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Jennifer C. Sedlachek
Project Manager

RECEIVED
By Alameda County Environmental Health 8:49 am, Apr 28, 2016

ExxonMobil

April 25, 2016

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

RE: Former Mobil RAS #10MHG/160 14th Street, Oakland, California.

Dear Ms. Detterman:

Attached for your review and comment is a letter report entitled ***Sensitive Receptor Survey and Work Plan for Soil Borings,*** dated April 25, 2016, for the above-referenced site. The letter was prepared by Cardno, of Petaluma, California, and details proposed 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's ***Sensitive Receptor Survey and Work Plan for Soil Borings,*** dated April 25, 2016

cc: Ms. Janice A. Jacobson, Cardno

April 25, 2016
Cardno 287202.W01

Cardno

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Ms. Jennifer C. Sedlachek
ExxonMobil Environmental Services Company
4096 Piedmont Avenue #194
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SUBJECT **Sensitive Receptor Survey and Work Plan for Soil Borings**
Former Mobil Service Station 10MHG
160 14th Street, Oakland, California

Ms. Sedlachek:

At the request of ExxonMobil Environmental Services (EMES), on behalf of ExxonMobil Oil Corporation, Cardno prepared this sensitive receptor survey (SRS) and work plan for soil borings for the subject site in response to a directive from Alameda County Environmental Health (ACEH), dated February 9, 2016 (Appendix A). The ACEH requested an SRS and a work plan to delineate off-site petroleum hydrocarbon and chlorinated solvent concentrations in groundwater. An extension was granted for this document in electronic correspondence dated April 11, 2016 (Appendix A). The ACEH provided initial comments on this document in electronic correspondence dated April 12, 2016 (Appendix A). Cardno updated the document to incorporate the ACEH's comments.

SITE DESCRIPTION

Former Mobil Service Station 10MHG (Assessor's Parcel Number 08-0628-5-1) is located on the southeastern corner of Madison Street and 14th Street in Oakland, California, as shown on the Site Vicinity Map (Plate 1). A service station operated at the site from 1964 to 1986, when the station was decommissioned (AAC, 2001a).

Currently, the site is located in a mixed-use commercial and residential area and is occupied by a multi-story building. The upper floors of the building are comprised of residential apartments while the lower floor is occupied by a restaurant, a café, and parking. The neighboring properties include a dry cleaner and office building to the west, the Islamic Center of Northern California to the northeast, retail and residential buildings to

the east, a public library to the south, and a preschool to the southwest. Select site features and neighboring properties are illustrated on the Generalized Site Plan (Plate 2) and Extended Site Plan (Plate 3).

GEOLOGY AND HYDROGEOLOGY

The site is located along the eastern margin of the San Francisco Bay within the East Bay Plain (Hickenbottom and Muir, 1988). The surficial deposits in the site vicinity are mapped as Merritt Sand consisting of fine-grained, very well sorted, well-drained eolian deposits of the Pleistocene and Holocene age (Graymer, 2000). The active northwest trending Hayward fault is located east of the site. Boring logs indicate that the site is underlain primarily by silts and sands.

The East Bay Plain is regionally divided into two major groundwater basins: the San Pablo and the San Francisco Basin. These basins are tectonic depressions that are filled primarily with a sequence of coalescing alluvial fans. The San Francisco Basin is further divided into seven sub-areas. The site is located in the Oakland Sub-Area, which is filled primarily by alluvial deposits that range from 300 to 700 feet thick without well-defined aquitards (CRWQCB, 1999). Under natural conditions, the direction of groundwater flow in the East Bay Plain is east to west towards San Francisco Bay and correlates with topography.

The site is located approximately 850 feet west of Lake Merritt, which is connected to the Oakland Inner Harbor to the west, which connects to the San Francisco Bay, located approximately 3.3 miles to the west and 0.8 mile to the south of the site. The groundwater flow direction at the site is presumably east towards Lake Merritt. Groundwater recharge of the East Bay Plain occurs by infiltration from precipitation, irrigation, pipe leakage, and stream flow. First-encountered groundwater at the site is present between 12 and 20 feet bgs.

PREVIOUS WORK

Groundwater and soil sampling results are summarized in Table 1 and Tables 2A and 2B, respectively. The locations of the former USTs and sampling locations are illustrated on Plates 2 and 3. Select groundwater analytical results are illustrated on Plate 4.

Fueling System Activities

In May 1986, one 10,000-gallon gasoline UST, one 6,000-gallon gasoline UST, and one 550-gallon used-oil UST were removed from the site in conjunction with the demolition of a Mobil gasoline service station. Concentrations of TPHg and used oil were not reported in soil samples collected from the gasoline USTs excavation or the used-oil UST excavation, respectively (Blaine, 1986).

Site Assessment Activities

Site assessment activities have been conducted since 2001, including a Phase I environmental site assessment (ACC, 2001a); a Tier 1 risk evaluation (ACC, 2006b); the drilling and sampling soil borings SB1 through SB3 and B-1 through B-6 (ACC, 2001b; ACC, 2006a; AAC, 2007); and the collection of discrete composite soil samples and excavation sidewall samples (AAC, 2007).

Remediation Activities

Between 2006 and 2008, the site was redeveloped. During redevelopment activities, approximately 6,528 tons of soil were excavated and removed from the site. During construction, a vapor barrier was installed to eliminate potential soil vapor intrusion concerns (ACC, 2006c; ACC, 2008).

SENSITIVE RECEPTOR SURVEY

On December 18, 2015, Cardno visited the site and adjacent properties to identify potential sensitive receptors.

Private and Public Water Supply Wells

In October 2015, Cardno contacted the County of Alameda Public Works Agency, Water Resources Section (County), to obtain records of private and public supply water wells within a 5,000-foot radius of the site. Public water supply wells were not located within the search radius. Six potential private water wells (one domestic well and five irrigation wells) were identified within a 5,000-foot radius of the site. The domestic well, owned by Western Union, is located at 125 12th Street, approximately 1,000 feet south of the site. It was installed in May 1991, and appears to be an irrigation well. It is reportedly 33 feet deep and 6 inches in diameter. During the December 2015 field visit, Cardno was not able to confirm the locations or uses of the six wells identified within the search radius. Well locations are illustrated on Plate 5.

Water for the city is provided by the East Bay Municipal Utility District (EBMUD).

