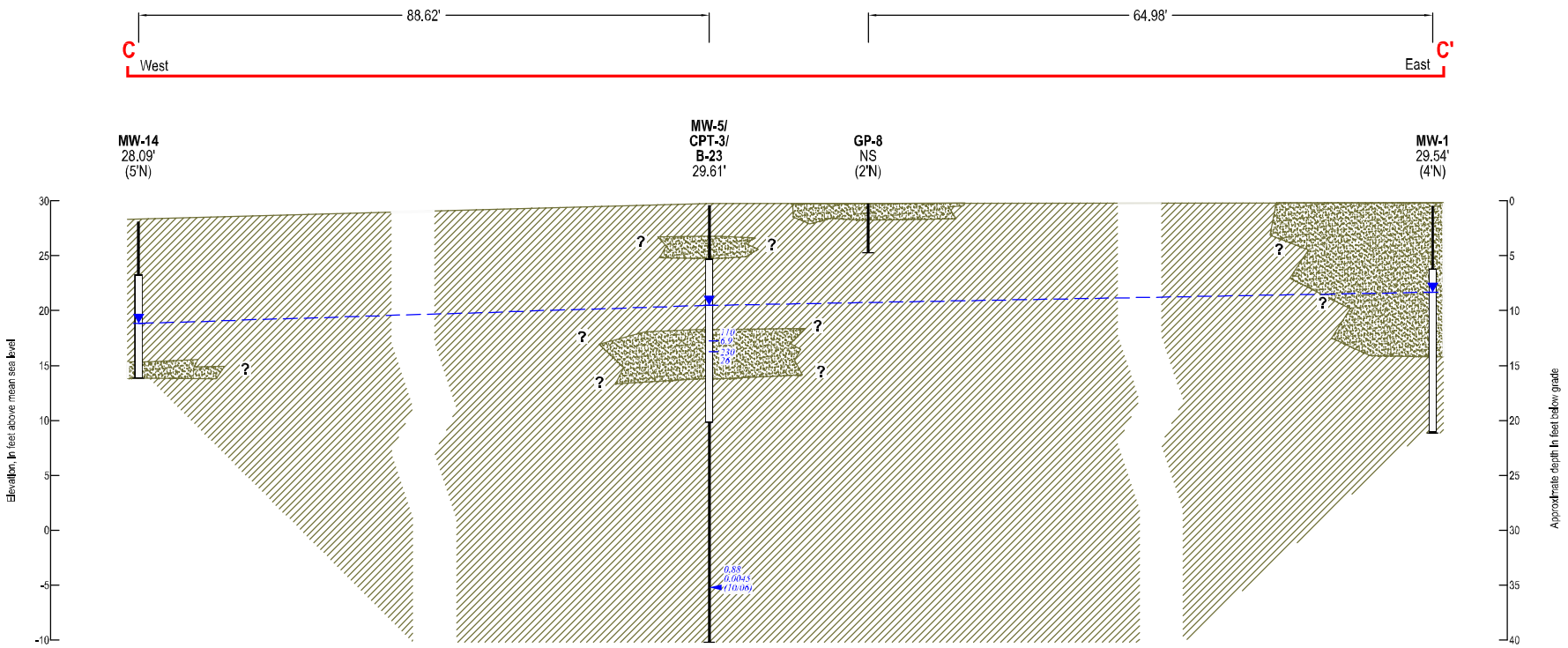
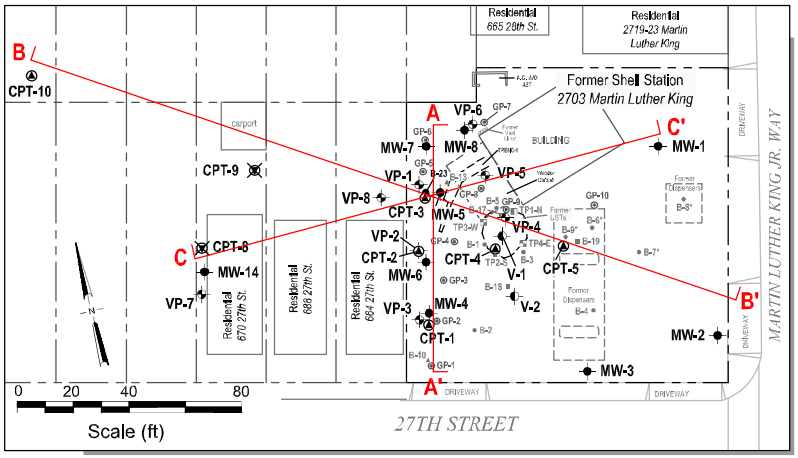
12/19/07

