ExxonMobil
Environmental Services Company
4096 Piedmont Avenue #194
Oakland, California 94611
510 547 8196 Telephone
510 547 8706 Facsimile

Jennifer C. Sedlachek
Project Manager

RECEIVED
By Alameda County Environmental Health at 3:57 pm, Dec 18, 2013

December 12, 2013

Ms. Karel Detterman
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Room 250
Alameda, California 94502-6577

RE: Former Mobil RAS #99105/6301 San Pablo Avenue, Oakland, California.

Dear Ms. Detterman:

Attached for your review and comment is a copy of the letter report entitled ***Second Addendum to Corrective Action Plan,*** dated December 12, 2013, for the above-referenced site. The report was prepared by Cardno ERI of Petaluma, California, and details activities at the subject site.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

If you have any questions or comments, please contact me at 510.547.8196.

Sincerely,

Jennifer C. Sedlachek
Project Manager

Attachment: Cardno ERI's ***Second Addendum to Corrective Action Plan,*** dated December 12, 2013

cc: w/ attachment
Mr. Leroy Griffin, Oakland Fire Department
Messrs. On Dan and Nathan Lam

w/o attachment
Ms. Rebekah A. Westrup, Cardno ERI

Cardno ERI
Shaping the Future

Cardno ERI
License A/C10/C36-611383

601 North McDowell Blvd.
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December 12, 2013
Cardno ERI 2783C.W02

Ms. Jennifer C. Sedlachek
ExxonMobil Environmental Services
4096 Piedmont Avenue #194
Oakland, California 94611

SUBJECT **Second Addendum to Corrective Action Plan**
Former Mobil Service Station 99105
6301 San Pablo Avenue, Oakland, California

Ms. Sedlachek:

At the request of ExxonMobil Environmental Services (EMES), on behalf of ExxonMobil Oil Corporation, Cardno ERI prepared this report for the subject site (Plate 1). Cardno ERI previously submitted the *Site Conceptual Model Update, Low-Threat Closure Evaluation, and Feasibility Study/Corrective Action Plan* (CAP), dated October 25, 2012, and *Corrective Action Plan Addendum* (CAP Addendum), dated September 24, 2013, proposing similar scopes of work (Cardno ERI, 2012; 2013). In both the CAP and CAP Addendum, Cardno ERI proposed installing groundwater monitoring well MW6 east of former well MW4 (in the vicinity of the former dispenser islands) and performing dual-phase extraction from existing well MW5 and proposed well MW6 to remediate hydrocarbon concentrations. The Alameda County Health Care Services (ACEH) approved the proposed work and requested an additional work plan to outline the strategy and schedule for performance monitoring in both groundwater and soil vapor in a letter dated September 24, 2013 (Appendix A). In electronic correspondence, the ACEH granted an extension for the due date of this document to December 15, 2013. Cardno ERI proposes to perform the previously approved work as well as install two additional groundwater monitoring wells.

SITE DESCRIPTION

The site (Assessor's Parcel Number 16-1455-10) is located at 6301 San Pablo Avenue, on the northwest corner of San Pablo Avenue and 63rd Street, in Oakland, California, as shown in the Site Vicinity Map (Plate 1). The site was operated as a Mobil service station from 1951 to 1980, then used as a rental car lot, and is currently an automobile oil change facility. Four 2,000-gallon gasoline USTs and one 350-gallon used-oil UST were present on the property. The tanks were not used after 1980 and were removed in 1994. The locations of the former USTs, former dispenser islands, groundwater monitoring wells, and select site features are shown on the Generalized Site Plan (Plate 2).

The site is at an elevation of approximately 42 feet above msl. Properties in the vicinity of the site are occupied by mixed use residential and commercial developments. An elementary school is located across San Pablo Avenue to the east and residential properties are located to the west and south of the site (Plate 2). The Saint Paul Primitive Baptist Church is located adjacent to the site to the southwest.

Additional information on the site geology, hydrogeology, and previous work is presented in the CAP and CAP Addendum (Cardno ERI, 2012; 2013).

PROPOSED WORK

To progress the site to closure, Cardno ERI proposes to install three additional wells (MW6 through MW8) and use a mobile DPE remediation system to extract soil vapor and groundwater from wells MW5 and proposed well MW6. In response to the ACEH's request to install additional wells downgradient of extraction wells MW5 and proposed well MW6, Cardno ERI proposes to install two wells (MW7 and MW8). Well MW7 will be located downgradient of well MW5 in the vicinity of boring AB12. Well MW8 will be located downgradient of vapor well VW4 and proposed well MW6. In addition, the location of proposed well MW6 has been adjusted to confirm current conditions near borings AB3 and AB4.

Pre-Drilling Activities

Prior to the onset of drilling, a well installation permit will be obtained from the Alameda County Public Works Agency. Cardno ERI personnel will visit the site to check for obstructions and to mark the proposed location. Underground Service Alert will be notified at least 48 hours prior to the onsite of field activities. Prior to drilling, the locations will be excavated with air, water, and hand tools to a depth of 4 to 8 feet bgs in accordance with EMES protocols. The procedures for well installation are described in the field protocols presented in Appendix B.

Well Installation and Sampling Activities

Though the location of proposed well MW6 has been moved, the well will be installed and constructed as previously proposed and approved (Cardno ERI, 2012; 2013). Proposed wells MW7 and MW8 will be sampled continuously from 5 feet bgs across the anticipated screened intervals to total depth for geological logging purposes. Select soil samples will be submitted for laboratory analysis.

Well MW7 will be constructed using 2-inch diameter, Schedule 40 PVC. Well MW8 will be constructed using 4-inch diameter, schedule 40 PVC. Both wells will be constructed with a screen approximately 10 feet in length, positioned during well installation in the zone of maximum residual hydrocarbon concentrations and across first-encountered groundwater. The locations of proposed wells MW6 through MW8 are shown on Plate 2.

Pre Feasibility Test

Following well installation and well development, Cardno ERI will collect groundwater samples from well MW5 and newly installed wells MW6 through MW7. The results of the sampling will be used to establish the baseline conditions in the wells prior to feasibility testing. The field protocol for groundwater sampling is included in Appendix B. Results of the baseline groundwater sampling will be included in the report of field activities. Prior to feasibility testing activities, if required, Cardno ERI will obtain an air discharge permit from the Bay Area Air Quality Management District (BAAQMD). Cardno ERI will notify the agencies and coordinate activities with property owner. Field work will occur in accordance with a site-specific HASP and Cardno ERI's standard field protocols (Appendix B). Prior to feasibility testing, Cardno ERI will mobilize a trailer-mounted DPE system to the site. The DPE system consists of a LRP connected to an air-water separator, pressure gauges, temperature gauges, and flow gauges. Either GAC or a catalytic oxidizer will be used for vapor-phase abatement. Extracted groundwater will be temporarily stored at the site pending removal and transport to an EMES-approved facility.

Dual-Phase Extraction Feasibility Test

To evaluate DPE as a remedial technology and obtain site-specific engineering data, two minimum 2-hour individual-well DPE tests will be performed in addition to a minimum 24-hour multi-well DPE test. Testing will be continued for five days if the results appear favorable. The tests will be performed using existing well MW5 and proposed well MW6 as the extraction wells. The tests will be conducted to assess the radius of influence of subsurface vacuum, extracted subsurface airflow rates, and extracted hydrocarbon vapor concentrations. Instrumentation will be used to monitor the performance of the system as well as the effects on nearby wells. Instrumentation will include water level indicators, Magnehelic® gauges, an anemometer and/or rotometer and a PID to measure VOC concentrations in vapor streams.