Surface Water Bodies and Wetlands

Lake Merritt lies approximately 850 feet to the east and flows to Oakland Inner harbor, which is approximately 4,300 feet to the southwest. San Francisco Bay lies approximately 3.3 miles to the west and 0.8 mile to the south of the site (Plate 5).

Public Use Areas within 330 Feet

Public use areas within 330 feet of the site include the Little Stars Preschool southwest of the site, the Oakland Public Library south of the site, and the Islamic Center of Northern California adjacent of the site to the northeast.

PROPOSED WORK

The purpose of the work is to delineate the extent of petroleum hydrocarbons and chlorinated solvents in groundwater. The proposed work consists of drilling eight soil borings around the perimeter of the site on private property and in the public right-of-way at the locations illustrated on Plate 2. The building at the site occupies the entire property leaving no available locations for on-site assessment. The building was constructed with a vapor barrier which would need to be breached to perform subsurface assessment.

The work will be conducted under the direction of a professional geologist and in accordance with the field protocol included in Appendix B, a site-specific health and safety plan, and applicable regulatory guidelines.

Pre-Field Activities

The borings will require an access agreement with off-site property owner(s) and an encroachment permit from the City of Oakland (City). Cardno will notify the ACEH if the proposed locations change significantly during the access negotiations or permitting process.

Prior to performing the fieldwork, soil boring permits will be obtained from the County. Cardno personnel will visit the site to check for underground and overhead obstructions and to mark the proposed boring locations. Underground Service Alert (USA North), the ACEH, the County, and the property owner will be notified at least 48 hours prior to the onset of field activities. In addition, a private utility location company will be employed to identify potential underground utilities or other obstructions in the proposed boring locations.

Soil Boring Activities

Prior to drilling, each boring location will be cleared to approximately 5 to 8 feet bgs using hand and/or air tools. The soil borings will subsequently be drilled using a direct-push type drill rig to approximately 20 feet bgs. Based on the results of previous investigations, groundwater is expected to be encountered between 12 and 20 feet bgs. The soil borings will be sampled continuously from the base of the cleared hole to total depth and will be sampled at a minimum once every 5 feet and or where visual indications of hydrocarbon concentrations are observed. Grab groundwater samples will be collected from each soil boring at first-encountered

groundwater. Soil samples will be selected for laboratory analysis based on changes in lithology, field screening with a PID, or visual observations such as staining.

Laboratory Analyses

Soil and groundwater samples will be submitted to a state-certified laboratory, under COC protocol, for analysis of TPHg and TPHd using EPA Method 8015M and full-scan VOCs including BTEX, naphthalene, and chlorinated solutions using EPA Method 8260B. In addition, soil samples collected between the surface and 10 feet bgs will be analyzed for PAHs using EPA Method 8310.

Survey

A licensed surveyor will record the locations and elevations of the borings and other relevant site features.

Waste Management Plan

Soil cuttings, groundwater, and decontamination rinsate generated during field activities will be temporarily stored on site in DOT-approved, 55-gallon drums. Upon characterization of the waste, the drums will be transported to EMES-approved disposal facilities. Waste documentation for the disposal of soil and water will be included in the report.

Report

After completion of the proposed field activities, the field and laboratory procedures, boring logs, laboratory results, conclusions, and recommendations will be incorporated into a report and submitted to EMES and the ACEH. The report will be signed by a State of California professional geologist.

CONTACT INFORMATION

The responsible party contact is Ms. Jennifer C. Sedlachek, ExxonMobil Environmental Services Company, 4096 Piedmont Avenue #194, Oakland, California, 94611. The consultant contact is Ms. Janice A. Jacobson, Cardno, 601 N. McDowell Boulevard, Petaluma, California, 94954. The agency contact is Ms. Karel Detterman, Alameda County Environmental Health, 1131 Harbor Bay Parkway, Alameda, California, 94502.

LIMITATIONS

For documents cited that were not generated by Cardno, the data taken from those documents is used "as is" and is assumed to be accurate. Cardno 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. Janice A. Jacobson, Cardno's project manager for this site, at janice.jacobson@cardno.com or at (707) 766-2000 with any questions regarding this report.

Sincerely,

SCANNED IMAGE

SCANNED IMAGE

PROFESSIONAL GEOLOGIST
DAVID RICHARD DANIELS
No. 8737
EXP. 7/31/17
STATE OF CALIFORNIA

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References

Acronym List

Plate 1	Site Vicinity Map
Plate 2	Generalized Site Plan
Plate 3	Extended Site Plan
Plate 4	Select Groundwater Analytical Results
Plate 5	Well Location Map

Table 1	Cumulative Groundwater Analytical Results
Table 2A	Cumulative Soil Analytical Results
Table 2B	Cumulative Soil Analytical Results – Metals

Appendix A	Correspondence
Appendix B	Field Protocol

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

REFERENCES

ACC Environmental Consultants (ACC). April 9, 2001a. *Phase I Environmental Site Assessment, 160 14th Street, Oakland, California.*

