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GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES

Project No.
7828.000.001

October 5, 2012

Dilan Roe
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

Subject: Jordan Ranch Parcel H (Case # R00002918)
Dublin, California

WORKPLAN FOR GROUNDWATER ASSESSMENT

Dear Ms. Roe:

On behalf of BJP-ROF Jordan Ranch, LLC, we prepared this workplan to assess the current extent of groundwater impacts at the former underground storage tank (UST) site, located within the Jordan Ranch Parcel H (Figure 1). The purpose of the groundwater assessment is to address data gaps associated with the inferred lateral limits of the groundwater plume and the vertical distribution of contaminant concentrations in the variable perched groundwater lenses.

CURRENT SITE CONCEPTUAL MODEL

The current site conceptual model (SCM) and identified data gaps are presented in tabular format in Tables 1 and 2. The SCM provides an evaluation of site geology and hydrology, historic groundwater levels, nature and extent of impacts, regional supply wells, human health exposure pathways, and data gaps.

The additional data that will be collected from this proposed groundwater assessment will be incorporated into geologic cross-sections and cumulative analytical data tables as part of the Final SCM. Cumulative analytical data tables and the draft geologic cross-sections were included in the *Draft Interim Remedial Action Workplan*, which was uploaded to the ACEH ftp site on September 13, 2012.

PROPOSED SOIL BORINGS

Soil borings will be advanced at 14 locations within the existing monitoring well network, crossgradient of the monitoring well network, and downgradient of the monitoring well network (Figure 2). Twelve of the fourteen soil borings will be advanced to a maximum depth of 30 feet below ground surface (bgs), which is consistent with the maximum depth of the existing monitoring wells. Two of the fourteen borings, located in the vicinity of the proposed extraction trench and MW-2, will be advanced to a depth of 40 feet bgs. Discrete zone groundwater samples will be collected from the 14 boring locations, as discussed in the following sampling methodology section.

The soil borings will be advanced with a direct-push Geoprobe® drill rig using the dual tube method. The dual tube method utilizes inner and outer direct push casings which are advanced concurrently. Soil cores are collected in the inner casing, and the outer casing remains in the

ground while the inner casing is extracted to yield the soil core. This method prevents sloughing of surface soil into the borehole and also seals off shallower water bearing zones during discrete zone groundwater sampling. Upon completion, the borings will be grouted in accordance with a site-specific permit from Zone 7 Water Agency.

We believe that empirical data collected from direct visual logging of continuous soil cores will provide a more representative depiction of the underlying geology and hydrogeology as opposed to the indirect sensing techniques of Cone Petrometer Testing (CPT). CPT relies on two methods to identify groundwater: 1) grain size prediction via electrical conductivity (EC) readings and 2) pore dissipation test. During previous investigations we noted that groundwater was often encountered in fine grained soil and not in course grained zones, therefore merely identifying course grained zones via EC readings would not necessarily be indicative of groundwater. Given this, identifying appropriate zones to conduct pore dissipation tests would be difficult. Furthermore, there would be difficulties with aligning the probe pressure sensor with the thin lenses of perched groundwater and any static pore pressure readings would likely be negligible given the limited quantity of groundwater present in the perched zones.

GRAB GROUNDWATER AND SOIL SAMPLING METHODOLOGY

We will collect discrete zone grab groundwater samples at each of the 14 soil boring locations. Additionally, soil cores from the proposed borings will be continuously screened with a photoionization detector (PID). Soil samples exhibiting significant PID concentrations (greater than 50 parts per million by volume (ppmv) will be retained for laboratory testing. This threshold is based on correlations of previous laboratory analyses and corresponding field PID readings. Two soil samples will be collected from the proposed boring located 10 feet from previous boring B-10 (color coded on Figure 2). The soil sample depths for B-10 will be selected at the time of field exploration; based on the highest PID readings. Potential soil impacts will be assessed at this proposed boring location in response to previously noted soil impacts in borings B-9 and B-10.

Previous subsurface investigations at the Site noted only minimal presence of groundwater. During the most recent soil boring investigation performed in August 2012, we visually noted groundwater in soil cores during drilling at eight of eleven locations. During the advancement of well boring MW-5, the previous consultant did not observe groundwater during drilling. Based on these observations, we anticipate the feasibility of discrete zone grab groundwater sampling will be limited by the relatively low volume of groundwater present at the Site. We anticipate that soil cores from some of the borings may appear dry and other borings may yield up to three individual water bearing zones.

