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By Alameda County Environmental Health 8:50 am, May 12, 2017

Mr. Mark Detterman
Senior Hazardous Materials Specialist, PG, CEG
Alameda County Environmental Health
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Alameda, California 94502

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100 Montgomery Street
Suite 300
San Francisco
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ENVIRONMENT

Subject:
Data Gap Work Plan
Former Atlantic Richfield Company Station No. 4931
731 West MacArthur Boulevard
Oakland, California 94609
ACEH Site No. RO0000076

Date:
May 11, 2017

Contact:
Hollis Phillips

Phone:
415.432.6903

Email:
Hollis.Phillips@arcadis.com

Our ref:
GP09BPNA.C110.N0000

Dear Mr. Detterman:

Arcadis U.S., Inc. (Arcadis) has prepared this report on behalf of the Atlantic Richfield Company, a BP affiliated company (ARCO), for the former ARCO service station listed below.

ARCO Facility No.	ACEH Site No.	Location
4931	RO0000076	731 West MacArthur Blvd., Oakland, CA

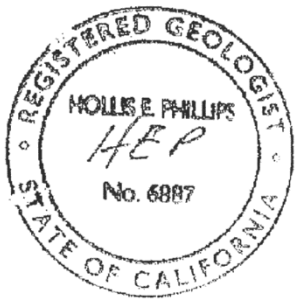
I have read and acknowledge the content, recommendations and/or conclusions contained in the attached work plan submitted on my behalf to ACDEH's FTP server and the SWRCB's GeoTracker website. If you have any questions or comments regarding the content of this report, please contact Hollis Phillips by telephone at 415.432.6903 or by e-mail at hollis.phillips@arcadis.com.

Sincerely,

Arcadis U.S., Inc.

HE Phillips

Hollis E. Phillips, P.G. (No. 6887)
Principal Geologist/Project Manager



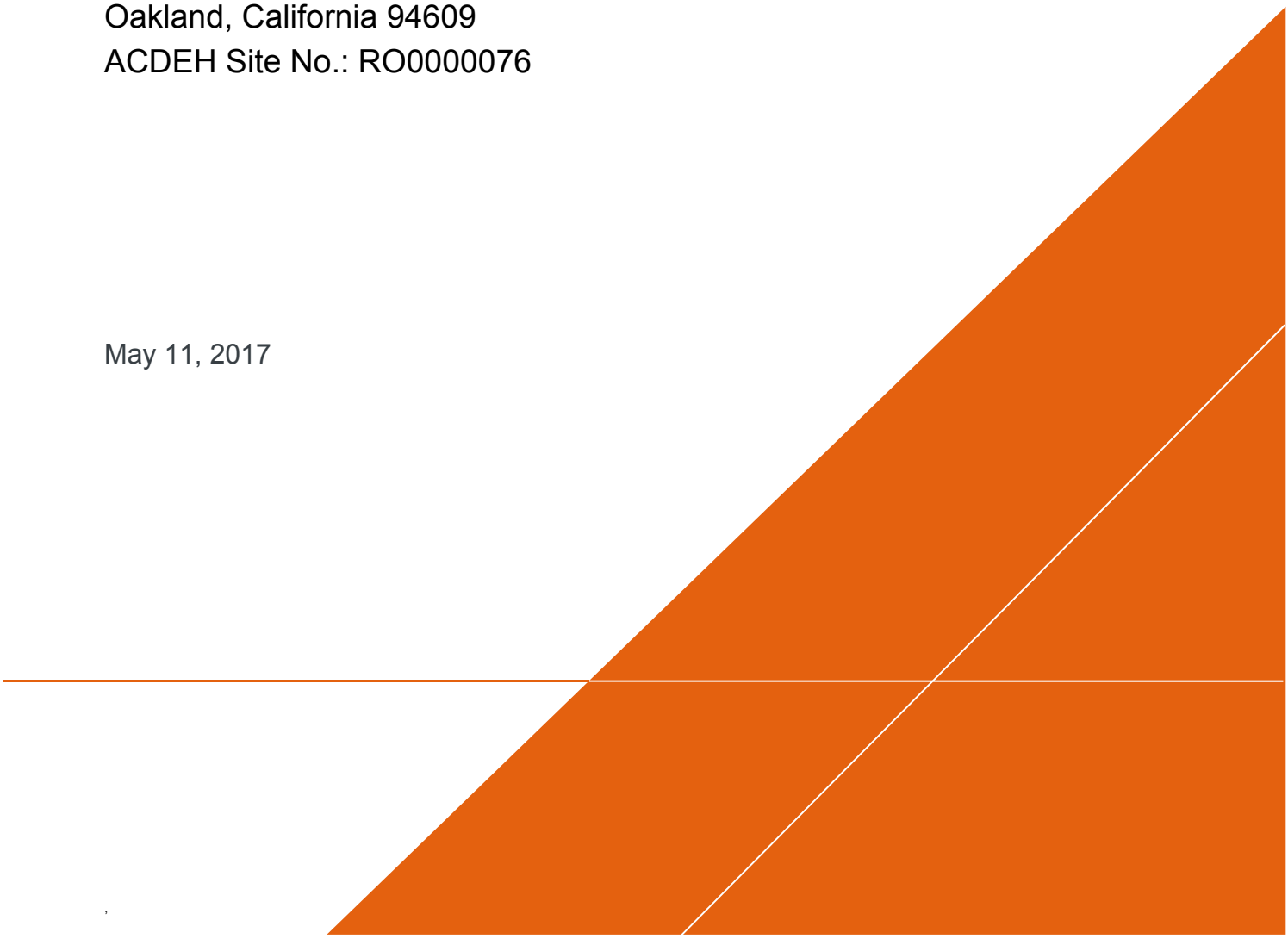
ARCADIS Design & Consultancy for natural and built assets

Atlantic Richfield Company, a BP-affiliated company

DATA GAP WORK PLAN

Former Atlantic Richfield Company Station No. 4931
731 West MacArthur Boulevard
Oakland, California 94609
ACDEH Site No.: RO0000076

May 11, 2017



Data Gap Work Plan

Prepared for:

Former Atlantic Richfield Company Station No. 4931

731 West MacArthur Boulevard

Oakland, CA

ACDEH Site No.: RO0000076

Prepared for:

Atlantic Richfield Company, a BP-affiliated company

Prepared by:

Arcadis U.S., Inc.

