ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
ALEX BRISCOE, Agency Director

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

November 18, 2013

Mr. Bob Webster
David D Bohannon Organization
60 31st Avenue
San Mateo, CA 94403
(sent via electronic mail to: Robert.Webster@ddbo.com)

Subject: Request for Work Plan Addendum; Fuel Leak Case No. RO0000167 and GeoTracker Global ID T0600102098; Bohannon Development Property, 575 Paseo Grande, San Lorenzo, CA 94580

Dear Mr. Webster:

Alameda County Environmental Health (ACEH) staff has reviewed the case file including the *Site Conceptual Model and Work Plan to Evaluate Post-Remediation Site Conditions,* dated December 20, 2012, and the *Fourth Quarter 2012 Groundwater Monitoring Report,* dated February 19, 2013, that were prepared and submitted by Stantec on your behalf. Thank you for submitting the documents. Thank you also for bringing Geotracker submittals into compliance with state regulations.

ACEH has evaluated the data and recommendations presented in the above-mentioned reports, in conjunction with the case files, and the State Water Resources Control Board's (SWRCBs) Low-Threat Underground Storage Tank Case Closure Policy (LTCP). Based on ACEH staff review, we have determined that the site fails to meet the LTCP General Criteria f (Secondary Source Removal) and the Media-Specific Criteria for Groundwater, and the Media-Specific Criteria for Vapor Intrusion to Indoor Air (see Attachment A for a copy of the LTCP checklist). The referenced Site Conceptual Model (SCM) and work plan addresses LTCP General Criteria e, and while not implemented appears sufficient to provide characterization and identification of data gaps at the site to meet that general criterion.

In order to discuss the site ACEH would like to invite you to meeting to resolve any questions that may arise under the LTCP and due to changes requested below. ACEH requests notification of suitable dates and times for the meeting.

The referenced groundwater monitoring report indicates that dissolved-phase groundwater trends are increasing in one of the source areas onsite (between May 2012 and November 2012 TPH as gasoline increased from 540 to 4,700 µg/l, and benzene increased between 110 and 1,700 µg/l in well POB-1A). The referenced work plan proposes to install 10 permanent onsite vapor wells to three feet below grade surface (bgs) in order to check for residual contamination in soil and also proposes to install 7 offsite soil bores in order to verify that the lateral extent of the groundwater dissolved-phase plume has been defined. The SCM also reported that the residential irrigation well at 15975 Paseo Largavista, located approximately 25 to 50 feet downgradient (southwest) from offsite well MW-4 (which documents currently increasing offsite dissolved-phase contamination), has been decommissioned. The second residential irrigation well that was downgradient of the site during a previous (northwest) historic groundwater flow direction (and is located at 15962 Via Del Sol), is reported to be "permanently" inactive, but has not been decommissioned.

Based on the review of the case file ACEH requests that you address the following technical comments and send us the documents requested below.

TECHNICAL COMMENTS

1. **General Criteria f – Secondary Source Has Been Removed to the Extent Practicable –** The LTCP defines the secondary source to be located directly below the former UST(s). Based on the lithologic log documenting fill to six feet in depth and the location of the well on site figures, well POB-A1 appears to be located within one of the known source areas at the site. Concentrations trends in the well document an increasing post-remedial groundwater trend, as noted above, between May 2012 and November 2012, the most recent groundwater sampling event. Please evaluate the efficiency of secondary source removal in this location and present the analysis in the Focused Site Conceptual Model (SCM) requested in Technical Comment 4f.

2. **LTCP Media Specific Criteria for Groundwater –** To satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds water quality objectives must be stable or decreasing in aerial extent, and meet all of the additional characteristics of one of the five classes of sites listed in the policy.