At each boring location, once the boring depth has been advanced to the saturated zone (greater than 12 feet bgs), advancement of the direct push casing will only occur after the previous soil core has been logged and the presence of groundwater has been determined. Once a groundwater bearing lens is logged in the soil core, the outer direct push casing will be extracted approximately 5 feet, creating a void space for groundwater sampling, while sealing off the upper zones. After the groundwater sample has been collected, advancement of the soil boring will resume until the next groundwater lens is logged, and the groundwater sampling process will be repeated, until reaching a depth of 30 feet bgs at 12 of the borings and 40 feet bgs at two of the borings (color coded on Figure 2).

We will use a stainless steel bailer to collect groundwater from the borings. The bailer will be lowered down through the drill casing and a groundwater sample will be obtained from the void space below the drill casing. At each location the groundwater samples will be transferred to five VOAs preserved with hydrochloric acid. The stainless steel bailer and drill casing will be decontaminated with Alconox® and water in between borings. The groundwater and soil samples will be labeled with a sample ID, date and time of collection, and placed in a cooler. The groundwater and soil samples will be transported and submitted to a State certified laboratory for analysis of total petroleum hydrocarbons as gasoline (TPHg), diesel (TPHd), volatile organic compounds (VOCs), including methanol, ethanol, *tert*-butyl alcohol (TBA), methyl *tert*-butyl ether (MTBE), ethyl *tert*-butyl ether (ETBE), *tert*-amyl methyl ether (TAME) and diisopropyl ether (DIPE)by EPA Test Method 8260B.

REPORTING

The data collected from the proposed groundwater assessment will be incorporated into the revised SCM and presented in the Final Interim Remedial Action Workplan. The report will include updated analytical tables and refined groundwater plume contours based on the new data from the proposed groundwater assessment. The report will be submitted electronically to ACEH and the California State Water Resources Control Board (SWRCB) GeoTracker website.

SCHEDULE

We can schedule the soil borings to occur within two weeks of receiving approval of this workplan. A report will be available within approximately two weeks of completing the soil borings.