100 Montgomery Street

Suite 300

San Francisco

California 94104

Tel 415 374 2744

Fax 415 374 2745

Our Ref.:

GP09BPNA.C110

Date:

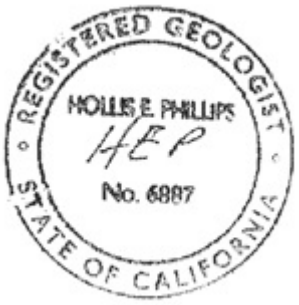
May 11, 2017

Carl Edwards

Environmental Scientist

Hollis E. Phillips, P.G. (No.6887)

Principal Geologist



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ACRONYMS AND ABBREVIATIONS

ACDEH	Alameda County Department of Environmental Health
ACPWA	Alameda County Public Works Agency
Arcadis	Arcadis U.S., Inc.
ARCO	Atlantic Richfield Company
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
btoc	below top of casing
DTSC	Department of Toxic Substances Control
DTW	depth to water
GRO	gasoline range organics
HASP	Health and Safety Plan
inHg	inches of mercury
LTC Policy	Low-Threat Underground Storage Tank Case Closure Policy
msl	mean sea level
MTBE	methyl tert-butyl ether
mL/min	milliliter per minute
PID	Photo-ionization detector
QA/QC	Quality Assurance and Quality Control
Site	Former Atlantic Richfield Company Station No. 4931 731 West MacArthur Boulevard, Oakland, California 94609
SWRCB	State Water Resources Control Board
TBA	tert-butyl alcohol
USA-North	Underground Service Alert
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank

1 INTRODUCTION

Arcadis U.S., Inc. (Arcadis) has prepared this Data Gap Work Plan (work plan) for the former Atlantic Richfield Company (ARCO) service station No. 4931 located at 731 W. MacArthur Boulevard in Oakland, California (the 'Site'; Figure 1). This work plan was prepared in response to the Alameda County Department of Environmental Health's (ACDEH) letter dated March 2, 2017 which requested additional data to assess the potential vapor intrusion pathway to the adjoining property located at 721 MacArthur Boulevard, along the eastern Site boundary.

Access to 721 MacArthur Boulevard is currently being pursued with the property owner, however Arcadis has yet to make successful contact by mail or phone. An access agreement was sent to the property owner on March 23 and May 2, 2017, respectively, with no reply. This work plan will include two scopes based on access to the entire property, or access to the property with the exception of the crawl space and partial basement.

1.1 Site Description

The Site is located at the southeastern corner of the intersection of West MacArthur Boulevard and West Street in Oakland, California. Currently, the Site is an active Westco Gasoline-branded retail fuel dispensing facility. Site features include a service station building, three dispenser islands, and four 10,000-gallon doubled-wall fiberglass gasoline underground storage tanks (USTs; Figure 2). With the exception of landscaped planters along portions of the property boundary and the station building, the Site is covered with asphalt and/or concrete.

Commercial and residential properties surround the Site. The Site is bound by West MacArthur Boulevard to the north-northeast and West Street to the west-northwest. Residential dwellings are located adjacent to the Site along the south and east property boundaries. An automotive repair facility known as Auto Mechs and residential dwellings are located directly west and southwest of the Site beyond West Street. A Big-O Tires-branded service center is located on the northwest corner of the intersection of West MacArthur Boulevard and West Street. An oil change service center known as Insta Lube is located on the northeast corner of the intersection of West MacArthur Boulevard and West Street. Interstate 580 is located approximately 600 feet south-southwest of the Site and Highway 24 is located approximately 1,000 feet east of the Site (Figure 1).

As shown on Figure 2, the Site and vicinity currently have 15 groundwater monitoring wells (A-2 through A-13 and AR-1 through AR-3), one soil vapor extraction well (AV-1), six soil vapor monitoring probes (SV-

1 through SV-6), and three sub-slab vapor probes (SS-SV-1 through SS-SV-3). Available records indicate that the groundwater monitoring wells are screened at depths ranging from 5 to 40 feet below ground surface (bgs).

1.2 Regional and Site-Specific Geology and Hydrogeology

The Site is approximately 60 feet above mean sea level (msl) and gently slopes toward the west. A nearly continuous clay layer (clay, clayey sand, and gravelly clay) extends from the surface to approximately 16.5 to 20 feet bgs. The clay layer is typically underlain by an approximately 4-foot-thick intermittent sand/gravel layer that has been encountered between 18 and 23 feet bgs. Groundwater is first encountered during drilling events between approximately 20 and 25 feet bgs and roughly correlates to the intermittent sand/gravel layer that underlies the clay layer. Boring logs from the most recent site investigation are available in Appendix A. Historical boring logs are available in Appendix C of the ACEH Low Threat Closure Policy Checklist and Site Conceptual Model (Arcadis 2013).

Since 2000, groundwater elevation at the Site has historically ranged from 42.37 to 57.76 feet above msl. Depth to water (DTW) recordings have ranged in site monitoring wells from 1.82 feet below top of casing (btoc) at groundwater monitoring well AR-2 on February 28, 2008 to 13.80 feet btoc at groundwater monitoring well A-2 on October 19, 2015. The average site DTW measured in groundwater monitoring wells since 2000 is approximately 8 feet btoc. DTW during the most recent groundwater monitoring event on August 25, 2016 ranged from 9.22 feet btoc at A-5 to 13.00 feet btoc at well A-2 (Arcadis 2016a).

The more permeable fill material associated with the UST removals at AR-2 likely facilitates the observed shallower DTW readings and corresponding higher groundwater elevations, compared to DTW and groundwater elevation recordings at nearby monitoring wells A-2 and A-3. According to drawings depicting the UST removals, AR-2 was installed directly in the former UST cavity and subsequent excavation.

Groundwater flow at the Site has been predominantly to the west measured during 52 monitoring events conducted between the Second Quarter of 2000 and the Third Quarter of 2016. Groundwater flow during the Third Quarter 2016 groundwater monitoring event was to the southwest at an approximate gradient of 0.014 foot per foot (ft/ft; Arcadis 2016a).

1.3 Soil Vapor Assessment History

In June 2011, Arcadis installed soil vapor probes SV-1 through SV-6 at an approximate depth of 5 feet below ground surface (bgs) using a hand auger (Arcadis 2011). Concentrations exceeding the San

Francisco Regional Water Quality Control Board (SF-RWQCB) Residential Environmental Screening Levels (ESLs) for gasoline range organics (GRO) and benzene were detected at SV-2, SV-3, and SV-5. The probe locations are centrally located at the Site.

In May 2015, Arcadis installed soil vapor probes SV-7 and SV-8 at an approximate depth of 5 feet bgs along the eastern property boundary (Arcadis 2015). In a directive dated February 11, 2015, ACDEH requested the probes to be installed at a depth approximately 5 feet below the foundation of the adjacent residential property. Based on the observed basement extending below the surface and water levels during installation, Arcadis determined the installation depth requested by ACDEH would have resulted in submerged probes. Soil vapor analytical results exceeded SF-RWQCB Residential ESLs for GRO at SV-8. The oxygen percent (%) by volume was detected at 11% in SV-7 and 1.3% in SV-8.

In November 2016, soil vapor probe SV-9 was installed at a depth of 8 feet bgs along the eastern Site boundary (Arcadis 2016b). This depth is approximately 5 feet below the foundation of the adjacent offsite property (721 West MacArthur Boulevard). Soil vapor samples were collected from SV-7 through SV-9 for additional characterization data. Soil vapor analytical results were consistent with May 2015 soil vapor assessment. The only detected exceedance of SF-RWQCB Residential ESLs included GRO at SV-8. The oxygen percent by volume was detected at 16.2%, 5.25% and 14.1% in SV-7 through SV-9, respectively, indicating a bio attenuation zone is present below foundations at the ground surface and foundations up to 3 feet bgs during the dry season.

