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June 15, 2017

Subject: Baker Road Redevelopment
20785 and 20957 Baker Road (Case #RO0003234)
Castro Valley, California

ACKNOWLEDGEMENT SATEMENT

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

Todd Deutscher
Catalyst Development Partners

Project No.
13255.000.000

June 15, 2017

Ms. Kit Soo
Senior Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

Subject: 20785 and 20957 Baker Road (Site Cleanup Program Case No. R00003234
Castro Valley, California

WORKPLAN FOR ADDITIONAL SITE CHARACTERIZATION

Dear Ms. Soo:

On behalf of Catalyst Development Partners, we have prepared this Workplan outlining additional characterization activities proposed for the site located at 20785 and 20957 Baker Road (Site) in Castro Valley, California. The purpose of the proposed scope of work is to perform a soil and groundwater assessment to further evaluate potential residual subsurface impairments associated with the historical land use and presence of former underground storage tanks (USTs) at the Site, and to determine if a bioattenuation zone exists in the upper five feet of soil.

BACKGROUND

Site Description

The Site is located at 20785 and 20957 Baker Road, northeast of Rutledge Road and southeast of Castro Valley Boulevard in Castro Valley, California (Figure 1). The Site consists of two parcels measuring approximately 1.12 acres in area and is identified with Assessor's Parcel Numbers (APN) 84A-16-5-9 and 84A-16-6-4.

The 20785 Baker Road parcel features two remnant building foundation slabs, a house, and is dirt- or partially asphalt-covered with overgrown vegetation. The 20957 Baker Road parcel features one remnant building foundation slab, and a majority of the parcel is dirt- or asphalt-covered with overgrown vegetation.

Multi-family housing is present in the vicinity to the north and south of the Site. An automotive shop is present to the west, and multi-family housing occupies the properties to the east of Baker Road. Redevelopment consisting of attached residential housing is planned for the Site.

Previous Studies

AEI, Preliminary Site Investigation Report, 20957 Baker Road, Castro Valley, California, June 7, 2005

AEI performed a preliminary site investigation for the Site in June 2005. The scope of work was performed to determine the extent of soil contamination and impact to groundwater resulting from the hydrocarbon release from former USTs at the Site.

In April 2004, two 1,000-gallon USTs were removed from the Site. The tanks, which had been unused for over 15 years, were reported to contain a small amount of fuel and sludge, but they were reported to be intact with no obvious leaks. Two soil samples were collected from underneath each UST and analyzed for total petroleum hydrocarbons as gasoline (TPH-g), benzene, toluene, ethylbenzene, and xylene(s) (BTEX), methyl tertiary butyl ether (MTBE), total petroleum hydrocarbons as diesel (TPH-d), and total lead. Hydrocarbons were reported in all the soil samples analyzed. TPH-g was reported at concentrations ranging from 160 milligrams per kilogram (mg/kg) to 1,400 mg/kg. TPH-d was reported at concentrations ranging from 1,400 mg/kg to 10,000 mg/kg. Lower concentrations of xylene(s) and lead were also detected.

Eight soil borings were advanced during the 2005 investigation to depths ranging from 14 to 18 feet below ground surface. No detectable concentrations of TPH-g, TPH-d, total petroleum hydrocarbons as motor-oil (TPH-mo), MTBE, or BTEX were reported in any of the soil samples. TPH-g was reported in one groundwater sample at concentration of 7,300 micrograms per liter (µg/L). The groundwater sample from this boring also exhibited a TPH-d concentration of 23,000 µg/L. Free product was observed both in the field and in this groundwater sample. No TPH-g was reported in groundwater samples from any other borings. TPH-d was detected in other groundwater samples to a maximum concentration of 670 µg/L. TPH-mo was reported at concentrations ranging from 300 µg/L to 1,400 µg/L. No MTBE was reported in the groundwater samples.

Based on the findings of the study, AEI recommended the installation of four groundwater monitoring wells, a one-year monitoring program, and the preparation of a remedial action plan if deemed necessary.

AEI, Additional Information Report, 20957 Baker Road, Castro Valley, California, November 15, 2008

AEI prepared an Additional Information Report for the 20957 Baker Road parcel in November 2008. The document provided an overview of past investigations and reporting for the property. The following was presented in the report, as well as supplemental information provided in a Case Closure Letter from Alameda County Department of Environmental Health (ACDEH) dated September 8, 2009.

In October 2007, five groundwater monitoring wells were installed, one on each side of the former UST location, one through the center of the tank backfill, and two downgradient of the former UST location. Low-level hydrocarbons were detected in samples collected in a boring near the former tank location. Depth to water at the time the wells were developed ranged from approximately 11 to 14½ feet below the ground surface. Analysis of the groundwater samples collected during the October 2007 groundwater monitoring event did not identify the presence of TPH-g, BTEX or MTBE in any of the groundwater samples. TPH-d was detected in one sample, but not during three subsequent events.

Following the four quarters of groundwater monitoring, AEI opined that the data for the Site met the established Regional Water Quality Control Board (RWQCB) standard for closure. Following a comment and rebuttal period between AEI and ACDEH, ACDEH did provide case closure in a letter dated September 9, 2009. In the case closure letter, ACDEH did note the absence of soil gas testing, but given the elapsed time since the release (prior to 1989), the potential for vapor intrusion appeared to be low. ACDEH did comment in the document that the closure was based

on the determination that the reported release did not appear to present a risk to human health, given the property use and conditions at the time of the closure. Soil and groundwater analyses from these site characterization activities are presented in Tables A and B.

ENGEO, Phase I Environmental Site Assessment, 20957 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 23, 2016.

ENGEO conducted a phase I environmental site assessment for the 20957 Baker Road property in August 2016. The property was reportedly used as a corporation yard/storage area for heavy equipment. Prior to development in the 1950s, the property appeared to be under cultivation for row crops.

Based on the findings of the ENGEO phase I assessment and previous assessments of the property, the following potential environmental concerns were identified for the property:

- Although the former leaking USTs at the property were removed and a case closure was subsequently granted, information in the former case file indicated that potential risks via vapor intrusion may not have been adequately assessed during past characterization activities.

- Historical records for the property indicated the property was under agricultural cultivation in the past. Recalcitrant agricultural chemicals could be present in near-surface soils.

A phase II environmental assessment was recommended for the property to (1) evaluate potential vapor intrusion impacts in the vicinity of the former USTs and (2) evaluate potential impacts to near surface soil due to the past agricultural activity.

