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January 13, 2017

Alameda County Health Care Services Agency
Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RECEIVED
By Alameda County Environmental Health 3:36 pm, Jan 13, 2017

Re: 76 Station No. 0746 (351647)
Soil Vapor Investigation Work Plan
3943 Broadway, Oakland, California
Fuel Leak Case No.: RO0000203
GeoTracker Global ID #T0600101471

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.

The information in this report is accurate to the best of my knowledge. This report was prepared by Arcadis, upon whose assistance and advice I have relied.

Sincerely,

James P. Kiernan, P.E.
Project Manager

Attachment: Soil Vapor Investigation Work Plan by Arcadis

ARCADIS Design & Consultancy for natural and built assets

Chevron Environmental Management Company

SOIL VAPOR INVESTIGATION WORK PLAN

Unocal Service Station No. 0746
3943 Broadway
Oakland, California
Case No: RO0000203

January 13, 2017

Soil Vapor Investigation Work Plan

Prepared for:

Unocal Service Station 0746

3943 Broadway

Oakland, CA

Case No.: RO0000203

Prepared for:

Chevron Environmental Management Company

Prepared by:

Arcadis U.S., Inc.

2999 Oak Road

Suite 300

Walnut Creek

California 94597

Tel 925 274 1100

Fax 925 274 1103

Our Ref.:

B0035135.1647.16002

Date:

January 13, 2017

Cameron McGovern

Environmental Scientist

Tamera Rogers

Project Manager

Katherine Brandt, P.G. (No. 9132)

Senior Geologist

CONTENTS

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

1,2-DCA	1,2-dichloroethane
ACDEH	Alameda County Department of Environmental Health
ACPWA	Alameda County Public Works Agency
Arcadis	Arcadis U.S., Inc.
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
btoc	below top of casing
CEMC	Chevron Environmental Management Company
COPC	constituents-of-potential concern
DIPE	di-isopropyl ether
DTSC	Department of Toxic Substances Control
EDB	1,2-dibromoethane
ETBE	ethyl tert-butyl ether
GRO	gasoline range organics
HASP	Health and Safety Plan
LTC Policy	Low-Threat Underground Storage Tank Case Closure Policy
LPH	liquid phase hydrocarbon
MTBE	Methyl tert-butyl ether
mL/min	milliliter per minute
PID	Photo-ionization detector
QA/QC	Quality Assurance and Quality Control
Site	Former Unocal Service Station 0746, located at 3943 Broadway, Oakland, California 94611
SWRCB	State Water Resources Control Board
TAME	tert-amyl-methyl ether
TBA	tert-butyl alcohol
USA-North	Underground Service Alert

USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound

1 INTRODUCTION

On behalf of Chevron Environmental Management Company's (CEMC's) affiliate, Union Oil Company of California (Union Oil), Arcadis U.S., Inc. (Arcadis) has prepared this *Soil Vapor Investigation Work Plan* (work plan) for Unocal service station No. 0746, located at 3943 Broadway in Oakland, California (the "Site") (Figure 1). The purpose of this work plan is to describe the approach that will be used to collect analytical data to evaluate potential petroleum hydrocarbon vapor intrusion concerns for offsite receptors. The work plan was requested by Alameda County Department of Environmental Health (ACDEH) in the November 10, 2016 technical comments on the October 14, 2016 *Updated Site Conceptual Model* ([SCM] Arcadis 2016) regarding possible vapor intrusion as it relates to the 2012 State Water Resources Control Board (SWRCB) Low Threat Closure (LTC) Policy (Appendix A).

1.1 Site Description

The Site is an operating 76-branded gas station located on the southwest corner of the intersection of Broadway and 40th Street in a mixed commercial and residential area (Figure 1). Station features currently include two 12,000-gallon double-walled Glasteel gasoline underground storage tanks (USTs), one 520-gallon waste oil UST, one station building including a service bay, one car wash building, and two product dispenser islands (Figure 2). The Site is bounded by 40th Street to the northeast, Manila Avenue to the northwest, commercial and residential properties to the southwest, and Broadway to the southeast.

Based on historical aerial photographs, the Site has been occupied by a service station with the current configuration since at least 1980. Based on available facility plans, the Union Oil station appears to have been constructed in 1967. The site also appears to have previously been occupied by a service station in a different configuration based on aerial photographs dated 1946 and 1958.

The nearest sensitive receptors are the Duck's Nest Preschool, which is located approximately 750 feet northeast and hydraulically upgradient from the site, and the Oakland Medical Center, which is located approximately 800 feet southeast and hydraulically cross-gradient from the Site.

1.2 Regional and Site-Specific Geology and Hydrogeology

The Site is located in the East Bay Plain Subbasin of the Santa Clara Valley Groundwater Basin (U.S. Geological Survey [USGS] 2006). The Site is underlain by Holocene (400 feet below ground surface [bgs] in the central portion of the basin) and Pleistocene-age eolian sand deposits (400 to 4,000 feet bgs in the central portion of the basin) referred to as the Merrit Sand. The Merrit Sand is described as typically

consisting of fine-grained, very well-sorted, well-drained eolian sand, interfingering with Holocene Bay Mud. The sand deposits can extend to a depth of approximately 50 feet bgs in the Oakland area (USGS 2000). Soil beneath the Site predominantly is comprised of alternating layers of silt and clay.