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

Sincerely,

ENGEO Incorporated

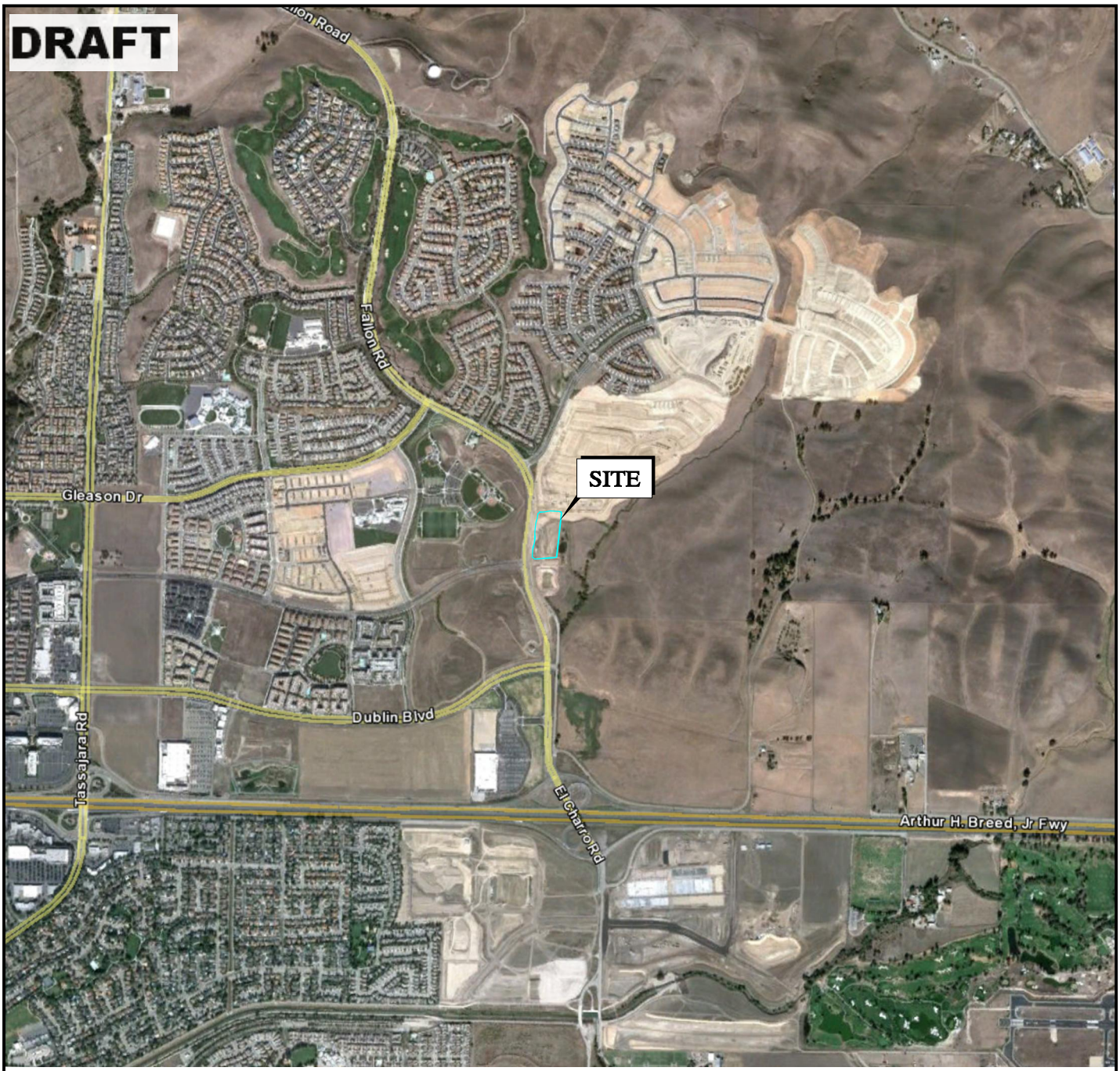
Morgan Johnson
Environmental Scientist

Shawn Munger, CHG
Principal

Attachments: Figures
Table 1 – Current Site Conceptual Model
Table 2 – Data Gaps and Proposed Additional Assessment

Copies: Mr. Ravi Nandwana, BJP-ROF Jordan Ranch, LLC
Mr. Kevin Fryer, BJP-ROF Jordan Ranch, LLC

DRAFT



N

0 FEET 2000

0 METERS 1000

DRAFT

BASE MAP SOURCE: GOOGLE EARTH

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VICINITY MAP

JORDAN RANCH - PARCEL H

DUBLIN, CALIFORNIA

PROJECT NO.: 7828.000.001			FIGURE NO. 1
DATE: AS SHOWN			
DRAWN BY: SRP	CHECKED BY: SM		

G:\Drafting\DRAFTING2_Dwg\7828\000\SoilGasAssessment-ParcelH\Phase 5\Remediation\7828000001-ParcelH-1-VicinityMap-0912.dwg 9-20-12 01:59:21 PM spatt

ORIGINAL FIGURE PRINTED IN COLOR

DRAFT

NG-6

WETLAND

<50 | <50 | <0.5 | <5
TP-1

<50 | <50 | <0.5 | <0.5
MW-1

B-6

FORMER DISPENSER

B-7

<50 | 250,000 | 15,000 | 1,200
NG-5

B-5

B-4

LATERAL LIMITS OF IMPACTED SOIL EXCAVATION

FORMER UST

B-9 B-8

B-10

NG-1

<50 | 190,000 | 10,000 | 17,000

B-11

TP-2

<50 | <50 | <0.5 | <5

B-3

NG-2

<50 | 160,000 | 16,300 | 14,000

NG-3

A

B-2

B

<50 | 120,000 | 6,300 | 460

B-1

2,200 | 45,000 | 940 | 290

GROUNDWATER EXTRACTION TRENCH 50' x 4' x 25'

NG-4

MW-5

<50 | 79,000 | 15,000 | 1,800

1,200 | 15,000 | 78 | 260

MW-2

<50 | <50 | <0.5 | <0.5

MW-3

(MISSING)

<50 | <50 | <0.5 | <0.5

TP-3

TPHg 100 ug/l CONTOUR
BENZENE 1 ug/l CONTOUR

POND

<50 | <50 | <0.5 | 14

MW-4

MTBE 13 ug/l CONTOUR

<50 | <50 | <0.5 | <1

NG-8

<50 | <50 | <0.5 | <1

NG-9

EXPLANATION

MW-5 — WELL CONCENTRATIONS REPORTED FOR JULY 2012. MW-3 IS REPORTED FOR AUGUST 2010

NG-5 — APPROXIMATE LOCATION OF GRAB GROUNDWATER SAMPLE (NEM, 2006)