ENGEO, Phase I Environmental Site Assessment, 20785 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 23, 2016

ENGEO conducted a concurrent phase I environmental site assessment for the 20785 Baker Road property in August 2016. A residential structure and garage was located at the property at the time of the reconnaissance. The southern portion of the property was used for equipment storage in combination with the 20957 Baker Road property, located to the south. Prior to development in the 1950s, the property appeared to be under cultivation for row crops surrounding the single-family residential structures.
Based on the findings of the ENGEO phase I assessment and previous assessments of the property, the following potential environmental concerns were identified for the property:

- Although the former leaking USTs at the parcel to the south were removed and a case closure was subsequently granted, information in the former case file indicated that potential risks via vapor intrusion may not have been adequately assessed during past characterization activities.

- Historical records for the property indicated the property was under agricultural cultivation in the past. Recalcitrant agricultural chemicals could be present in near-surface soils.

- Lead-based paint and/or asbestos-containing building materials may be present within structures at the property.

A phase II environmental assessment was recommended for the property to evaluate potential impacts to near surface soil due to the past agricultural activity.

ENGEO, Phase II Environmental Site Assessment, 20957 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 31, 2016

A phase II environmental site assessment was performed at the 20957 Baker Road property in August 2016. Soil samples were collected from a total of two locations across the property. The soil borings were advanced to a total depth of 2 feet below ground surface using a Geoprobe® direct-push rig. Continuous soil cores were retrieved from each boring. Soil samples were collected at approximate depths of 3 to 9 inches and 12 to 18 inches below the ground surface from each of the borings and analyzed for the presence of organochlorine pesticides (OCPs), arsenic, and lead.

None of the soil samples exhibited detectable concentrations of OCPs. All of the collected soil samples exhibited detectable lead concentrations; the detected concentrations for S-1 and S-4 were 7.41 and 33.2 milligrams per kilogram (mg/kg), respectively. These concentrations were below the respective screening level assuming a residential land use scenario. Detected arsenic concentrations in the collected soil samples for S-1 and S-4 were 13.7 and 26.5 mg/kg, respectively. This is in excess of the respective arsenic screening level assuming a residential land use scenario and is in excess of expected background concentrations observed in the San Francisco Bay Area. Given the reported arsenic concentrations, it appeared the surface soil at the property may have been impacted from historic agricultural activities.

In order to evaluate potential vapor intrusion concerns, a soil gas assessment was conducted at the property. Three temporary soil gas monitoring wells (SG-1 through SG-3) were installed at the property using a Geoprobe® rig, as presented on Figure 2.

Each of the soil gas samples exhibited detectable target analyte concentrations; the detected analytes are typically associated with gasoline and/or other refined petroleum hydrocarbon product. Elevated concentrations of gasoline were detected in all three samples. Two of the three samples exhibited ethylbenzene concentrations in excess of the respective human risk screening level. One sample also exhibited a naphthalene concentration in excess of the respective human risk screening level. As the soil gas samples were collected in the immediate vicinity of the former UST location, additional soil gas sampling was recommended to determine the extent of soil gas impact at the property. Soil gas data is presented in Table B and soil data is presented in Table A.

ENGEO, Phase II Environmental Site Assessment, 20785 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 31, 2016

A phase II environmental site assessment was performed at the 20785 Baker Road property in August 2016. Soil samples were collected from a total of six locations across the property. Soil Borings S-2 and S-3 were advanced to a total depth of 2 feet below ground surface using a

Geoprobe® direct-push rig. Continuous soil cores were retrieved from each boring. Soil samples were collected at approximate depths of 3 to 9 inches and 12 to 18 inches below the ground surface from each of the borings. The remaining soil borings were advanced to 9 inches using a hand auger. Samples were collected at the approximate depth of 3 to 9 inches below the ground surface and analyzed for the presence of organochlorine pesticides (OCPs), arsenic, and lead.

Locations S-7 and S-8 exhibited low levels of detectable concentrations of OCPs. Detected analytes included gamma-chlordane, alpha-chlordane, 4,4-DDE, dieldrin, 4,4-DDT, heptachlor epoxide and chlordane; these concentrations were below respective screening levels. All of the collected soil samples exhibited detectable lead concentrations; the detected concentrations ranged between 6.49 and 49.6 milligrams per kilogram (mg/kg). These concentrations were below the respective screening level assuming a residential land use scenario[1].

Detected arsenic concentrations in the collected soil samples ranged between 3.88 and 27.3 mg/kg. The detected concentrations were in excess of the respective arsenic screening level assuming a residential land use scenario. Although several detected concentrations were within expected background concentrations, some detected arsenic concentrations were in excess of expected background concentrations observed in the San Francisco Bay Area. Soil data is presented in Table A.

Given the reported arsenic and pesticide concentrations, it appeared the surface soil at the property may have been impacted from historic agricultural activities.

ENGEO, Workplan For Site Characterization, 20785 and 20975 Baker Road (Former Case #R00002739), Castro Valley, California, Project Number 13255.000.000, December 29, 2016

A Workplan for additional site characterization was prepared for the Site and approved by the Alameda County Department of Environmental Health (ACDEH) in December 2016. The purpose of the proposed site characterization outlined in the published Workplan was to determine if the Site has been impacted by past agricultural activities and to determine the extent and magnitude of soil vapor impact in the area of former USTs at the Site.

ENGEO, Site Characterization Report, 20785 and 20975 Baker Road, Castro Valley, California, Project Number 13255.000.000, April 14, 2017; DRAFT

ENGEO implemented the approved Workplan in March 2017. Thirteen soil borings (SS-1 through SS-13) were installed to 2 feet below ground surface. For each sample location, two samples were recovered at approximate depths of 0 to 12 inches and 12 to 24 inches below the ground surface. All samples were analyzed for lead, arsenic, and OCPs (Table A). All soil samples collected from the Site exhibited detectable concentrations of arsenic ranging between 2.47 to 19.8 mg/kg. These concentrations are within background concentrations observed in the San Francisco Bay Area, within the exception of arsenic concentrations observed in

[1] Regional Water Quality Control Board, Soil Human Health Risk Screening Levels, Residential Land Use, Shallow Soil, Table S-1, February 2016 (Revision 3).

samples collected at six locations. OCPs including dieldrin, beta-BHC, delta-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT, chlordane, endosulfan II, endrin aldehyde, endosulfan sulfate, and heptachlor epoxide were detected in the soil samples collected from the Site. In both shallow and deep samples collected from the Site, all OCPs were detected at levels below the corresponding residential screening levels.

Additionally, 14 temporary soil gas monitoring borings (SG-A through SG-N) were installed in the vicinity of the former UST. Each of the soil gas samples (all collected in the immediate vicinity of the former UST location) exhibited detectable target analyte concentrations; the detected analytes are typically associated with gasoline and/or other refined petroleum hydrocarbon products (Table B). TPH-g concentrations ranged between non-detect to 13,000 micrograms per cubic meter ($\mu g/m^3$). All detected concentrations were below the corresponding residential screening level. The soil gas samples were also analyzed for mixed gases, including carbon dioxide, carbon monoxide, oxygen, and methane (Table C). Oxygen levels ranged between 1.5 to 15 percent. These levels of oxygen demonstrate that natural bioattenuation can likely occur in the subsurface. Methane and carbon monoxide were not detected in any of the soil gas samples collected from the Site.

