



June 8, 2017

Mr. Michael Murphy
M & M Property Company LLC
2740 Broadway
Oakland, CA 94612-3110
(Sent via E-mail to: mmurphy@oaklandvw.com)

Subject: Case File Review for Site Cleanup Program (SCP) Case RO0003201 and GeoTracker Global ID T10000008348, M & M Property Company LLC, 2800 Broadway, Oakland, CA 94612

Dear Mr. Murphy:

Alameda County Department of Environmental Health (ACDEH) staff has reviewed the SCP case file for the above-referenced site, including the document entitled *Data Gaps Investigation Work Plan, M & M Property LLC, 2800 Broadway, Oakland, California*, dated March 17, 2017, prepared by LANGAN on your behalf. The Data Gaps Investigation Work Plan presents investigation activities to address data gaps and to prepare a site conceptual model (SCM) for the site. Proposed activities include a video survey of the sink drain inside the building which leads to a discharge point at the city sewer located somewhere beneath 28th Street; advancement of membrane interface probes (MIPs) and soil borings to facilitate soil and grab groundwater sample collection; and monitoring well installation.

Based on our review of the above-mentioned report, ACDEH request that you prepare a comprehensive SCM prior to implementation of the proposed scope of the work for collection of soil vapor, soil and groundwater data. Please address the technical comments listed below and submit (via email) a draft SCM and any proposed revisions to the work plan based on SCM findings, by the date indicated below. Upon receipt of the draft SCM, ACDEH will schedule a meeting with you and your consultant to discuss the findings and the subsurface investigation. Subsequent to the review of the SCM, ACDEH will provide authorization to perform subsurface investigation in a separate directive letter.

TECHNICAL COMMENTS

1. Site Conceptual Model

The work plan presents a brief SCM in Section 3.0 and states that a comprehensive SCM will be prepared after additional data is collected. ACDEH requests that a comprehensive SCM be prepared to support the scope of work presented in the work plan, in order to facilitate collection of data to support redevelopment of the site in an efficient manner. Please present the SCM in tabular format, with supporting tables and figures. An accompanying table identifying data gaps and the proposed scope of work identified in the work plan must also be prepared to facilitate review and approval. An example is provided in Attachment A for your reference.

The SCM must include a review of available reports at and in the vicinity of the site, and include comprehensive figures and tables, including cross sections to provide a better understanding to support the proposed scope of work presented in the work plan. The SCM should also include the conceptual redevelopment plans for the site in order to facilitate data

collection to support site redevelopment. The utility and foundation surveys should also be incorporated into the SCM, as discussed in our comments below (identified by section corresponding to the work plan for your reference):

a) Site Geology and Hydrogeology (Section 3.1)

- Provide more detail on whether more than one water bearing zone is present beneath the site. Several environmental reports available for the adjacent Volkswagen site and vicinity indicate the presence of a shallow groundwater bearing zone, and a deeper semi-confined zone. It is important that the hydrogeology of the site is understood prior to undertaking a complex soil and groundwater investigation.

b) Site Investigations (Section 3.3)

- Indicate at what depths the 11 grab groundwater samples (B-2, B-4 through B-10, and B-12 through B-14) were collected from as part of Phase II investigations performed by ATC in 2015.
- At the 2470 Broadway Site (Broadway Volkswagen), note that groundwater concentrations for grab groundwater samples collected from MIP-1 through MIP-5 are above their respective Tier 1 Environmental Screening Levels (ESLs) and Maximum Contaminant Levels (MCLs) for trichloroethylene (TCE) and most of the total petroleum hydrocarbons (TPH). However, MIP-3 through MIP-5 are still indicated as having low concentrations of VOCs which is not accurate.

c) Groundwater Flow Direction (Section 4.2)

- Clarify whether the groundwater gradient and groundwater direction ranging from the west to northwest is based on monitoring wells screened in the shallow or deep zone, or a combination of screened intervals.

d) Utility Survey (Section 5.1)

- The Work Plan proposed a video survey of the sink drain inside the building which runs south to its discharge point and then to the city sewer located beneath 28th Street. In addition to the video survey, a comprehensive utility survey must be performed at the site to investigate historic infrastructure associated with the former automotive repair facility and current infrastructure for the identification of preferential pathways for contaminant migration prior to the proposed intrusive investigation, and to fine tune placement of the proposed MIP borings and associated soil borings. A survey of utilities located along Broadway and 28th Street, adjacent to the site should also be performed. Results of the utility surveys must be presented on figures in the SCM.

e) Foundation Survey (Section 5.2)

- The work plan proposes installation of soil vapor probes at a depth of 5 feet below ground surface along the north and east perimeter of the site to evaluate the potential risk for vapor intrusion to indoor air of building occupants in adjacent buildings. Probes must be installed to a depth of 5 feet below the bottom of foundations, therefore, a foundation survey must be performed to determine the appropriate depth of probe installation. The foundation survey should include the existing buildings east of the site (SMOG shop and senior facility), the planned construction of the multiuse facility

to the north of the site (slab on grade and subterranean garage), and the potential site redevelopment configurations provided to us on June 7, 2017. The depth of elevator shafts located in buildings should also be identified.

