



ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
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November 17, 2014 (*Revised*)

Mr. Alexis Coulter
Chevron Environmental Management Co.
6101 Bollinger Canyon Road
San Ramon, CA 94583
(Sent via electronic mail to:
ACoulter@chevron.com)

Mr. Geoffrey Sears
Emery Station Office II, LLC
c/o Wareham Development Corporation
1120 Nye Street, Suite 400
San Rafael, CA 94901
(Sent via electronic mail to:
gsears@warehamproperties.com)

Subject: Request for Data Gap Investigation Work Plan; SCP Case File No. RO0002535 and Geotracker Global ID SLT2O07076; Chevron #20-6265, Former Asphalt Batch Plant and Bulk Terminal, 1520 Powell Street, Emeryville, CA 94608

Dear Ms. Coulter and Mr. Sears:

Alameda County Environmental Health (ACEH) staff has reviewed the case file including the *Response to ACEH October 8, 2013 Correspondence*, dated September 10, 2014 for the above referenced site. The letter was submitted on Chevron's behalf by Arcadis, Inc. (Arcadis). Thank you for submitting the letter, and the documents itemized in Technical Comment 1 of the October 8, 2013 ACEH letter. The Arcadis letter provided additional data for the site in order to augment the *Conceptual Site Model and Closure Request*; (SCM & RFC), dated December 14, 2012, which was the subject of the previous directive letter from ACEH.

The SCM and RFC was submitted to support Chevron's position that the site meets the criteria presented in the San Francisco Regional Water Quality Control Board's *Assessment Tool for Closure of Low-Threat Chlorinated Solvent Sites*, dated July 31, 2009. Based on our review of the data, ACEH is not in agreement that the SCM supports case closure at this time. Therefore at this juncture, please address the following technical comments and send us the reports described below.

TECHNICAL COMMENTS

1. Integration of Site Vicinity Data Resources – As background, the subject site, referenced as the Emerystation No. 3 Redevelopment, appears to have been substantially completed in 2000. At present the southern portion of the site consists of four stories of parking, one below grade, and three above grade, with a residential condominium development above the parking. The northern portion of the site was also redeveloped in 1999 and 2000 into an Amtrak passenger terminal.

In order to understand the subject site, ACEH has reviewed reports prepared and submitted by others to the Department of Toxic Substances Control (DTSC) for the "South Bay Front Site B" case (Envirostor 70000131), located immediately south of the subject site (known as East Powell Street Area). This review in particular has included, but was not limited to, the following reports available on Envirostor:

- *Final Work Plan for Groundwater Pilot Study at East Powell*, prepared by Erler & Kalinowski, Inc, dated October 17, 2011
- *Final Remedial Action Plan Amendment and Remedial Design and Implementation Plan for Shallow Groundwater*, prepared by Erler & Kalinowski, Inc, dated June, 2013, including Appendix A, (*Summary of Additional Groundwater Investigations on Southern Portion of Site B and Along Horton Street*) and
- *Final Pilot Study Report for East Powell Groundwater*, prepared by Erler & Kalinowski, Inc, dated June 2013

- a. **Groundwater Bearing Zones** - These reports indicate that the SCM generated for the subject site by Arcadis is not sufficiently comprehensive of the site and vicinity, and focuses on only the upper portion of the upper shallow groundwater-bearing zone at the site and vicinity. The EKI reports listed above provide significant additional stratigraphic and analytical data for the site and vicinity. This data appears to provide ample evidence that the former Chevron site likely contains potentially significant residual Trichloroethene (TCE) contamination (or potentially sites further upgradient). In particular EKI has delineated channelized contaminant flow in groundwater (i.e. a paleochannel) and two groundwater bearing zones beneath East Powell Street (an upper and lower Course Grained Unit or CGU). According to EKI, the Chevron wells for the subject site monitor only the upper portion of the upper CGU. As constructed, Chevron wells do not appear capable of detecting Halogenated Volatile Organic Compound (HVOC) contamination in the lower CGU. Therefore, it appears appropriate to install wells on the former Chevron site for this purpose.
- b. **Source of PCE Contamination** – The referenced Arcadis response indicated that the search for historic waste manifests or inventory data for the office and laboratory where the onsite TCE use is reported to have occurred was unsuccessful. As noted previously, the subject site principally appears to be a TCE release site based on historic analytical data, whereas the Powell Street Release Area and Site B appears to include tetrachlorethene (PCE). ACEH's review of available analytical data for the former Chevron site and the East Powell Street Area, indicates that the highest PCE concentrations in groundwater are present in wells MWX-8, MW-19A, and MWX-2, all located along the railroad track right of way. Lower concentrations are also present in wells MW-17 and MW-18 along the south edge of Powell Street; however, PCE may have been present at similar lower concentrations in other Powell Street wells which could not be resolved prior to the injection of emulsified vegetable oil (EVO) due to high detection limits caused by high TCE concentrations in these lower CGU wells. Consequently, based on available data, at present the PCE contamination does not appear to originate from the former Chevron site. As you are likely aware, as additional data is gathered, this is subject to reevaluation and may change.
- c. **Source of TCE** - Prior to the injection of EVO beneath Powell Street for the City of Emeryville, concentrations of TCE up to 2,100 micrograms per liter ($\mu\text{g/l}$) TCE and 12,400 $\mu\text{g/l}$ were documented in the upper CGU and lower CGU, respectively. PCE was generally not detected, except along the southern margin of Powell Street, as discussed above. Since injection of the EVO, groundwater contaminant concentrations in wells in the Powell Street vicinity, including EPW01 to EPW04, and EPW06, document significant reductions of all HVOCs; however, have not been sampled since December 2012 or February 2013, depending on the well set.