TP-3 — APPROXIMATE LOCATION OF GRAB GROUNDWATER SAMPLE (ICES, 2006)

B-11 — APPROXIMATE LOCATION OF SOIL BORING

APPROXIMATE LOCATION OF PROPOSED DISCRETE ZONE GRAB GROUNDWATER SAMPLES TO 30 FEET IN DEPTH

APPROXIMATE LOCATION OF PROPOSED DISCRETE ZONE GRAB GROUNDWATER SAMPLES TO 40 FEET IN DEPTH

APPROXIMATE LOCATION OF PROPOSED SOIL AND DISCRETE ZONE GRAB GROUNDWATER SAMPLES

N

0 FEET 20
0 METERS 10

X | X | X | X

- METHYL TERT-BUTYL ETHER (MTBE) CONCENTRATION
- BENZENE CONCENTRATION
- TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPHg)
- TOTAL PETROLEUM HYDROCARBONS AS DIESEL (TPHd)

ALL REPORTED IN MICROGRAMS PER LITER (ug/l)

DRAFT

BASE MAP SOURCE: GOOGLE EARTH

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PROPOSED GROUNDWATER ASSESSMENT BORING LOCATIONS
JORDAN RANCH - PARCEL H
DUBLIN, CALIFORNIA

PROJECT NO.: 7828.000.001
SCALE: AS SHOWN
DRAWN BY: SRP
CHECKED BY: SM
FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg\7828\000\SoilGasAssessment-ParcelH\Phase 5\Remediation\7828000001-ParcelH-2-GroundwaterAssessment--0912.dwg Plot Date: 10-04-12 spatters

ORIGINAL FIGURE PRINTED IN COLOR

Table 1

CURRENT SITE CONCEPTUAL MODEL
Jordan Ranch – Parcel H
Dublin, California

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Geology and Hydrogeology	Regional	Eastern Dublin is situated along the north margin of the Amador and Livermore Valleys. These valleys form a generally east-west trending structural basin within the Diablo Range of the Coast Range Province, which is comprised of a series of predominantly northwest-southeast trending valleys and ridges. The Amador and Livermore Valleys are bounded on the west by the Calaveras Fault, on the east by the Greenville Fault, and along part of the southern boundary by the Los Positas Fault. The valleys are a structural low filled with young (late Tertiary and Quaternary age, less than 25 million years old) sedimentary deposits derived from the surrounding hills (Springer, 1984). This portion of Alameda County is primarily underlain by Tassajara Formation that has accumulated in the area since the Pliocene time, according to the 1991 compilation by D.L. Wagner, E.J. Bortugno, and R.D. McJunkin, Geologic Map of the San Francisco-San Jose Quadrangle, California. Considering the surface topography for the region, as interpreted from the Livermore Quadrangle map, regional groundwater would be expected to flow towards the south-southwest. The City of Dublin does obtain a portion of its drinking water supply from groundwater. Review of the DWR Water Data Library and the SWRCB GeoTracker GAMA Database identified no depth to water measurements for regional supply wells in the Dublin, Pleasanton, Livermore area.	None	NA
	Site	The underlying geology has been logged at 30 exploration locations that were advanced to depths up to 30 feet within the Site. The soil within the 30 foot vertical depth interval is classified as predominately Clayey Sand (SC), with a slightly cohesive structure. Limited laterally discontinuous thin lenses (3-36 inch thickness) of fine grained sand (SP) and fine gravel (GP) were logged at various depths. Perched groundwater is present in thin lenses at various depths greater than 12 feet, which are not always correlated with course grained lenses. The perched groundwater lenses are interbedded with dry soil. Groundwater appears to be present in less than 10% of the cross-sectional area of the subsurface to a depth of 30 ft. Elevated injection pressures observed during bioinjections indicate low hydraulic conductivity. The variability and lack of groundwater bearing zones makes calculating the hydraulic conductivity impractical. Groundwater elevation data from the site monitoring wells indicates a southerly groundwater gradient. This is consistent for all monitoring events. Groundwater was first encountered during drilling of the monitoring well borings at the following depths: MW-1 (27’), MW-2 (25’), MW-3 (dry), MW-4 (25’), MW-5 (dry). The top of screen for these monitoring wells was installed at a depth of 15’. Therefore, the wells are appropriately screened above first groundwater. The presence of water in the well casing above the screened interval is due to local semi-confined conditions and is a potentiometric surface. The recorded groundwater elevations are not indicative of in-situ groundwater depths in the surrounding formation. During previous sampling events, we noted that the water elevation in the well casing rises when the well cap is removed and stabilizes after approximately 20 minutes. This is a logical explanation for why measured groundwater elevations are lower for prior consultants sampling events (sampling technique variability). We opine that the artesian water level rise observed in the well casings during sampling is due to head pressure from the adjacent wetland and pond.	The greatest depth explored to date is 30 feet. Geologic data will be collected from greater depths to evaluate if more substantial water bearing zones are present at depth.	Two direct push borings will be advanced to a depth of 40 feet and continuous soil cores will be logged to classify soil type and identify water bearing zones (Figure 2)
Surface Water Bodies	Site	A spring-fed pond and wetland area are located greater than 200 feet cross-gradient from the former UST. The wetland is located on the north side of the pond. The elevation of the pond bottom is higher than first encountered groundwater.	None	NA
Nearby Wells	Regional	An onsite domestic supply well was abandoned in 2011 under Zone 7 permit # 2011117. The well was located approximately 250’ upgradient from the former UST According to GeoTracker GAMMA, the nearest active supply well is located approximately 3 miles to the southeast (California Water Service – Livermore)	A formal well survey is needed to identify water supply wells within 2,000 feet of the Site.	Submit DWR Well Completion Report Request