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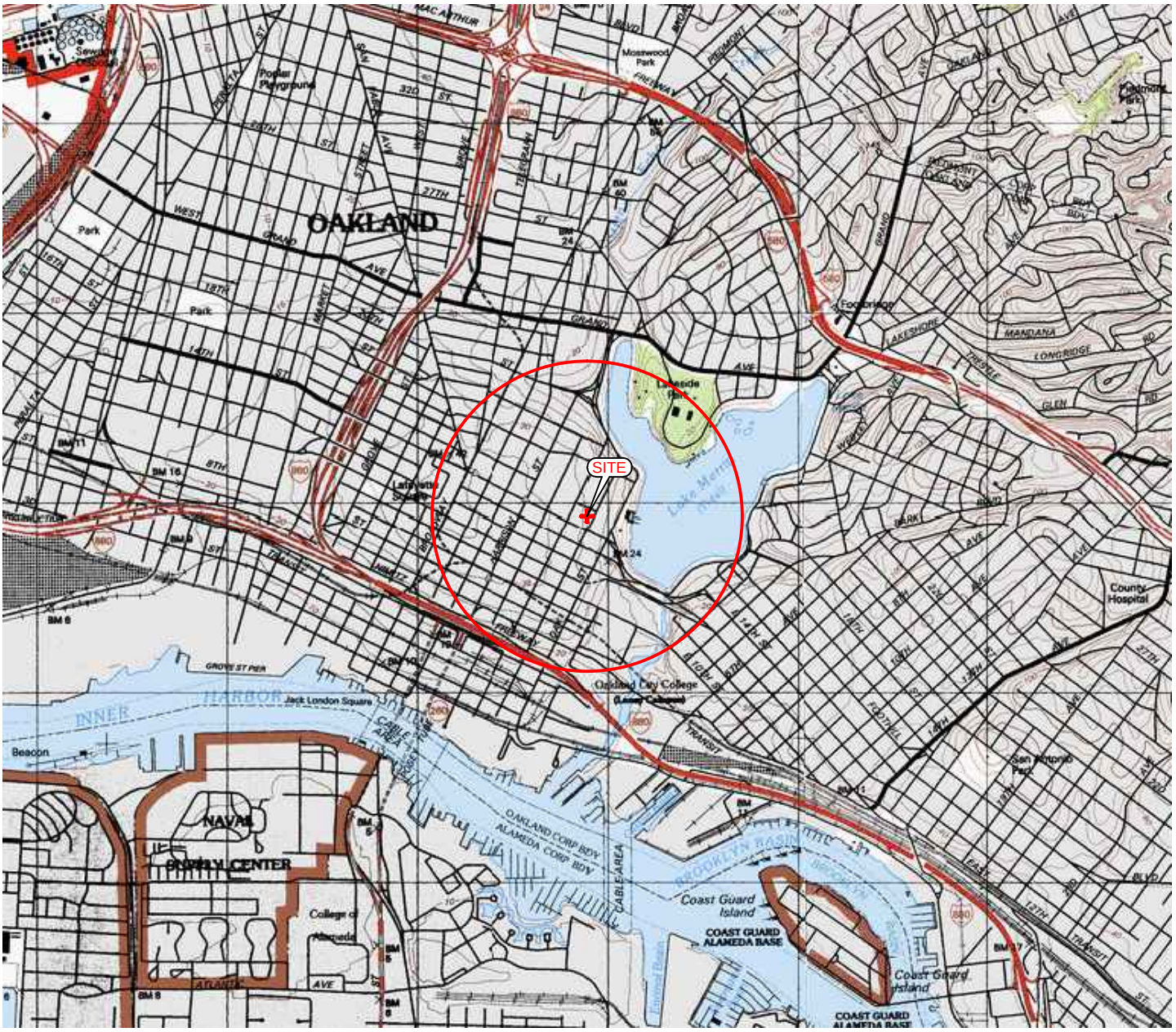
Graymer, R.W. 2000. Geologic map and map database of the Oakland metropolitan area, Alameda, Contra Costa, and San Francisco Counties, California. USGS, Miscellaneous Field Studies MF-2342.

Hickenbottom, Kelvin and Muir, Kenneth S. June 1988. *Geohydrogeology and Groundwater Quality Overview of the East Bay Plain Area, Alameda County, CA*. Alameda County Flood Control and Water Conservation District. 83p.

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	Semi-volatile 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