SITE GEOLOGY AND HYDROGEOLOGY

Review of published topographic maps found that the Site is situated at an approximate elevation of 163 feet above mean sea level. The relatively level Site has a gentle slope toward the south-southwest. A review of the 1997 Helley and Graymer, et al. Geologic Map (USGS 1997) found that the Site is primarily underlain by Pleistocene-age alluvial and fluvial fan deposits, (Qpaf).

Based on the boring logs prepared and presented in the referenced studies, the lithology observed in the borings typically consists of 0.5 to 2 feet of gravelly clay – clayey gravel (fill material). The fill material is underlain by silty clay to depths of 3 to 4 feet below the ground surface. This material is, in turn, underlain by dark yellowish brown clayey silt, which grades into sand between 6 and 9 feet below the ground surface. Silty and gravelly sand is present to depths of 15 to 18 feet below the ground surfaces, where it is underlain by claystone bedrock.

Based on a review of site exploration and groundwater monitoring performed between 2005 and 2008, first groundwater is generally encountered between depths of 8½ and 11½ feet below the ground surface. Based on a review of the 2007 and 2008 groundwater elevation data, there is a slight flow gradient generally directed toward the south-southwest.

PROPOSED SCOPE OF WORK

Groundwater Sampling

We will retain a C-57 licensed direct push drilling subcontractor to advance Geoprobe® borings at three locations until groundwater is encountered (anticipated to be approximately 12 feet below the ground surface) (Figure 2). The Sampling and Analysis Plan (SAP) is presented in Appendix A.

As part of this task, we will obtain a boring permit from the Alameda County Public Works Agency (ACPWA). The borings will be screened with a photoionization detector (PID) for volatile organic vapors. Temporary PVC casings will be used in each of the three boreholes to facilitate collection; groundwater samples will be collected using dedicated bailers. Groundwater samples will then be placed in laboratory-provided glassware.

The groundwater samples will be submitted to a State-certified laboratory for analysis of TPH-g and VOCs including BTEX and naphthalene (EPA Method 8260), TPH-d and TPH-mo (EPA Method 8015B with silica gel cleanup) and dissolved metals (EPA Method 6010).

The borings will be filled with grout upon completion of sampling, in accordance with the ACPWA requirements.

Soil Sampling

In order to further define the vertical and lateral extent of residual impact associated with the former USTs, one soil boring will be advanced within the footprint of the former tank excavation, and four borings will be advanced along the perimeter of the former tank excavation. These five borings will be advanced to depths of 10 feet below ground surface (at the base of the tank excavation), as shown in Figure 2. Two soil samples (for a total of ten soil samples) will be recovered from each boring at the following depth intervals: approximately 4½ to 5 feet below the ground surface and approximately 7½ to 8 feet below the ground surface (at the base of the former UST excavation). The SAP is presented in Appendix A.

An additional 17 soil borings will be advanced within the vicinity of the former UST excavation to assess the potential presence of a bioattenuation zone within the upper five feet of soil. One soil sample from each of the seventeen soil borings will be recovered from an approximate depth interval of 4½ to 5 feet below the ground surface.

All borings will be screened with a PID for volatile organic vapors. If significant PID readings are recovered for other soil samples, additional samples will be collected and submitted for laboratory testing.

Soil samples will be retrieved within continuous Geoprobe® acetate core liners measuring 5 feet in length. Continuous soil cores from each boring will be logged by an ENGEO geologist or engineer. Specific soil samples will be collected for laboratory analysis by cutting 6-inch portions of the Geoprobe soil core liners corresponding to the respective desired sampling depths in each location.

The sample sleeves will be sealed using Teflon® sheets secured by tight-fitting plastic end caps. Upon collection of samples, a sample label will be placed on the sample and will include a unique sample number, sample location, time/date collected, laboratory analysis, and the sampler's identification. The soil samples will be placed in an ice-cooled chest and submitted under documented chain-of-custody to a State-accredited fixed-base analytical laboratory.

All soil samples will be analyzed for TPH-g and VOCs, including BTEX and naphthalene (EPA Method 8260), and TPH-d and TPH-mo (EPA Method 8015B with silica gel cleanup). Laboratory analysis will be performed on a standard 5-day laboratory turnaround.

REPORTING

Following completion of the proposed field activities, a summary report, including all analytical results, will be prepared and provided in a letter report and submitted electronically to ACDEH. As appropriate, all reports and analytical data will be electronically uploaded to the California State Water Resources Control Board (SWRCB) GeoTracker website.

SCHEDULE

Following approval of this Workplan, the proposed site sampling is tentatively scheduled for the week of June 19, 2017. Following completion of the work, a review meeting will be conducted with ACDEH on June 30, 2017, followed by preparation of a Remedial Action Plan (RAP).

If you have any questions regarding this Workplan, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

Kelsey Gerhart, EIT

Divya Bhargava, PE

Jeffrey A. Adams, PhD, PE

kg/db/jaa/bvv

Attachments: References
Figures 1 – 2
Tables A - C

REFERENCES

AEI, Preliminary Site Investigation Report, 20957 Baker Road, Castro Valley, California, June 7, 2005.

AEI, Additional Information Report, 20957 Baker Road, Castro Valley, California, November 15, 2008.

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

ENGEO, Phase I Environmental Site Assessment, 20957 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 23, 2016.

ENGEO, Phase I Environmental Site Assessment, 20785 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 23, 2016.

ENGEO, Phase II Environmental Site Assessment, 20785 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 31, 2016.