Table 1

CURRENT SITE CONCEPTUAL MODEL
Jordan Ranch – Parcel H
Dublin, California

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Constituents of Concern		Total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl tert butyl ether (MTBE) have been identified as the constituents of concern (COCs). Additional TPHg related volatile organic compounds (VOCs) have been detected in soil and groundwater including: naphthalene, sec-butylbenzene, tert-butylbenzene, n-butylbenzene, 1,2-dichloroethane, isopropylbenzene, p-isopropylbenzene, n-propylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene. It should be noted that naphthalene is a constituent of gasoline as well as diesel. During prior investigations, three different laboratories reported relatively low concentrations of total petroleum hydrocarbons as diesel (TPHd) in soil and groundwater; and the different laboratories flagged the results stating they represent a weathered gasoline fraction, and are not consistent with the typical diesel chromatogram. Based on the laboratories findings, we conclude that TPHd is not a COC.	None	NA
Potential Sources	On-site	The source of the impacts was an unauthorized release from a former gasoline underground storage tank (UST) and dispenser prior to 1995. The UST and dispenser were located at the south side of Barn 1. During the remedial excavation, remnant product piping and electrical conduit were observed terminating within the limits of the former UST basin. No above ground storage tanks (ASTs) were identified at the Site. Based on the chromatograms reported by multiple laboratories, we conclude that unauthorized release(s) of TPHd did not occur at the Site.	None	NA
Potential Sources	Off-site	The Site is located within a residential area. There are no surrounding industrial land uses in the vicinity and no potential off-site sources are known to exist.	None	NA
Potential Presence of LNAPL		During the third quarter 2012, TPHg was detected in groundwater at a maximum concentration of 45,000 ug/l, which is 30% of the pure product solubility of TPHg. TPHg concentrations exceeding the pure product solubility were previously detected in grab groundwater samples collected within the former UST basin at locations NG-1, NG-2, and NG-5 at concentrations up to 250,000 ug/l. These locations have since been excavated.	No subsequent groundwater data has been collected at locations NG-1, NG-2, and NG-5. However, the excavation of this area to a depth of 25 feet in 2011 effectively removed the soil impacts that were the source of the previous LNAPL.	Two direct push borings will be advanced upgradient of MW-5 in the vicinity of NG-1, NG-2, and NG-5. Groundwater samples will be collected from the two direct push borings to assess the current concentrations of COCs in this area (Figure 2)
Nature and Extent of Environmental Impacts	Extent in Soil	Soil borings were advanced at 30 locations within and surrounding the former UST basin (release point). Site investigations identified significant soil impacts within the UST basin, which was reportedly backfilled with soil that was excavated during the UST removal. Based on the laboratory chromatograms, no diesel impacts have been identified at the site. A remedial excavation of the former UST basin was performed by ENGEO in 2011. Follow-up soil borings were advanced at 11 locations around the perimeter of the excavation. The borings confirm that the previously noted sidewall impacts from 14 to 25 feet bgs, generally extend less than five feet laterally from the sidewalls. Two of the borings (B-9/B-10) located 14 to 20 feet from the west sidewall, exhibited relatively low concentrations of TPHd at 220 and 340 mg/kg (later reported as weathered gasoline by the laboratory), which we consider to be isolated and de minimus since no impacts were noted in B-8. The remaining nine borings exhibited PID readings up to 4 ppm and soil samples were analyzed from six of these borings, exhibiting no detections above laboratory reporting limits. Although significant concentrations of TPH were previously noted in the confirmation soil samples collected at 25 feet bgs from the base of the remedial excavation, we believe the vertical extent of the elevated soil impacts terminates at approximately 25 feet bgs, based on visual observations that clearly identified a transition from stained soil to non-stained soil at approximately 25 feet bgs during the excavation. Maximum pre-excavation concentrations detected in soil within the UST basin: TPHg – 4,200 mg/kg, benzene – 16 mg/kg (18.5'-19.5'). Maximum post excavation concentrations are: TPHg – 3,700 mg/kg, benzene – <1 mg/kg (25')	Incomplete delineation of soil impacts at locations B-9 and B-10 at depths of 9 and 13 feet bgs.	One direct push boring will be advanced adjacent to boring B-10. The boring will be logged continuously with a PID and two soil samples and one groundwater sample will be submitted for laboratory analysis.