Geologic Cross Section C-C'
- Grab and QM Groundwater Results





EXPLANATION

= Fine-Grained Soils

= Coarse-Grained Soils

TPHg / Benzene — Concentrations in Groundwater, in ppm (08/27/07)

Depth of Groundwater (08/27/07)

Inferred Groundwater Depth

TPHg / Benzene / (DATE) — Grab Groundwater Sample Depth

Well ID / Elev. — Well Designation; TOC Elevation, in feet above msl (NS = Not Surveyed)

(offset) — Offset distance and direction to cross-section line

Groundwater Monitoring Well or Soil Boring

Well Screen Interval

Bottom of boring

10
Scale (ft)
0
10

FIGURE

5A

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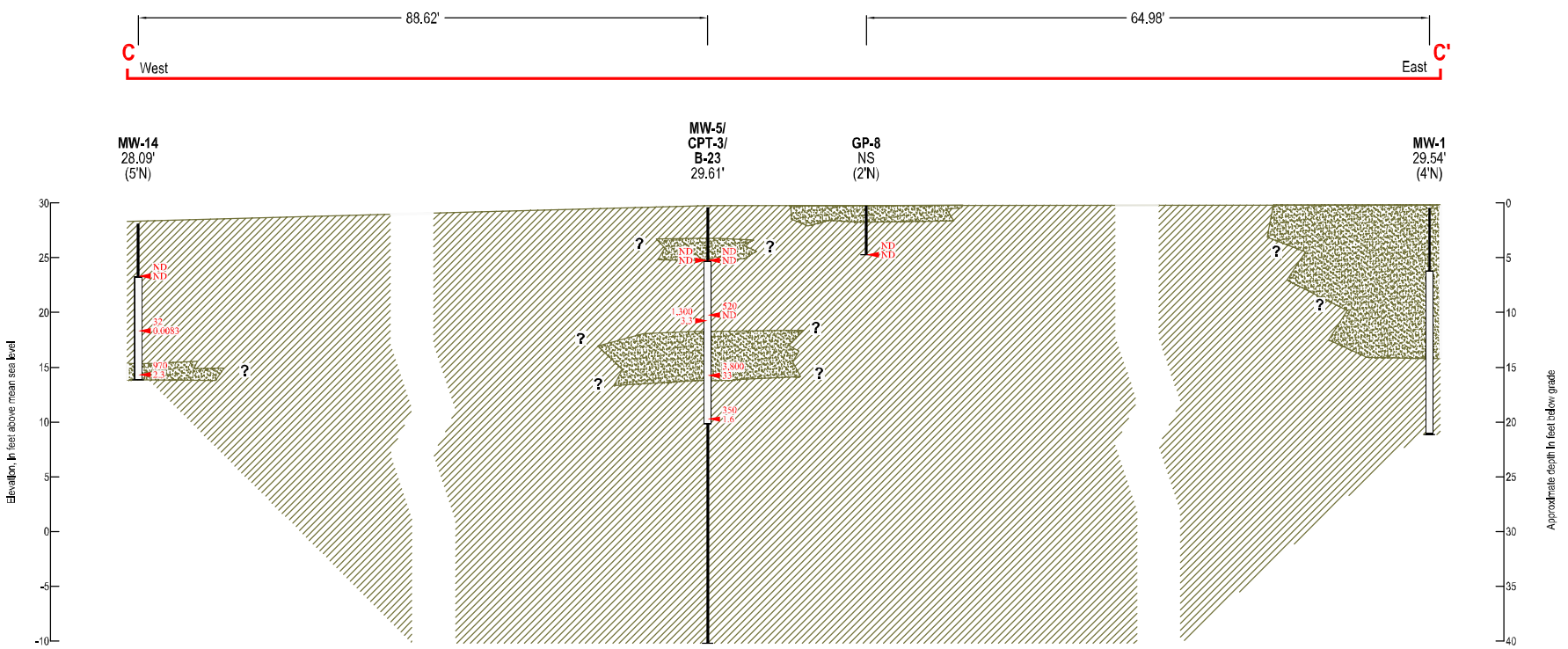
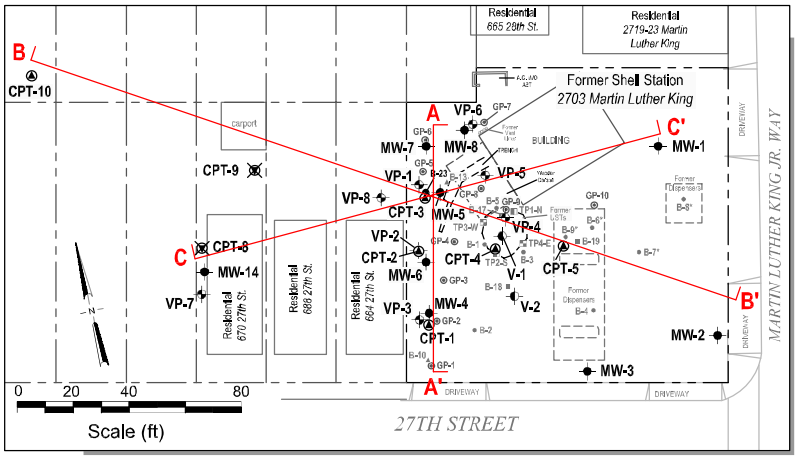
2703 Martin Luther King Jr. Way