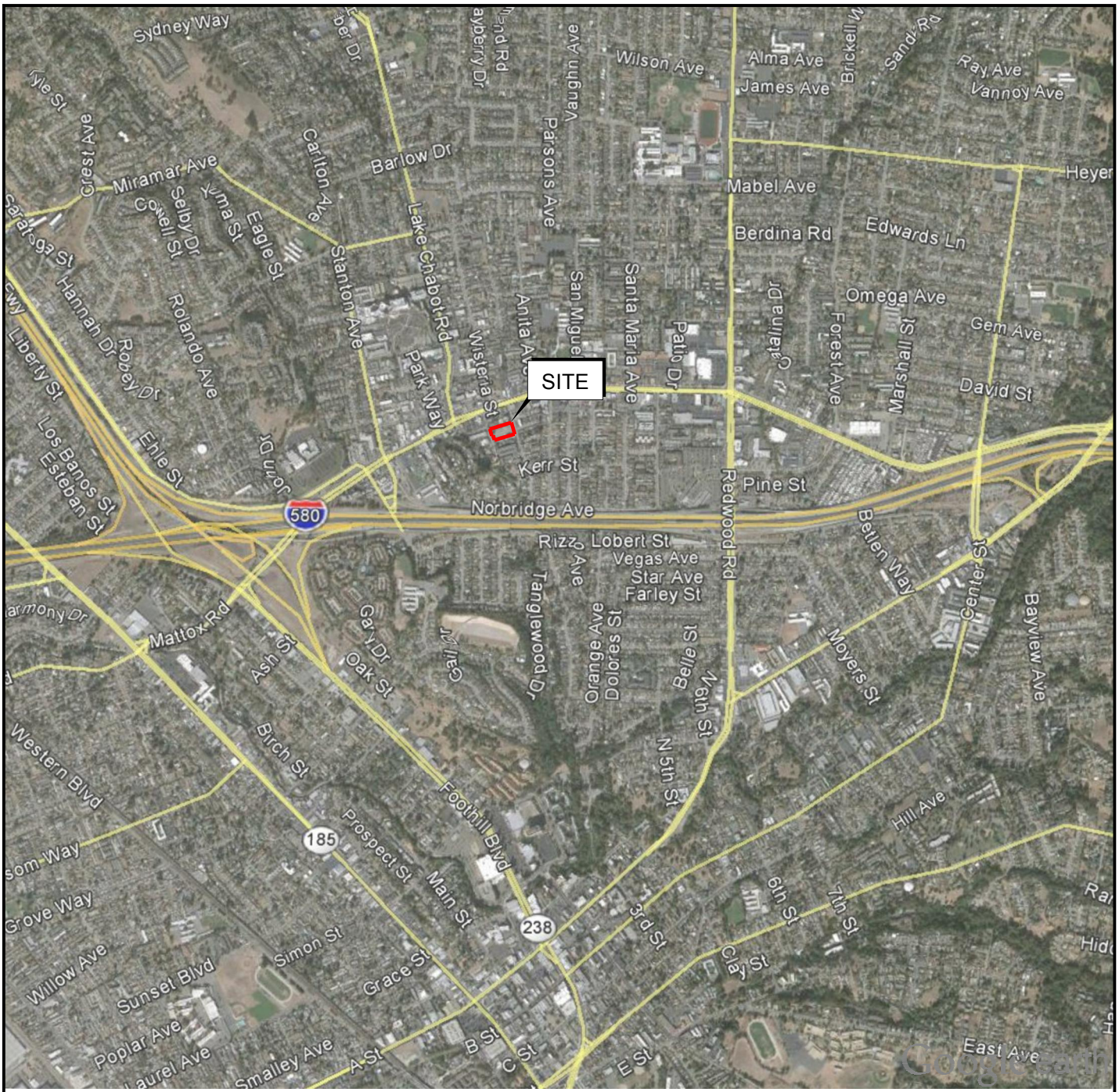
ENGEO, Phase II Environmental Site Assessment, 20957 Baker Road, Castro Valley, California, Project Number 13255.000.000, August 31, 2016.

ENGEO, Workplan For Site Characterization, 20785 and 20975 Baker Road (Former Case #R00002739), Castro Valley, California, Project Number 13255.000.000, December 29, 2016.

ENGEO, Site Characterization Report, 20785 and 20975 Baker Road, Castro Valley, California, Project Number 13255.000.000, April 14, 2017; DRAFT.

San Francisco Regional Water Quality Control Board, Environmental Screening Levels, February 2016, 3rd Revision.

FIGURES



BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO Expect Excellence

VICINITY MAP

20785 AND 20957 BAKER ROAD

CASTRO VALLEY, CALIFORNIA

PROJECT NO.:	13255.000.000		FIGURE NO. 1
SCALE:	AS SHOWN		
DRAWN BY:	SRP	CHECKED BY:	JAA

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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- SG-N — SOIL GAS SAMPLE (ENGEO, 2017)
- SG-3 — PREVIOUS SOIL GAS SAMPLE (ENGEO, 2016)
- PROPOSED GRAB GROUNDWATER SAMPLE
- PROPOSED SOIL BORING TO 8 FEET
- PROPOSED SOIL BORING TO 5 FEET

N

0 FEET 30

0 METERS 15

NOTE:
CONCENTRATION ARE SHOWN IN ug/m³

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE AND WILLIAM HEZMALHALCH ARCHITECTS INC., 2016