EXPLANATION

0.5-mile radius circle

SOURCE: Modified from a map provided by www.topoquest.com

FN 2872TOPO

N

APPROXIMATE SCALE

0 0.5 1 MILE

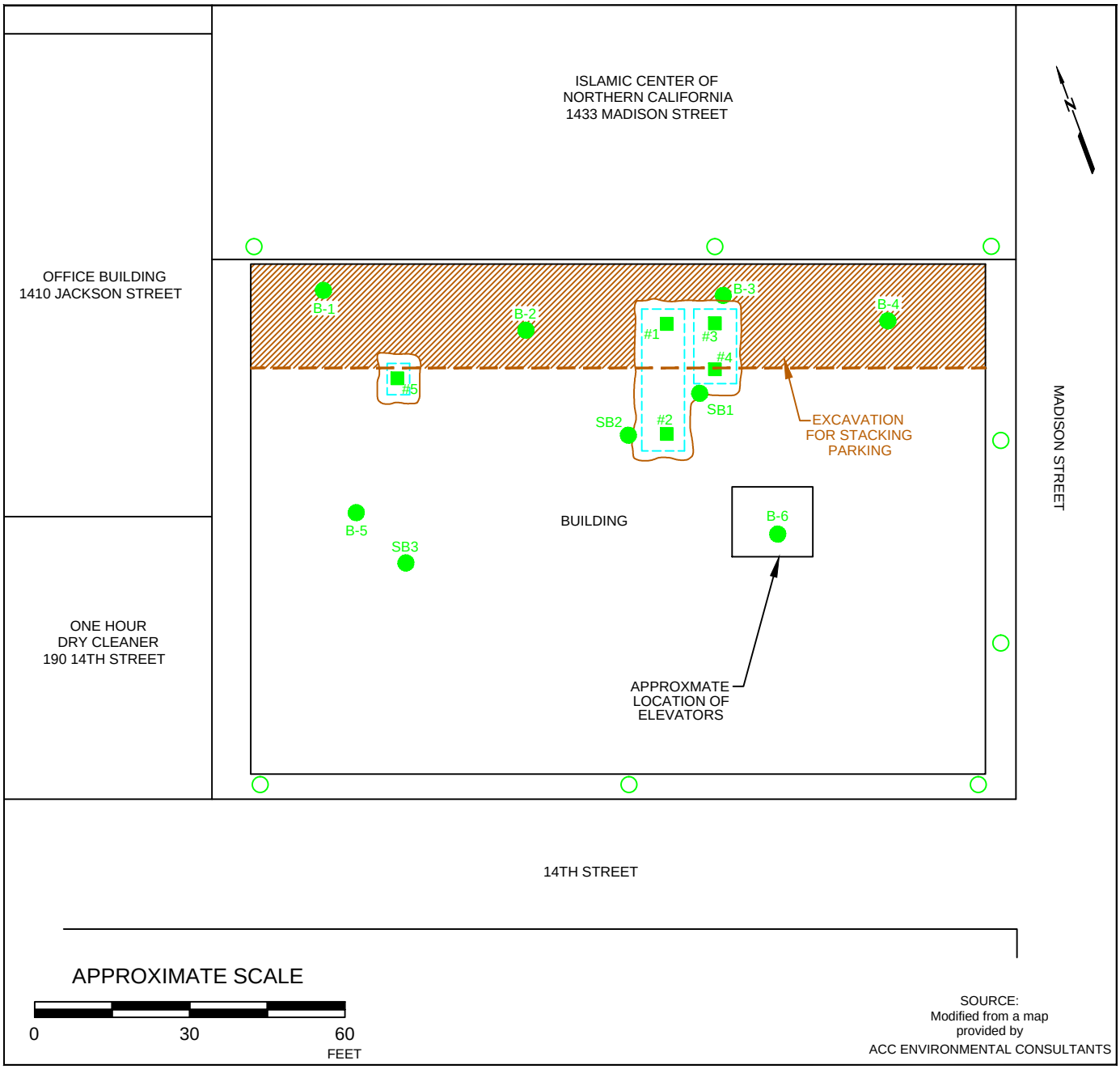
Cardno Shaping the Future

SITE VICINITY MAP

Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

PROJECT NO. 2872

PLATE 1



FN 28720003 W01

EXPLANATION

B-6 ● Soil Boring

○ Proposed Soil Boring

#5 ■ Excavation Soil Sample

Former UST

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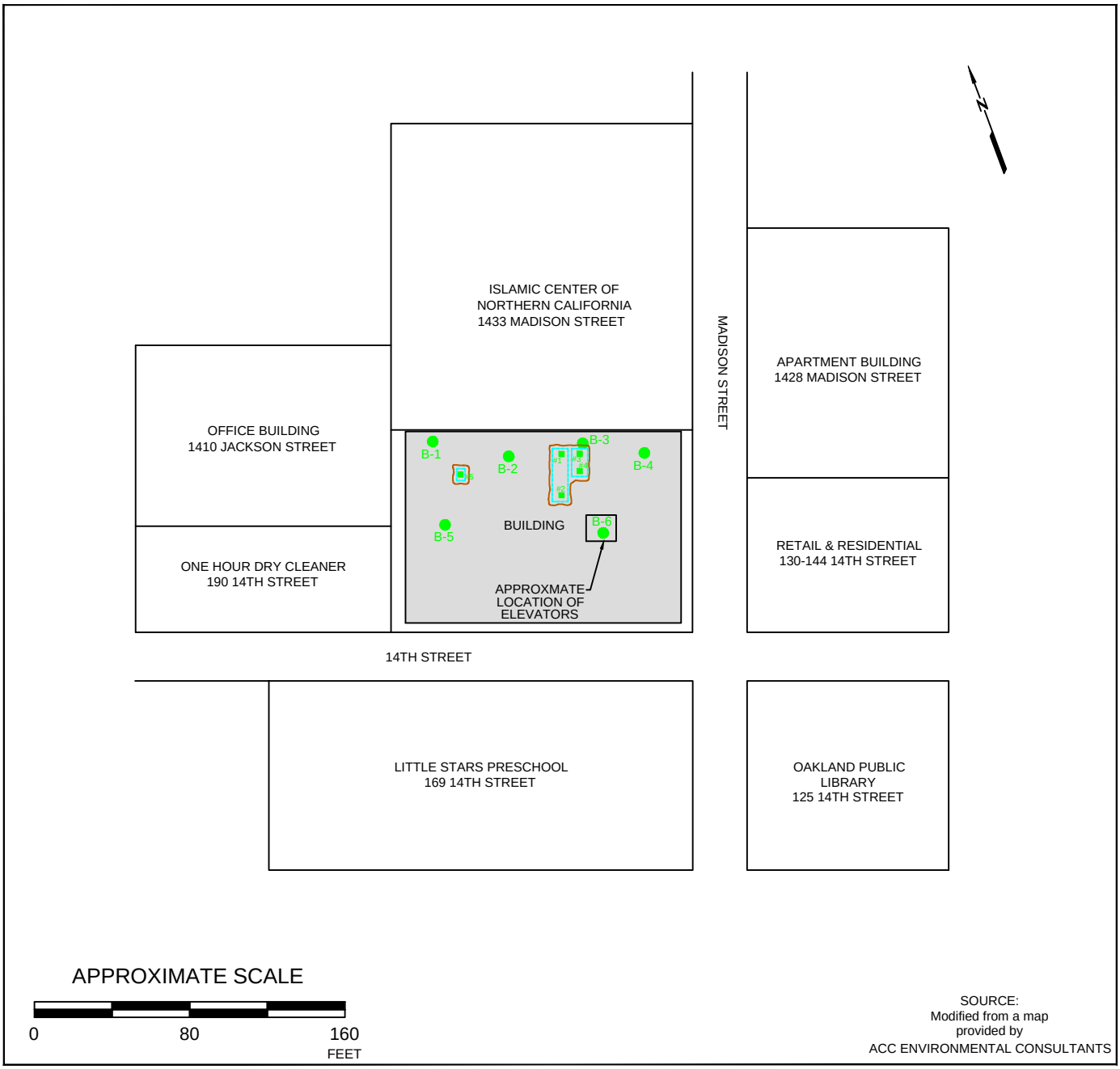
GENERALIZED SITE PLAN

Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

PROJECT NO. 2872

PLATE 2



FN 28720002 W01

EXPLANATION

B-6
● Soil Boring

#5
■ Excavation Soil Sample

Former UST

EXTENDED SITE PLAN

Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

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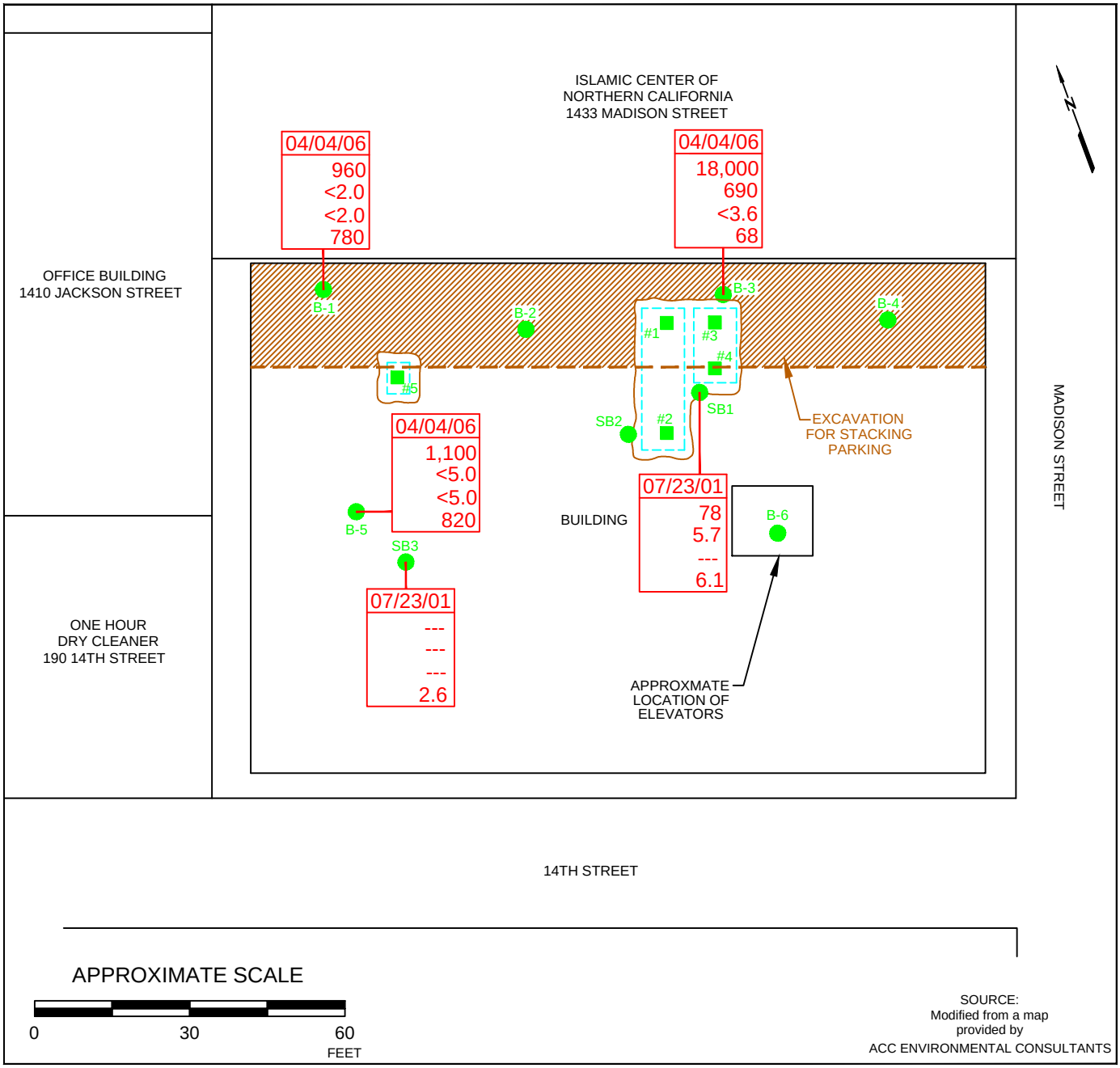
PROJECT NO. 2872

PLATE 3



FN 28720003 W01

EXPLANATION

B-6 — Soil Boring

#5 — Excavation Soil Sample

Former UST

Sample Date
Total Petroleum Hydrocarbons as gasoline
Benzene
Methyl Tertiary Butyl Ether
Tetrachloroethene

<	Less than the stated laboratory reporting limit
---	Not analyzed
ug/L	Micrograms per Liter

Cardno — Shaping the Future

SELECT GROUNDWATER ANALYTICAL RESULTS

Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

PROJECT NO. 2872

PLATE 4

EXPLANATION

1. 2100 Harrison Street (Irrigation)
2. 300 Lakeside Drive (Irrigation)
3. 244 Lakeside Drive (Irrigation)
4. 125 12th Street (Domestic)
5. 425 Foothill Boulevard (Irrigation)
6. 900 Fallon Street (Irrigation)

Imagery Source: Google Earth Pro
Imagery Date: July 26, 2014

APPROXIMATE SCALE

0 1100 2200 Feet

5,000-Foot Radius

1,000-Foot Radius

WELL LOCATION MAP

FORMER MOBIL SERVICE STATION 10MHG
160 14th Street
Oakland, California

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PROJECT NO. 2872

PLATE 5

FN 2872 16 SRS WELL LOCATION MAP 5,000-FEET_SP W01

TABLE 1
CUMULATIVE GROUNDWATER ANALYTICAL RESULTS
Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

Sample ID	Sampling Date	TPHmo (µg/L)	TPHd (µg/L)	TPHg (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)	Add'l HVOCs (µg/L)
Environmental Screening Levels (February 2016)														
Tier 1		---	100	100	1.0	40	13	20	5.0	0.42	0.46	6.0	0.01	---
2001 Soil Boring Investigation														
SB1-W	07/23/01	<690	340	78	5.7	<0.50	1.9	<0.50	---	6.1	<0.50	<0.50	<0.50	ND
SB3-W	07/23/01	---	---	---	---	---	---	---	---	2.6	<0.50	<0.50	<0.50	ND
2006 Groundwater Sampling														
B-1	04/04/06	---	---	960	<2.0	18	<2.0	2.8	<2.0	780	33	<2.0	<2.0	ND
B-3	04/04/06	---	---	18,000	690	82	990	2,070	<3.6	68	5.3	16	87	ND
B-5	04/04/06	---	---	1,100	<5.0	<5.0	<5.0	6.6	<5.0	820	42	<5.0	<5.0	ND

Notes:

TPHmo	=	Total petroleum hydrocarbons as motor oil analyzed using EPA Method 8015M.
TPHd	=	Total petroleum hydrocarbons as diesel analyzed using EPA Method 8015M.
TPHg	=	Total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015.
MTBE	=	Methyl tertiary butyl ether analyzed using EPA Method 8020/8021.
BTEX	=	Benzene, toluene, ethylbenzene, and total xylenes analyzed using EPA Method 8020/8021.
PCE	=	Tetrachloroethene analyzed using EPA Method 8021B.
TCE	=	Trichloroethene analyzed using EPA Method 8021B.
cis-1,2-DCE	=	cis-1,2-Dichloroethene analyzed using EPA Method 8021B
Vinyl Chloride	=	Vinyl chloride analyzed using EPA Method 8021B.
Add'l HVOCs	=	Additional halogenated volatile organic compounds analyzed using EPA Method 8021B.
µg/L	=	Micrograms per liter.
ND	=	Not detected.
<	=	Less than the laboratory reporting limit.
---	=	Not analyzed/Not applicable/Not sampled.
a	=	The chromatographic pattern does not match that of the specified standard.