   Our review of the case files indicates that insufficient data and analysis has been presented to support the requisite characteristics of plume stability or plume classification as follows:

   a. **Plume Stability and Post-Remedial Groundwater Trends –** Contaminant concentrations in monitoring wells within the source zone and downgradient of the site (POB-A1 and MW-4, respectively) document increasing groundwater concentration trends beneath and downgradient of the site. As of the date of the most recent groundwater monitoring event (November 2012), groundwater concentrations exceed the majority of pre-remedial groundwater concentrations.

   b. **Downgradient and Lateral Extent of Groundwater Plume –** As discussed in the previous directive letter, the downgradient and lateral extent of groundwater contamination has not been defined. The predominant groundwater flow path downgradient of well MW-4 appears to consistently pass between offsite wells MW-5 and MW-6 that are separated by approximately 270 feet of distance. Additionally, the migration of contaminants in utility preferential pathways has been identified to be probable due to shallow groundwater at the site. Further, the presence of an increasing groundwater trend in well MW-4 documents that the contaminate plume has migrated beyond the utility preferential pathways. Consequently ACEH requests that the effect of the preferential pathways on the extent of the contaminant plume be evaluated. The referenced work plan has proposed a scope of work to investigate the downgradient and lateral extent of groundwater contamination; however, as noted in the Technical Comment 4 below, modifications to the scope of work to define the plume extent are requested by ACEH in an effort to expedite and focus the work scope.

   c. **Two Documented Groundwater Flow Directions -** As discussed in the previous directive letter, a historic groundwater flow direction to the northwest has been documented by earlier groundwater flow contours. Additionally, the detection of higher benzene concentrations in Gore Sorber samples collected to the west of the site, rather than to the southwest as current groundwater flow directions would suggest, also indicate the potential for unevaluated groundwater contamination to the west of the subject site. The referenced work plan has proposed a scope of work to investigate the downgradient and lateral extent of groundwater contamination in the historic flow direction; however, as noted in the Technical Comment 4 below, modifications to the scope of work to identify the lateral extent of the groundwater contaminant plume are requested by ACEH in an effort to expedite and focus the work.

3. **LTCP Media Specific Criteria for Vapor Intrusion to Indoor Air –** The LTCP describes conditions, including bioattenuation zones, which if met will assure that exposure to petroleum vapors in indoor air will not pose unacceptable health risks to human occupants of existing or future site buildings, and adjacent parcels. Appendices 1 through 4 of the LTCP criteria illustrate four potential exposure scenarios and describe characteristics and criteria associated with each scenario.

   Our review of the case files indicates that the site data fails to support the requisite characteristics of one of the four scenarios. Specifically, it appears that petroleum contamination has been present at greater than 100 milligrams per kilogram (mg/kg) within the 0 to 5 and the 5 to 10 foot depth zones prescribed in the LTCP; however, post-remediation sampling is proposed to determine if these concentrations have been reduced by remedial actions at the site.

Additionally, the LTCP specifies that if soil vapor is collected under scenario 4, it is to be collected at a depth of five feet bgs or five feet below a building foundation. Existing vapor points have been installed to three feet bgs, and also did not collected oxygen data that might allow alternative scenarios to be considered. The proposed soil vapor points are also proposed to be installed to three feet bgs. As noted in Technical Comment 4 below, modifications to the scope of work for soil vapor sampling are requested by ACEH in an effort to expedite and focus the work.

4. **Work Plan Modifications –** The referenced work plan proposes a series of actions with which ACEH is in general agreement of undertaking; however, ACEH requests several modifications to the approach, and the submittal of a brief work plan addendum, including a revised Figure 10 to document the changes, by the date below.

   a. **Soil Vapor Sampling –** The referenced work plan proposes the installation of 10 three-foot deep vapor probes as the primary method of evaluating post-remedial conditions at the site. The vapor wells appear to be placed in areas with pre-remedial residual contamination, in locations mid-way between Dual Phased Extraction (DPE) wells due to the unknown radius of influence of the DPE well, in backfilled source areas, and in background locations. ACEH is in general agreement that the wells should provide sufficient information about post-remediation soil vapor concentrations; however, requests the wells be installed to a depth of five feet bgs so that the site can be evaluated in accordance with the LTCP. Because groundwater may be encountered as shallow as 6 feet bgs (when a confining clay is not present), a slightly shallower depth of installation may be required at limited locations if justified.