Although the data supports an incomplete indoor vapor intrusion pathway in the vicinity of residential properties along the eastern Site boundary, ACDEH recommended further characterization based on the increase in GRO concentration at SV-8 between the May 2015 and November 2016 soil vapor sampling events.

2 PROPOSED SCOPE OF WORK

To further evaluate the potential offsite vapor intrusion pathway, Arcadis proposes two potential scopes of work based on access to 721 MacArthur Boulevard:

Scope 1:

- Collect additional soil vapor samples in third quarter 2017 and first quarter 2018 from SV-8 and SV-9 for ongoing characterization of soil vapor concentrations and the bioattentuation zone along the eastern Site boundary.

- Install two indoor (one in the partial basemen and one in the crawl space) and one outdoor Summa® canisters at 721 MacArthur Street to assess air quality.

- Two field mobilizations will occur separately in third quarter 2017 and first quarter 2018 due to the changing seasons and associated water levels.

Scope 2:

- Collect additional soil vapor samples in third quarter 2017 and first quarter 2018 from SV-8 and SV-9 for ongoing characterization of soil vapor concentrations and the bioattentuation zone along the eastern Site boundary.

- Advance paired borings (SV-10) adjacent to the partial basement for the installation of offsite soil vapor probes at approximately 5 feet and 8 feet bgs to directly measure potential vapor intrusion.

- Two field mobilizations will occur separately in third quarter 2017 and first quarter 2018 due to the changing seasons and associated water levels.

Figure 2 shows the proposed sampling locations and outline of 721 MacArthur Boulevard.

2.1 Health and Safety

Prior to initiating field activities, the site-specific Health and Safety Plan (HASP) will be updated in accordance with state and federal requirements for use during the proposed field activities. All necessary permits and licenses will be obtained prior to the initiation of the subsurface investigation, including drilling permits from Alameda County Public Works Agency (ACPWA). Underground utilities and other potential subsurface obstructions in the vicinity of the proposed drilling locations will be located and marked prior to drilling by a third-party utility locator. The utility survey will include identifying the boring location using white paint and obtaining an Underground Service Alert (USA-North) ticket by calling USA-North at least two working days prior to drilling activities.

2.2 Air Sampling

Observations from a survey of 721 West MacArthur Avenue conducted in November 2016 included an earthen floor crawl space located at grade underneath a majority of the residence, and a 10 by 12-foot partial basement extending 3 feet bgs and located in the southwest corner of the property. Additionally, vents were observed along the crawl space walls indicating some mixing with outdoor air. Arcadis staff

were not permitted by the tenant to enter the partial basement. Arcadis proposes to collect one representative crawl space air sample (CS-1), one outdoor air sample (OA-1) to assess potential background petroleum hydrocarbon constituent concentrations, and one indoor air sample (IA-1) in the partial basement. Two field mobilizations will be organized during the third quarter 2017 and first quarter 2018 to collect samples during the dry and wet seasons, respectively.

Indoor and outdoor air sampling will be performed using laboratory-supplied 6-liter Summa® canisters. In the crawl space, the canisters will be positioned roughly 1-2 feet above the floor, and between 3 to 5 feet above the partial basement floor and outdoor surface. As recommended in the Department of Toxic Substances Control (DTSC) Vapor Intrusion Guidance Document, Arcadis field staff will close any doors or windows leading to the crawl space and partial basement prior to installing the canisters (DTSC 2011). The crawl space and partial basement will be screened using a photoionization detector (PID) to identify potential sources that may affect the sampling analytical results. Additionally, a building survey will be conducted to note the conditions before/after sampling and to identify potential sources of volatile chemicals that could be removed from the area during sampling.

2.2.1 Shut-in Test

Prior to air sampling, a shut-in test will be conducted to check for leaks in the sampling system. Following assembly of the valves, lines, and fittings upstream from the top of the Summa® canister, each sampling system will be evacuated to approximately 10 inches of mercury (inHg) using a syringe while the sampling canister is attached with its valve in the closed position for approximately 10 minutes. If no observable loss of vacuum occurs the sample train will be considered sealed and usable for sampling. After the shut-in test is validated, the sampling train will not be altered except to open the valve to allow for the collection of the air sample.

Following a successful shut-in test, the canisters will be opened and a mass flow controller will collect indoor air at approximately 3.8 mL/min over a 24-hour sampling period. Sampling will be terminated once the vacuum gauges of the canisters nears -5 inHg.

2.2.2 Air Sample Collection and Laboratory Analysis

The air samples will be transported to a California Department of Public Health certified analytical laboratory under proper chain-of-custody procedures and analyzed for the following constituents:

- GRO, benzene, toluene, ethylbenzene, total xylenes (collectively BTEX), naphthalene, methyl tert-butyl ether (MTBE), and tert butyl alcohol (TBA) using United States Environmental Protection Agency (USEPA) Method TO-3M.

2.3 Soil Vapor Sampling

Based on the analytical results from the May 2015 and November 2016 soil vapor sampling events, Arcadis proposes additional sampling events at SV-8 and SV-9. Soil vapor sampling will be performed using laboratory-supplied 1-liter Summa® canisters. Using small (1-liter, or similar) Summa® canisters is desirable to minimize the potential for breakthrough of ambient air into the samples as described in Section 3.6 of the Soil Gas Advisory (DTSC 2015). The laboratory-supplied Summa® canisters will be batch certified by the laboratory prior to field receipt.

As described in Section 4.2 of the Soil Gas Advisory, soil vapor assembly tests will be conducted at each probe prior to sample collection. These pre-sampling tests include shut-in, leak, and purge volume tests that will be completed before soil vapor samples are collected after the soil vapor probe has equilibrated (DTSC 2015). A schematic drawing for the proposed soil vapor sampling train is shown on Figure 3.

2.4 Soil Vapor Probe Installation and Completions

In lieu of access to the crawl space and partial basement, Arcadis alternatively propose to advance paired borings (SV-10) to assess soil vapor adjacent to the partial basement (Figure 2). Soil vapor probes will be installed at approximately 5 feet and 8 feet bgs in order to capture vapor data in both the wet and dry season.

2.4.1 Construction of Soil Vapor Probes

If necessary, asphalt and/or concrete surface materials at each soil vapor probe location will be cored with a concrete coring machine. Once the surface material core is removed, the boreholes for the soil vapor probes will be advanced using a hand auger to total depth.