TABLE 2A
CUMULATIVE SOIL ANALYTICAL RESULTS
Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

Sample ID	Sampling Date	Depth (feet bgs)	Waste Oil (mg/kg)	TPHmo (mg/kg)	TPHd (mg/kg)	TPHg (mg/kg)	B (mg/kg)	T (mg/kg)	E (mg/kg)	o-X (mg/kg)	pm-X (mg/kg)	X (mg/kg)	MTBE (mg/kg)
Environmental Screening Levels (February 2016)													
Tier 1			---	100	240	100	0.044	2.9	1.4	---	---	2.3	0.023
1986 UST Removals													
10,000-Gallon Gasoline UST													
#1	05/08/86	15.5-16	---	---	---	<2	---	---	---	---	---	---	---
#2	05/08/86	15.5	---	---	---	<2	---	---	---	---	---	---	---
6,000-Gallon Gasoline UST													
#3	05/08/86	12	---	---	---	<2	---	---	---	---	---	---	---
#4	05/08/86	12	---	---	---	<2	---	---	---	---	---	---	---
550-Gallon Used-Oil UST													
#5	05/08/86	8	<10	---	---	---	---	---	---	---	---	---	---
2001 Soil Investigation													
SB1-13.0	07/23/01	13	---	---	---	<1.0	0.014	<0.0050	<0.0050	---	---	<0.0050	<0.0050
SB1-15.5	07/23/01	15	---	---	---	<1.0	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050
SB2-8.0	07/23/01	8	---	650	100a	87	1.8	<0.62	2.0	---	---	<0.62	<0.62
SB2-13.0	07/23/01	13	---	---	---	<1.0	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050
2006 Soil Investigation													
B-1@10.5'	04/04/06	10.5	---	---	---	<0.94	<0.0047	<0.0047	<0.0047	---	---	<0.0047	<0.0047
B2-COMP	04/04/06	---	---	---	---	---	---	---	---	---	---	---	---
B-4@3’	04/04/06	3	---	---	---	---	---	---	---	---	---	---	---
B-4@6'	04/04/06	6	---	---	---	<0.98	<0.0049	<0.0049	<0.0049	---	---	<0.0049	<0.0049
B-5@2’	04/04/06	2	---	---	---	---	---	---	---	---	---	---	---
B-6@4’	04/04/06	4	---	---	---	---	---	---	---	---	---	---	---
B-6@8'	04/04/06	8	---	---	---	<0.0049	<0.0049	<0.0049	0.0064	---	---	0.022	<0.0049
SW-S-16.0	09/01/06	16	---	---	---	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.0050
SW-W-21.0	09/01/06	21	---	---	---	1.9c	0.041	<0.0048	0.34	<0.0048	<0.0048	---	<0.0048
SW-E-14.5	09/06/06	14.5	---	---	---	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	---	<0.0050
EB-13W-14.0	09/06/06	14	---	---	---	<0.94	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	---	<0.0047
Soil Stockpile Samples													
Comp.1	07/21/06	---	---	---	---	<0.99	<0.0050	<0.0050	0.005	---	---	0.005	<0.0050
Comp.2	07/21/06	---	---	---	---	<0.93	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050

TABLE 2A
CUMULATIVE SOIL ANALYTICAL RESULTS
Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

Sample ID	Sampling Date	Depth (feet bgs)	Waste Oil (mg/kg)	TPHmo (mg/kg)	TPHd (mg/kg)	TPHg (mg/kg)	B (mg/kg)	T (mg/kg)	E (mg/kg)	o-X (mg/kg)	pm-X (mg/kg)	X (mg/kg)	MTBE (mg/kg)
Environmental Screening Levels (February 2016)													
Tier 1			---	100	240	100	0.044	2.9	1.4	---	---	2.3	0.023
Composite 1	08/02/06	---	---	18	2.2a	<0.93	<0.0050	<0.0050	0.005	---	---	<0.0050	<0.0050
Composite 2	08/02/06	---	---	13	1.5a	<0.94	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050
Composite 3	08/02/06	---	---	150	53a	<0.89	<0.0050	<0.0050	0.069	---	---	<0.0050	<0.0050
Composite 4	08/02/06	---	---	13	5.8a	<0.96	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050
Composite 5	08/02/06	---	---	7.2	1.2a	<1.0	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050
S-COMP	12/04/06	---	---	15b	3.3a,b	---	---	---	---	---	---	---	---

Notes:

Waste Oil	=	Waste oil analyzed using modified EPA Method 3510.
TPHmo	=	Total petroleum hydrocarbons as motor oil analyzed using EPA Method 8015M.
TPHd	=	Total petroleum hydrocarbons as diesel analyzed using EPA Method 8015M.
TPHg	=	Total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015.
MTBE	=	Methyl tertiary butyl ether analyzed using EPA Method 8020/8021.
BTEX	=	Benzene, toluene, ethylbenzene, and total xylenes analyzed using EPA Method 8020/8021.
Metals	=	Total metals analyzed using EPA Method 6010B.
STLC	=	Soluble Threshold Limit Concentration.
mg/kg	=	Milligrams per kilogram.
mg/L	=	Milligrams per liter.
feet bgs	=	Feet below ground surface.
ND	=	Not detected.
---	=	Not analyzed/Not applicable/Not sampled.
<	=	Less than the laboratory reporting limit.
a	=	The chromatographic pattern does not match that of the specified standard.
b	=	Heavy hydrocarbons contributed to the quantitation.
c	=	Unknown single peak(s).

TABLE 2B
CUMULATIVE SOIL ANALYTICAL RESULTS - METALS
Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

Sample ID	Sampling Date	Depth (feet bgs)	Anti-mony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Bery-llium (mg/kg)	Cadmium (mg/kg)	Chro-mium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Moly-bdenum (mg/kg)	Nickel (mg/kg)	Sele-nium (mg/kg)	Silver (mg/kg)	Tha-llium (mg/kg)	Vana-dium (mg/kg)	Zinc (mg/kg)	STLC Lead (mg/L)	STLC Chromium (mg/L)
Environmental Screening Levels (February 2016)																					
Tier 1			31	0.067	2,900	0.083	0.00006	120,000	23	3,100	80	13	390	83	390	390	0.78	600	23,000	---	---
1986 UST Removals																					
10,000-Gallon Gasoline UST																					
#1	05/08/86	15.5-16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
#2	05/08/86	15.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6,000-Gallon Gasoline UST																					
#3	05/08/86	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
#4	05/08/86	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
550-Gallon Used-Oil UST																					
#5	05/08/86	8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2001 Soil Investigation																					
SB1-13.0	07/23/01	13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SB1-15.5	07/23/01	15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SB2-8.0	07/23/01	8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SB2-13.0	07/23/01	13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2006 Soil Investigation																					
B-1@10.5'	04/04/06	10.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
B2-COMP	04/04/06	---	<2.9	2.9	68	0.22	<0.24	36	5.7	8.9	18	0.066	<0.97	23	<0.24	<0.24	<0.24	32	42	---	---
B-4@3’	04/04/06	3	---	---	---	---	---	---	---	---	2.7	---	---	---	---	---	---	---	---	---	---
B-4@6'	04/04/06	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
B-5@2’	04/04/06	2	---	---	---	---	---	---	---	---	5.0	---	---	---	---	---	---	---	---	---	---
B-6@4’	04/04/06	4	---	---	---	---	---	---	---	---	3.2	---	---	---	---	---	---	---	---	---	---
B-6@8'	04/04/06	8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SW-S-16.0	09/01/06	16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SW-W-21.0	09/01/06	21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SW-E-14.5	09/06/06	14.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
EB-13W-14.0	09/06/06	14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Soil Stockpile Samples																					
Comp.1	07/21/06	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Comp.2	07/21/06	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 2B
CUMULATIVE SOIL ANALYTICAL RESULTS - METALS
Former Mobil Service Station 10MHG
160 14th Street
Oakland, California