ENGEO Expect Excellence

PROPOSED BORING LOCATIONS

20785 AND 20957 BAKER ROAD
CASTRO VALLEY, CALIFORNIA

PROJECT NO.: 13255.000.000	FIGURE NO. 2
SCALE: AS SHOWN	
DRAWN BY: SRP	CHECKED BY: JAA

ORIGINAL FIGURE PRINTED IN COLOR

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TABLES

Table A - Summary of Soil Analytical Results

Sample ID	Date Collected	Arsenic	Lead	Soluble lead (STLC)	Organochlorine pesticides (OCPs)													
					beta-BHC	delta-BHC	gamma-Chlordane	alpha-Chlordane	4,4-DDE	Dieldrin	4,4-DDD	4,4-DDT	Endosulfan II	Endrin Aldehyde	Endosulfan Sulfate	Chlordane	Heptachlor Epoxide	Other OCPs
		mg/kg	mg/kg	mg/L	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
RWQCB ESLs[1]		**0.067[2]**	**80**	**5[3]**	**-**	**-**	**-**	**-**	**1,900**	**38**	**2,700**	**1,900**	**-**	**-**	**-**	**480**	**67**	**N/A**
PREVIOUS CHARACTERIZATION																		
S-1@3-9"	8/19/2016	**13.7**	**7.41**	NA	<3.2	<1.6	<1.6	<1.7	<1.9	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
S-1@12-18"	8/19/2016	**2.9**	**13.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-2@3-9"	8/19/2016	**27.3**	**6.49**	NA	<1.3	<0.62	<0.65	<0.69	<0.78	<0.59	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND
S-2@12-18"	8/19/2016	**1.92**	**19.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-3@3-9"	8/19/2016	**17.9**	**14.1**	NA	<1.3	<0.62	<0.65	<0.69	<0.78	<0.59	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND
S-3@12-18"	8/19/2016	**5.51**	**8.29**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-4@3-9"	8/19/2016	**26.5**	**33.2**	NA	<1.3	<0.62	<0.65	<0.69	<0.78	<0.59	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND
S-4@12-18"	8/19/2016	**6.64**	**12.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-5@3-9"	8/24/2016	**13.1**	**48.4**	NA	<6.3	<3.1	<3.3	<3.5	<3.9	<3.0	<11	<2.6	<12	<3.0	<2.3	<42	<1.6	ND
S-6@3-9"	8/24/2016	**7.51**	**9.71**	NA	<0.32	<0.16	<0.16	<0.17	<0.19	<0.15	<0.57	<0.13	<0.58	<0.15	<0.12	<2.1	<0.078	ND
S-7@3-9"	8/24/2016	**3.88**	**49.6**	NA	<3.2	<1.6	**9.71**	**8.55**	**26.6**	**36.8**	<5.7	**87.9**	<5.8	<1.5	<1.2	**73.1**	<0.78	ND
S-8@3-9"	8/24/2016	**13.5**	**43.1**	NA	<3.2	<1.6	<0.16	<0.17	**1.9**	<1.5	<5.7	**8.03**	<5.8	<1.5	<1.2	**73.1**	**0.78**	ND
ADDITIONAL CHARACTERIZATION																		
SS-1@0-12"	3/3/2017	**9.67**	**22.4**	NA	<3.2	<1.6	<1.6	<1.7	**6.44**	**1.7**	<5.7	7.84	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-1@12-24"	3/3/2017	**5.14**	**9.02**	NA	<1.3	<0.62	<0.65	<0.69	**4.29**	**0.9**	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND
SS-2@0-12"	3/3/2017	**10.2**	**12.9**	NA	<3.2	<1.6	**2.1**	**2.34**	**4.98**	**2.51**	<5.7	**12.3**	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-2@12-24"	3/3/2017	**8.33**	**6.01**	NA	<3.2	<1.6	<1.6	<1.7	**4.62**	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-3@0-12"	3/3/2017	**13.6**	**8.21**	NA	<0.95	<0.47	<0.49	<0.52	<0.58	<0.44	<1.7	<0.39	<1.7	<0.45	<0.35	<6.3	<0.23	ND
SS-3@12-24"	3/3/2017	**11**	**7.96**	NA	<6.3	<3.1	<3.3	<3.5	5.08	<3.0	<11	<2.6	<12	<3.0	<2.3	<42	<1.6	ND
SS-4@0-12"	3/3/2017	**10.7**	**10.5**	NA	**45.6**	**61.3**	<1.6	<1.7	<1.9	**5.31**	**7.88**	**10.8**	**37.8**	**72.5**	**60**	<21	<0.78	ND
SS-4@12-24"	3/3/2017	**4.72**	**6.68**	NA	<3.2	<1.6	<1.6	<1.7	**2.61**	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-5@0-12"	3/3/2017	**16.4**	**5.11**	NA	<3.2	**5.34**	<1.6	<1.7	<1.9	<1.5	<5.7	<1.3	8.93	17.6	<1.2	<21	<0.78	ND
SS-5@12-24"	3/3/2017	**6.1**	**7.99**	NA	<3.2	<1.6	<1.6	<1.7	**2.37**	**1.81**	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-6@0-12"	3/3/2017	**8.79**	**15.1**	NA	<3.2	**6.4**	<1.6	<1.7	<1.9	<1.5	<5.7	**8.72**	**13.4**	**18.7**	<1.2	<21	<0.78	ND
SS-6@12-24"	3/3/2017	**2.47**	**3.46**	NA	<3.2	<1.6	<1.6	<1.7	<1.9	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-7@0-12"	3/3/2017	**10.3**	**83.1**	3.23	<3.2	<1.6	<1.6	<1.7	<1.9	15.3	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-7@12-24"	3/3/2017	**17.7**	**10.8**	NA	<3.2	<1.6	<1.6	<1.7	<1.9	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-8@0-12"	3/3/2017	**13.2**	**5.46**	NA	<0.95	<0.47	<0.49	<0.52	<0.58	2.44	<1.7	<0.39	<1.7	<0.45	<0.35	<6.3	<0.23	ND
SS-8@12-24"	3/3/2017	**10.7**	**10.1**	NA	<3.2	<1.6	<1.6	<1.7	**2.81**	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-9@0-12"	3/3/2017	**11.1**	**24.8**	NA	<3.2	<1.6	<1.6	<1.7	<1.9	**12**	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-9@12-24"	3/3/2017	**8.34**	**10**	NA	<3.2	<1.6	<1.6	<1.7	**2.02**	<1.5	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-10@0-12"	3/3/2017	**12.9**	**36.2**	NA	<3.2	<1.6	<1.6	<1.7	<1.9	**13.5**	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-10@12-24"	3/3/2017	**8.79**	**10.4**	NA	<3.2	<1.6	<1.6	<1.7	**2.11**	**1.78**	<5.7	<1.3	<5.8	<1.5	<1.2	<21	<0.78	ND
SS-11@0-12"	3/3/2017	**19.8**	**110**	**4.57**	<0.95	<0.47	<0.49	<0.52	<0.58	**4.22**	<1.7	<0.39	<1.7	<0.45	<0.35	<6.3	<0.23	ND
SS-11@12-24"	3/3/2017	**11.1**	**11.5**	NA	<1.3	<0.62	<0.65	<0.69	<0.78	<0.59	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND
SS-12@0-12"	3/16/2017	**3.67**	**8.54**	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ND
SS-12@12-24"	3/16/2017	**6.17**	**5.2**	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	ND
SS-13@0-12"	3/3/2017	**8.58**	**64.1**	1.55	<0.95	<0.47	**58.3**	**60.6**	**9.08**	**32.4**	<1.7	**26.7**	<1.7	<0.45	<0.35	**401**	**11.3**	ND
SS-13@12-24"	3/3/2017	**8.18**	**89.6**	2.21	<3.2	<1.6	**32.1**	**37.2**	**55.5**	**36.1**	<5.7	**47.3**	<5.8	<1.5	<1.2	**170**	**7.92**	ND
Dup-1@0-12"	3/3/2017	**10.1**	**7.16**	NA	<0.95	<0.47	<0.49	<0.52	<0.58	**2.59**	<1.7	<0.39	<1.7	<0.45	<0.35	<6.3	<0.23	ND
Dup-2@12-24"	3/3/2017	**8.74**	**13.9**	NA	<1.3	<0.62	<0.65	<0.69	<0.78	<0.59	<2.3	<0.52	<2.3	<0.60	<0.47	<8.4	<0.31	ND

Notes:
N/A = Not Applicable
ND = Not Detected
<3.2 mg/kg indicates that the result is less than the laboratory reporting limit of 3.2 mg/kg.
Yellow highlighted cell indicate concentrations exceeed corresponding residential screening levels.

[1] Regional Water Quality Control Board (RWQCB), Direct Exposure Human Health Risk Screening Levels for Soil (Residential Land Use), Table S-1, February 2016 (Revision 3).

[2] Although arsenic concentrations exceed the corresponding residential screening levels, concentrations are within expected background concentrations observed in the San Francisco Bay Area, with the exception of the yellow highlighted results (which exceed the estimated background concentration of 14 mg/kg).