Vacuum will be applied to each extraction well for a minimum of two hours during the individual tests. Induced vacuum will be measured in surrounding wells VW1, VW3 through VW5, MW2, MW3, and MW5 through MW8 (excluding the active the extraction well(s) a minimum of once every two hours during the test. Groundwater levels will be monitored in wells MW2, MW3, and MW5 through MW8 (excluding the active the extraction wells) prior to initiating the test and a minimum of every four hours during the testing. Well locations are shown on Plate 2.

Soil vapor samples will be collected from the influent vapor stream at the beginning and end of each feasibility testing segment. In addition, influent vapor samples will be collected a minimum of once every 8 hours during continuous operation. Effluent samples will be taken as required to ensure compliance with BAAQMD regulations. A grab groundwater sample will be collected from wells MW5 and MW6 prior to beginning the feasibility testing and following the completion of testing.

Waste Management Plan

The soil and water generated during field activities will be temporarily stored on site. Waste soil and water will be transported to EMES-approved facilities for recycling or disposal. Waste documentation will be included in the final report of field activities.

Site Safety Plan

Fieldwork will be performed in accordance with a site-specific safety plan.

Groundwater Monitoring

Following completion of the feasibility testing, groundwater monitoring wells MW5 through MW8 will be sampled on a quarterly basis for a period of one year. The remaining wells will be sampled on the exsiting semi-annual sampling schedule. Groundwater monitoring results will be included in semi-annual monitoring and sampling reports.

Soil Vapor Monitoring

Prior to initiating feasibility testing activities, soil vapor samples will be collected in tedlar bags from vapor wells VW1, VW3, VW4, and VW5 to establish baseline concentrations. Following the completion of feasibility testing activities, soil vapor samples will be collected in tedlar bags from vapor wells VW1, VW3, VW4, and VW5 to establish monitor the effects of the feasibility testing on the soil vapor sampling wells. The vapor samples will be analyzed in the field using a PID. Results will be tabulated and presented in the report of field activities.

During the quarter following completion of the DPE test, soil vapor wells VW1, VW3, VW4, and VW5 will be sampled according to the field protocol included in Appendix B and submitted for laboratory analysis. In addition, vapor samples will be collected in tedlar bags and field screened with a PID on a quarterly basis for a minimum of one year following the feasibility testing. If the results of the quarterly vapor sampling indicate that no additional DPE events are required, an additional sampling event will be conducted using the field protocol included in Appendix B. Results of the soil vapor sampling events will be included in the semi-annual monitoring and sampling reports.

Laboratory Analyses

Select soil samples will be submitted for analysis to an EMES-approved, state-certified analytical laboratory. The samples will be analyzed for TPHd and TPHg by EPA Method 8015B; BTEX, fuel oxygenates (MTBE, DIPE, ETBE, TAME, and TBA), and lead scavengers (1,2-DCA and EDB) by EPA Method 8260B. In addition soil samples submitted for analysis between 0 and 10 feet bgs will be analyzed for naphthalene.

The groundwater samples will be analyzed for TPHd and TPHg using EPA Method 8015B and BTEX, MTBE, DIPE, ETBE, TAME, TBA, 1,2-DCA, and EDB using EPA Method 8260B.

Soil vapor samples will be analyzed for full-scan VOCs, including BTEX, fuel oxygenates, lead scavengers, and naphthalene using EPA Method TO-17; TPHg using EPA Method TO-3 or TO-15; and helium, oxygen, carbon dioxide, and methane using American Society of Testing and Materials (ASTM) Method 1946.

COST EVALUATION

In the CAP Addendum, a cost evaluation of well installation activities for one well (including well development, additional quarterly sampling, and sampling associated with DPE activities) was presented. The adjusted costs for the revised scope of work are included in the following table.

Costs to install groundwater monitoring wells MW6 through MW8, perform 48-hour DPE source removal feasibility test, and perform one year of quarterly monitoring and sampling are presented in the following table. The projected cost assumes that one DPE feasibility test will be performed. Each additional event will cost approximately $25,000 and each additional quarterly monitoring event will cost approximately $6,000.

Task	Cost*	Frequency/Year	Number of Years	Total Cost
Well Installation	$25,000	1	1	$25,000
High Vacuum DPE Event	$25,000	1	1	$25,000
Quarterly Sampling Event	$6,000	4	1	$24,000
			Total Costs	**$74,000**

*Total includes costs for permits, subcontractors, analytical analyses, waste disposal, consumables, and personnel for field work and reports.

In addition, costs to perform SVS sampling not previously included are presented in the following table.

Task	Cost*	Frequency/Year	Number of Years	Total Cost
SVS Sampling	$10,000	1	1	$10,000
			Total Costs	**$10,000**

*Total includes costs for analytical analyses, waste disposal, consumables, and personnel for field work and reports.

CONTACT INFORMATION

The responsible party contact is Ms. Jennifer C. Sedlachek, ExxonMobil Environmental Services, 4096 Piedmont Avenue #194, Oakland, California, 94611. The consultant contact is Ms. Rebekah A Westrup, Cardno ERI, 601 North McDowell Boulevard, Petaluma, California, 94954. The agency contact is Ms. Karel Detterman Alameda County Health Care Services, Environmental Health Services, Environmental Protection, 1131 Harbor Bay Parkway, Suite 250, Alameda, California, 94502.

LIMITATIONS

For documents cited that were not generated by Cardno ERI, the data taken from those documents is used "as is" and is assumed to be accurate. Cardno ERI does not guarantee the accuracy of this data and makes no warranties for the referenced work performed nor the inferences or conclusions stated in these documents.

This document and the work performed have been undertaken in good faith, with due diligence and with the expertise, experience, capability, and specialized knowledge necessary to perform the work in a good and workmanlike manner and within all accepted standards pertaining to providers of environmental services in California at the time of investigation. No soil engineering or geotechnical references are implied or should be inferred. The evaluation of the geologic conditions at the site for this investigation is made from a limited number of data points. Subsurface conditions may vary away from these data points.

Please contact Ms. Rebekah A Westrup, Cardno ERI's project manager for this site, at (707) 766-2000 with any questions regarding this site.

Sincerely,

Rebekah A Westrup
Project Manager
for Cardno ERI
707 766 2000
Email: rebekah.westrup@cardno.com

David R. Daniels
P.G. 8737
for Cardno ERI
707 766 2000
Email: david.daniels@cardno.com

cc: Ms. Karel Detterman, Health Care Services Agency, Environmental Health Services, Environmental Protection, 1131 Harbor Bay Parkway, Suite 250, Alameda, California, 94502

Mr. Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa, Ste. 3341, Oakland, California, 94612

Messrs. On Dan and Nathan Lam, 200 El Dorado Terrace, San Francisco, California, 94112

Enclosures:

References

Acronym List

Plate 1	Site Vicinity Map
Plate 2	Generalized Site Plan
Appendix A	Correspondence
Appendix B	Field Protocols