      To better understand the soil vapor environment please additionally analyze for naphthalene and oxygen (per the LTCP; see below), as well as nitrogen, methane, and CO_2 by appropriate analytical methodologies. These are intended to validate the vapor well analytical results.

   b. **Addition of Naphthalene, PAHs, and Oxygen to the Analytical Suite –** The LTCP evaluates a site against a select set of analytes that include naphthalene, Poly Aromatic Hydrocarbons (PAHs) in soil, and oxygen in soil vapor. ACEH consequently requests the inclusion of naphthalene in the soil analytical suite, and naphthalene and oxygen in the soil vapor analytical suite. In the area of the former waste oil UST and sumps, PAHs are also requested to be analyzed in soil, unless existing data is available for both the 0 to 5 and the 5 to 10 foot depth intervals.

      In regards to soil vapor, please be aware that Appendix E of the Department of Toxic Substance Control (DTSC) April 2012 *Advisory Active Soil Gas Investigations,* specifies that TO-17 analysis for naphthalene should be used to validate TO-15 naphthalene analysis and also specifies the tubing type due to sorption of naphthalene by standard sampling tubing. Consequently ACEH requests confirmation sampling by TO-17 in the analytical program and use of appropriate non-sorbing tubing for naphthalene soil vapor collection.

   c. **Soil Sampling & Analysis –** In order to characterize onsite post-remediation hydrocarbon concentrations for evaluation against the Direct Contact and Outdoor Exposure Criteria , ACEH requests that soils be collected for laboratory analysis in both the 0 to 5 and the 5 to 10 foot depth zones as prescribed by the LTCP. At a minimum, if these soil bores are not installed at any of the soil bore locations, the collection and analysis of undisturbed soil samples from the vapor well soil bores can also be submitted for the 0 to 5 foot depth zone of these additional adjacent soil bores. Analysis in the 5 to 10 foot zone is still required. Analysis is requested to be biased toward higher PID readings in each depth zone.

   d. **HydroPunch Soil Bore Installation –** The referenced work plan proposes to install two soil bore transects consisting of a total of seven HydroPunch soil bores to 20 feet bgs to allow the collection of groundwater from the two water-bearing zones (5 to 8 feet bgs, and below 13 feet bgs) encountered beneath the site and vicinity. Groundwater monitoring of the lower groundwater bearing zone (wells POB-B1, and POBS-B2, and potentially NOBS-B1 as the later well is downgradient of subsurface utility conduits) downgradient of the site document declining groundwater concentration trends at the site and vicinity. However, as noted above, groundwater trends in shallow groundwater (wells MW-4 and POBS-A1) are increasing. As a consequence, ACEH requests that the proposed HydroPunch bores define only the lateral and downgradient

extent of contamination in upper groundwater bearing zone in each documented groundwater flow direction. As a result, shallower soil bores, rather than 20-foot deep soil bores, are requested.

The proposed bores are up to approximately 100 feet apart. ACEH requests the installation of additional soil bores in order to decrease the spacing between soil bores in each transect in order to eliminate the potential that the groundwater plume may pass between bore and well locations. ACEH requests the proposed number of bores and the proposed location of the additional soil bores be depicted in a revised Figure 10 *Proposed Sampling Locations*.

e. **Additional HydroPunch Soil Bore Locations –** In order to determine the extent that the groundwater plume may be utilizing preferential pathways provided by underground utilities that have been identified to be in the groundwater bearing zone, ACEH requests the installation of a soil bore transect upgradient (e.g. east) of Paseo Largovista, and downgradient of the known multiple source zones. ACEH also requests documentation of the soil and groundwater sampling methodologies to be used in this soil bore transect, in the brief work plan addendum requested below. Please document the number of soil bores to and the location of these bores in a revised Figure 10 *Proposed Sampling Locations*.

f. **Focused SCM and Work Plan Addendum –** Please update the SCM as a Focused SCM, and prepare a Work Plan Addendum to address the Technical Comments contained in this letter, and to identify additional data gaps, if any, and a proposed scope of work to address them, by the date identified below. Please support the scope of work in the Revised Data Gap Investigation Work Plan with a focused SCM and Data Quality Objectives (DQOs) that relate the data collection to each LTCP criteria. For example please clarify which scenario within each Media-Specific Criteria a sampling strategy is intended to apply to.

In order to expedite review, ACEH requests the focused SCM be presented in a tabular format that highlights the major SCM elements and associated data gaps, which need to be addressed to progress the site to case closure under the LTCP. Please see Attachment A "Site Conceptual Model Requisite Elements". Please sequence activities in the proposed revised data gap investigation scope of work to enable efficient data collection in the fewest mobilizations possible.