[3] Used for California regulated hazardous waste. Source is California Code of Regulations, Title 22, Chapter 11, Article 3. If a substance is ten times the STLC value found in the TTLC, the Waste Extraction Test (WET) is indicated. If any substance in the waste extract is equal to or greater than the STLC value, it is considered a hazardous toxic waste.

Table B - Summary of Soil Gas Analytical Results: VOCs

Sample ID	Date Collected	TPH-g	1,1-Dichloroethene	1,1-Difluoroethane	1,3-Butadiene	2-Butanone (MEK)	4-Methyl-2-Pentanone (MIBK)	Acetone	Benzene	Carbon Disulfide	cis-1,2-dichloroethene	n-hexane	n-heptane	Cyclohexane	Isopropanol	tert-Butanol	Toluene	TCE	PCE	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyl Toluene	Ethyl benzene	m,p-Xylene	o-xylene	Naphthalene	1,2,4-Trichlorobenzene	Other VOCs
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³			µg/m³
RWQCB ESL[2]		**3.00E+05**	**3.70E+04**	**880**	**--**	**2.60E+06**	**1.60E+06**	**1.50E+07**	**48**	**--**	**4,200**	**--**	**--**	**--**	**--**	**--**	**1.60E+05**	**240**	**240**	**--**	**--**	**--**	**--**	**560**	**5.20E+04**	**5.20E+04**	**41**	**1000**	**N/A**
PREVIOUS CHARACTERIZATION																													
SG-1	8/19/2016	**88,100**	<69	<470	<39	<52	<72	8,500	<56	<54	<69	<62	NA	NA	NA	<53	<66	<94	<120	**88**	**<86**	**95**	<86	**3,500**	**17,000**	**5,200**	<92	<130	ND
SG-2	8/19/2016	**15,300**	<20	<140	<11	<15	<21	4,900	<16	<16	<20	<18	NA	NA	NA	<15	<19	<27	<34	<25	<25	<21	<25	**210**	**1,100**	**370**	<26	**160**	ND
SG-3	8/19/2016	**245,000**	<99	<680	<55	<74	<100	2,500	<80	<78	<99	<88	NA	NA	NA	<76	<94	<130	<170	**5,700**	**2,300**	**170**	<120	**3,700**	**20,000**	**7,800**	**130**	<190	ND
ADDITIONAL CHARACTERIZATION																													
SG-A	3/15/2017	**280**	<4.2	<4.3	**37**	<11	<4.4	**28**	**19**	**63**	<4.2	**30**	**7.4**	**21**	<11	N/A	**15**	<5.7	<7.3	<5.3	<5.3	<4.4	<5.3	<4.6	4.8	<4.6	<4.3	<7.9	ND
SG-B	3/14/2017	**3,200**	<9.6	<9.8	<5.3	<7.1	<9.9	**43**	**8.2**	**35**	<9.6	**820**	<9.9	**14**	<24	N/A	**740**	<13	<16	<12	<12	<9.9	<12	**18**	**71**	**20**	<9.6	<18	ND
SG-C	3/14/2017	**3,400**	<8.5	<8.7	<4.7	**9.5**	<8.8	**35**	**11**	**35**	<8.5	**740**	**9.9**	**17**	<21	N/A	**280**	<11	**20**	<11	<11	<8.8	<11	<9.3	**21**	<9.3	<8.6	<16	ND
SG-D	3/14/2017	**210**	<3.9	<4.0	<2.2	<2.9	<4.0	<9.4	<3.1	<3.1	<3.9	<3.5	<4.0	<3.4	<9.7	N/A	**9.5**	<5.3	<6.7	<4.8	<4.8	<4.0	<4.8	<4.3	<4.3	<4.3	<3.9	<7.3	ND
SG-E	3/15/2017	**13,000**	<21	<21	**21**	<51	<21	**58**	**26**	**170**	<21	**3,600**	<21	**50**	<51	N/A	**2,400**	<28	<36	<26	<26	<21	<26	**50**	**220**	**46**	<110	<39	ND
SG-F	3/15/2017	**6,000**	<8.0	<8.2	**7.9**	**24**	<8.3	**35**	**18**	**200**	<8.0	**1,900**	**13**	**27**	<20	N/A	**870**	<11	<14	**11**	<9.9	<8.3	<9.9	**22**	**100**	**23**	<42	<15	ND
SG-G	3/14/2017	**4,700**	<7.4	<7.5	**5.2**	**7.5**	**7.6**	**210**	**8.5**	**42**	<7.4	**1,000**	**15**	**22**	<18	N/A	**1,800**	<10	<13	<9.1	<9.1	<6.6	<9.1	**31**	**130**	**33**	<39	<14	ND
SG-H	3/14/2017	**4,800**	<12	<12	**6.6**	<8.7	<12	**69**	<9.4	**180**	<12	**1,600**	**22**	**30**	<29	N/A	**870**	<16	<20	<15	<15	<12	<15	**22**	**98**	**25**	<12	<11	ND
SG-I	3/14/2017	**280**	<4.5	<4.6	<2.5	**3.6**	<4.6	**21**	<3.6	**5.6**	<4.5	**15**	<4.6	<3.9	<11	N/A	**80**	<6.0	<7.6	<5.5	<5.5	<4.6	<5.5	<4.9	**11**	<4.9	<4.5	<8.3	ND
SG-J	3/14/2017	**<64**	<4.2	<4.2	<2.3	<3.1	<4.3	<10	<3.4	**31**	<4.2	**15**	<4.3	<3.6	<10	N/A	**24**	<5.6	<7.1	<5.2	<5.2	<4.3	<5.2	<4.6	<4.6	<4.6	<4.2	<7.8	ND
SG-K	3/15/2017	**1,400**	<4.6	<4.7	**20**	**12**	<4.7	**52**	**11**	**190**	<4.6	**31**	**5**	**11**	<11	N/A	**78**	<6.2	<7.8	<5.7	<5.7	<4.7	<5.7	<5.0	<5.0	<5.0	<4.6	<8.6	ND
SG-L	3/14/2017	**6,600**	<8.7	<8.9	<4.8	**11**	<9.0	**61**	**11**	**180**	<8.7	**2100**	**28**	**30**	<22	N/A	**1,500**	<12	<15	<11	<11	<9.0	<11	**33**	**130**	**33**	<46	<16	ND
SG-M	3/14/2017	**790**	<4.6	<4.7	<2.5	**6.6**	<4.7	**31**	**4.8**	**40**	<4.6	**140**	**6.2**	<4	**13**	N/A	**260**	<6.2	<7.8	<5.7	<5.7	<4.7	<5.7	**9.4**	**40**	**11**	<4.6	<8.5	ND
SG-N	3/14/2017	**1,400**	<4.7	<4.8	<2.6	**8.7**	<4.8	**72**	<3.8	**7.6**	<4.7	**180**	<4.8	<4.0	<12	N/A	**400**	<6.3	<8.0	**6.9**	<5.8	<4.8	<5.8	**18**	**87**	**29**	<4.7	<8.7	ND
SG-DUP	3/14/2017	**1,300**	<4.6	<4.7	<2.6	**9**	<4.8	**72**	<3.7	**7.7**	<4.6	**190**	<4.8	<4.0	<12	N/A	**410**	<6.3	<7.9	**6.8**	<5.8	<4.8	<5.8	**18**	**89**	**28**	<4.7	<8.7	ND

Notes:
N/A- Not Applicable
-- means no screening level exists
<4.2 indicates that the result is less than the laboratory reporting limit of 4.2 µg/m³.
Yellow highlighted cell indicate concentrations exceeed corresponding residential screening levels.
Green highlighted cells indicate laboratory reporting limits exceed corresponding residential screening levels.