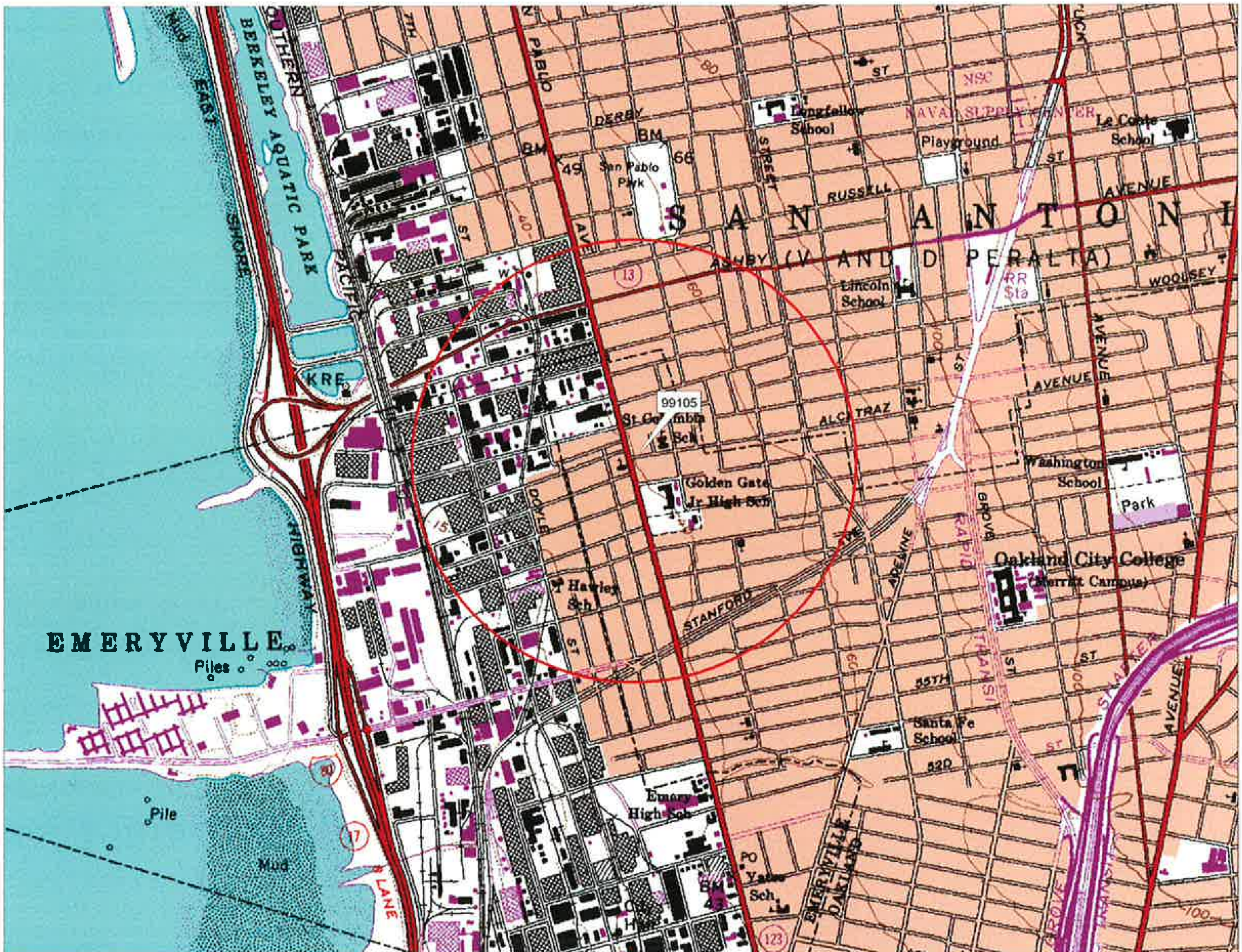
REFERENCES

Cardno ERI. October 25, 2012. *Site Conceptual Model Update, Low-Threat Closure Evaluation, and Feasibility Study/Corrective Action Plan, Former Mobil Service Station 99105, 6301 San Pablo Avenue, Oakland, California.*

Cardno ERI. May 14, 2013. *Corrective Action Plan Addendum, Former Mobil Service Station 99105, 6301 San Pablo Avenue, Oakland, California.*

ACRONYM LIST

µg/L	Micrograms per liter
µs	Microsiemens
1,2-DCA	1,2-dichloroethane
acfm	Actual cubic feet per minute
AS	Air sparge
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
CEQA	California Environmental Quality Act
cfm	Cubic feet per minute
COC	Chain of Custody
CPT	Cone Penetration (Penetrometer) Test
DIPE	Di-isopropyl ether
DO	Dissolved oxygen
DOT	Department of Transportation
DPE	Dual-phase extraction
DTW	Depth to water
EDB	1,2-dibromoethane
EPA	Environmental Protection Agency
ESL	Environmental screening level
ETBE	Ethyl tertiary butyl ether
FID	Flame-ionization detector
fpm	Feet per minute
GAC	Granular activated carbon
gpd	Gallons per day
gpm	Gallons per minute
GWPTS	Groundwater pump and treat system
HVOC	Halogenated volatile organic compound
J	Estimated value between MDL and PQL (RL)
LEL	Lower explosive limit
LPC	Liquid-phase carbon
LRP	Liquid-ring pump
LUFT	Leaking underground fuel tank
LUST	Leaking underground storage tank
MCL	Maximum contaminant level
MDL	Method detection limit
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mg/m^3	Milligrams per cubic meter
MPE	Multi-phase extraction
MRL	Method reporting limit
msl	Mean sea level
MTBE	Methyl tertiary butyl ether
MTCA	Model Toxics Control Act
NAI	Natural attenuation indicators
NAPL	Non-aqueous phase liquid
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
ORP	Oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OVA	Organic vapor analyzer
P&ID	Process & Instrumentation Diagram
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene or perchloroethylene
PID	Photo-ionization detector
PLC	Programmable logic control
POTW	Publicly owned treatment works
ppmv	Parts per million by volume
PQL	Practical quantitation limit
psi	Pounds per square inch
PVC	Polyvinyl chloride
QA/QC	Quality assurance/quality control
RBSL	Risk-based screening levels
RCRA	Resource Conservation and Recovery Act
RL	Reporting limit
scfm	Standard cubic feet per minute
SSTL	Site-specific target level
STLC	Soluble threshold limit concentration
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TAME	Tertiary amyl methyl ether
TBA	Tertiary butyl alcohol
TCE	Trichloroethene
TOC	Top of well casing elevation; datum is msl
TOG	Total oil and grease
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHmo	Total petroleum hydrocarbons as motor oil
TPHs	Total petroleum hydrocarbons as stoddard solvent
TRPH	Total recoverable petroleum hydrocarbons
UCL	Upper confidence level
USCS	Unified Soil Classification System
USGS	United States Geologic Survey
UST	Underground storage tank
VCP	Voluntary Cleanup Program
VOC	Volatile organic compound
VPC	Vapor-phase carbon



FN 2783TOPO

EXPLANATION

1/2-mile radius circle

N

APPROXIMATE SCALE

0 0.5 1 mile

SOURCE:
Modified from a map
provided by
DeLorme 3-D TopoQuads

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Shaping the Future

SITE VICINITY MAP

FORMER MOBIL SERVICE STATION 99105
6301 San Pablo Avenue
Oakland, California

PROJECT NO.
2783

PLATE
1

FN 2783 13 W02 GSP_WP

Cardno ERI
Shaping the Future

GENERALIZED SITE PLAN

FORMER MOBIL SERVICE STATION 99105
6301 San Pablo Avenue
Oakland, California

EXPLANATION

- MW5 — Groundwater Monitoring Well
- AB13 — Soil Boring
- MW8 — Proposed Groundwater Monitoring Well
- VW5 — Soil Vapor Sampling Well
- MW4 — Destroyed Groundwater Monitoring Well
- MP6 — Destroyed Observation Well
- PLI-5 — Soil Boring by Others (Alisto Engineering Group and Tank Protect Engineering)
- Alisto 1996 (11 Feet Deep)
- TEC 2001 (6 Feet Deep)

PROJECT NO. 2783

PLATE 2

L:\EXXONMOBIL\ExxonMobil Projects\022783C (99105) Oakland\2783 Autocad\WORK PLANS\13 W02\13 W02 GSP_WP.dwg, mary.jones

APPENDIX A

CORRESPONDENCE

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
ALEX BRISCOE, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

September 24, 2013

Jennifer Sedlachek
ExxonMobil
4096 Piedmont, Ave., #194
Oakland, CA 94611 (Sent via e-mail to: jennifer.c.sedlachek@exxonmobil.com)

On Dan and Nathan Lam
200 El Dorado Terrace
San Francisco, CA 94112

Subject: Fuel Leak Case No. RO0000445 and Geotracker Global ID T0600101855, Mobil#99-105 / Cars Rent A Car, 6301 San Pablo Avenue, Oakland, CA 94608

Dear Ms. Sedlachek and Messrs. Lam:

Thank you for the recently submitted report entitled, *Corrective Action Plan Addendum* (CAP Addendum) dated May 14, 2013 prepared by Cardno ERI for the subject site. Alameda County Environmental Health (ACEH) staff has reviewed the case file including the above-mentioned reports for the above-referenced site.