Based on previous investigations, the Site is underlain by fill material ranging from 2 to 4 feet in thickness. Beneath the fill, soils are primarily comprised of interlayered clayey/silty deposits and silty/clayey sand. A continuous sand layer extends from approximately 6 to 12 feet bgs. A deeper saturated sand layer extends from 14 to 16 feet bgs. Shallow groundwater beneath the Site is considered to be semi-confined. Monitoring wells are typically screened into both the 6- to 12-foot and 14- to 16-foot-bgs sand layers with the exception of RW-1 which is screened from 5 to15 feet bgs where the sandy layers occur at 10 to13 feet bgs.

Twelve groundwater monitoring wells and one remediation well are present at the Site (MW-1 through MW-12 and RW-1). Historically, the depth to groundwater at the Site has ranged from approximately 3.61 to 15.79 feet below top of casing (btoc), with both depths recorded in June 2011. The most recent monitoring and sampling event at the Site was completed in June 2016; during this event the measured depth to groundwater ranged from 7.91 feet btoc (onsite well MW-6) to 13.58 feet btoc (offsite well MW-10). Historical groundwater flow direction has been to the southwest, with gradients ranging from 0.05 to 0.01 foot per foot. During the June 2016 event, the calculated groundwater flow direction was to the southwest at a gradient of approximately 0.01 foot per foot (Arcadis 2016).

As mentioned above, shallow groundwater is considered semi-confined. Groundwater was first encountered in the well and exploratory borings at depths ranging from 10.5 to 20 feet bgs; but generally, between 11 and 13 feet bgs.

2 PROPOSED SCOPE OF WORK

To evaluate potential offsite vapor intrusion concerns, Arcadis proposes the following scope of work:

- Install and sample three (3) dual-nested, multilevel soil vapor probes (VP-1 through VP-3) set at approximately 5 feet bgs and 8 feet bgs (deeper probe not proposed at 10 feet bgs due to shallow groundwater).

Figure 2 shows the proposed locations of the three soil vapor probes. The proposed locations may be modified depending on surface and aboveground obstructions, overhead and underground utilities, accessibility, or other possible safety concerns. Note that at this time, we do not have access to the offsite property. Therefore, depending on the timing of the investigation and the status of the access negotiations, VP-3 may or may not be able to be installed concurrently with VP-1 and VP-2.

2.1 Health and Safety, Permitting, and Utility Clearance

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. The utility survey will include identifying the probe locations 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. Additionally, a private third-party utility locator will screen the proposed locations to determine the location(s) of nearby underground utilities.

2.2 Soil Vapor Probe Installation and Completions

In order to assess the potential for vapor migration of volatile petroleum hydrocarbon constituents into the indoor air of the adjacent offsite building, Arcadis proposes to install two onsite (VP-1 and VP-2) and one offsite (VP-3) permanent multilevel soil vapor probes. Soil vapor probe VP-1 will be installed in the area of the former used oil tank and to the southwest of monitoring well MW-2. Soil vapor probe VP-2 will be installed northwest of monitoring well MW-5 and outside of the onsite trash enclosure. Offsite soil vapor probe VP-3 is proposed to be installed near the southeast corner of the Ohgane Korean BBQ Restaurant building, south-southwest of monitoring well MW-5.

The proposed locations of vapor probes VP-1 and VP-2 were selected based on historical detections of constituents of potential concern (COPCs), such as benzene, toluene, ethylbenzene and xylenes (BTEX), detected in groundwater that may be associated with the USTs and dispenser islands toward the north and northeast. The location of vapor probe VP-3 was selected to serve as a downgradient point of the general groundwater flow direction of the Site. The approximate proposed locations of soil vapor probes VP-1, VP-2, and VP-3 are shown on Figure 2. Note that the vapor probe locations are subject to change in the field based on accessibility, maneuverability, or safety issues.

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, which is anticipated to be approximately 8 feet bgs. The total depth of the deeper probe may change based on observed field conditions and moisture content of encountered soil.

2.2.1 Soil Sampling and Laboratory Analysis

Soils encountered in the probe borings will be logged continuously for lithologic properties including soil type, color, and moisture content. In addition, observations will be noted regarding observed odor, staining, and relative volatile organic compound (VOC) concentrations as measured with a photoionization detector (PID). All soil samples will be logged by experienced field personnel, under the supervision of a California Professional Geologist. As the standard hand auger bucket is 6 inches in length, soil from the ground surface to immediately above the water table will be retrieved from the subsurface in 6 inch intervals and be thoroughly examined and logged for stratigraphic characteristics.