[2] Regional Water Quality Control Board (RWQCB), Subslab/Soil Gas Vapor Intrusion Human Health Risk Screening Levels (Residential Land Use), Table SG-1, February 2016 (Revision 3).

Table C - Summary of Soil Gas Analytical Results: Fixed Gases

Sample ID	Date Collected	Helium	Carbon Monoxide	Carbon Dioxide	Oxygen	Methane
		%	%	%	%	%
SG-A	3/15/2017	<0.21	<0.21	**3.1**	**12**	<0.21
SG-B	3/14/2017	<0.24	<0.24	**5.8**	**3.6**	<0.24
SG-C	3/14/2017	<0.21	<0.21	**6**	**3.7**	<0.21
SG-D	3/14/2017	<0.20	<0.20	**2.2**	**16**	<0.20
SG-E	3/15/2017	<0.35	<0.35	**1.3**	**13**	<0.35
SG-F	3/15/2017	<0.40	<0.40	**0.8**	**12**	<0.40
SG-G	3/14/2017	<0.19	<0.19	**6.6**	**5.7**	<0.19
SG-H	3/14/2017	<0.20	<0.20	<0.20	**15**	<0.20
SG-I	3/14/2017	<0.23	<0.23	**2.4**	**15**	<0.23
SG-J	3/14/2017	<0.21	<0.21	**8.4**	**8.2**	<0.21
SG-K	3/15/2017	<0.23	<0.23	**1.6**	**12**	<0.23
SG-L	3/14/2017	<0.22	<0.22	**1.1**	**9.6**	<0.22
SG-M	3/14/2017	<0.23	<0.23	**8.9**	**2.2**	<0.23
SG-N	3/14/2017	<0.24	<0.24	**9.3**	**1.8**	<0.24
SG-DUP	3/14/2017	<0.23	<0.23	**9.5**	**1.5**	<0.23

Notes:

ND- Not Detected

APPENDIX A

Sampling and Analysis Plan

13255.000.000
June 15, 2017

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this Sampling and Analysis Plan (SAP) is to provide field sampling procedures and data gathering methods that will be used during site characterization activities at 20785 and 20957 Baker Road in Castro Valley, California (the Site). This SAP will be used by field personnel as a reference for sampling and analysis during the characterization activities.

2.0 SAMPLING EQUIPMENT AND PROCEDURES

This section describes sampling equipment and procedures associated with soil and groundwater sampling. This section also includes a discussion of equipment blank sampling and decontamination procedures for sampling equipment.

2.1 GENERAL PROCEDURES

The purpose of the additional characterization is to work is to further evaluate potential residual subsurface impairments associated with the historical land use and former presence of underground storage tanks (USTs) at the Site, and to determine if a bioattenuation zone exists in the upper 5 feet of soil.

Prior to drilling, an ENGEO representative will contact USA North Service Alert to check for the location of underground utilities at the site. A boring permit will be obtained from the Alameda County Public Works Agency (ACPWA). We will retain a C-57 licensed drilling contractor to advance the soil and groundwater exploratory borings at the project site.

2.2 GROUNDWATER SAMPLING

- Three direct-push borings will be advanced until groundwater is encountered (anticipated to be approximately 12 feet below the ground surface). The borings will be screened with a PID for volatile organic vapors.

- Temporary PVC casings will be used in each of the three boreholes to facilitate collection; groundwater samples will be collected using dedicated bailers. Groundwater samples will then be placed in laboratory-provided sample jars.

- The groundwater samples will be submitted to a State-certified laboratory for analysis of TPH- g and VOCs including BTEX and naphthalene (EPA Method 8260), TPH-d and TPH-mo (EPA Method 8015B with silica gel cleanup) and dissolved metals (EPA Method 6010).

- The borings will be filled with grout upon completion of sampling, in accordance with the ACPWA requirements.

2.3 SOIL SAMPLING

- In order to further define the vertical and lateral extent of residual impact associated with the former USTs, one soil boring will be advanced within the footprint of the former tank excavation, and 4 borings will be advanced along the perimeter of the former tank excavation. These 5 borings will be advanced to depths of 10 feet below ground surface (at the base of the tank excavation), as shown in Figure 2. Two soil samples (for a total of 10 soil samples) will be recovered from each boring at the following depth intervals: approximately 4½ to 5 feet

below the ground surface and approximately 7½ to 8 feet below the ground surface (at the base of the former UST excavation).

- An additional seventeen soil borings will be advanced within the vicinity of the former UST excavation to assess the potential presence of a bioattenuation zone within the upper five feet of soil. One soil sample from each of the seventeen soil borings will be recovered from an approximate depth interval of 4½ to 5 feet below the ground surface.
- Soil samples will be retrieved within continuous Geoprobe® acetate core liners measuring 5 feet in length. Soil samples will be collected for laboratory analysis by cutting a 6-inch-long portion of the Geoprobe® soil core liner corresponding to the respective desired sampling depths at each location. During drilling, the soil cores and cuttings will be screened for VOCs using a PID.
- The sample sleeves will be sealed using Teflon® sheets secured by tight-fitting plastic end caps. Upon the collection of each sample, a label will be placed on the sample including a unique sample number, sample location, time/date collected, laboratory analysis, and the sampler's identification. The soil samples will be placed in an ice-cooled chest and submitted under documented chain-of-custody to a State-certified laboratory.
- All soil samples will be analyzed for TPH-g and VOCs including BTEX and naphthalene (EPA Method 8260), and TPH-d and TPH-mo (EPA Method 8015B with silica gel cleanup). Laboratory analysis will be performed on a standard 5-day laboratory turnaround.
- The borings will be filled with grout upon completion of sampling, in accordance with the ACPWA requirements.