The above-mentioned report addresses ACEH's technical comments on the Site Conceptual Model Update, Low-Threat Closure Evaluation, and Feasibility Study/Corrective Action Plan (CAP) dated October 25, 2012. The CAP and CAP Addendum propose conducting dual-phase extraction (DPE) from source areas where newly observed free product is present (MW-5) and maximum concentration of soil vapor were observed. ACEH generally concurs with the proposed corrective action, however requests that you address the following technical comments and send us a Groundwater and Soil Vapor Performance Monitoring Work Plan that addresses the technical comments below.

TECHNICAL COMMENTS

1. **DPE Performance Monitoring** – The CAP and CAP Addendum recommend DPE extraction from existing well MW-5 and proposed well MW-6. ACEH notes that using the monitoring wells as groundwater extraction wells does not provide for an adequate groundwater monitoring network to evaluate the effectiveness of the remedial action. Obtaining a sample from a well that is being used in remediation will not be representative of static conditions.

   In an email correspondence dated September 5, 2013, Cardno ERI states that soil borings installed and sampled in 2012 are representative of groundwater conditions with respect to the lateral distribution of dissolved-phase hydrocarbons and that a groundwater performance monitoring well network is not necessary. Our review of the rose diagram indicates that groundwater flow direction has varied from northwest to south during historic groundwater monitoring events. Although these borings previously identified the downgradient extent of the groundwater contaminant plume, they were advanced prior to the recent detection of sheen and increasing total petroleum hydrocarbon as diesel (TPHd) concentrations that are indicative of free product in monitoring well MW-5. This same rationale may apply to the vicinity of proposed monitoring well MW-6 in the vicinity of vapor well VW4 that had significantly elevated levels of petroleum hydrocarbons in soil gas. Therefore, installation of performance monitoring wells downgradient of the extraction wells in the source area is necessary.

In addition, since soil vapor is the main concern at the site, ACEH recommends that performance monitoring include post remedial monitoring for vapor more than once as proposed. ACEH recommends that the vapor wells be sampled for verification monitoring for one year after DPE events are completed. At a minimum, soil vapor monitoring should include wells VW-1, VW-4 and VW-5.

Please present a strategy and schedule for performance monitoring of both groundwater and soil vapor in the area of remediation. Please include development and sampling of new monitoring and extraction wells to collect baseline conditions prior to start-up of the DPE system.

Please update the remedial costs as appropriate to incorporate the elements discussed above.

2. **Well Installation and Soil Sampling** – The Low-Threat Closure Policy uses soil concentrations from the 0 to 5 and 5 to 10 foot interval to assess direct contact and outdoor air, since TPHd has been detected in groundwater at the site and previously no naphthalene data has been collected in soil or groundwater, please collect naphthalene data from the proposed well boring(s) and add naphthalene to the groundwater analysis in wells with historical detections of TPHd on a one time basis. Use silica gel cleanup for TPHd analysis in groundwater.

3. **Groundwater Monitoring** – Please continue semi-annual groundwater monitoring in accordance with the approved groundwater monitoring plan until the CAP is approved for the site and submit groundwater monitoring report (GWM_R) in accordance with the schedule below.

TECHNICAL REPORT REQUEST

Please submit technical reports to ACEH (Attention: Barbara Jakub), according to the following schedule:

- **September 30, 2013** – Groundwater Monitoring Report (2nd Semi-Annual) (File to be named: GWM_R_yyyy-mm-dd)

- **November 15, 2013** – Groundwater and Soil Vapor Performance Monitoring Work Plan (File to be named CAP_R_ADEND_yyyy-mm-dd)

- **March 1, 2014** – Groundwater Monitoring Report (1st Semi-Annual) (File to be named: GWM_R_yyyy-mm-dd)

Should you have any questions or concerns regarding this correspondence or your case, please contact Dilan Roe at (510) 567-6767 or send her an electronic mail message at dilan.roe@acgov.org as I will be transferring out of the Local Oversight Program on September 27, 2013.

Sincerely,

Barbara J. Jakub

Digitally signed by Barbara J. Jakub
DN: cn=Barbara J. Jakub, o, ou,
email=barbara.jakub@acgov.org,
c=US
Date: 2013.09.24 15:59:53 -07'00'

Barbara J. Jakub, P.G.
Hazardous Materials Specialist

Enclosure: Responsible Party(ies) Legal Requirements/Obligations
ACEH Electronic Report Upload (ftp) Instructions

cc: Rebekah Westrup, Cardno ERI, 601 North McDowell Blvd., Petaluma, CA 94954-2312 *(Sent via e-mail to: rwestrup@ERI-US.com)*
Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa Plaza, Ste. 3341, Oakland, CA 94612-2032 (*Sent via E-mail to:* lgriffin@oaklandnet.com)
Dilan Roe, ACEH (*Sent via E-mail to:* dilan.roe@acgov.org)
Barbara Jakub, ACEH (*Sent via E-mail to:* barbara.jakub@acgov.org)
GeoTracker, File

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

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) 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 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 Spills, Leaks, Investigations, and Cleanup (SLIC) 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 for more information on these requirements (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/).

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." 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 6735, 6835, and 7835.1) 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 registered 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 fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later 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 SLIC)	**REVISION DATE:** July 20, 2010
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC) 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) Using Internet Explorer (IE4+), go to ftp://alcoftp1.acgov.org
      (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
   b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
   d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   e) 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.

APPENDIX B

FIELD PROTOCOLS

Cardno ERI
Soil Boring and Well Installation
Field Protocol

Preliminary Activities

Prior to the onset of field activities at the site, Cardno ERI obtains the appropriate permit(s) from the governing agency(s). Advance notification is made as required by the agency(s) prior to the start of work. Cardno ERI marks the borehole locations and contacts the local one call utility locating service at least 48 hours prior to the start of work to mark buried utilities. Borehole locations may also be checked for buried utilities by a private geophysical surveyor. Prior to drilling, the borehole location is cleared in accordance with the client's procedures. Fieldwork is conducted under the advisement of a registered professional geologist and in accordance with an updated site-specific safety plan prepared for the project, which is available at the job site during field activities.

Drilling and Soil Sampling Procedures

Cardno ERI contracts a licensed driller to advance the boring and collect soil samples. The specific drilling method (e.g., hollow-stem auger, direct push method, or sonic drilling), sampling method [e.g., core barrel or California-modified split spoon sampler (CMSSS)] and sampling depths are documented on the boring log and may be specified in a work plan. Soil samples are typically collected at the capillary fringe and at 5-foot intervals to the total depth of the boring. To determine the depth of the capillary fringe prior to drilling, the static groundwater level is measured with a water level indicator in the closest monitoring well to the boring location, if available.

The borehole is advanced to just above the desired sampling depth. For CMSSSs, the sampler is placed inside the auger and driven to a depth of 18 inches past the bit of the auger. The sampler is driven into the soil with a standard 140-pound hammer repeatedly dropped from a height of 30 inches onto the sampler. The number of blows required to drive the sampler each 6-inch increment is recorded on the boring log. For core samplers (e.g., direct push), the core is driven 18 inches using the rig apparatus.