Up to three soil samples are planned to be collected from each soil boring for analytical testing. Generally, soil samples will be collected from intervals that exhibit the most significant indications of petroleum hydrocarbon impacts based on odor, elevated PID readings, staining, or other evidence. At least one soil sample will be collected in the interval from 0 to 5 feet bgs, at 5 feet bgs, and at 8 feet bgs, based on criteria presented in the LTC Policy for direct contact, outdoor air exposure and to assess characteristics of the bioattenuation zone (SWRCB 2012). Soil samples may also be collected from the bottom of each boring just above the water table to assess the vertical extent of COPC-affected soils. Additional soil samples may be collected as necessary based on field observations.

Samples will be collected for laboratory analyses in accordance with United States Environmental Protection Agency (USEPA) Method 5035/5035A, which includes the placement of soil into EnCore samplers or TerraCore vials (two with sodium bisulfate; one with methanol), or equivalent coring sampler, from each sampled location.

Soil samples will be sealed, labeled, and placed in an ice-chilled cooler for delivery to a California Department of Public Health-certified analytical laboratory, under proper chain of custody procedures. Soil samples will be analyzed for the following:

- Gasoline Range Organics (GRO;C_6-C_{12}) using USEPA Method 8015 Modified;
- BTEX using USEPA Method 8260B.
- Di-isopropyl ether (DIPE), ethyl tert-butyl ether (ETBE), methyl tert-butyl ether (MTBE), tert-amyl-methyl ether (TAME), tert-butyl alcohol (TBA), 1,2-dichloroethane (1,2-DCA), 1,2-dibromoethane (EDB), and ethanol by USEPA Method 8260B.
- Naphthalene by USEPA Method 8260B.

2.2.2 Construction of Soil Vapor Probes

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 probes is shown on Figure 3.

2.3 Soil Vapor Sampling

Due to the introduction of atmospheric oxygen into the vadose zone during soil vapor probe installation, an equilibration time is required to allow the sand pack and tubing to equilibrate with the subsurface prior to sampling. Prior to sampling, a minimum of 72 hours will be allowed for equilibration following soil vapor probe installation.

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 gas 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 gas samples are collected after the soil gas well has equilibrated (DTSC 2015). A schematic drawing for the proposed soil vapor sampling train is shown on Figure 4.

2.3.1 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).

2.3.2 Leak Tests

A leak test will be used to evaluate whether any significant ambient air is introduced into the soil gas 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 gas probe each time a soil gas 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.

2.3.3 Purging

Purging will consist of removing approximately three volumes of stagnant soil gas 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.

2.3.4 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 gas 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 gas 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.

2.4 Decontamination

All down-hole drilling and sampling equipment will be steam-cleaned prior to deployment and following the completion of the sampling location. Decontamination of non-dedicated or non-disposable field equipment will be conducted using Alconox ® solution and deionized water rinse to prevent potential cross-contamination.

2.5 Investigation Derived Waste Disposal

Soil cuttings and purge/rinse water generated during drilling operations will be contained in 55-gallon drums and temporarily stored onsite pending characterization and disposal. A composite soil sample of investigation derived waste will be collected for waste profiling purposes. Following the receipt of waste characterization sampling results, all investigation derived waste will be transported to an appropriate disposal and treatment facility.

2.6 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 and associated permits. As previously discussed, currently we do not have access to the offsite property for the installation of VP-3. Depending on the timing of the investigation and the status of the access negotiations, this probe may not be able to be installed concurrently. Implementation schedules for the field work will be dependent on the availability of an ACPWA inspector. If ACDEH has significant comments or requires a change to the scope of work outlined in this work plan, please provide direction prior to the start of scheduled activities.

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 soil vapor probe locations, documentation of soil vapor 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 SWRCB 2012 LTC Policy to evaluate the potential for vapor migration into the adjacent offsite building and support risk-based decision making for the Site. Detected concentrations of other petroleum hydrocarbon constituents will be discussed qualitatively. Finally, conclusions and recommendations relevant to the assessment objectives will be presented.

4 REFERENCES

ACDEH. 2016. Subject: Work Plan Request; Fuel Leak Case No. RO0000203 and GeoTracker Global ID T0600101471, Unocal #0746, 3943 Broadway, Oakland, CA 94611. November 10.