2. Proposed Scope of Work

Subsequent to updating the site conceptual model, the proposed scope of work must be revised as necessary to address additional data gaps identified (as necessary). The proposed scope of work must also address ACDEH's comments below:

a. Data Acquisition and Soil Borings (Section 5.2.2 MIP)

- Provide examples of what type of chemicals/compounds/lithologic information the detectors/probes typically respond to and how this information will be used for characterization.
- Provide justification as to why a depth of approximately 30 feet below ground surface (bgs) is proposed for the eight MIP borings. Also indicate where you are expecting groundwater in the shallow zone, and deep zone, if present.
- Add an additional MIP/soil boring location to the scope of work. This location will be required to provide coverage on the northwest corner of the site where no soil or groundwater data is available. A grab groundwater sample will be collected based on the findings of the MIP/soil boring. See attached Figure 2.
- Three soil samples are mentioned to be collected at each location. Please indicate why these samples are required, how the samples will be selected and how they will be collected (i.e. from MIP boring or separate boring).
- Grab groundwater samples are mentioned to be collected however, it is not clear whether more than one depth interval was considered. If more than one saturated zone is anticipated based on available historical groundwater information and MIP data, grab groundwater samples must be collected at the anticipated depths and care must be taken to avoid cross contamination of the different water bearing zones.
- Provide the sequence of activities involved in the advancement of the MIP borings, collection of soil samples and grab groundwater samples. Please also include the thought process involved in the evaluation of the MIP data, logistics, and method for collection of soil and depth discrete grab groundwater samples.
- The MIP data results for each boring must be discussed with ACDEH prior to the installation of the soil borings, collection of grab groundwater samples, and siting of the monitoring wells. The final number of soil borings, grab groundwater sample and monitoring wells will be discussed with ACDEH prior to finalization.

b. Monitoring Well Installation (Section 5.2.3)

- Note that the locations of the proposed monitoring wells are subject to change and its actual location will be based on the findings of the MIP and soil borings.

- Indicate the estimated depth of proposed wells, details to their construction and whether wells of different zones are anticipated. For clarity, it is appropriate to include a proposed well construction details table in the work plan.

c. Soil Vapor Sampling (Section 5.2.4)

- Add two additional soil vapor sampling locations to the scope of work. These locations are required to provide further evaluation of vapor intrusion risk to the adjacent property to the north. This will change the total of proposed soil vapor sampling locations from four to six locations. See attached Figure 2.
- Soil vapor probes must be installed at depths of approximately 5 feet below the bottom of the anticipated onsite foundation at the site. If it is not certain what the future elevation of the onsite foundation will be, then, a pair of soil vapor probes are recommended to be installed at depths of approximately 5 feet below the bottom of the existing onsite foundation and 5 feet below the bottom of the anticipated onsite foundation at the site. For locations in proximity to the north and east property boundary, the depths of the soil vapor probes must be installed at depths of approximately 5 feet below the bottom of the foundations located on the properties to the north and east.
- Install semi-permanent soil vapor probes instead of temporary probes to facilitate potential future sampling (if deemed necessary based on the results of this proposed soil vapor sampling)
- All methods and procedures associated with the proposed soil vapor sampling should be performed in accordance with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), Los Angeles Regional Water Quality Control Board (LARWQCB) and San Francisco Regional Water Quality Control Board (SFRWQCB) Advisory Active Soil Gas Investigations, dated July 2015, as mentioned in your Work Plan.
- Include the analyses for fixed gases (oxygen, carbon dioxide and methane) by American Society for Testing and Materials (ASTM) Method D-1946 for at least half of the soil vapor samples.
- Note that the locations of the proposed monitoring wells are subject to change and its actual location will be based on the findings of the MIP and soil borings.
- Indicate the estimated depth of the proposed wells, details to their construction and whether wells screened in different zones are anticipated. For clarity, it is appropriate to include a proposed well construction details table in the work plan.