Soil samples are preserved in the metal or plastic sleeve used with the CMSSS or core sampler, in glass jars or other manner required by the local regulatory agency (e.g., Environmental Protection Agency Method 5035). Sleeves are removed from the sample barrel, and the lowermost sample sleeve is immediately sealed with Teflon™ tape, capped, labeled, placed in a cooler chilled to 4° Celsius and transported to a state-certified laboratory. The samples are transferred under chain-of-custody (COC) protocol.

Field Screening Procedures

Cardno ERI places the soil from the middle of the sampling interval into a plastic re-sealable bag. The bag is placed away from direct sunlight for a period of time which allows volatilization of chemical constituents, after which the tip of a photo-ionization detector (PID) or similar device is inserted through the plastic bag to measure organic vapor concentrations in the headspace. The PID measurement is recorded on the boring log. At a minimum, the PID or other device is calibrated on a daily basis in accordance with manufacturer's specifications using a hexane or isobutylene standard. The calibration gas and concentration are recorded on a calibration log. Instruments such as the PID are useful for evaluating relative concentrations of volatilized hydrocarbons, but they do not measure the concentration of petroleum hydrocarbons in the soil matrix with the same precision as laboratory analysis. Cardno ERI trained personnel describe the soil in the bag according to the Unified Soil Classification System and record the description on the boring log, which is included in the final report.

Air Monitoring Procedures

Cardno ERI performs a field evaluation for volatile hydrocarbon concentrations in the breathing zone using a calibrated photo-ionization detector or lower explosive level meter.

Groundwater Sampling

A groundwater sample, if desired, is collected from the boring by using Hydropunch™ sampling technology or installing a well in the borehole. In the case of using Hydropunch™ technology, after collecting the capillary fringe soil sample, the boring is advanced to the top of the soil/groundwater interface and a sampling probe is pushed to approximately 2 feet below the top of the static water level. The probe is opened by partially withdrawing it and thereby exposing the screen. A new or decontaminated bailer is used to collect a water sample from the probe. The water sample is then emptied into laboratory-supplied containers constructed of the correct material and with the correct volume and preservative to comply with the proposed laboratory test. The container is slowly filled with the retrieved water sample until no headspace remains and then promptly sealed with a Teflon-lined cap, checked for the presence of bubbles, labeled, entered onto a COC record and placed in chilled storage at 4° Celsius. Laboratory-supplied trip blanks accompany the water samples as a quality assurance/quality control procedure. Equipment blanks may be collected as required. The samples are kept in chilled storage and transported under COC protocol to a client-approved, state-certified laboratory for analysis.

Backfilling of Soil Boring

If a well is not installed, the boring is backfilled from total depth to approximately 5 feet below ground surface (bgs) with either neat cement or bentonite grout using a tremie pipe and either the boring is backfilled from 5 feet bgs to approximately 1 foot bgs with hydrated bentonite chips or backfill is continued to just below grade with neat cement grout. The borehole is completed to surface grade with material that best matches existing surface conditions and meets local agency requirements. Site-specific backfilling details are shown on the respective boring log.

Well Construction

A well (if constructed) is completed using materials documented on the boring log or specified in a work plan. The well is constructed with slotted casing across the desired groundwater sampling depth(s) and completed with blank casing to within 6 inches of surface grade. No further construction is conducted on temporary wells. For permanent wells, the annular space of the well is backfilled with Monterey sand from the total depth to approximately 2 feet above the top of the screened casing. A hydrated granular bentonite seal is placed on top of the sand filter pack. Grout may be placed on top of the bentonite seal to the desired depth using a tremie pipe. The well may be completed to surface grade with a 1-foot thick concrete pad. A traffic-rated well vault and locking cap for the well casing may be installed to protect against surface-water infiltration and unauthorized entry. Site-specific well construction details including type of well, well depth, casing diameter, slot size, length of screen interval and sand size are documented on the boring log or specified in the work plan.

Well Development and Sampling

If a permanent groundwater monitoring well is installed, the grout is allowed to cure a minimum of 48 hours before development. Cardno ERI personnel or a contracted driller use a submersible pump or surge block to develop the newly installed well. Prior to development, the pump is decontaminated by allowing it to run and re-circulate while immersed in a non-phosphate solution followed by successive immersions in potable water and de-ionized water baths. The well is developed until sufficient well casing volumes are removed so that turbidity is within allowable limits and pH, conductivity and temperature levels stabilize in the purge water. The volume of groundwater extracted is recorded on a log.

Following development, groundwater within the well is allowed to recharge until at least 80% of the drawdown is recovered. A new or decontaminated bailer is slowly lowered past the air/water interface in the well, and a water sample is collected and checked for the presence of non-aqueous phase liquid, sheen or emulsions. The water sample is then emptied into laboratory-supplied containers as discussed above.

Surveying

If required, wells are surveyed by a licensed land surveyor relative to an established benchmark of known elevation above mean sea level to an accuracy of +/- 0.01 foot. The casing is notched or marked on one side to identify a consistent surveying and measuring point.

Decontamination Procedures

Cardno ERI or the contracted driller decontaminates soil and water sampling equipment between each sampling event with a non-phosphate solution, followed by a minimum of two tap water rinses. De-ionized water may be used for the final rinse. Downhole drilling equipment is steam-cleaned prior to drilling the borehole and at completion of the borehole.

Waste Treatment and Soil Disposal

Soil cuttings generated from the drilling or sampling are stored on site in labeled, Department of Transportation-approved, 55-gallon drums or other appropriate storage container. The soil is removed from the site and transported under manifest to a client- and regulatory-approved facility for recycling or disposal. Decontamination fluids and purge water from well development and sampling activities, if conducted, are stored on site in labeled, regulatory-approved storage containers. Fluids are subsequently transported under manifest to a client- and regulatory-approved facility for disposal or treated with a permitted mobile or fixed-base carbon treatment system.

Cardno ERI
Shaping the Future

Cardno ERI
Soil Vapor Sampling Well Installation and Sampling Field Protocol

Preliminary Activities

Prior to the onset of field activities at the site, Cardno ERI obtains the appropriate permit(s) from the governing agency(s). Advance notification is made as required by the agency(s) prior to the start of work. Cardno ERI marks the borehole locations and contacts the local one call utility locating service at least 48 hours prior to the start of work to mark buried utilities. Borehole locations may also be checked for buried utilities by a private geophysical surveyor. Prior to drilling, the borehole location is cleared in accordance with the client's procedures. Fieldwork is conducted under the advisement of a registered professional geologist and in accordance with an updated site-specific safety plan prepared for the project, which is available at the job site during field activities.

Well Construction

The borehole is advanced to the desired depth using either a direct-push rig, hand auger, or air vacuum rig. Lithologic conditions are recorded on a boring log during borehole advancement, and select soil matrix sampling may be conducted based on soil characteristics.

Each soil vapor sampling (SVS) well is constructed using inert screen material attached to $^{1}/_{8}$- to ¼-inch outer diameter inert tubing. A gas-tight vacuum fitting or valve is attached to the top of each length of tubing using a female compression fitting. Each screen is set within a minimum of a 12-inch thick appropriately sized sand pack, with a minimum of 3 inches of sand pack above the top of the screen. A minimum of 4 inches of dry granular bentonite is set above each screen and associated sand pack. In SVS wells with multiple and separate casings and screens, the annular space between the top of the dry granular bentonite above the deep screen and the bottom of the sand pack associated with the shallow screen is sealed with a minimum of 18 inches of hydrated bentonite. The remainder of the annular space of the well is sealed with hydrated bentonite to 1 foot below ground surface. Wellheads are finished with traffic-rated well boxes set in concrete flush with the surrounding grade. No glues, chemical cements, or solvents are used in well construction.