5. **Rebound Testing –** As noted above groundwater concentrations in several wells are undergoing a rebound in concentrations in the post-remediation time period. ACEH requests an evaluation of the site and the appropriateness of restarting the remediation system, or the cycling of the system by the date identified below**.**

6. **Groundwater Sampling Interval –** Except for the semi-annual groundwater monitoring interval previously requested for wells MW-1, MW-5, MW-6, and MW-7, groundwater monitoring is to continue to occur on a quarterly basis during rebound testing. ACEH requests the submittal of groundwater monitoring reports by the dates referenced below.

TECHNICAL REPORT REQUEST

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

- **January 17, 2014 –** Data Gap Investigation Addendum and Focused SCM
  File to be named: RO167_WP_ADEND_R-yyyy-mm-dd
- **February 14, 2014 –** Fourth Quarter 2013 Groundwater Monitoring Report
  File to be named: RO167_GWM_R_yyyy-mm-dd
- **60 Days After Work Plan Approval –** Soil & Groundwater Investigation
  File to be named: RO167_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.

Online case files are available for review at the following website: http://www.acgov.org/aceh/index.htm.

If you have any questions, please call me at (510) 567-6876 or send me an electronic mail message at mark.detterman@acgov.org.

Sincerely,

Digitally signed by Mark Detterman
DN: cn=Mark Detterman, o, ou, email=mark.detterman@acgov.org, c=US
Date: 2013.11.18 15:58:12 -08'00'

Mark E. Detterman, PG, CEG
Senior Hazardous Materials Specialist

Enclosures: Attachment 1 – Responsible Party (ies) Legal Requirements / Obligations
Electronic Report Upload (ftp) Instructions

Attachment A – Site Conceptual Model Requisite Elements

cc: Chris Maxwell, Stantec Consulting Corporation, 57 Lafayette Circle, 2nd Floor, Lafayette, CA 94549; (sent via electronic mail to Chris.Maxwell@stantec.com)

Mason Albrecht, Stantec Consulting Corporation, 57 Lafayette Circle, 2nd Floor, Lafayette, CA 94549; (sent via electronic mail to Mason.Albrecht@stantec.com)

Dilan Roe (sent via electronic mail to dilan.roe@acgov.org)
Mark Detterman (sent via electronic mail to mark.detterman@acgov.org)
Electronic File, GeoTracker

Attachment 1

Responsible Party(ies) Legal Requirements/Obligations

REPORT/DATA REQUESTS

These reports/data are being requested pursuant to Division 7 of the California Water Code (Water Quality), Chapter 6.7 of Division 20 of the California Health and Safety Code (Underground Storage of Hazardous Substances), and Chapter 16 of Division 3 of Title 23 of the California Code of Regulations (Underground Storage Tank Regulations).

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (Local Oversight Program [LOP] for unauthorized releases from petroleum Underground Storage Tanks [USTs], and Site Cleanup Program [SCP] for unauthorized releases of non-petroleum hazardous substances) require submission of reports in electronic format pursuant to Chapter 3 of Division 7, Sections 13195 and 13197.5 of the California Water Code, and Chapter 30, Articles 1 and 2, Sections 3890 to 3895 of Division 3 of Title 23 of the California Code of Regulations (23 CCR). Instructions for submission of electronic documents to the ACEH FTP site are provided on the attached "Electronic Report Upload Instructions."

Submission of reports to the ACEH FTP site is in addition to requirements for electronic submittal of information (ESI) to the State Water Resources Control Board's (SWRCB) Geotracker website. In April 2001, the SWRCB adopted 23 CCR, Division 3, Chapter 16, Article 12, Sections 2729 and 2729.1 (Electronic Submission of Laboratory Data for UST Reports). Article 12 required electronic submittal of analytical laboratory data submitted in a report to a regulatory agency (effective September 1, 2001), and surveyed locations (latitude, longitude and elevation) of groundwater monitoring wells (effective January 1, 2002) in Electronic Deliverable Format (EDF) to Geotracker. Article 12 was subsequently repealed in 2004 and replaced with Article 30 (Electronic Submittal of Information) which expanded the ESI requirements to include electronic submittal of any report or data required by a regulatory agency from a cleanup site. The expanded ESI submittal requirements for petroleum UST sites subject to the requirements of 23 CCR, Division, 3, Chapter 16, Article 11, became effective December 16, 2004. All other electronic submittals required pursuant to Chapter 30 became effective January 1, 2005. Please visit the SWRCB website for more information on these requirements: (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/).

PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 7835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, late reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

Alameda County Environmental Cleanup Oversight Programs (LOP and SCP)	**REVISION DATE:** July 25, 2012
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010
SECTION: Miscellaneous Administrative Topics & Procedures	**SUBJECT:** Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (petroleum UST and SCP) require submission of all reports in electronic form to the county's FTP site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities.

REQUIREMENTS

- **Please do not submit reports as attachments to electronic mail.**
- Entire report including cover letter must be submitted to the ftp site as **a single Portable Document Format (PDF) with no password protection**.
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- **Signature pages and perjury statements must be included and have either original or electronic signature.**
- **Do not password protect the document**. Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted**.
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

  RO#_Report Name_Year-Month-Date (e.g., RO#5555_WorkPlan_2005-06-14)

Submission Instructions

1) Obtain User Name and Password
   a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
      i) Send an e-mail to deh.loptoxic@acgov.org
   b) In the subject line of your request, be sure to include **"ftp PASSWORD REQUEST"** and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for**.

2) Upload Files to the ftp Site
   a) Using Internet Explorer (IE4+), go to ftp://alcoftp1.acgov.org
      (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
   b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
   c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
   d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
   e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.

3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
   a) Send email to deh.loptoxic@acgov.org notify us that you have placed a report on our ftp site.
   b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
   c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
   d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

ATTACHMENT A

Site Conceptual Model Requisite Elements

ATTACHMENT A

Site Conceptual Model

The site conceptual model (SCM) is an essential decision-making and communication tool for all interested parties during the site characterization, remediation planning and implementation, and closure process. A SCM is a set of working hypotheses pertaining to all aspects of the contaminant release, including site geology, hydrogeology, release history, residual and dissolved contamination, attenuation mechanisms, pathways to nearby receptors, and likely magnitude of potential impacts to receptors.

The SCM is initially used to characterize the site and identify data gaps. As the investigation proceeds and the data gaps are filled, the working hypotheses are modified, and the overall SCM is refined and strengthened until it is said to be "validated". At this point, the focus of the SCM shifts from site characterization towards remedial technology evaluation and selection, and later remedy optimization, and forms the foundation for developing the most cost-effective corrective action plan to protect existing and potential receptors.

For ease of review, Alameda County Environmental Health (ACEH) requests utilization of tabular formats to (1) highlight the major SCM elements and their associated data gaps which need to be addressed to progress the site to case closure (see Table 1 of attached example), and (2) highlight the identified data gaps and proposed investigation activities (see Table 2 of the attached example). ACEH requests that the tables presenting the SCM elements, data gaps, and proposed investigation activities be updated as appropriate at each stage of the project and submitted with work plans, feasibility studies, corrective action plans, and requests for closures to support proposed work, conclusions, and/or recommendations.

The SCM should incorporate, but is not limited to, the topics listed below. Please support the SCM with the use of large-scaled maps and graphics, tables, and conceptual diagrams to illustrate key points. Please include an extended site map(s) utilizing an aerial photographic base map with sufficient resolution to show the facility, delineation of streets and property boundaries within the adjacent neighborhood, downgradient irrigation wells, and proposed locations of transects, monitoring wells, and soil vapor probes.

a. Regional and local (on-site and off-site) geology and hydrogeology. Include a discussion of the surface geology (e.g., soil types, soil parameters, outcrops, faulting), subsurface geology (e.g., stratigraphy, continuity, and connectivity), and hydrogeology (e.g., water-bearing zones, hydrologic parameters, impermeable strata). Please include a structural contour map (top of unit) and isopach map for the aquitard that is presumed to separate your release from the deeper aquifer(s), cross sections, soil boring and monitoring well logs and locations, and copies of regional geologic maps.