Although groundwater concentrations beneath Powell Street have undergone significant reductions, the upgradient TCE source area has not been specifically located or targeted for remediation. The former Chevron site was identified by EKI to be a likely source of the TCE contamination, and TCE use is documented in the southwestern portion of the former Chevron parcel. Of significance, the lower CGU, which is documented to contain the highest TCE groundwater concentrations, was identified by EKI to be between 13 and 24 feet below surface grade (bgs). Notably, onsite soil excavation was predominantly to a depth of approximately 10 feet bgs, but locally extended to a depth of approximately 15 feet bgs, thus a residual soil source may be present beneath the existing structure at the redeveloped site.

2. **Incomplete List of Requested Documents** – As noted in the previous October 2013 directive letter, a February 18, 2000 directive letter from ACEH requested the submittal of a Risk Management Plan prior to site development, and a post-construction report. An itemized list of applicable content for both reports was provided. Neither report has been submitted. Disposal documentation for exported soil and groundwater extraction (construction dewatering) was to have been included in the later report. Only a copy of an EBMUD discharge permit has been provided.

Thank you for requesting these documents from the Wareham Development Corporation. Because these documents contain information of important relevance to the site, ACEH will continue to seek their submittal. Therefore, ACEH requests further efforts to obtain these documents.

3. Additional Missing Documents – During ACEH's further review of the site, additional reports have been noted to be lacking from the public record, and but are cited in the bibliography of the SCM / RFC report. ACEH requests the submittal of these as well as other missing reports or communications that should be a part of the public record. At present these include the following:

- **McKesson Environmental Services Report** – Documents the installation of wells MW-1 to MW-9 in 1985; only bore logs have been provided.
- **Harding Lawson Report** – August 1988 report documents the installation of wells MW-10 to MW-12; only the bore logs have been provided.
- **Cambria Environmental Technology Report** – October 1997 report; Site Information Summary for Case Closure.

4. Placement of Historic Wells and Bores – As noted in the previous October 2013 directive letter, figure 7 , and subsequent associated figures, of the referenced SCM & RFC contain a number of bores and wells locations that do not appear to be supported by available historic documents. As previously detailed, these include the depicted locations of wells MW-1, MW-2, MW-12, perhaps MW-13, soil bores SB-2 to SB-25, and includes soil bores SB-33 to SB-43 as detailed in the previous directive letter. Arcadis has noted that the well and bore locations were not surveyed. ACEH understands this, and like Arcadis, is limited to historic documents that depict the wells and bores at locations other than depicted by Arcadis. In order to limit confusion between the historic record and the updated SCM, ACEH requests the wells and bores be located as depicted on historic documents.

This concern is in particular an issue for the location of soil bore SB-42, which was documented to contain a concentration of 15 milligrams per kilogram (mg/kg) TCE at a depth of 4 feet bgs, as follows:

- Historic documents place the bore within 6 feet of the former office / lab building while Arcadis has placed the soil bore at an approximate distance of 50 feet from the former building, and thus offsite.
- ACEH has not found historic documents that indicate offsite soil bores were drilled.
- As noted previously, this particular concern affects the placement of soil bores SB-33 to SB-43.
- As currently depicted, excavation for the existing site building does not appear to have removed this apparently onsite residual shallow TCE contamination, and soil at depth may represent a potential significant residual TCE source that can impact the lower CGU at the EPW well series.
- As noted in the previous directive letter, additional residual contamination may also be present beneath other known shallow TCE source removal areas within the former "Office and Lab Area" of the site, and proximal to one of the elevator shafts and sumps.

5. Risk of Vapor Intrusion – The Arcadis document determined the location of three elevator pits associated with the existing site building, and notified ACEH that groundwater infiltration has not occurred in the past four years into the elevator sumps at these locations. Although it does not currently appear viable to obtain a groundwater infiltration sample, ACEH remains concerned that at least one elevator shaft can function as a preferential pathway for vapor intrusion, and that apparently unexcavated onsite shallow TCE soil contamination outside the building envelope, commented in Technical Comment 4 above, remains as a vapor intrusion risk. Please be aware that waterproofing membranes have not been documented to withstand HVOC contamination. Additionally, while high capacity fans are reported to be linked to a carbon monoxide detector in the basement, the linkage of the carbon monoxide detector with respect to the mitigation of potential chlorinated solvent vapor intrusion has not been established. This potential vapor risk should be incorporated into the SCM.