A boring log is completed with the construction details for each well, including the materials of construction, depth of the borehole, screen length, and annular seal thickness.

Soil Vapor Sampling

Samples are collected using a soil vapor purging and sampling manifold consisting of a flow regulator, vacuum gauges, vacuum pump, shroud, and laboratory-prepared, gas-tight, opaque containers such as Summa™ canisters. Samples may also be collected using a syringe and analyzed by a mobile laboratory. Prior to use, Summa™ canisters are checked to ensure they are under the laboratory induced vacuum between 31 and 25 inches of mercury (in. Hg). New inert tubing is used to purge and sample each well. Prior to purging and sampling each SVS well, the sampling manifold is connected to the gas-tight vacuum fitting or valve at the wellhead, and the downstream tubing and fittings are vacuum tested at approximately 24 to 28 in. Hg. Purging and sampling are conducted only on SVS wells when the tubing and fittings hold the applied vacuum for 5 minutes per vacuum gauge reading.

When required, Cardno ERI conducts a purge volume versus constituent concentration test on at least one SVS well prior to purging and sampling activities. The purge volume test well is selected based on the location of the anticipated source of chemical constituents at the site and on the location of anticipated maximum soil vapor concentrations based on lithologic conditions. If the SVS well has been in place for more than 1 week, it is assumed that soil vapor in the sand pack has equilibrated with the surrounding soil, and only the screen and tubing volumes are included in the purge volume calculation. If the SVS well has been in place for less than 1 week, the volume of the sand pack around the screen is included in the purge volume calculation. A photo-ionization detector (PID) or on-site mobile laboratory is used to evaluate concentrations of chemical constituents in the vapor stream after 1, 3, and 10 volumes of vapor have been purged from the SVS well. Purging is conducted at a rate of 100 to 200 milliliters per minute (ml/min). The purge volume exhibiting the highest concentration is the volume of vapor purged from each SVS well prior to sampling. If the three separate purge volumes produce equal concentrations a default of 3 purge volumes is extracted prior to sampling.

Prior to sampling, a helium leak test is performed at each SVS well, including a summa canister and its fittings, to check for leaks in the SVS annulus. To assess the potential for leaks in the SVS well annulus, a shroud is placed over the SVS well and summa canister and the shroud is filled with a measured amount of helium. Helium screening is performed in the field by drawing soil gas into a Tedlar bag via a lung-box and screening the contents of the Tedlar bag with a helium meter. The concentration of helium in the sample divided by the concentration of helium in the shroud provides a measure of the proportion of the sample attributable to leakage. A leak that comprises less than 5% of the sample is insignificant. Helium screening is also performed using laboratory analysis of the contents of the summa canister collected under the shroud. Sampling is conducted at approximately the same rate of purging, at 100 to 200 ml/min. Soil vapor samples are submitted under chain-of-custody protocol for the specified laboratory analyses.

At a minimum, weather conditions (temperature, barometric pressure and precipitation), the sampling flow rate, the purge volume, the helium leak detection percentage results, the sample canister identification number, the method of sample collection, and the vacuum of the sampling canister at the start and end of sample collection (if applicable) are recorded on a log for each SVS well purged and sampled.

Decontamination Procedures

If soil samples are collected, Cardno ERI or the contracted driller decontaminates the soil sampling equipment between each sampling interval using a non-phosphate solution, followed by a minimum of two tap water rinses. De-ionized water may be used for the final rinse. Downhole drilling equipment is steam-cleaned or triple-rinsed prior to advancing each borehole.

Waste Treatment and Disposal

Soil cuttings generated from the well installation are stored on site in labeled, Department of Transportation-approved, 55-gallon drums or other appropriate storage container. The soil is removed from the site and transported under manifest to a client- and regulatory-approved facility for recycling or disposal. Decontamination water is stored on site in labeled, regulatory-approved storage containers, and is subsequently transported under manifest to a client- and regulatory-approved facility for disposal or treated with a permitted mobile or fixed-base carbon treatment system.

GROUNDWATER SAMPLING PROTOCOL

The static water level and separate-phase product level, if present, in each well that contained water and/or separate-phase product are measured with a ORS Interface Probe, which is accurate to the nearest 0.01 foot. To calculate groundwater elevations and evaluate groundwater gradient, depth to water (DTW) levels are subtracted from top of casing elevations.

Groundwater samples collected for subjective evaluation are collected by gently lowering approximately half the length of a clean Teflon® or polypropylene bailer past the air-water interface (if possible) and collecting a sample from near the surface of the water in the well. The samples are checked for measurable free-phase hydrocarbons or sheen. If appropriate, free-phase hydrocarbons are removed from the well.

Before water samples are collected from the groundwater monitoring wells, the wells are purged until a minimum of three well casing volumes is purged and stabilization of the temperature, pH, and conductivity is obtained. Water samples from the wells that do not obtain stability of the temperature, pH, and conductivity are considered to be "grab samples." The quantity of water purged from each well is calculated as follows:

1 well casing volume = $\pi r^2 h(7.48)$ where:

r	=	radius of the well casing in feet
h	=	column of water in the well in feet (depth to bottom - depth to water)
7.48	=	conversion constant from cubic feet to gallons
π	=	ratio of the circumference of a circle to its diameter

Gallons of water purged/gallons in 1 well casing volume = well casing volumes removed.

The wells are purged using a submersible pump. Prior to use at the site and between wells the pump is cleaned.

Five gallons of water are placed in three 15-gallon tubs. Liquinox detergent is added to the first tub of water. The pump and tubing are submerged in the first tub and the water is pumped through the pump. The process is repeated in the second and third tub.

After purging, each well is allowed to recharge to at least 80% of the initial water level. Water samples from wells that do not recover at least 80% (due to slow recharging of the well) between purging and sampling are considered to be "grab samples." Water samples are collected with a new, disposable Teflon® or polypropylene bailer. The groundwater is carefully poured into selected sample containers (40-milliliter [ml] glass vials, 1,000-ml glass amber bottles, etc.), which are filled so as to produce a positive meniscus.

Depending on the required analysis, each sample container is preserved with hydrochloric acid, nitric acid, etc., or it is preservative free. The type of preservative used for each sample is specified on the Chain-of-Custody record.

Each vial and glass amber bottle is sealed with a cap containing a Teflon® septum, and subsequently examined for air bubbles to avoid headspace, which would allow volatilization to occur. The samples are promptly transported in iced storage in a thermally-insulated ice chest, accompanied by a Chain-of-Custody record, to a California state-certified laboratory.

Water generated during purging and cleaning is contained and transported off site for treatment and disposal.

Cardno ERI
Dual-Phase Extraction Test
Field Protocol

Dual-phase extraction (DPE) consists of extracting vapor and liquid through the same conduit. If vapor phase, dissolved phase and separate phase contaminants are all present, the procedure is often referred to as multi-phase extraction. Testing procedures are the same for both.

Objective

The objective of a DPE test is often two-fold: 1) to determine the radius of influence (ROI) and obtain engineering data for evaluation of future remediation options at the site, and 2) to accomplish mass removal of hydrocarbons by removing both soil vapor and groundwater from one or more wells.

Cardno ERI utilizes a DPE mobile treatment system that has the capability of removing hydrocarbon-affected groundwater and soil vapor simultaneously. Vacuum may be provided by various types of blowers - a liquid ring pump (high vacuum for tight formations – 10 to 25 inches of mercury) or positive displacement or regenerative blowers (modest vacuum for sandy formations – 3 to 12 inches of mercury). Hydrocarbon vapor is treated on site with a thermal/catalytic oxidizer, which has been approved for operation by the local air pollution control agency. As an alternative, for sites with low soil vapor concentrations, Cardno ERI uses activated carbon to treat the extracted soil vapor.