b. Analysis of the hydraulic flow system in the vicinity of the site. Include rose diagrams for depicting groundwater gradients. The rose diagram shall be plotted on groundwater elevation contour maps and updated in all future reports submitted for your site. Please address changes due to seasonal precipitation and groundwater pumping, and evaluate the potential interconnection between shallow and deep aquifers. Please include an analysis of vertical hydraulic gradients, and effects of pumping rates on hydraulic head from nearby water supply wells, if appropriate. Include hydraulic head in the different water bearing zones and hydrographs of all monitoring wells.

c. Release history, including potential source(s) of releases, potential contaminants of concern (COC) associated with each potential release, confirmed source locations, confirmed release locations, and existing delineation of release areas. Address primary leak source(s) (e.g., a tank, sump, pipeline, etc.) and secondary sources (e.g., high-

concentration contaminants in low-permeability lithologic soil units that sustain groundwater or vapor plumes). Include local and regional plan view maps that illustrate the location of sources (former facilities, piping, tanks, etc.).

d. Plume (soil gas and groundwater) development and dynamics including aging of source(s), phase distribution (NAPL, dissolved, vapor, residual), diving plumes, attenuation mechanisms, migration routes, preferential pathways (geologic and anthropogenic), magnitude of chemicals of concern and spatial and temporal changes in concentrations, and contaminant fate and transport. Please include three-dimensional plume maps for groundwater and two-dimensional soil vapor plume plan view maps to provide an accurate depiction of the contaminant distribution of each COC.

e. Summary tables of chemical concentrations in different media (i.e., soil, groundwater, and soil vapor). Please include applicable environmental screening levels on all tables. Include graphs of contaminant concentrations versus time.

f. Current and historic facility structures (e.g., buildings, drain systems, sewer systems, underground utilities, etc.) and physical features including topographical features (e.g., hills, gradients, surface vegetation, or pavement) and surface water features (e.g. routes of drainage ditches, links to water bodies). Please include current and historic site maps.

g. Current and historic site operations/processes (e.g., parts cleaning, chemical storage areas, manufacturing, etc.).

h. Other contaminant release sites in the vicinity of the site. Hydrogeologic and contaminant data from those sites may prove helpful in testing certain hypotheses for the SCM. Include a summary of work and technical findings from nearby release sites, including the two adjacent closed LUFT sites, (i.e., Montgomery Ward site and the Quest Laboratory site).

i. Land uses and exposure scenarios on the facility and adjacent properties. Include beneficial resources (e.g., groundwater classification, wetlands, natural resources, etc.), resource use locations (e.g., water supply wells, surface water intakes), subpopulation types and locations (e.g., schools, hospitals, day care centers, etc.), exposure scenarios (e.g. residential, industrial, recreational, farming), and exposure pathways, and potential threat to sensitive receptors. Include an analysis of the contaminant volatilization from the subsurface to indoor/outdoor air exposure route (i.e., vapor pathway). Please include copies of Sanborn maps and aerial photographs, as appropriate.

j. Identification and listing of specific data gaps that require further investigation during subsequent phases of work. Proposed activities to investigate and fill data gaps identified.