6. Data Gap Investigation Work Plan and Updated Conceptual Site Model – Please prepare a Data Gap Investigation Work Plan to address the technical comments listed above. Please support the scope of work in the Data Gap Investigation Work Plan with a focused SCM and Data Quality Objectives (DQOs) that relate the data collection to the specific data gap(s) it is intended to address.

In order to expedite review, ACEH requests a 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 data gap investigation scope of work to enable efficient data collection in the fewest mobilizations possible.

- 7. Groundwater Monitoring** – As noted above, groundwater monitoring has not occurred at the subject site since December 2012 or February 2013. It appears appropriate to resume groundwater monitoring at the site. It also appears appropriate to coordinate groundwater monitoring and sampling with vicinity groundwater monitoring and sampling events for other sites. This will provide a much more comprehensive understanding of site vicinity groundwater concentrations. Please incorporate all available site and vicinity wells into the program and in to analytical tables, including the EPW series of wells in Powell Street. Because the site has not been monitored or sampled in nearly two years, please submit semi-annual groundwater monitoring reports by the dates requested below. Please initiate the coordination of groundwater monitoring and sampling with adjacent sites in the interim. It is the understanding of ACEH that Site B wells will be monitored and sampled near the end of November 2014.

TECHNICAL REPORT REQUEST

Please submit reports to Alameda County Environmental Health (Attention: Mark Detterman), and 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 following specified file naming convention and schedule:

- **February 6, 2015** – Data Gap Investigation Plan and Focused Site Conceptual Model
File to be named: RO2535_WP_SCM_R_YYYY-MM-DD
- **February 27, 2015** – Second Semi-Annual 2014 Groundwater Monitoring and Sampling Report
File to be named: RO2535_GWM_R_YYYY-MM-DD
- **August 21, 2015** – First Semi-Annual 2015 Groundwater Monitoring and Sampling Report
File to be named: RO2535_GWM_R_YYYY-MM-DD
- **60 Days After Work Plan Approval** – Site Investigation Report
File to be named: RO2535_SWI_R_YYYY-MM-DD

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

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

Sincerely,

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

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

Attachment A *Site Conceptual Model Requisite Elements*

cc: Ms. Juanita Bacey, California Environmental Protection Agency, Department of Toxic Substances Control, 700 Heinz Avenue, Suite 200, Berkeley, CA 94710, (Sent via electronic mail to: JBacey@dtsc.ca.gov)

Justin Sobieraj, Arcadis US, Inc, 100 Smith Ranch Road, Suite 329, San Rafael, CA 94903;
(sent via electronic mail to: Justin.Sobieraj@arcadis-us.com)

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

Attachment 1

Responsible Party(ies) Legal Requirements / Obligations

REPORT REQUESTS

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of reports in electronic form. The electronic copy replaces paper copies and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program FTP site are provided on the attached "Electronic Report Upload Instructions." Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) GeoTracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the GeoTracker database over the Internet. Beginning July 1, 2005, these same reporting requirements were added to Spills, Leaks, Investigations, and Cleanup (SLIC) sites. Beginning July 1, 2005, electronic submittal of a complete copy of all reports for all sites is required in GeoTracker (in PDF format). Please visit the SWRCB website for more information on these requirements (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/).

PERJURY STATEMENT

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

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

UNDERGROUND STORAGE TANK CLEANUP FUND

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

AGENCY OVERSIGHT

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

Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC)	REVISION DATE: May 15, 2014
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010, July 25, 2010
SECTION: Miscellaneous Administrative Topics & Procedures	SUBJECT: Electronic Report Upload (ftp) Instructions

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

REQUIREMENTS

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

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

Submission Instructions

- 1) Obtain User Name and Password
 - a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
 - i) Send an e-mail to deh.loptoxic@acgov.org
 - b) In the subject line of your request, be sure to include "**ftp PASSWORD REQUEST**" and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for.**
- 2) Upload Files to the ftp Site
 - a) Using Internet Explorer (IE4+), go to <ftp://alcoftp1.acgov.org>
 - (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
 - b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
 - c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
 - d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
 - e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.
- 3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
 - a) Send email to deh.loptoxic@acgov.org notify us that you have placed a report on our ftp site.
 - b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
 - c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
 - d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

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-

ATTACHMENT A

Site Conceptual Model (continued)

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	<p>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).</p> <p>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).</p>	None	NA
	Site	<p>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).</p> <p>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.</p>	<p>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.</p> <p>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.</p>	<p>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.</p> <p>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.</p>
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.	<i>Groundwater:</i> 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.	<i>Soil vapor:</i> 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.	<i>Groundwater:</i> 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.	<i>Groundwater:</i> VOCs by EPA Method 8260, dissolved oxygen, oxidation/reduction potential, temperature, pH, and specific conductance. <i>Soil:</i> 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.	<i>Soil vapor:</i> 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