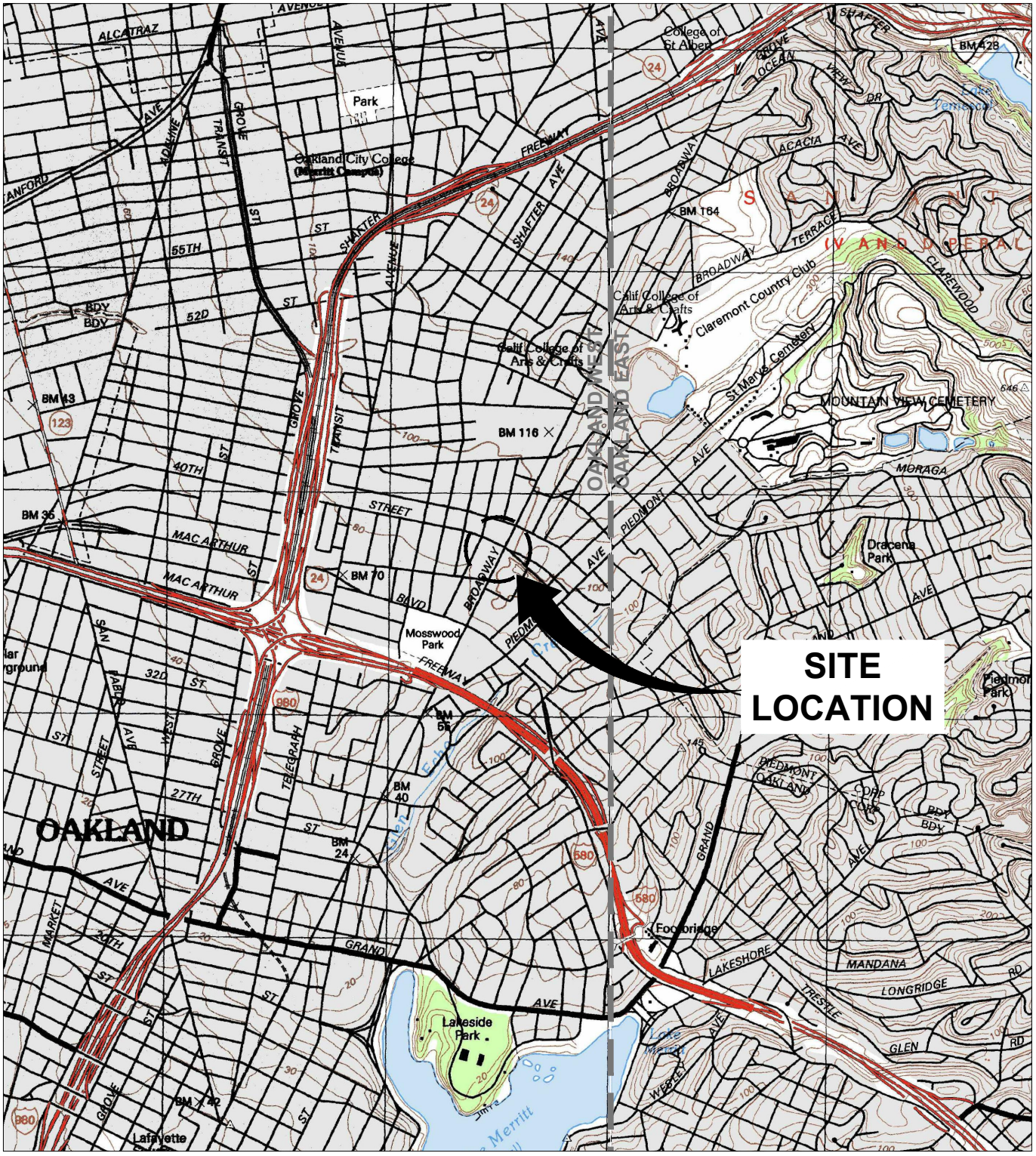
Arcadis, U.S., Inc. (Arcadis). Response to Comments and Updated Site Conceptual Model, Unocal Station No. 0746, 3943 Broadway, Oakland, California. October 14.

Department of Toxic Substances Control (DTSC). 2015. Advisory- Active Soil Gas Investigations. July.

United States Geological Survey. 2000. R.W. Graymer. Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California.

United States Geological Survey. 2006. R.D. Catchings, J.W. Borchers, M.R. Goldman, G. Gandhok, D.A. Ponce, and C.E. Steedman. Subsurface Structure of the East Bay Plain Ground-Water Basin: San Francisco Bay to the Hayward Fault, Alameda County, California.

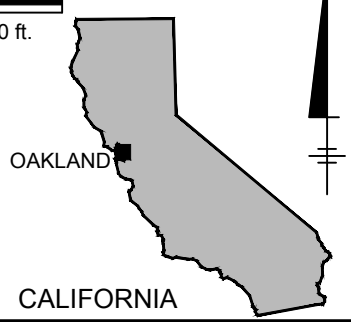
FIGURES



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., OAKLAND WEST, CALIFORNIA, 1993, AND OAKLAND EAST, CALIFORNIA, 1997.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