TABLE 1

INITIAL SITE CONCEPTUAL MODEL

CSM Element	CSM Sub-Element	Description	Data Gap	How to Address
Geology and Hydrogeology	Regional	The site is in the northwest portion of the Livermore Valley, which consists of a structural trough within the Diablo Range and contains the Livermore Valley Groundwater Basin (referred to as "the Basin") (DWR, 2006). Several faults traverse the Basin, which act as barriers to groundwater flow, as evidenced by large differences in water levels between the upgradient and downgradient sides of these faults (DWR, 2006). The Basin is divided into 12 groundwater basins, which are defined by faults and non-water-bearing geologic units (DWR, 1974). The hydrogeology of the Basin consists of a thick sequence of fresh-water-bearing continental deposits from alluvial fans, outwash plains, and lacustrine environments to up to approximately 5,000 feet bgs (DWR, 2006). Three defined fresh-water bearing geologic units exist within the Basin: Holocene Valley Fill (up to approximately 400 feet bgs in the central portion of the Basin), the Plio-Pleistocene Livermore Formation (generally between approximately 400 and 4,000 feet bgs in the central portion of the Basin), and the Pliocene Tassajara Formation (generally between approximately 250 and 5,000 or more feet bgs) (DWR, 1974). The Valley Fill units in the western portion of the Basin are capped by up to 40 feet of clay (DWR, 2006).	None	NA
	Site	***Geology:*** Borings advanced at the site indicate that subsurface materials consist primarily of finer-grained deposits (clay, sandy clay, silt and sandy silt) with interbedded sand lenses to 20 feet below ground surface (bgs), the approximate depth to which these borings were advanced. The documented lithology for one on-site boring that was logged to approximately 45 feet bgs indicates that beyond approximately 20 feet bgs, fine-grained soils are present to approximately 45 feet bgs. A cone penetrometer technology test indicated the presence of sandier lenses from approximately 45 to 58 feet bgs and even coarser materials (interbedded with finer-grained materials) from approximately 58 feet to 75 feet bgs, the total depth drilled. The lithology documented at the site is similar to that reported at other nearby sites, specifically the Montgomery Ward site (7575 Dublin Boulevard), the Quest laboratory site (6511 Golden Gate Drive), the Shell-branded Service Station site (11989 Dublin Boulevard), and the Chevron site (7007 San Ramon Road). ***Hydrogeology:*** Shallow groundwater has been encountered at depths of approximately 9 to 15 feet bgs. The hydraulic gradient and groundwater flow direction have not been specifically evaluated at the site.	As noted, most borings at the site have been advanced to approximately 20 feet bgs, and one boring has been advanced and logged to 45 feet bgs; CPT data was collected to 75 feet bgs at one location. Lithologic data will be obtained from additional borings that will be advanced on site to further the understanding of the subsurface, especially with respect to deeper lithology. The on-site shallow groundwater horizontal gradient has not been confirmed. Additionally, it is not known if there may be a vertical component to the hydraulic gradient.	Two direct push borings and four multi-port wells will be advanced to depth (up to approximately 75 feet bgs) and soil lithology will be logged. See items 4 and 5 on Table 2. Shallow and deeper groundwater monitoring wells will be installed to provide information on lateral and vertical gradients. See Items 2 and 5 on Table 2.
Surface Water Bodies		The closest surface water bodies are culverted creeks. Martin Canyon Creek flows from a gully west of the site, enters a culvert north of the site, and then bends to the south, passing approximately 1,000 feet east of the site before flowing into the Alamo Canal. Dublin Creek flows from a gully west of the site, enters a culvert approximately 750 feet south of the site, and then joins Martin Canyon Creek approximately 750 feet southeast of the site.	None	NA
Nearby Wells		The State Water Resources Control Board's GeoTracker GAMA website includes information regarding the approximate locations of water supply wells in California. In the vicinity of the site, the closest water supply wells presented on this website are depicted approximately 2 miles southeast of the site; the locations shown are approximate (within 1 mile of actual location for California Department of Public Health supply wells and 0.5 mile for other supply wells). No water-producing wells were identified within 1/4 mile of the site in the well survey conducted for the Quest Laboratory site (6511 Golden Gate Drive; documented in 2009); information documented in a 2005 report for the Chevron site at 7007 San Ramon Road indicates that a water-producing well may exist within 1/2 mile of the site.	A formal well survey is needed to identify water-producing, monitoring, cathodic protection, and dewatering wells.	Obtain data regarding nearby, permitted wells from the California Department of Water Resources and Zone 7 Water Agency (Item 11 on Table 2).