The installation of the soil vapor probes will be completed in accordance with the *Advisory - Active Soil Gas Investigations* guidance (Soil Gas Advisory; Department of Toxic Substances Control [DTSC] July 2015). Each probe will be constructed with a stainless-steel screen implant 6 inches long and 0.5-inch in diameter, with a slot size of 0.01 inch. The probes will be connected to Teflon® tubing to enable sampling at the ground surface. Valves will be installed at the tube ends that can be closed when sampling is not being conducted. The shallow probe will be set from approximately 4.75 to 5.25 feet bgs (center of the

screen set at 5 feet bgs). Approximately 3 inches of #3 Sand will be placed in the borehole above and below the probe. A 1-foot interval of dry granular bentonite will be placed above the sand pack of each vapor probe. A limited amount (<2 inches) of hydrated granular bentonite may be placed above the dry granular bentonite to secure the sand pack from the grout mixture. Following the hydrated granular bentonite, a neat cement grout/bentonite mixture will be added. The deeper probe will be constructed in a similar manner centered at approximately 8 feet bgs. Near the surface, the probes will be completed with approximately 6 inches of concrete and completed with a flush-mounted well box. The surface completion design may change based on field conditions and at the request of the property owner. A schematic drawing for the proposed multilevel soil vapor probe is shown on Figure 4.

2.4.2 Shut-in Tests

Prior to purging or sampling, a shut-in test will be conducted to check for leaks in the aboveground sampling system. To conduct a shut-in test, the aboveground valves, lines, and fittings downstream from the top of the probe will be assembled. The system will be evacuated to a minimum measured vacuum of about 100 inches of water (7.35 inches of mercury) using a purge pump. The shut-in test will be conducted while the sampling canister is attached with its valve in the closed position. The vacuum gauge will be connected to the system with a 'T'-fitting for at least 1 minute or longer. If there is any observable loss of vacuum, the fittings will be adjusted until the vacuum in the sample train does not noticeably dissipate. After the shut-in test is validated, the sampling train will not be altered. The vacuum gauge will be calibrated and sensitive enough to indicate a water pressure change of 0.5 inch (DTSC 2015).

2.4.3 Leak Tests

A leak test will be used to evaluate whether any significant ambient air is introduced into the soil vapor sample during the collection process and to determine the integrity of the sampling system. Atmospheric leakage occurs in three ways, according to the Soil Gas Advisory (DTSC 2015):

1. Advection through voids in the probe packing material and along the borehole sidewall;
2. Advection directly through the soil column; and
3. Advection through the fittings in the sampling train at the surface.

A leak test will be conducted at every soil vapor probe each time a soil vapor sample is collected to evaluate the integrity of the samples. As stated in Section 4.2.2 of the Soil Gas Advisory, introducing ambient air may result in an underestimation of actual site contaminant concentrations or, alternatively, may introduce external contaminants into samples from ambient air (DTSC 2015).

The well head and entire sampling train (valves, tubing, fittings, gauges, and Summa® canister) will be placed in a sampling shroud. Commercial grade helium will be used as a tracer compound for the leak test. The tracer compound will be pumped into the shroud and monitored for concentration stability using a helium detector (e.g., Radio detection MGD-2002 or similar). Helium concentrations will be maintained at approximately 10 to 20 percent (%) for the duration of purging and sampling at each location.

Laboratory analysis for the tracer compound in the soil vapor samples will also be used to assess if any significant leakage occurred. Purged soil vapor from purge volume testing will also be measured for helium as a pre-sampling leak detection procedure. Leakage will be calculated based on the following equation:

$$\%\ Leakage = \left(\frac{Helium\ Concentration\ in\ Sample\ (\%)}{Helium\ Concentration\ in\ Shroud\ (\%)}\right) \times 100\ (\%)$$

As stated in Section 4.2.2.2 of the 2015 DTSC Advisory, “An ambient air leak up to 5 percent is acceptable if quantitative tracer testing is performed by shrouding.” If leakage is calculated to be above 5% based on fixed gas analytical data, the quality of the soil vapor data will be further evaluated.

2.4.4 Purging

Purging will consist of removing approximately three volumes of stagnant soil vapor from the sampling system to ensure that samples are representative of subsurface conditions (DTSC 2015). A Summa® canister dedicated to purging activities will purge each probe at a flow rate of approximately 100 milliliters per minute (mL/min). The purge volume will be calculated based on the dimensions of the following:

- The internal volume of tubing;
- The pore space of the sand pack around the probe tip; and
- The aboveground gauges, tubing, sampling equipment.

2.4.5 Soil Vapor Sample Collection and Laboratory Analysis

Following purging, the soil vapor samples will be collected using evacuated 1-liter Summa® canisters with laboratory-provided flow regulators (combined with laboratory-provided soil vapor sampling manifolds) set to approximately 100 mL/min. The valve on the sampling train will be opened, allowing soil vapor to flow

into the Summa® canisters until the vacuum gauge reads approximately -5 inches of mercury. Initial and final vacuum gauge readings will be taken and recorded on the chain-of-custody form and on the laboratory-supplied sample labels included on each Summa® canister. A duplicate sample collected in-line with its respective parent sample for each day of sampling and an equipment blank sample collected using a laboratory supplied air source will also be submitted to the laboratory for quality assurance purposes.

Passivated stainless steel canisters, such as Summa® canisters, have minimal problems associated with their handling. Therefore, no additional precautions or safeguards are needed (DTSC 2015). The soil vapor samples will be delivered under appropriate chain-of-custody protocols to a California Department of Public Health certified analytical laboratory, under proper chain-of-custody procedures. The soil vapor samples will be analyzed for the presence of the following constituents:

- GRO, BTEX, naphthalene, MTBE, and TBA using Modified USEPA Method TO-15; and
- Fixed gases, including oxygen, methane, carbon dioxide and helium, using Modified ASTM Method D-1946.

2.5 Quality Assurance and Quality Control Procedures

To verify that the analytical data collected during the investigation is valid and usable, the data will be evaluated using a standard quality assurance and quality control (QA/QC) program. Field QA/QC procedures will include calibration of sampling equipment (including the PID), the use of standard chain-of-custody procedures for sample control, and written and visual documentation of field activities in daily field logs and by photograph. The degree of laboratory accuracy and precision will be established by evaluating method blanks, laboratory control samples, matrix spike samples, and surrogate quality control sample results. All comments reported by the laboratory will be reviewed during this evaluation and incorporated into the summary report as necessary.

3 SCHEDULE AND REPORTING

Arcadis is prepared to initiate field work after receipt of written approval from ACDEH, associated permits, and access to 721 MacArthur Boulevard. As previously discussed, we currently cannot access the property and are awaiting responses from the property owner regarding site access agreements sent on March 23 and May 2, 2017. While ACDEH reviews this work plan, Arcadis will continue to pursue access,

however as previously indicated this property owner has never responded to the request for an access agreement.

Pending access, a report will be prepared following receipt of the laboratory analytical data to document the results of the soil vapor survey. The report will include a scaled site plan showing the sampling locations, documentation of sampling activities performed and results of the laboratory analyses. Detected concentrations of the primary risk drivers including benzene, ethylbenzene and naphthalene in soil vapor will be compared to human health risk-based screening criteria presented in the State Water Resources Control Board (SWRCB) 2012 Low-Threat Underground Storage Tank Case Closure Policy (LTC) Policy. Finally, conclusions and recommendations relevant to the assessment objectives will be presented.