Table 1

CURRENT SITE CONCEPTUAL MODEL
Jordan Ranch – Parcel H
Dublin, California

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Nature and Extent of Environmental Impacts	Extent in Shallow Groundwater	Groundwater samples were previously collected at 17 locations upgradient, downgradient, and cross-gradient from the former UST and Dispenser to a maximum depth of 30 feet. Key groundwater sample locations are: MW-3, MW-4 and TP-3 (downgradient) and TP-2 (cross-gradient). Based on non-detect samples from these key perimeter locations, the plume limits appear to be generally defined (Figure 2). As of the third quarter 2012 monitoring event, the detected TPHg concentration in MW-5 is 39% lower than the historic maximum concentration, indicating that the lateral extent of the plume is decreasing. We attribute this decrease to the remedial excavation and in-situ bioaugmentation. Historical maximum detections in groundwater: TPHg - 250,000 ug/l, benzene - 16,000 ug/l, MTBE -17,000 ug/l. hese locations were grab samples which were located within areas that were subsequently excavated. Current maximum concentrations in the wells are TPHg – 45,000 ug/l, benzene – 940 ug/l, MTBE – 290 ug/l.	The lateral limits of the northwest edge of the plume north of MW-3 and the southeast edge of the plume between MW-4 and TP-2 (cross-gradient directions) are not completely defined. However, the extent of cross-gradient migration would not be expected to be greater than the downgradient migration, which is defined by MW-4. The total distance from the release point to MW-4 is approximately 150' (longitudinal axis). Therefore the cross gradient axis of the plume is estimated to be less than 150'. Since the groundwater monitoring wells at the site are screened across a vertical interval from 15 to 30 feet, the well data may not be representative of concentrations in the individual water bearing lenses.	Additional soil borings will be advanced at 14 locations to further define the lateral and vertical extent of the groundwater plume. At each of the 14 locations, discrete zone groundwater samples will be collected for each individual water bearing lens that is logged.
Nature and Extent of Environmental Impacts	Extent in Deep Groundwater	To date, groundwater sampling has been limited to depths of 30 feet and less. In our opinion it is unlikely that significant groundwater impacts extend greater than 30 feet for the following reasons: 1) the specific gravity of petroleum hydrocarbons is less than water, which limits the downward migration of petroleum hydrocarbon impacts in the subsurface; and 2) the maximum depth to groundwater recorded in site monitoring wells is 18.6 feet.	No groundwater samples have been collected from depths greater than 30 feet.	Two direct-push borings will be advanced to a depth of 40 feet and discrete zone groundwater samples will be collected for each individual water bearing lens that is logged to a depth of 40 feet.
Nature and Extent of Environmental Impacts	Extent in Soil Gas	Initial soil gas data was collected from nine temporary soil gas probes advanced downgradient of the former UST basin in 2006. None of the samples exhibited TPHg concentrations greater than the residential shallow soil gas ESL. Two of the nine samples, which were closest two the former UST basin, exhibited concentrations of benzene slightly above the residential shallow soil gas ESL, and the benzene laboratory reporting limits for the remaining samples exceeded the ESL. Low concentrations of toluene and xylenes were detected below the ESL. Four permanent soil gas wells were installed in June 2012 in the immediate vicinity of the former UST basin. Two of the wells are located within the limits of the remedial excavation and two of the wells are located immediately south of the remedial excavation. One sampling event was completed for the wells in June 2012, and one of the four wells exhibited concentrations of TPHg and benzene exceeding the residential shallow soil gas ESLs. Based on the mean detected soil gas concentrations, carcinogenic risk associated with vapor intrusion under a residential scenario, is less than $1E^{-6}$.	Only one round of soil gas well sampling has been performed at the Site and TPHg and benzene were detected at concentrations exceeding residential shallow soil gas ESLs in one of four wells.	A second soil gas sampling event for the site soil gas monitoring wells is scheduled for October 2012.
Migration Pathways	Potential Conduits	No underground utilities existing within the Site. Remnant product piping and electrical conduit were encountered at a depth of 3 feet during the remedial excavation. The piping and conduit were isolated to the confines of the remedial excavation and did not extend beyond the sidewalls.	None	NA