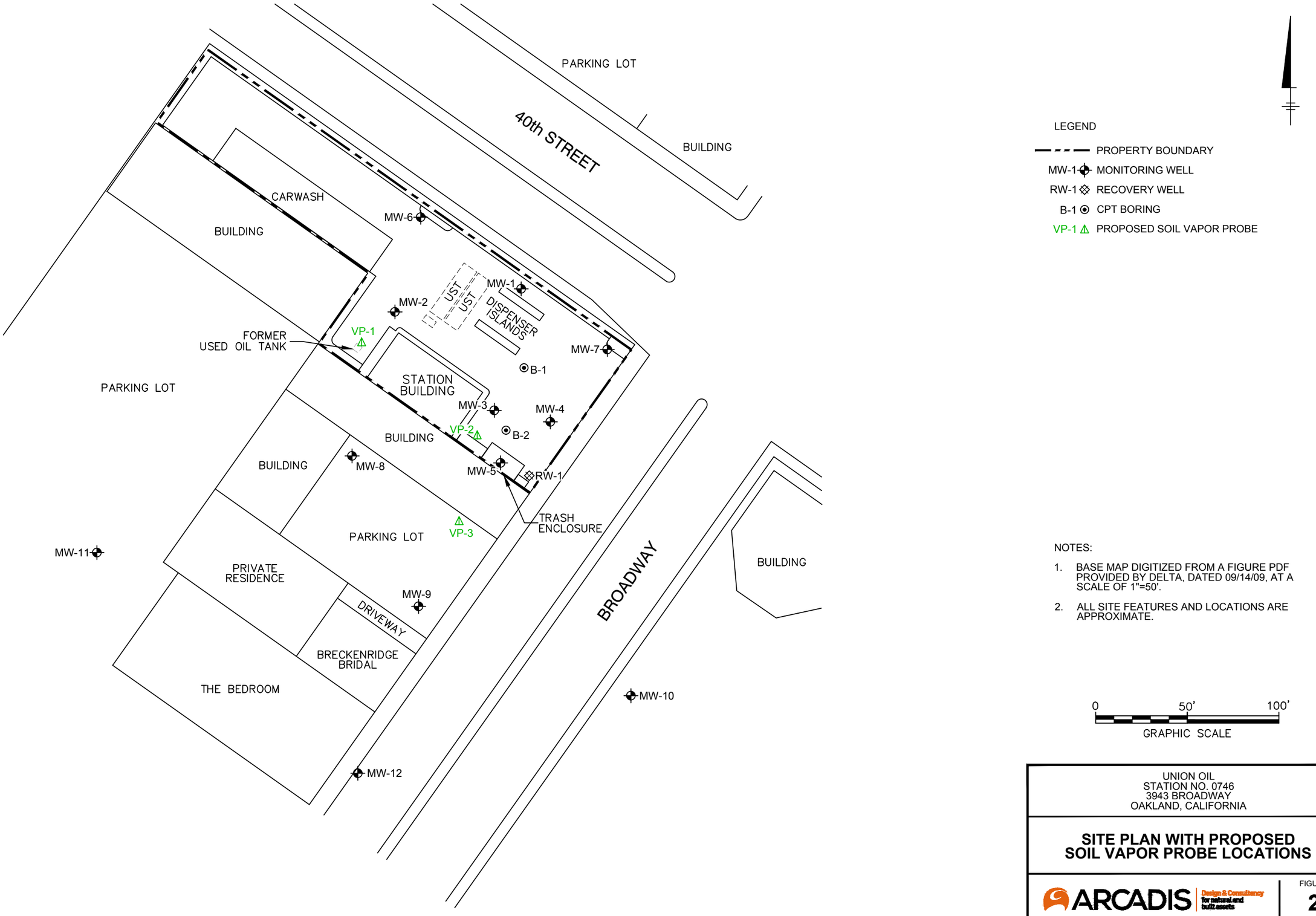
UNION OIL
STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

CITY: SAN RAFAEL, CA DIV/GROUP: ENV DB: J. HARRIS
G:\ENVCAD\San Rafael\ACTIVE\00473381\2015\GWR01\DWG\473381N01.dwg LAYOUT: 1 SAVED: 6/28/2012 12:24 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 9/22/2016 4:05 PM BY: HARRIS, JESSICA
XREFS: IMAGES: PROJECTNAME: ---
Oakland East.jpg
Oakland West.jpg



NOTES:

1. BASE MAP DIGITIZED FROM A FIGURE PDF PROVIDED BY DELTA, DATED 09/14/09, AT A SCALE OF 1"=50'.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

0 50' 100'

GRAPHIC SCALE

UNION OIL
STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

SITE PLAN WITH PROPOSED SOIL VAPOR PROBE LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