4 REFERENCES

Arcadis, U.S., Inc. (Arcadis) 2011. Soil Vapor Probe Installation and Sampling Summary, Former Atlantic Richfield Company Station No. 4931, 731 West MacArthur Boulevard, Oakland, California 94609. July 15.

Arcadis. 2013. ACEH Low Threat Closure Policy Checklist and Site Conceptual Model, Former Atlantic Richfield Company Station No. 4931, 731 West MacArthur Boulevard, Oakland, California 94609. June 28.

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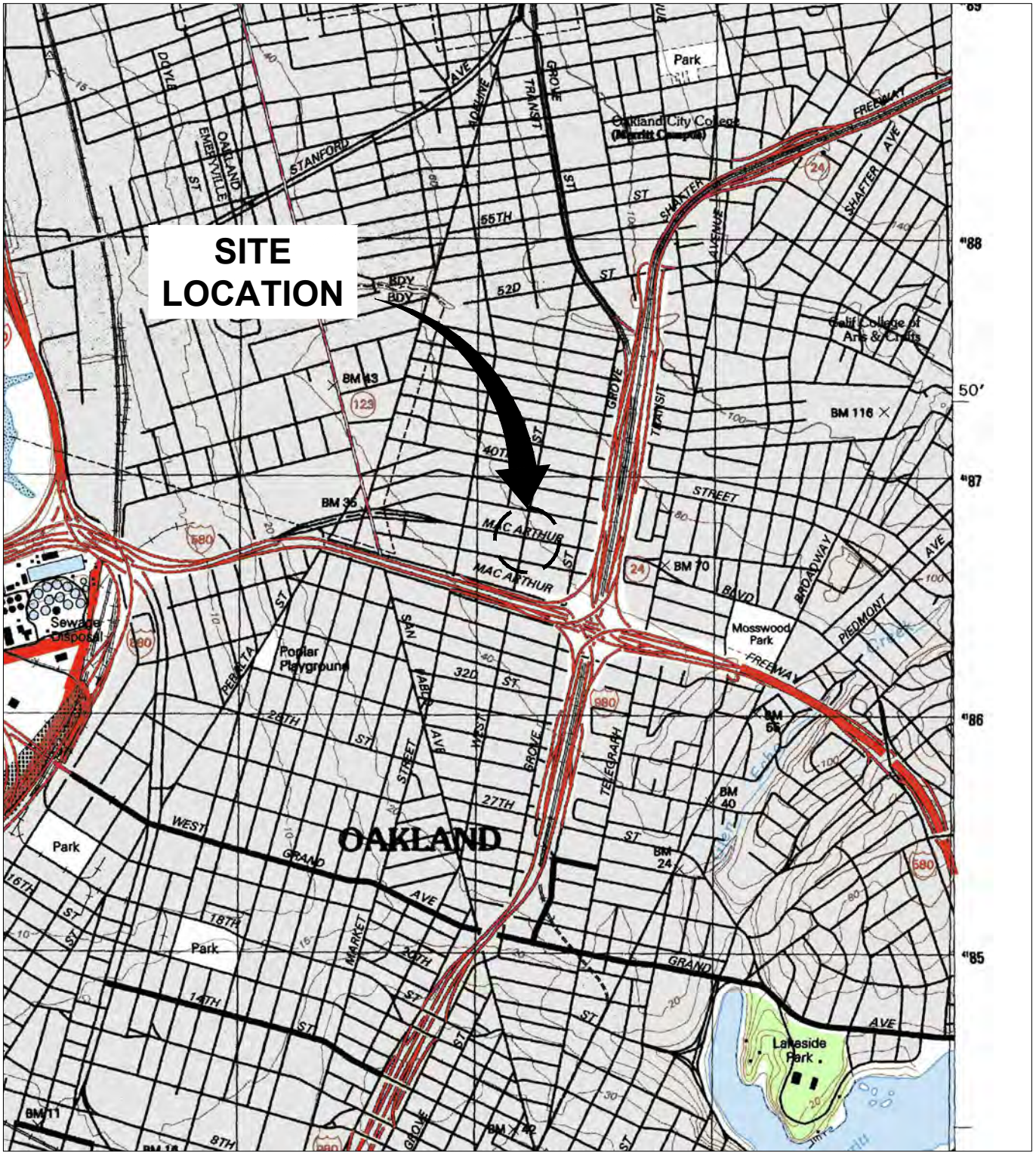
Department of Toxic Substances Control (DTSC). 2011. Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion and Indoor Air. October.

DTSC. 2015. Advisory- Active Soil Gas Investigations. July.

FIGURES



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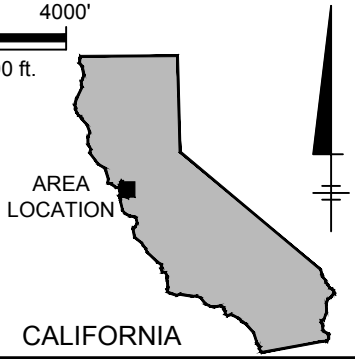