Oakland, California

I:\SONOMA\SHELL\OAKLAND 2703 MLK JR WAY\FIGURES\X-SECT C-C'.DWG

12/19/07

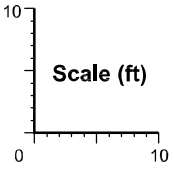




EXPLANATION

- = Fine-Grained Soils
- = Coarse-Grained Soils
- Approximate Soil Sample Location
- NA Not Analyzed
- ND Not Detected
- TPHg / Benzene — Concentrations in Soil, in mg/kg; (MTBE analyzed by EPA Method 8020 in parentheses, all others by EPA Method 8260 or NA)

Well ID _ Well Designation
Elev. — TOC Elevation, in feet above msl (NS = Not Surveyed)
(offset) — Offset distance and direction to cross-section line
— Groundwater Monitoring Well or Soil Boring
— Well Screen Interval
— Bottom of boring



FIGURE

5B

Geologic Cross Section C-C'
- Grab and QM Groundwater Results

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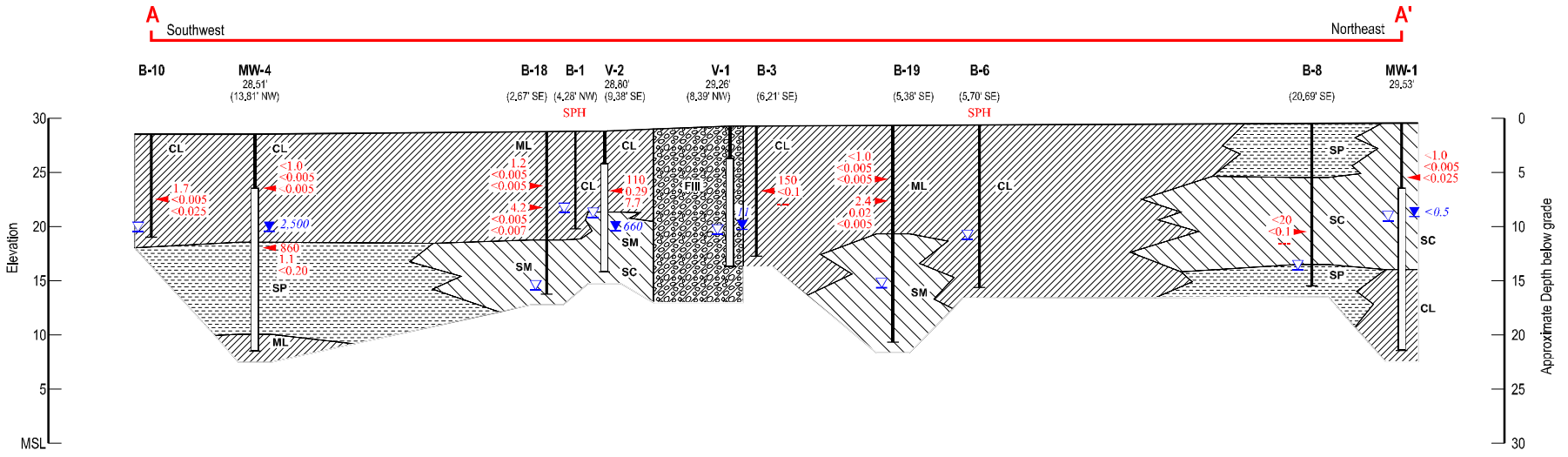
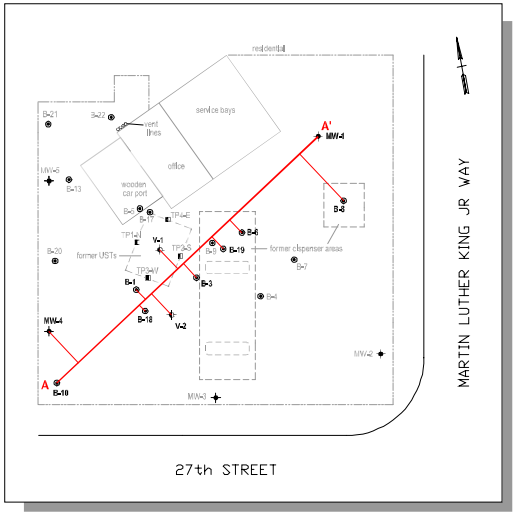
Oakland, California

I:\SONOMA\SHELL\OAKLAND 2703 M.L.K.JR WAY\FIGURES\X-SECT C-C'.DWG

12/12/03





EXPLANATION

- = Low Estimated Permeability Soils — CL, ML
- = Moderate Estimated Permeability Soils — SC, SM
- = High Estimated Permeability Soils — SP
- = Fill (Tank Pit)

CL = Clay
ML = Clayey Silt
SC = Clayey Sand
SM = Silty Sand
SP = Poorly Graded Sand

▼ Groundwater Elevation on 10/20/03

▽ Initial Groundwater level

Well ID / ELEV (projection) — Well Designation, GW Elevation, Projected distance from A-A'

Groundwater Monitoring Well

Well Screen Interval

Bottom of boring

TPHg / Benzene / MTBE — Hydrocarbon concentrations in soil, in mg/kg (ppm)

SPH — Seperate Phase Hydrocarbons detected during installation

Benzene — Benzene concentrations in groundwater in micrograms per liter (ppb) Sample taken on 10/20/03