3. Sampling and Analyses Matrix Table

- Please include a sampling and analysis matrix table for the proposed MIP, soil and grab groundwater locations. Specifically, include the proposed location and associated

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sample IDs, proposed number of samples and depths, proposed laboratory analysis and method, and rationale for sampling.

SUBMITTAL ACKNOWLEDGEMENT STATEMENT

Please note that ACDEH has updated its Attachment 1 with regards to report submittals to ACDEH. ACDEH will now be requiring a Submittal Acknowledgement Statement, replacing the Perjury Statement, as a cover letter signed by the Responsible Party (RP). The language for the Submittal Acknowledgement Statement is as follows:

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

Note this change to your submittals to ACDEH.

TECHNICAL REPORT REQUEST

Please upload technical reports to the ACDEH ftp site (Attention: Dilan Roe), and to the State Water Resources Control Board's GeoTracker website according to the following schedule and file-naming convention:

- July 17, 2017 – Meeting to discuss Draft SCM (submitted via email to ACDEH by July 10, 2017)
- July 31, 2017 – Draft Site Conceptual Model and Revised Work Plan
File to be named: RO3201_WP_R_yyyy-mm-dd
- September 29, 2017 – Data Gap Investigation Report and Updated SCM
File to be named: RO3201_SWI_R_yyyy-mm-dd

If you have any questions, please call Dilan Roe (510) 567-6767 or send me an electronic mail message at dilan.roe@acgov.org. Online case files are available for review at the following website: <http://www.acgov.org/aceh/index.htm>.

Sincerely,

Kit Soo, California PG 8957
Senior Hazardous Materials Specialist

Attachment: Figure 2 – Site Plan with Previous and Proposed Sampling Locations
Attachment 1 - Responsible Party(ies) Legal Requirements/Obligations
ACDEH Electronic Report Upload (ftp) Instructions
Attachment A – Site Conceptual Model Requisite Elements

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cc: Peter Cusack, LANGAN, 1 Almaden Boulevard, Suite 590, San Jose, CA 95113 (*Sent via E-mail to: pcusack@langan.com*)

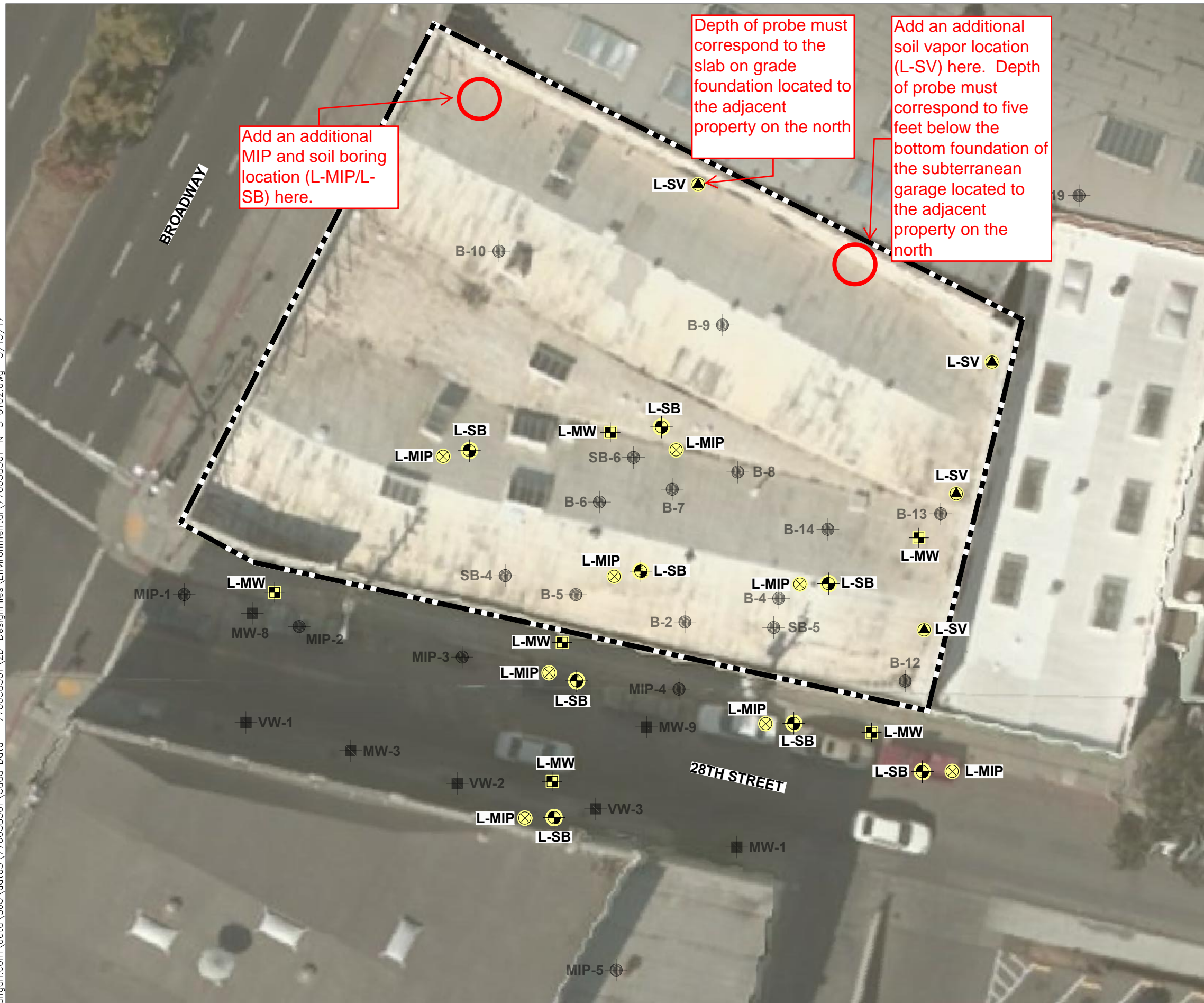
Mukta Patil, LANGAN, 1 Almaden Boulevard, Suite 590, San Jose, CA 95113 (*Sent via E-mail to: mpatil@langan.com*)