FORMER ARCO STATION No. 4931
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: PETALUMA, CA DIV/GROUP: ENV DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\RETURN-TO\EMERYVILLE, CA\GP09BPNAIC110N000003Q12\DWG\GP09BPNAC110-N01.dwg LAYOUT: 1 SAVED: 10/1/2012 11:40 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 10/1/2012 11:59 AM BY: HARRIS, JESSICA
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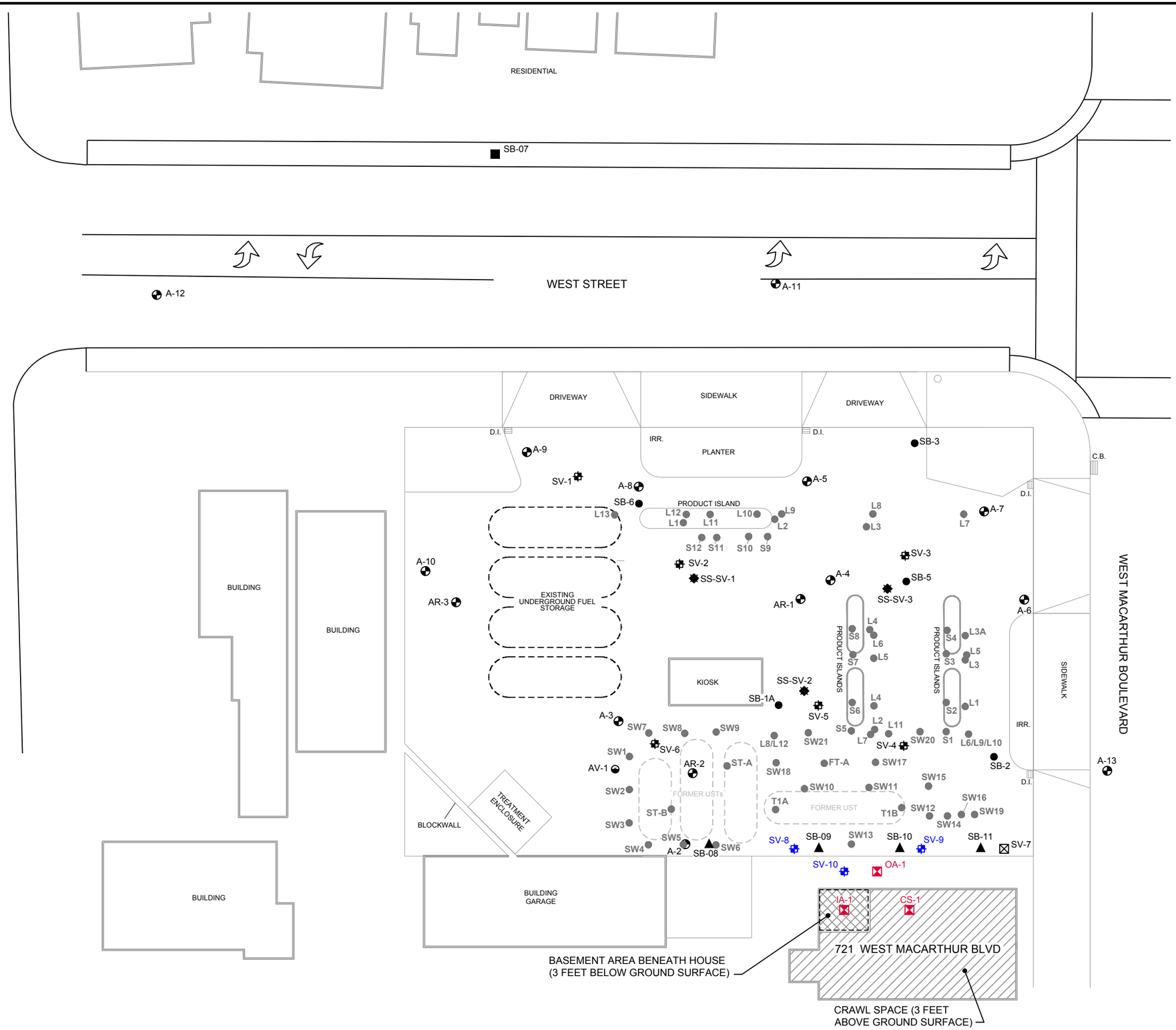

LEGEND

- MONITORING WELL
- SOIL BORING (ARCADIS, OCTOBER 2010)
- SOIL SAMPLE LOCATION
- SOIL VAPOR EXTRACTION WELL
- SOIL VAPOR PROBE (ARCADIS, MAY-JUNE 2011)
- SUB-SLAB SOIL VAPOR PROBE (ARCADIS, DECEMBER 2012)
- SOIL BORING (ARCADIS, MAY 2015)
- SOIL BORING (ARCADIS, NOVEMBER 2016)
- SOIL VAPOR PROBE (ARCADIS, MAY 2015)
- PROPOSED AIR SAMPLING LOCATION
- PROPOSED SOIL VAPOR SAMPLING LOCATION

NOTES:

1. SITE MAP ADAPTED FROM FIGURES BY OTHERS. ALL FEATURES AND LOCATIONS ARE APPROXIMATE.

0 25' 50'

Approximate Scale: 1 in. = 25 ft.

FORMER ARCO STATION No. 4391
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SITE PLAN SHOWING PROPOSED SAMPLING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

CITY: EMERYVILLE, CA DIV/GROUP: ENVCAD DB: A. REYES, J. HARRIS
G:\ENVCAD\Emeryville\ACTIVE\GP09BPNAC110\N0000\SiteUpdate\DWG\GP09BPNAC110 B02.dwg LAYOUT: 2 SAVED: 5/8/2017 10:05 AM ACADVER: 20.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 5/10/2017 5:21 PM BY: REYES, ALEC
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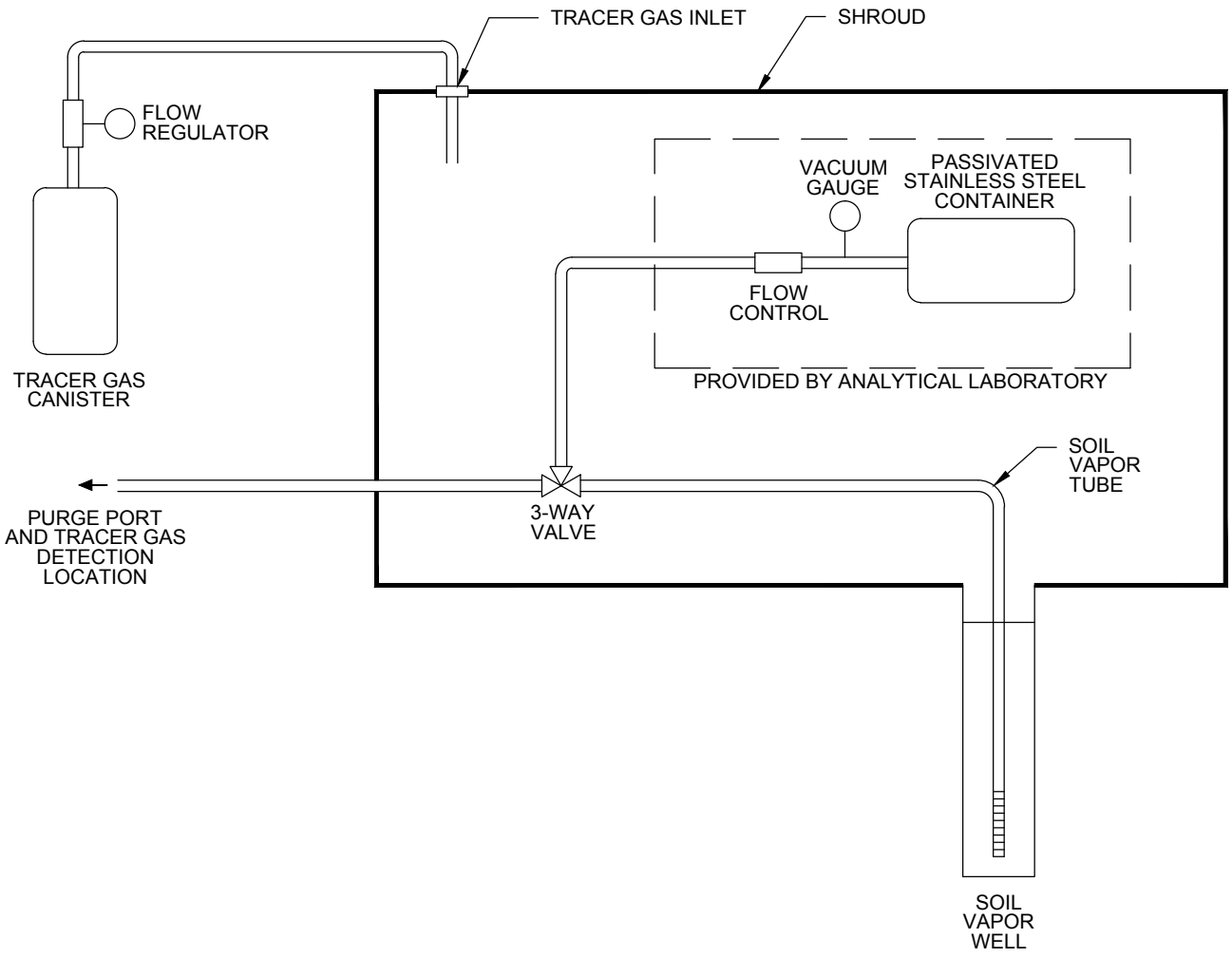