2.4 DECONTAMINATION PROCEDURES

Disposable sampling equipment will be bagged and properly disposed upon use. Non-disposable sampling equipment will be decontaminated to prevent cross contamination between samples. Sampling equipment will be decontaminated by washing with a non-phosphate detergent such as Alconox™ or Liquinox™. Given the small volume anticipated, decontamination water will be collected and discharged to the surface. The following steps will be followed for decontamination of non-disposable sample equipment:

- Wash with a non-phosphate detergent and water solution. This step will remove visible contamination from the equipment. Fill a 5-gallon bucket approximately 3/4 full and dilute with a non-phosphate detergent as directed by the manufacturer. Use a dedicated long-handled brush to assist with cleaning.
- Rinse with potable water. This step will decrease the gross contamination and reduce the frequency of changing of the non-phosphate detergent and water solution. Fill a 5-gallon bucket, 3/4 full with water. Use a dedicated long-handled brush to assist with cleaning of equipment. Frequent changing of this water will increase its effectiveness.
- Rinse with de-ionized water. Fill a 5-gallon bucket approximately 3/4 full of water and use a dedicated long-handled brush to assist with cleaning. Periodic changing of this water is required.

2.5 SAMPLE LABELING, DELIVERY, AND CHAIN-OF-CUSTODY

This section describes how samples will be labeled, picked up, delivered, and tracked.

2.6 SAMPLE LABELING

Sample labels will be completed using indelible, black ink, and affixed to each sample container. Soil sample containers will be placed into resealable plastic bags to protect the sample from moisture during transportation to the laboratory. Each sample container will be labeled at a minimum with the following:

- Unique sample identification number
- Sample collection date (month/day/year)
- Time of collection (12 or 24-hour clock)
- Project number
- Sampler initials
- Analyses to be performed; and preservation, if any

2.7 SAMPLE DELIVERY

This section applies to samples that will be picked up by the analytical testing laboratory or samples delivered to the offsite analytical laboratory. Samples may be picked up in the field or at the Field Geologist/Engineer's office by the analytical testing laboratory. The soil and groundwater samples will be maintained at 4° Celsius. The chain-of-custody documentation will be completed and signed by the laboratory-assigned courier. The samples may then be relinquished to the courier for transportation to the laboratory. The laboratory will record the temperature of cooler immediately upon receipt of the samples.

2.8 CHAIN-OF-CUSTODY

A chain-of-custody is a vital tool for tracking samples and is a written record of sample possession from the time the sample is collected until it is analyzed. The following will be recorded on the chain-of-custody forms:

- Project name
- Project location
- Project number
- Project contact
- Client
- Project Manager
- Sample identification
- Date and time sample was collected
- Sample type (soil, wastewater etc.)
- Number of sample containers
- Required analytical test methods
- Remarks/observations specific to the sample
- Number of samples to be relinquished to the analytical laboratory
- Transfer signatures associated with relinquishing samples (the sampler will initiate the chain-of-custody procedure)
- Courier/laboratory representative signature (for commercial carrier, record air bill number) Date/time of custody transfers
- Comments regarding the condition of the samples, (e.g., cooled with ice, etc.)

- Additional comments
- Written request for electronic file for all samples analyzed
- Information regarding sample storage/disposal
- Turn-around-time requirement; Sampler signature
- Courier signature

3.0 ANALYTICAL TESTING METHODS

This section describes analytical test methods, sample container, preservation, and holding time requirements for samples. The groundwater samples will be analyzed for TPH-g and VOCs including BTEX and naphthalene (EPA Method 8260), TPH-d and TPH-mo with silica gel cleanup (EPA Method 8015B) and dissolved lead/arsenic(EPA Method 6010). Soil samples will be analyzed for TPH-gasoline and VOCs including BTEX and naphthalene (EPA Method 8260) and TPH-d and TPH-mo with silica gel cleanup (EPA Method 8015B). Table 1 summarizes the analytical test methods for the types of samples to be collected based on regulatory requirements, as well as the hold times.

4.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Field Quality Assurance/Quality Control (QA/QC) samples will be collected and analyzed during sampling to assess the consistency and performance of the sampling program. Field QC samples for this project will include field duplicates samples.

4.1 FIELD DUPLICATES

Field duplicates consist of a sample of the same matrix as the primary sample collected. Duplicate soil samples will be collected at the same time and location as the primary sample, using the same sampling techniques. The purpose of field duplicate samples is to evaluate the precision of the overall sample collection and analysis process. Field duplicates for the soil samples will be collected at a frequency of one per 20 samples and will be analyzed using the same method as the primary sample. A field duplicate will be collected from one groundwater sampling location and will be analyzed using the same method as the primary sample. Field duplicate sample numbers will be similar to the sample nomenclature; however, minor adjustments in the numbering system will be made to ensure that the identities of the duplicate samples are “blind” to the analytical laboratory. Locations of duplicate samples and their identifications will be recorded in the field logbook and on the sampling map.

4.2 SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Sample container requirements, preservatives, and holding time requirements for the analytical test methods to be used in this characterization project are summarized in Table 1.

5.0 SITE MANAGEMENT AND RECORD KEEPING

Sampling information will be recorded on chain-of-custody forms, in a field logbook, and on the appropriate excavation or stockpile map/plan. These documents will be completed in the field at the time of sample collection. Entries will be legible and recorded in indelible black ink. At a minimum, the logbook will contain the following information:

- Project name and location.
- Date and time of entries.
- Personnel in attendance, including any visitors to the site; general weather conditions.
- Work performed on a daily basis.
- Field observations.
- Sampling information (including sample identification, sample location, sample description/type, and analytical testing).
- Field measurements data (including air monitoring results, instrument calibration records, and problems, if applicable).
- Descriptions of deviations from the SAP, if applicable; Problems encountered and corrective action taken; QC-related activities and identification of field QC samples.
- Detailed record of oral and/or written requests by the regulatory agencies, client, subcontractor.
- Any other events that may affect the sampling and analyses.

TABLE 1: Analytical Test Methods, Sample Container, Preservation, and Holding Time Requirements

SOIL SAMPLING				
PARAMETER	**PRESERVATIVE**	**HOLDING TIME**	**EPA METHOD #**	**CONTAINER**
VOCs and TPH-gasoline	4°C	14 days	8260	2”x6” liner
TPH-diesel and TPH-motor oil	4°C	14 days	8015B with silica gel cleanup	2”x6” liner
GROUNDWATER SAMPLING				
PARAMETER	**PRESERVATIVE**	**HOLDING TIME**	**EPA METHOD #**	**CONTAINER**
VOCs and TPH-gasoline	4°C, HCL	14 days	8260	40 mL VOA vials
TPH-diesel and TPH-motor oil	4°C	7 days	8015B with silica gel cleanup	1L amber
Dissolved lead/arsenic	4°C	6 months	6010	100 mL poly