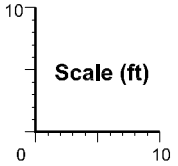


FIGURE
3

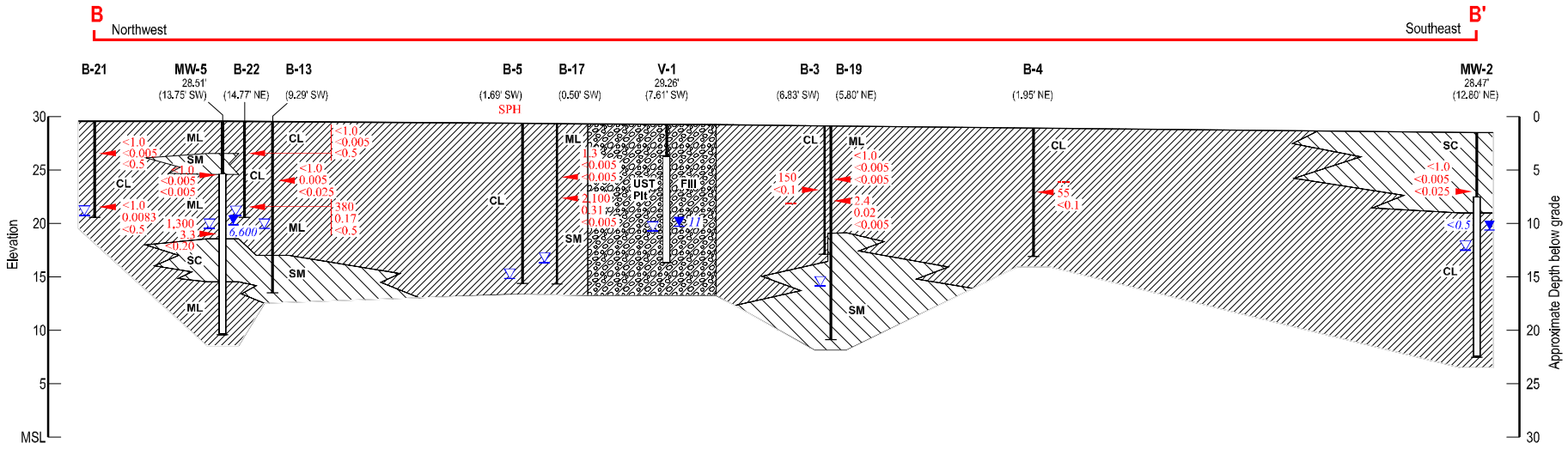
Geologic Cross Section A - A'

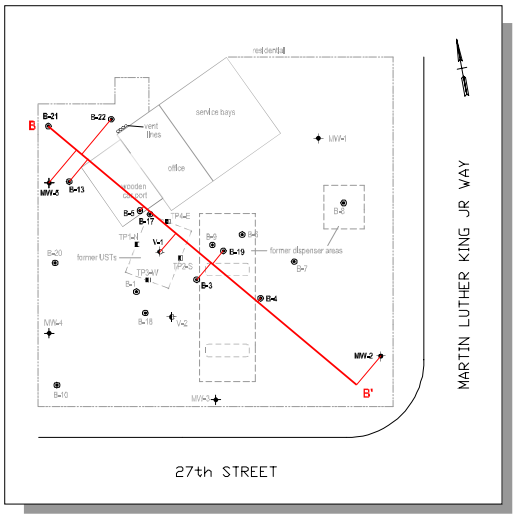
Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California

CAMBRIA

G:\OAKLAND 2703 MLK\FIGURES\<SECTION>-A.DWG

12/12/03





EXPLANATION

- = Low Estimated Permeability Soils — CL, ML
- = Moderate Estimated Permeability Soils — SC, SM
- = Fill (Tank Pit)

- CL = Clay
- SC = Clayey Sand
- SM = Silty Sand
- ML = Clayey Silt

- ▼ Depth of Groundwater on 10/20/03
- ▽ Initial Groundwater level

Well ID
ELEV
(projection)
Well Designation
GW Elevation
Projected distance from A-A'

Groundwater Monitoring Well

Well Screen Interval

Bottom of boring

TPHg
Benzene
MTBE
Hydrocarbon concentrations in soil, in mg/kg (ppm)

SPH
Seperate Phase Hydrocarbons detected during installation

Benzene
Benzene concentrations in groundwater in micrograms per liter (ppb)
Sample taken on 10/20/03

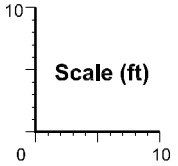


FIGURE
4

Geologic Cross Section B - B'

Former Shell Service Station
2703 Martin Luther King Jr. Way
Oakland, California

CAMBRIA

G:\OAKLAND\2703 MLK\FIGURES\XSECTION-A.DWG