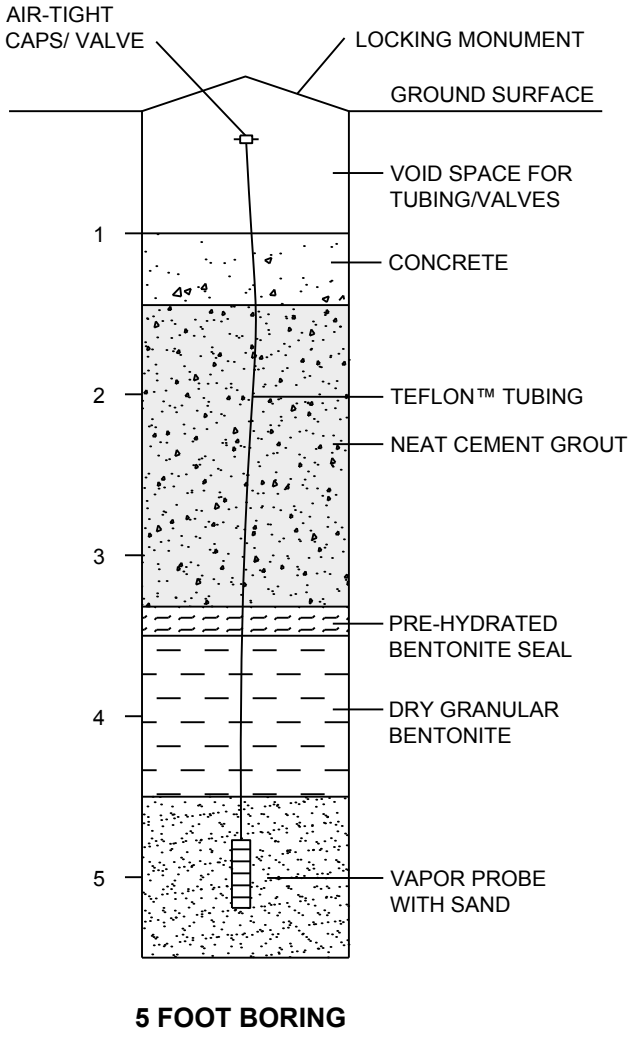
ADAPTED FROM
ACTIVE SOIL INVESTIGATIONS ADVISORY, APRIL 2012

FORMER ARCO STATION No. 4931
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

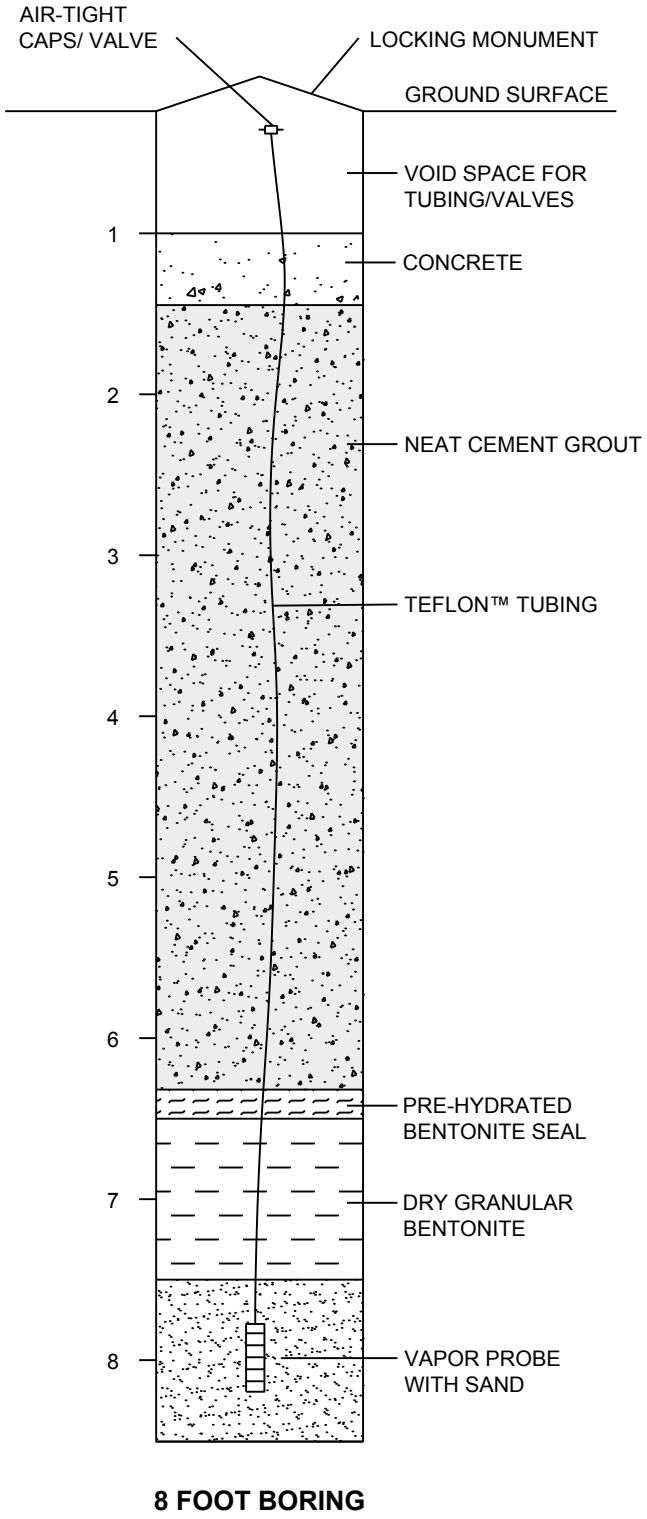
SOIL VAPOR SAMPLING TRAIN SCHEMATIC

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



5 FOOT BORING



8 FOOT BORING

FORMER ARCO STATION No. 4391
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

PROPOSED SOIL VAPOR PROBE SCHEMATIC DIAGRAMS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

APPENDIX A

ACDEH 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 2, 2017

Hollis Phillips
ARCADIS U.S., Inc
100 Montgomery, Suite 300
San Francisco, CA 94104
(Sent via email to: Hollis.Phillips@arcadis-us.com)