Table 1

CURRENT SITE CONCEPTUAL MODEL
Jordan Ranch – Parcel H
Dublin, California

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Potential Receptors/Risk	On-site	Currently the Site is vacant and therefore human receptors are not currently at risk. No potential ecological receptors are identified at the Site since the impacts are isolated to the subsurface and nearby surface water bodies are situated at a higher elevation and are cross gradient from the area of impacts. For a hypothetical residential scenario, we identify the following human health exposure pathways: Soil: incomplete pathway. Soil impacts are isolated to depths greater than nine feet, therefore a resident could not be exposed via incidental ingestion and/or direct contact. The previously noted soil impacts at 9 feet appear to be isolated, and the detected TPHg concentrations are less than the construction worker ESL, therefore a hypothetical swimming pool installation would not pose an unacceptable health risk. Groundwater: incomplete pathway. Groundwater beneath the Site is not currently used for potable purposes and there are no plans to utilize groundwater beneath the Site for potable purposes in the foreseeable future. Soil gas: complete pathway. Vapor intrusion is a potential concern for future onsite residential buildings. Future building occupants could be exposed to VOCs through inhalation of indoor air. Based on the mean detected soil gas concentrations at the Site, carcinogenic risk associated with vapor intrusion under a residential scenario, is less than $1E^{-6}$.	Vapor intrusion has been identified as a complete exposure pathway for a hypothetical residential scenario.	A Tier II Risk Assessment may be performed in the future to further evaluate potential vapor intrusion risks.
Potential Receptors/Risk	Off-site	Based on the subsurface data the impacts do not appear to extend beyond the boundaries of Parcel H. Potential off-site receptors include: • Nearby water supply wells • Indoor air in existing neighboring residential buildings.	A formal well survey is needed to identify water supply wells within 2,000 feet of the Site.	Submit DWR Well Completion Report Request

Table 2

DATA GAPS AND PROPOSED ADDITIONAL ASSESSMENT
Jordan Ranch – Parcel H
Dublin, California