Dilan Roe, ACDEH (*Sent via E-mail to: dilan.roe@acgov.org*)

Paresh Khatri, ACDEH (*Sent via E-mail to: paresh.khatri@acgov.org*)

GeoTracker, eFile

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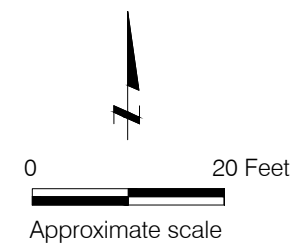
Add an additional MIP and soil boring location (L-MIP/L-SB) here.

Depth of probe must correspond to the slab on grade foundation located to the adjacent property on the north

Add an additional soil vapor location (L-SV) here. Depth of probe must correspond to five feet below the bottom foundation of the subterranean garage located to the adjacent property on the north

EXPLANATION

- L-SB** Approximate location of proposed soil boring by Langan
- L-MIP** Approximate location of proposed MIP boring by Langan
- L-SV** Approximate location of proposed soil-vapor probe by Langan
- L-MW** Approximate location of proposed groundwater monitoring well by Langan
- B-1** Approximate location of boring by ATC Cardno, September and November 2015
- SB-4** Approximate location of boring by AEI, April 2015
- MIP-1** Approximate location of boring by Arcadis, April 2013
- MW-9** Approximate location of monitoring well by Arcadis (Abandoned in April 2015)
- VW-1** Approximate location of vapor extraction monitoring well by Arcadis (Abandoned in April 2015)
- Site boundary



2800 BROADWAY
Oakland, California

SITE PLAN WITH PREVIOUS AND PROPOSED SAMPLING LOCATIONS

Date 03/07/17 | Project No. 770638301 | Figure 2

LANGAN

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

Alameda County Department of Environmental Health's (ACDEH) Environmental Cleanup Oversight Programs, Local Oversight Program (LOP) and Site Cleanup Program (SCP) 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 File Transfer Protocol (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 SCP 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 (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/) for more information on these requirements.

ACKNOWLEDGEMENT STATEMENT

All work plans, technical reports, or technical documents submitted to ACDEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I have read and acknowledge the content, recommendations and/or conclusions contained in the attached document or report submitted on my behalf to ACDEH's FTP server and the SWRCB's GeoTracker website." 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 6731, 6735, and 7835) 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 licensed 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 case meet this requirement. Additional information is available on the Board of Professional Engineers, Land Surveyors, and Geologists website at: <http://www.bpelsg.ca.gov/laws/index.shtml>.

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: December 1, 2016
	ISSUE DATE: July 5, 2005
	PREVIOUS REVISIONS: October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010, July 25, 2010; May 15, 2014, November 29, 2016
SECTION: Miscellaneous Administrative Topics & Procedures	SUBJECT: Electronic Report Upload (ftp) Instructions


The Alameda County Environmental Cleanup Oversight Programs (LOP 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) Open File Explorer using the Windows  key + E keyboard shortcut.
 - i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
 - b) On the address bar, type in ftp://alcoftp1.acgov.org.
 - c) Enter your User Name and Password. (Note: Both are Case Sensitive)
 - d) Click Log On.
 - e) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
 - f) 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