Jim Smith
BP Contracts Manager
201 Helios Way, Sixth Floor
Houston, TX, 77079
(Sent via email to: Jim.Smith2@bp.com)

Raj Mulkh & Bhatia Kulwinder, et. al.
Address Unknown

Vintners Distributors, Inc
Address Unknown

Alazani Abdulrahim
27081 Call Avenue
Hayward, CA 94542

Subject: Request for Work Plan; Fuel Leak Case No. RO0000076 and GeoTracker Global ID T0600100110, ARCO #04931, 731 W Macarthur Blvd, Oakland, CA 94609

Dear Responsible Parties:

Alameda County Department of Environmental Health (ACDEH) staff has reviewed the case file including the *Site Investigation and Soil Vapor Sampling Report*, dated December 16, 2016. The report was prepared and submitted by ARCADIS, U.S., Inc. (ARCADIS). The report documented the installation of soil bores SB-08 to SB-11, and the installation of soil vapor well SV-9 to a depth of eight feet below grade surface (bgs), which is approximately five feet below the bottom of the foundation of the adjacent residential house and basement. Soil samples were collected from the 0 to 5 and the 5 to 10 foot depth intervals in all soil bores, from deeper intervals in selected bores, and soil vapor samples were collected from the three soil vapor wells at the site.

ACDEH has evaluated the additional data and recommendations presented in report to determine if the site is eligible for closure as a low risk site under the State Water Resource Control Board's Low Threat Closure Policy (LTCP). Prior to the recent work the remaining Criteria that was not meet at the site was the Media-Specific Criteria for Vapor Intrusion to Indoor Air. The recently collected data has provided some clarification of the risk of vapor intrusion at the immediately adjacent residential home; however, the data has also produced conflicting indicators. Based on the data requirements of the LTCP, the site appears to meet the Vapor Intrusion to Indoor Air Criteria; however, based on the full data set, ACDEH has determined that the site should remain open to resolve the conflicting vapor data, as discussed in more detail below.

Therefore, at this juncture ACDEH requests that you prepare a Data Gap Work Plan that is supported by a focused Site Conceptual Model (SCM) for data collection to address the Technical Comments provided below.

TECHNICAL COMMENTS

1. **LTCP Media Specific Criteria for Vapor Intrusion to Indoor Air** – As requested, data collected during the recent site investigation was largely targeted to determine if the site met the Vapor Intrusion to Indoor Air Criteria of the LTCP. Recently collected soil analytical data documents the presence of at least a 10 foot bioattenuation zone on the site, if not more, with soil Total petroleum Hydrocarbon (TPH) concentrations less than 100 milligrams per kilogram (mg/kg). Previously, insufficient soil analytical data was available to determine the depth of the bioattenuation zone at the eastern upgradient site boundary. Groundwater concentrations adjacent to the eastern boundary with the residence are not well documented but utilizing the only well near the boundary (A-2) that is sampled, the well has historically been nondetect for Total Petroleum Hydrocarbons as gasoline (<50 micrograms per liter [µg/l] TPHg), benzene, and

ethylbenzene (<0.5 µg/l), has yielded only low methyl tert butyl either (MTBE) concentrations (detected but less than 10 µg/l). Thus the site appears to meet Scenario 3 of the vapor intrusion LTCP criteria.

Due to the uncertainty of the bioattenuation zone, (until recently) soil vapor data was also generated during the recent investigation. The data indicates that the site appears to meet Scenario 4a of the vapor intrusion LTCP criteria (no bioattenuation zone); however, does not always met Scenario 4b (bioattenuation zone) of the vapor intrusion LTCP criteria due to oxygen concentrations at less than 4 percent (%) at times in soil vapor well SV-8 (May 2015 sampling event). Please also note that the SV-8 vapor sampling point was not installed to a depth of five feet below the adjacent foundation (due to the presence of a partial basement at the residence). As described in the referenced report, the partial basement is approximately six feet in height, is concrete floored, and extends approximately three feet below grade, while the three foot high concrete foundation allows it to extend approximately three above grade. Recently installed vapor well SV-9 was installed to a depth of eight feet, and is thus approximately five feet below the foundation of the residence.

Utilizing San Francisco Bay Regional Water Quality Control Board (RWCB) Environmental Screening Levels (ESLs) for TPHg vapors which were also collected, site vapor analytical data consistently yield TPHg vapor concentrations above the target residential ESL of 300,000 µg/m^3 (490,000 and 2,200,000 µg/m^3), and had increased substantially between vapor sampling events at SV-8. Again, please note the depth of this vapor point is only two feet below the basement slab depth.

Thus while the site appears to meet some Criterions of the LTCP Vapor Intrusion to Indoor Air Criteria, but has also produced inconsistent shallower data (closer to a potential receptor), ACDEH has determined that the case should remain open to resolve the conflicting data. ACDEH is in agreement that an additional soil vapor sampling event in approximately May 2017 is appropriate. Additionally, to directly address residential exposures and help resolve the conflicting data, it appears appropriate to request either the collection of crawl space and / or basement indoor air samples if allowed, or the collection of offsite data in close proximity of the residence, to determine if the additional horizontal separation from the site is sufficient to provide additional vapor concentration reductions from contamination remaining at the site. The data will provide a level of comfort that the residents are protected from the potential of vapor intrusion at shallower depths. Thus ACDEH requests that you prepare a Data Gap Work Plan that is supported by a focused Site Conceptual Model (SCM) for data collection to address these Technical Comments. It may be useful to include either contingency or option in the work plan to accommodate potential changes based on the input from offsite residents or owners without significant further review. Please submit a Data Gap Work Plan by the date identified below.

TECHNICAL REPORT REQUEST

Please upload technical reports to the ACDEH ftp site (Attention: Mark Detterman), 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 12, 2017 – Data Gap Work Plan**
  File to be named: WP_R_yyyy-mm-dd

- **October 27, 2017 - 2017 Annual Groundwater Monitoring Event**
  File to be named: GWM_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. If your email address does not appear on the cover page of this notification, ACDEH is requesting you provide your email address so that we can correspond with you quickly and efficiently regarding your case.

Thank you for your cooperation. ACDEH looks forward to working with you and your consultants to advance the case toward closure. If you have any questions, please call me at (510) 567-6876 or send me an electronic mail message at mark.detterman@acgov.org.

Sincerely,

Mark E. Detterman, PG, CEG
Senior Hazardous Materials Specialist

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

cc: Dilan Roe, ACDEH, (Sent via electronic mail to: dilan.roe@acgov.org)
Paresh Khatri, ACDEH; (Sent via electronic mail to: paresh.khatri@acgov.org)
Mark Detterman, ACDEH (Sent via electronic mail to: mark.detterman@acgov.org)
Electronic File

Arcadis U.S., Inc.

100 Montgomery Street

Suite 300

San Francisco, California 94104

Tel 415 374 2744

Fax 415 374 2745

www.arcadis.com