CITY: SAN RAFAEL, CA DIV/GROUP: ENVCAD DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\B0035135\1647\160620\DWG\35135164 7B01.dwg LAYOUT: 2 SAVED: 12/15/2016 4:51 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ----
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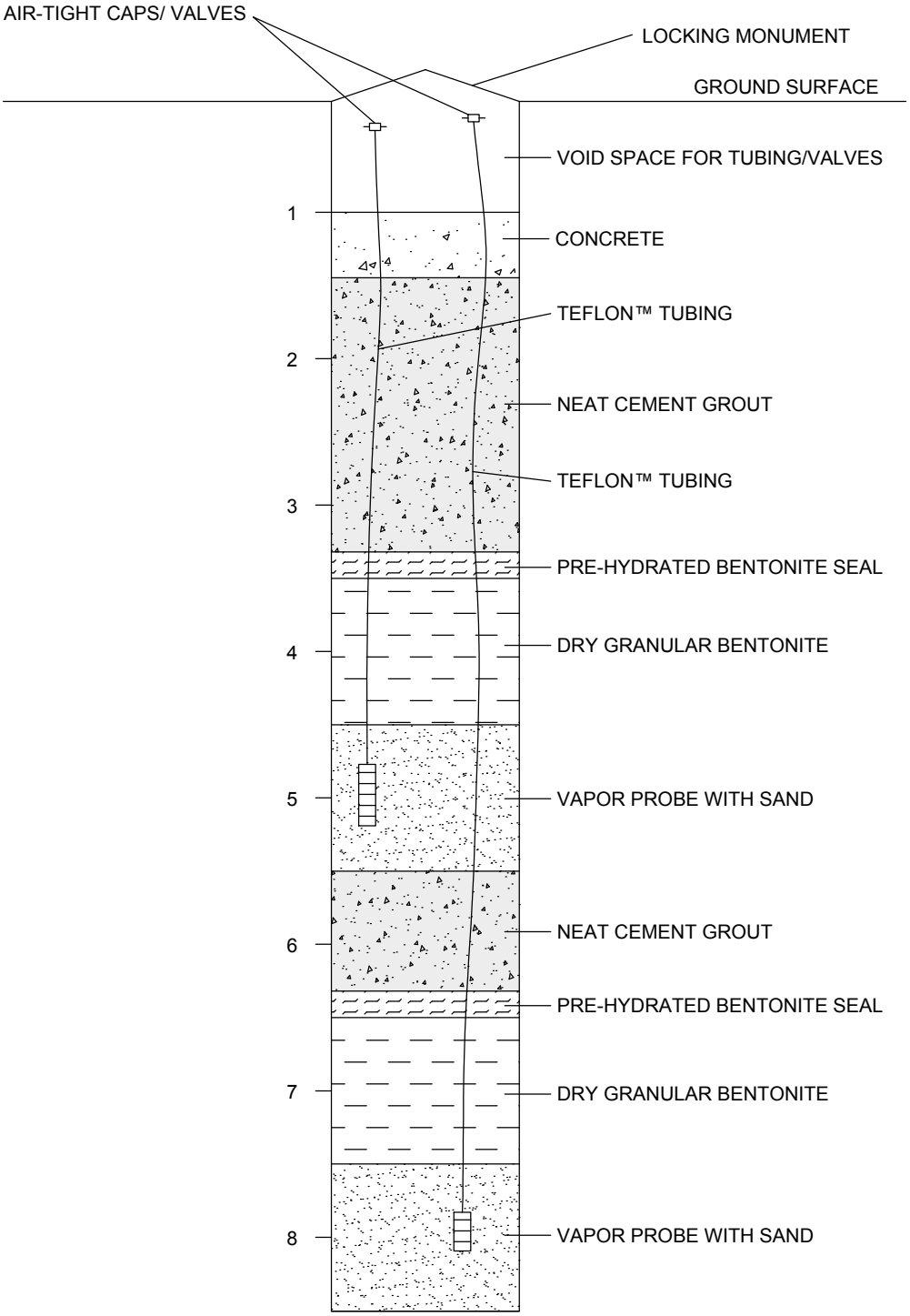
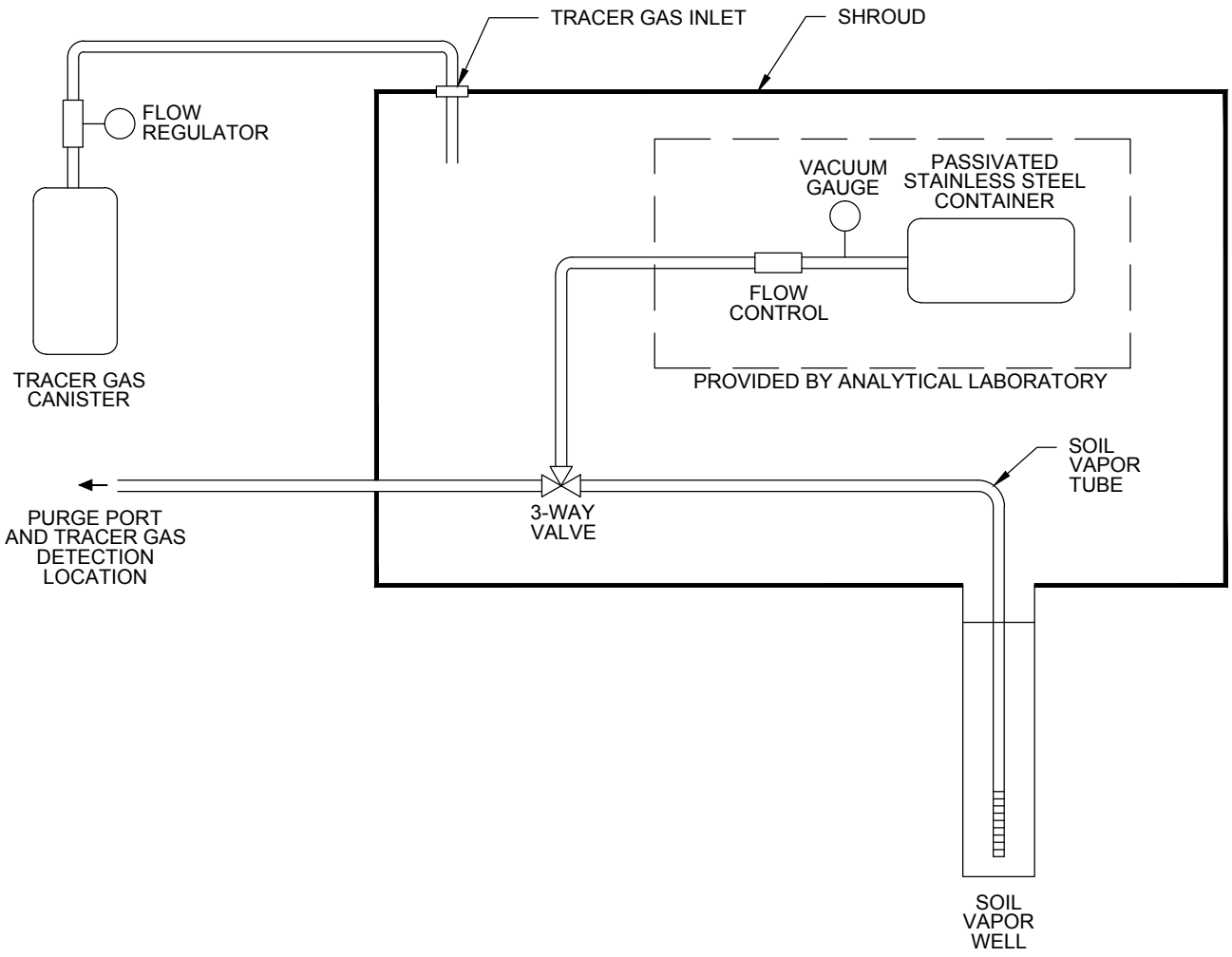