Phase I – DPE Test to Obtain Engineering Data

For the extraction well, one groundwater well is selected near the center of the area to be tested. Usually this is a zone containing high levels of hydrocarbons. A wellhead assembly is installed as shown on Plate DPE-1 (attached). Vacuum is measured in three places: 1) at V_o to monitor the performance of the blower and to estimate flow from the pump curve, 2) at V_1 to determine the vacuum being applied to the formation, and 3) at V_2 to determine the line loss in the stinger and to be sure a standing head of water has not developed in the vacuum stinger tube. Vapor flow rates are measured and vapor samples are collected for analysis after vapor passes through the phase separator and blower.

Observation wells are selected at various distances from the extraction well. It may be necessary to drill additional observation wells if the existing wells are too far away from the extraction well to observe an induced vacuum and/or a water level decrease. If groundwater is present, the wells are equipped with a wellhead seal and a stinger tube as shown on Plate DPE-2 (Wells #3 and #4) (attached). The induced vacuum is periodically measured at V_3 and V_4 during the test using magnehelic gauges or other calibrated meters to determine the effective ROI for vapor extraction, and the values are recorded. The log of the induced vacuum is plotted against the distance from the extraction well to the observation well. The effective ROI is taken as the distance where the induced vacuum would be 0.5 inches of water.

The change in liquid level is measured in the stinger tube using a water level meter to an accuracy of 0.01 foot, and recorded to determine the hydraulic gradient and establish an ROI for groundwater capture. Various hydraulic models are used to determine a capture zone with respect to groundwater flow direction and gradient.

Note: Observation wells #1 and #2 on Plate DPE-2 are included for information to show the effect of removing only vapor from an extraction well. There would be an induced rise of the water level in the well due to vacuum, but the level in the stinger tube would not change because it is still under atmospheric pressure, indicating no hydraulic gradient and thus no net flow of groundwater toward the extraction well.

The test is run until the induced vacuum and depth to water in the observation wells stabilize – usually 4 to 8 hours. Stabilization is said to be reached when readings do not change more than 10% for three consecutive hourly observations. The test for engineering data may be repeated on other extraction wells if there is an indication that the site stratigraphy may not be uniform.

Prior to starting Phase I of the DPE test, Cardno ERI performs the following tasks:

1. Collect groundwater samples from the extraction well(s).
2. Install a stinger tube in the extraction well, extending to approximately 1-2 feet above the total depth of each well. An aboveground hose, covered by a temporary ramp in traffic areas, is used to connect the wellhead assembly from the extraction well to the treatment system.
3. Install dip tubes in each observation well containing groundwater approximately 3 to 4 feet into groundwater.
4. Measure distances from each observation well to the extraction well.
5. Connect the extraction well to the phase separator on the unit.
6. Calibrate and install magnehelic gauges on all test wells to measure vacuum (in inches of water) and a flow meter [in cubic feet per minute (cfm)] at the extraction well.
7. Install a sample port after the phase separator and blower to sample the influent vapor stream.
8. Install a flow meter on the pressure side of the blower.

During Phase I of the DPE test, Cardno ERI performs the following tasks:

1. Check and change magnehelic gauges as needed to obtain readings in each gauge's scale range.
2. Record the following values:

   - Soil vapor influent concentrations at the unit on the pressure side of the blower
   - Vacuum readings at the extraction well
   - Vacuum readings at each observation well
   - Flow readings at the unit on the pressure side of the blower
   - Volume of groundwater extracted
   - Hour meter reading on the extraction unit
   - Water levels in each observation well containing groundwater

   The soil vapor concentrations are measured using a photo-ionization detector or a lower explosive limit meter. The meter is calibrated on a daily basis using a hexane or isobutylene standard. The calibration gas and concentration, and the well and system influent measurements are recorded.

   For very concentrated vapor streams, dilution air will be added and measured with a rotameter or pitot tube.

3. Pump water periodically from the phase separator into a holding tank.
4. Collect samples in a Tedlar® bag from the influent vapor stream for analysis by a client-approved, state-certified laboratory under proper storage, shipment and chain-of-custody (COC) protocol. Samples are always stored out of direct sunlight. No ice is placed in the cooler, and the COC is placed inside the cooler. At a minimum, samples are typically collected at the beginning and end of Phase I.

Phase II – DPE for Mass Removal

For mass removal, one or more groundwater wells are selected near the center of the area containing the highest hydrocarbons. Wellhead fittings as shown on Plate DPE-1 are placed on each extraction well. If more than one well is used for extraction, the total vacuum will be reduced. Care is exercised to ensure that a reasonable ROI is maintained.

Total vapor flow is measured on the pressure side of the blower and the measured flow rate is checked against the blower curve. Vapor samples are collected periodically in a Tedlar® bag for analysis on the pressure side of the blower, usually at the beginning, middle and end of an extended test.

Water is collected in tank(s) for later off-site disposal or treated on site with carbon adsorption through a properly permitted unit. The water produced is measured with a totalizer or by recording the level in the tank(s).

The mass of constituents removed with the soil vapor is calculated and tabulated using vapor flow rates and constituent concentrations; the mass of constituents removed with groundwater is calculated and tabulated using water volume and constituent concentrations.

Prior to starting Phase II of the DPE test, Cardno ERI performs the same tasks involving the extraction well(s) and the unit as prior to Phase I with the following modifications:

1. Connect the extraction well(s) to a manifold to provide individual well control as necessary during this portion of the test.

2. Install a sample port at each extraction well to sample soil vapor at each wellhead.

During Phase II of the DPE test, Cardno ERI performs the following tasks:

1. Record the same values for the extraction well(s) and the unit with the following modification:

    - Record soil vapor concentrations at each extraction well, if feasible

2. Pump water periodically from the phase separator into a holding tank.

3. Collect influent vapor stream samples for laboratory analysis as described in Phase I.

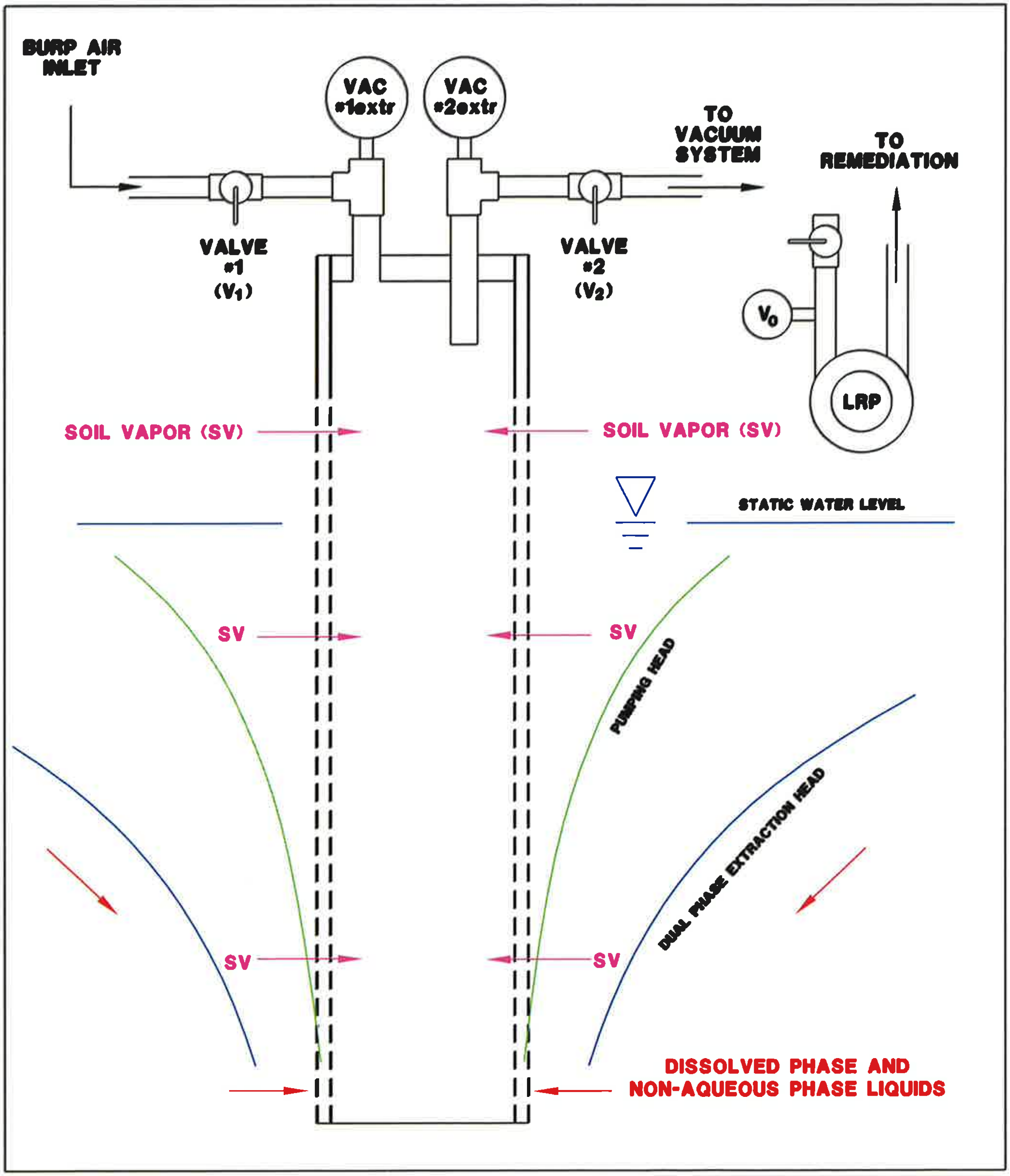
4. Collect groundwater samples periodically and at the end of Phase II for analysis of constituents of concern or those required by the permit. Submit groundwater samples collected during Phases I and II to a client-approved, state-certified laboratory under proper storage, shipment and COC protocol.

Groundwater Disposal

Extracted groundwater is treated at a client- and regulatory-approved facility, treated with a permitted mobile carbon treatment system, or transported off site in a truck or trailer-mounted tank and disposed of in accordance with regulatory requirements.

At the end of the DPE test and following receipt of the analytical results, Cardno ERI prepares a report summarizing the field and laboratory procedures, presenting the laboratory and feasibility testing results, providing mass removal calculations, and discussing conclusions and recommendations.

Attachments: Plate DPE-1 – Example Dual-Phase Extraction Wellhead Assembly
Plate DPE-2 – Example Observation Well Responses



FN Example DPE-EXTR

Cardno ERI
Shaping the Future

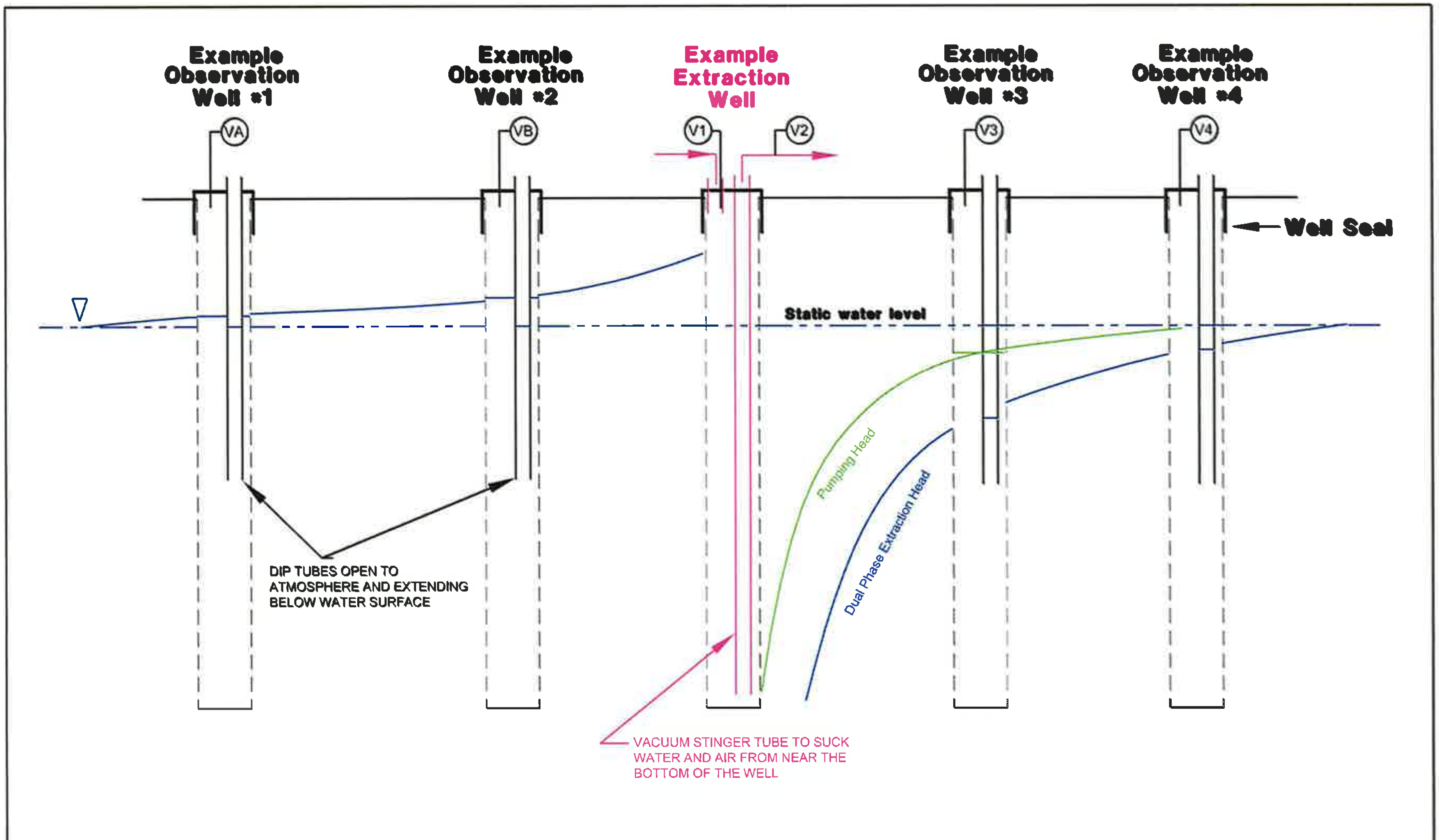
EXAMPLE DUAL-PHASE EXTRACTION WELLHEAD ASSEMBLY

Cardno ERI
25371 Commercentre Drive, Suite 250
Lake Forest, California 92630

PROJECT NO.
DPE-1

PLATE
DPE-1

DATE: 01/10/11



Note: water level in the dip tube can be different from water level in the formation

FN Example DPE-OBSER-2

Cardno ERI
Shaping the Future

EXAMPLE OBSERVATION WELL RESPONSES

Cardno ERI
25371 Commercentre Drive, Suite 250
Lake Forest, California 92630

EXPLANATION

(V1) Vacuum applied at example extraction well

(V3) Induced vacuum observed at example observation well #3

PROJECT NO.
DPE

PLATE
DPE-2

DATE: 01/10/11