Item	Data Gap	Proposed Investigation	Rationale	Analysis
1	The greatest depth explored to date is 30 feet. Geologic data will be collected from greater depths to evaluate if more substantial water bearing zones are present at depth. No groundwater samples have been collected from depths greater than 30 feet	Two direct push borings will be advanced to a depth of 40 feet and continuous soil cores will be logged to classify soil type and identify water bearing zones (Figure 2) Discrete zone groundwater samples will be collected foreach individual water bearing lens that is logged to a depth of 40 feet at the two borings.	Geologic logging and discrete zone groundwater sampling in the 30 to 40 foot depth interval will provide empirical data that will be used to evaluate the extent of impacts in the deeper subsurface zones. Based on this data, the vertical concentration gradient can be refined.	Continuous logging of soil type and PID readings. Groundwater analysis of: TPHg, TPHd, VOCs, and 7 fuel oxygenates by EPA Test Method 8260B.
2	The lateral limits of the northwest edge of the plume north of MW-3 and the southeast edge of the plume between MW-4 and TP-2 (cross-gradient directions) are not completely defined. However, the extent of cross-gradient migration would not be expected to be greater than the downgradient migration, which is generally defined by MW-4. The total distance from the release point to MW-4 is approximately 150' (longitudinal axis). Therefore the cross gradient axis of the plume is estimated to be less than 150'. Since the groundwater monitoring wells at the site are screened across a vertical interval from 15 to 30 feet, the well data may not be representative of concentrations in the individual water bearing lenses.	Additional soil borings will be advanced at 14 locations to further define the lateral and vertical extent of the groundwater plume (Figure 2). At each of the 14 locations, discrete zone groundwater samples will be collected for each individual water bearing lens that is logged.	The soil borings will provide data for areas along the inferred peripheral edge of the groundwater plume and central source area. Data from the additional borings will confirm the lateral extent of the groundwater impacts extending from the unauthorized release point to determine the isoconcentration contours. Discrete zone groundwater sampling will provide empirical data for evaluating the vertical contaminant concentration gradient. This data will be used for future remediation system design and evaluating potential impacts to deeper aquifers.	Groundwater analysis of: TPHg, TPHd, VOCs, and 7 fuel oxygenates by EPA Test Method 8260B.
3	No subsequent groundwater data has been collected at locations NG-1, NG-2, and NG-5, where TPHg was previously detected at concentrations exceeding pure product solubility. Based on this previous data, there is a potential for LNAPL at the Site.	Two soil borings will be advanced upgradient of MW-5 in the vicinity of NG-1, NG-2, and NG-5 (Figure 2).	It is our opinion that the remedial excavation of the area encompassing NG-1, NG-2, and NG-5 to a depth of 25 feet in 2011 effectively removed the soil impacts that were the source of the previous LNAPL, thereby reducing significantly reducing concentrations in groundwater to levels that are less than 30% of the pure product solubility. To confirm this finding, groundwater data will be collected from two borings upgradient of MW-5 in the vicinity of NG-1, NG-2, and NG-5.	Groundwater analysis of: TPHg, TPHd, VOCs, and 7 fuel oxygenates by EPA Test Method 8260B.
4	Incomplete delineation of soil impacts at locations B-9 and B-10 at depths of 9 and 13 feet bgs.	One direct push boring will be advanced adjacent to boring B-10 (Figure 2).	The remaining soil impacts at location B-9 appear to be isolated and defined to the east based on the lack of impacts exhibited at boring B-8. The proposed additional boring 10 feet west of B-10 will provide confirm whether the soil impacts are isolated or extend further west.	Continuous logging of soil type and PID readings. Two soil samples and groundwater analysis of: TPHg, TPHd, VOCs, and 7 fuel oxygenates by EPA Test Method 8260B.
5	Only one round of soil gas well sampling has been performed at the Site. Vapor intrusion has been identified as a complete exposure pathway for a hypothetical residential scenario.	A second soil gas sampling event for the site soil gas monitoring wells is scheduled for October 2012. A Tier II Risk Assessment may be performed in the future to further evaluate potential vapor intrusion risks.	Additional soil gas data will provide a more comprehensive understanding of potential seasonal fluctuations in soil gas concentrations. Soil gas concentrations would be expected to be lower during the winter months due to increased moisture content in the vadose zone acting to reduce vapor migration through the pore space. A Tier II Risk Assessment could further substantiate the conclusion that based on the mean detected soil gas concentrations, carcinogenic risk associated with vapor intrusion under a residential scenario, is less than $1E^{-}$.	Soil gas analysis of: TPHg and VOCs by EPA Test Method TO-15.
6	A formal well survey is needed to identify water supply wells within 2,000 feet of the Site.	Perform a search of DWR well completion reports.	Potential off-site migration of groundwater impacts should be evaluated since groundwater samples have been collected from only 17 onsite locations, and 14 proposed additional onsite locations.	None

October 5, 2012

Subject: Jordan Ranch Property – Former Leaking Underground Storage Tank
Dublin, California

PERJURY STATEMENT

"I declare, that to the best of my knowledge at the present time, the information and/or recommendations contained in the attached document are true and correct."

Submitted by Responsible Party:

ROBERT RADANOVICH
BJP-ROF Jordan Ranch, LLC
5000 Hopyard Road, #170
Pleasanton, CA 94588