UNION OIL
STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

PROPOSED SOIL VAPOR PROBE SCHEMATIC DIAGRAM

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



ADAPTED FROM
ACTIVE SOIL INVESTIGATIONS ADVISORY, APRIL 2012

UNION OIL
STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

SOIL VAPOR SAMPLING TRAIN SCHEMATIC

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

November 10, 2016

Union Oil Company of California, a Chevron affiliate
Dba Chevron Environmental Management Company
6101 Bollinger Canyon Road
San Ramon, CA 94583
Attn.: James Kiernan
(*Sent via electronic mail to: jkiernan@chevron.com*)

Phillips 66
76 Broadway
Sacramento, CA 95818
Attn.: Ed Ralston (*Sent via electronic mail to: Ed.C.Ralston@p66.com*)

Broadway Union #0746
Dba Broadway Union 76, Inc.
3943 Broadway
Oakland, CA 94611
Attn.: Clement K. Leung
(Sent via electronic mail to: broadwayunion76@yahoo.com)

CJS Leung, LLC
C/o Clement Leung
3943 Broadway
Oakland, CA 94611

Clover Trust 1997-1
C/o Circle R Co #U-0746
Address Unknown

Suncor Holdings COP II LLC
Address Unknown

Subject: Work Plan Request, Fuel Leak Case No. RO0000203 and GeoTracker Global ID T0600101471, Unocal #0746, 3943 Broadway, Oakland, CA 94611

Dear Responsible Parties:

Alameda County Department of Environmental Health (ACDEH) has reviewed the case file for the subject site including the document entitled *Response to Comments and Updated Site Conceptual Model* (SCM) dated October 14, 2016 and prepared by Arcadis U.S. Inc. (Arcadis) for the subject site. The SCM was prepared at the request of ACDEH in our letter dated July 1, 2016. The SCM was prepared in conjunction with the State Water Resources Control Board's (SWRCB's) Low Threat Underground Storage Tank Case Closure Policy (LTCP) and addresses several data gaps identified in our letter which have been incorporated in the updated site conceptual model portion of the document.

Additionally, the SCM includes a summary outline of correspondences requested by ACDEH which document attempts to gain access to off-site groundwater monitoring wells MW-8 and MW-9.

Based on the information provided in the SCM, Arcadis is of the opinion that the site meets the eight (8) General and the three (3) Media-Specific Criteria of the LTCP and requests the site be considered for low-threat closure.

ACDEH notes that SCM states approximately 1.04 gallons of free product as light non-aqueous phase petroleum hydrocarbons (LNAPL) were removed from monitoring well MW-5 between January and March (inclusive), 2016 using absorbent socks. As ongoing attempts at free product removal have been successful at removing measurable free product, ACDEH is of the opinion free product has not been removed to the extent practicable. Therefore, LTCP General Criteria d has not been met.

Additionally, as free product well MW-5 is situated along the downgradient property boundary, ACDEH is of the opinion free product extends off-site with regard to the Groundwater Media Specific Criteria.

Based on the reported groundwater flow and distribution of wells, ACDEH is of the opinion the contaminant plume may not be captured by the wells currently sampled in the well network. By including wells MW-8 and MW-9 in the network of wells actively sampled, information may be gained that could aid in making a determination of plume length in addition to plume direction. Without the inclusion of wells MW-8 and MW-9 in the active sampling network, ACDEH is of the opinion the plume has not been defined and does not meet the Groundwater Media Specific Criteria. Therefore, ACDEH will work to gain access to the off-site wells MW-8 and MW-9.