Sample ID	Sampling Date	Depth (feet bgs)	Anti-mony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Bery-llium (mg/kg)	Cadmium (mg/kg)	Chro-mium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Moly-bdenum (mg/kg)	Nickel (mg/kg)	Sele-nium (mg/kg)	Silver (mg/kg)	Tha-llium (mg/kg)	Vana-dium (mg/kg)	Zinc (mg/kg)	STLC Lead (mg/L)	STLC Chromium (mg/L)
Environmental Screening Levels (February 2016)																					
Tier 1			31	0.067	2,900	0.083	0.00006	120,000	23	3,100	80	13	390	83	390	390	0.78	600	23,000	---	---
Composite 1	08/02/06	---	<3.0	2.5	90	0.34	<0.25	59	5.6	9.2	5.2	0.023	<1.0	34	<0.25	<0.25	<0.25	40	25	---	ND
Composite 2	08/02/06	---	<3.0	2.1	61	0.20	<0.25	62	7.0	5.6	2.9	<0.020	<1.0	43	<0.25	<0.25	<0.25	37	24	---	ND
Composite 3	08/02/06	---	<3.0	3.1	97	0.28	<0.26	48	6.6	12	71	0.031	<1.0	28	<0.26	<0.26	<0.26	36	56	0.0022	ND
Composite 4	08/02/06	---	<3.0	1.8	57	0.18	<0.26	67	6.8	5.1	6.7	<0.020	<1.0	43	<0.26	<0.26	<0.26	36	26	---	---
Composite 5	08/02/06	---	<3.0	2.7	81	0.32	<0.25	60	9.1	9.3	5.1	<0.020	<1.0	41	<0.25	<0.25	<0.25	41	27	---	ND
S-COMP	12/04/06	---	<3.0	1.7	73	0.24	0.57	39	4.7	11	46	0.058	<1.0	20	<0.25	<0.25	<0.25	26	38	---	---

Notes:

Waste Oil	=	Waste oil analyzed using modified EPA Method 3510.
TPHmo	=	Total petroleum hydrocarbons as motor oil analyzed using EPA Method 8015M.
TPHd	=	Total petroleum hydrocarbons as diesel analyzed using EPA Method 8015M.
TPHg	=	Total petroleum hydrocarbons as gasoline analyzed using EPA Method 8015.
MTBE	=	Methyl tertiary butyl ether analyzed using EPA Method 8020/8021.
BTEX	=	Benzene, toluene, ethylbenzene, and total xylenes analyzed using EPA Method 8020/8021.
Metals	=	Total metals analyzed using EPA Method 6010B.
STLC	=	Soluble Threshold Limit Concentration.
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feet bgs	=	Feet below ground surface.
ND	=	Not detected.
---	=	Not analyzed/Not applicable/Not sampled.
<	=	Less than the laboratory reporting limit.
a	=	The chromatographic pattern does not match that of the specified standard.
b	=	Heavy hydrocarbons contributed to the quantitation.
c	=	Unknown single peak(s).

APPENDIX A

CORRESPONDENCE

From:	Detterman, Karel, Env. Health
To:	"Sedlachek, Jennifer C"; "james.chappell@cardno.com"
Cc:	Roe, Dilan, Env. Health
Subject:	Fuel Leak Case No. RO0002922 and Geotracker Global ID T06019782296, Mobil #10-MHG, 160 14th St., Oakland, CA 94612
Date:	Tuesday, February 09, 2016 12:21:36 PM
Attachments:	Attachment_1_and_ftpUploadInstructions_2014-05-15.pdf

Hello Jennifer and Jim:

Thank you for attending the meeting held at Alameda County Environmental Health's (ACEH) offices on February 4, 2016 to discuss our evaluation of the site data in reference to the State Water Resources Control Board's (SWRCBs) Low Threat Underground Storage Tank Case Closure Policy (LTCP) and develop a path to case closure.

The site was formerly a Mobile Service Station with two gasoline underground storage tanks (USTs) and a waste oil UST which were removed along with the station in 1986. A dry cleaner business is located immediately northwest of the site and according to the Phase I Report has been there since 1963. The site was then used as a paved parking lot until 2006, when the site was extensively excavated prior to redevelopment. A multiple story building with subgrade parking, ground floor commercial space and upper floor residential was completed in 2008. Soil and grab groundwater samples taken prior to and during the site excavation detected total petroleum hydrocarbons (TPH), tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride. Groundwater was encountered onsite at 17 feet below ground surface and the direction of the groundwater gradient is probably to the east towards Lake Merritt.