TABLE 2

DATA GAPS AND PROPOSED INVESTIGATION

Item	Data Gap	Proposed Investigation	Rationale	Analysis
5	Evaluate the possible presence of impacts to deeper groundwater. Evaluate deeper groundwater concentration trends over time. Obtain data regarding the vertical groundwater gradient. Obtain more lithological data below 20 feet bgs.	Install four continuous multichannel tubing (CMT) groundwater monitoring wells (aka multi-port wells) to approximately 65 feet bgs in the northern parking lot with ports at three depths (monitoring well locations may be adjusted pending results of shallow grab groundwater samples; we will discuss any potential changes with ACEH before proceeding). Groundwater monitoring frequency to be determined. Soil samples will be collected only if there are field indications of impacts. Soil lithology will be logged. However, information regarding the moisture content of soil may not be reliable using sonic drilling technology (two borings will be logged using direct push technology; see Item 4, above).	One well is proposed at the western (upgradient) property boundary to confirm that there are no deeper groundwater impacts from upgradient. Two wells are proposed near the center of the northern parking lot to evaluate potential impacts in an area where deeper impacts, if any, would most likely to be found. One well is proposed at the eastern (downgradient) property boundary to confirm that there are no impacts extending off-site. Port depths will be chosen based on the locations of saturated soils (as logged in direct push borings; see Item 4, above), but are expected at approximately 15, 45, and 60 feet bgs.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance.
6	Evaluate possible off-site migration of impacted soil vapor in the downgradient direction (east). Evaluate concentration trends over time.	Install 4 temporary nested soil vapor probes at approximately 4 and 8 feet bgs along the eastern property boundary. Based on the results of the sampling, two sets of nested probes will be converted to vapor monitoring wells to allow for evaluation of VOC concentration trends over time.	Available data indicate that PCE and TCE are present in soil vapor in the eastern portion of the northern parking lot. Samples are proposed on approximately 50-foot intervals along the eastern property boundary to provide a transect of concentrations through the vapor plume. The depths of 4 and 8 feet bgs are chosen to provide data closest to the source (i.e., groundwater) while avoiding saturated soil, and also provide shallower data to help evaluate potential attenuation within the soil column. Two sets of nested vapor probes will be converted into vapor monitoring wells (by installing well boxes at ground surface); the locations of the permanent wells will be chosen based on the results of samples from the temporary probes.	*Soil vapor* : VOCs by EPA Method TO-15.
7	Evaluate potential for off-site migration of impacted groundwater in the downgradient direction (east).	Advance two borings to approximately 20 feet bgs in the parking lot of the property east of the Crown site for collection of grab groundwater samples.	Two borings are proposed off-site, on the property east of the Crown site, just east of the building in the expected area of highest potential VOC concentrations.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance.
8	Evaluate VOC concentrations just north of the highest concentration area.	Advance two borings to approximately 20 feet bgs north of Building A for collection of soil and grab groundwater samples. Soil samples will be collected at two depths in the vadose zone. Soil samples will be collected based on field indications of impacts (PID readings, odor, staining) or, in the absence of field indications of impacts, at 5 and 10 feet bgs.	The highest concentrations of PCE in groundwater were detected at boring NM-B-32, just north of Building A. The nearest available data to the north are approximately 75 feet away. One of the borings will be advanced approximately 20 feet north of NM-B-32 to provide data close to the highest concentration area. A second boring will be advanced approximately halfway between the first boring and former boring NM-B-33 to provide additional spatial data for contouring purposes. These borings will be part of a transect in the highest concentration area.	*Groundwater:* VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance. *Soil:* VOCs by EPA Method 8260 (soil samples to be collected using field preservation in accordance with EPA Method 5035).
9	Evaluate VOC concentrations in soil vapor in the south parcel of the site.	Install four temporary soil vapor probes at approximately 5 feet bgs around boring SV-25, where PCE was detected in soil vapor at a low concentration.	PCE was detected in soil vapor sample SV-25 in the southern parcel, although was not detected in groundwater in that area. Three probes will be installed approximately 30 feet from of boring SV-25 to attempt to delineate the extent of impacts. A fourth probe is proposed west of the original sample, close to the property boundary and the location of mapped utility lines, which may be a potential conduit, to evaluate potential impacts from the west.	*Soil vapor* : VOCs by EPA Method TO-15.
10	Obtain additional information regarding subsurface structures and utilities to further evaluate migration pathways and sources.	Ground penetrating radar (GPR) and other utility locating methodologies will be used, as appropriate, to further evaluate the presence of unknown utilities and structures at the site.	Utilities have been identified at the site that include an on-site sewer lateral and drain line, and shallow water, electric, and gas lines. Given the current understanding of the distribution of PCE in groundwater at the site, it is possible that other subsurface utilities, and specifically sewer laterals, exist that may act as a source or migration pathway for distribution of VOCs in the subsurface.	NA