ACDEH is in agreement that, as an active fueling station, the site does not need to meet the Petroleum Vapor Intrusion to Indoor Air Media Specific (VI-IA) Criteria. As indicated above however, monitoring well MW-5, located adjacent to the southern property line, continues to exhibit free product. MW-5 is also located adjacent to a commercial building situated on the down gradient side of the site. Therefore, it is unclear to ACDEH that the VI-IA Criteria is met for off-site receptors. Additionally, as proposed in the SCM, Arcadis plans to a conduct soil vapor investigation to determine if there are any potential vapor intrusion concerns for off-site receptors. Hence, it appears that Arcadis is in agreement with ACDEH that the VI-IA Media Specific Criteria has not been met.

As indicated above, ACDEH does not agree with the LTCP assessment provided by Arcadis in the SCM and requests that you address the following technical comments and submit the requested work plan by the date provided below.

TECHNICAL COMMENTS

1. **Off-Site Access** – ACDEH requests that you continue with your negotiation attempts for gaining access to off-site wells MW-8 and MW-9. To facilitate access, ACDEH will prepare and present a letter addressed to the property owner requesting access to the wells. ACDEH is also willing to schedule a meeting with the parties to facilitate resolution of access impediments.

2. **Free Product Removal** – ACDEH requests continued monthly free product monitoring of well MW-5. Please include the reporting of product removal in the semi-annual groundwater monitoring reports requested below.

3. **Soil Gas Investigation** – Please prepare a work plan to investigate the down gradient off-site vapor intrusion risk in accordance with the document entitled *Final- Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance)* prepared by Cal/EPA, dated October 2011.

   ACDEH requests that you include contingency on-site sampling locations in the event that off-site access is not available. Please conduct the on-site soil gas investigation in accordance with the July 2015 *Advisory- Active Soil Gas Investigations* prepared by California Environmental Protection Agency/ Department of Toxic Substances Control (Cal EPA / DTSC), and the Regional Water Quality Control Boards of the Los Angeles (LARWQCB) and San Francisco (SFRWQCB) regions.

   ACDEH requests the work plan be prepared in conjunction with the LTCP regardless of the on-site or off-site sampling scenarios.

TECHNICAL REPORT REQUEST

Please upload technical reports to the ACDEH ftp site (Attention: Keith Nowell) and the SWRCB's GeoTracker website in accordance with the following specified file naming convention and schedule:

- **January 13, 2017** – Vapor Intrusion Investigation Work Plan- (file to be named: RO0000203_WP_R_yyyy-mm-dd)

- **January 31, 2017** – Fourth Quarter Semi-annual Groundwater Monitoring Report- (file to be named: RO0000203_GWM_R_yyyy-mm-dd)
- **July 31, 2017** – Second Quarter Semi-annual Groundwater Monitoring Report- (file to be named: RO0000203_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.

Thank you for your cooperation. ACDEH looks forward to working with you and your consultants to advance the case toward closure. Should you have any questions regarding this correspondence or your case, please call me at (510) 567-6764 or send an electronic mail message at keith.nowell@acgov.org.

Sincerely,

Keith Nowell

Digitally signed by Keith Nowell
DN: cn=Keith Nowell, o=Alameda County, ou=Department of Environmental Health, email=keith.nowell@acgov.org, c=US
Date: 2016.11.10 14:59:14 -08'00'

Keith Nowell, PG, CHG
Hazardous Materials Specialist

Enclosures: Attachment 1 – Responsible Party (ies) Legal Requirements

Cc: Tamera Rogers, Arcadis U.S. Inc., 6296 San Ignacio Ave, Suite C & D, San Jose, CA, 95119 (*Sent via electronic mail to: tamera.rogers@arcadis.com*)

Dilan Roe, ACDEH (*Sent via electronic mail to: dilan.roe@acgov.org*)
Paresh Khatri, ACDEH (*Sent via electronic mail to: paresh.khatri@acgov.org*)
Keith Nowell, ACDEH, (*Sent via electronic mail to keith.nowell@acgov.org*)

GeoTracker, file

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STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER ESI

UPLOADING A GEO_REPORT FILE

SUCCESS

Your GEO_REPORT file has been successfully submitted!

Submittal Type:	**GEO_REPORT**
Report Title:	**SOIL VAPOR INVESTIGATION WORK PLAN**
Report Type:	**Soil Vapor Intrusion Investigation Report**
Report Date:	**1/13/2017**
Facility Global ID:	**T0600101471**
Facility Name:	**UNOCAL #0746**
File Name:	**351647 - Soil Vapor INV WP FIN 01132017-signed.pdf**
Organization Name:	**ARCADIS**
Username:	**ARCADIS76**
IP Address:	**8.39.233.205**
Submittal Date/Time:	**1/13/2017 2:08:49 PM**
Confirmation Number:	**3855125129**