During the meeting we agreed that this site has been impacted by petroleum hydrocarbons from the former service station and chlorinated hydrocarbons from the former waste oil UST and/or the dry cleaner. Extensive site excavation for the redevelopment provided source removal of the petroleum hydrocarbon-impacted soil. Chlorinated hydrocarbons appear to be present in groundwater, and may present an ecological risk to Lake Merritt, a vapor intrusion risk to current occupants of the new building, especially from elevator shafts and stair wells penetrating native soil below the vertical extent of the excavation, and to occupants of adjacent buildings. For the fuel leak case, two data gaps related to the LTCP's Media-Specific Criteria for Groundwater appear to remain:

1. Ground water plume length has not been has not been delineated off-site and downgradient of the site. Please present a strategy in the Data Gap Work Plan to determine if groundwater in the vicinity of the site has been impacted by a release, and if so, to adequately define the extent of the groundwater plume;

2. Additionally, please perform a Sensitive Receptor Study to determine if sensitive receptors are present within a radius of 1,500 feet of the site by utilizing Alameda County Public Works Agency (ACPWA) and Department of Water Resources (DWR) well data sources for a complete inventory of vicinity water supply wells. ACEH understands that DWR's response is currently delayed, so please utilize ACPWA's data base. ACEH requests the identification and location on a site vicinity figure of all active, inactive, standby, decommissioned (sealed

with concrete), unrecorded, and abandoned (improperly decommissioned or lost) wells including irrigation, water supply, industrial, dewatering, and cathodic protection wells within a 1,500-foot radius of the site. Please plot the numbered well locations on an aerial photography-based figure and provide a table listing the same numbered well locations, site addresses, well depth and use. Additionally, please identify on the same figure beneficial resources and other sensitive receptors including, but not limited to, surface water bodies, natural resources, schools, hospitals, day care centers, elder care facilities, etc.

To expedite review, please e-mail the draft Data Gap Work Plan to my attention. I will send comments for incorporation into the final work plan so that it may be uploaded as follows:

TECHNICAL REPORT REQUEST

Please upload the final Data Gap Work Plan to the ACEH ftp site (Attention: Karel Detterman), and to the State Water Resources Control Board's Geotracker website, in accordance with Attachment 1 and the following specified file naming convention and schedule:

- April 12, 2016 – Final Data Gap Investigation Work Plan
  File to be named: RO2922_WP_R_yyyy-mm-dd

This report is 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,

Karel Detterman, PG
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
Direct: 510.567.6708
Fax: 510.337.9335
Email: karel.detterman@acgov.org

PDF copies of case files can be downloaded at:

http://www.acgov.org/aceh/lop/ust.htm

From: Detterman, Karel, Env. Health [mailto:Karel.Detterman@acgov.org]
Sent: Monday, April 11, 2016 1:55 PM
To: Janice Jacobson <janice.jacobson@cardno.com>
Cc: jennifer.c.sedlachek@exxonmobil.com; James Chappell <jim.chappell@cardno.com>
Subject: RE: Fuel Leak Case No. RO0002922, Former Mobil 10MHG_DRAFT_160 14th Street, Oakland, CA 94612

Hello Janice:

Thank you for sending the draft work plan; I have been focusing on completing two case closures, so have been unable to review the draft work plan just yet. Below is an extension for the Work Plan:

REVISED TECHNICAL REPORT REQUEST

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

- **April 26, 2016 –** Final Data Gap Investigation Work Plan
  File to be named: RO2922_WP_R_yyyy-mm-dd

This report is 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.

Should you have any questions or concerns regarding this correspondence or your case, please send me an e-mail message at karel.detterman@acgov.org or call me at (510) 567-6708.

Thank you,

Karel Detterman, PG
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
Direct: 510.567.6708
Fax: 510.337.9335
Email: karel.detterman@acgov.org

PDF copies of case files can be downloaded at:

http://www.acgov.org/aceh/lop/ust.htm

From: Detterman, Karel, Env. Health [mailto:Karel.Detterman@acgov.org]
Sent: Tuesday, April 12, 2016 2:40 PM
To: jennifer.c.sedlachek@exxonmobil.com
Cc: Janice Jacobson <janice.jacobson@cardno.com>; James Chappell <jim.chappell@cardno.com>
Subject: Fuel Leak Case No. RO0002922 and Geotracker Global ID T06019782296, Mobil #10-MHG, 160 14th St., Oakland, CA 94612

Hello Jennifer:

Alameda County Environmental Health (ACEH) staff has reviewed the case file including the Draft *Sensitive Receptor Survey and Work Plan for Soil Borings* (Work Plan) prepared and submitted by e-mail on your behalf by Cardno on March 22, 2016 in conjunction with the State Water Resources Control Board's (SWRCBs) Low Threat Underground Storage Tank Case Closure Policy (LTCP). The draft Work Plan was submitted in response to our February 4, 2016 meeting and February 9, 2016 Directive Letter. Thank you for submitting the draft Work Plan.

Based on ACEH staff review of the draft Work Plan, the proposed scope of work is conditionally approved for implementation provided that the technical comments below are incorporated during the proposed work. Submittal of a work plan addendum is not required unless an alternate scope of work outside that described in the work plan or these technical comments is proposed. We request that you address the following technical comments in the draft work plan, upload the final work plan by the date provided below, perform the proposed work, and send us the report described below. Please provide 72-hour advance written notification to this office (e-mail preferred to: karel.detterman@acgov.org) prior to the start of field activities.

TECHNICAL COMMENTS

1. **Soil Boring Depths to First Groundwater:** Please ensure that grab groundwater samples are obtained from all soil borings to fulfill the remaining data gaps related to the LTCP's Media Specific Criteria for Groundwater identified during the February 4, 2016 meeting.

2. **Sensitive Receptor Survey:** Please include the Sensitive Receptor Survey figure and table including the information shown in the attached table in the Soil and Groundwater Investigation Report requested below.

3. **Distances in feet:** Please ensure that all units of length are in feet instead of meters.

4. **Pre-Field Activities and Waste Management Plan:** Please additionally notify the current property owner prior to conducting these activities.

REVISED TECHNICAL REPORT REQUEST

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

- **April 26, 2016 –** Final Data Gap Investigation Work Plan
  File to be named: RO2922_WP_R_yyyy-mm-dd

- **June 27, 2016 –** Soil and Groundwater Investigation Report
  File to be named: RO2922_SWI_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.

Should you have any questions or concerns regarding this correspondence or your case, please send me an e-mail message at karel.detterman@acgov.org or call me at (510) 567-6708.

Thank you,

Karel Detterman, PG
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
Direct: 510.567.6708
Fax: 510.337.9335
Email: karel.detterman@acgov.org

PDF copies of case files can be downloaded at:

http://www.acgov.org/aceh/lop/ust.htm

APPENDIX B

FIELD PROTOCOL

Cardno
Soil Boring and Well Installation
Field Protocol

Preliminary Activities

Prior to the onset of field activities at the site, Cardno 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 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 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 4º Celsius and transported to a state-certified laboratory. The samples are transferred under chain-of-custody (COC) protocol.

Field Screening Procedures

Cardno 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 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 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 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 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.