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November 5, 2012

Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor (95814)
P.O. Box 100
Sacramento, CA 95812-0100
(*Sent via E-mail to: commentletters@waterboards.ca.gov*)

Subject: **Comment Letter - BP 11133 Case Closure Summary**, Revised Notice of Opportunity for Public Comment; Underground Storage Tank Cleanup Fund Case Closure Recommendation; Claim Number 5502; Fuel Leak Case No. RO0000403; Global ID # T0600100210; BP #11133, 2220 98th Avenue, Oakland, CA 94603

Dear Ms. Townsend:

Alameda County Environmental Health (ACEH) staff has received the *Notice of Opportunity for Public Comment* dated August 31, 2012, and the *Revised Notice of Opportunity for Public Comment,* dated September 10, 2012, signed by Lisa Babcock, Fund Manager of the Underground Storage Tank Cleanup Fund (USTCF or Fund). The purpose of these notifications is to inform interested parties of 1) the USTCF's intent to recommend closure of the subject site to the California State Water Resources Control Board (SWRCB) at a future Board meeting, and 2) the sixty day public comment period on the Fund's *UST Case Closure Summary*, dated August 31, 2012, signed by Lisa Babcock. According to the *Revised Notice of Opportunity for Public Comment*, written comments to the SWRCB on the Fund's *UST Case Closure Summary* must be received by 12:00 noon on November 5, 2012. This letter herein transmits ACEH's comments.

Requirements for Investigation and Cleanup of Unauthorized Releases from USTs

ACEH reviewed the USTCF's *UST Case Closure Summary*, including *Attachment 1: Compliance with State Water Board Policies and State Law* (i.e., the SWRCB's Low-Threat UST Case Closure Policy Paper Check List), and *Attachment 2: Summary of Basic Site Information (Conceptual Site Model)* in conjunction with the case files for the above-referenced site. A complete record of the case files (i.e., regulatory directives and correspondence, reports, data submitted in electronic deliverable format, etc.) can be obtained through review of both the SWRCB's Geotracker database, and the ACEH website at http://www.acgov.org/aceh/index.htm.

ACEH additionally reviewed the requirements for investigation and cleanup of unauthorized releases from USTs contained in the following resolutions, policies, codes, and regulations:

- SWRCB Draft Resolution 2012-xx, *Additional Actions to Improve the UST Cleanup Program*, to be considered for adoption by the SWRCB at their November 6th, 2012 meeting;
- SWRCB Draft *Plan for Implementation of Low-Threat UST Case Closure Policy and Additional Program Improvements*, to be considered for adoption by the SWRCB at their November 6th, 2012 meeting;
- SWRCB Resolution 2012-0016, *Approve a Substitute Environmental Document and Adopt a Proposed Water Quality Control Policy for Low-Threat Underground Storage Tank Case Closure*, adopted on May 1, 2012; and effective August 17, 2012;

- California Code of Regulations (CCR) Title 23, Article 5 and Article 11, UST Regulations, as amended and effective July 1, 2011;
- California Health & Safety Code (HS&C) Sections 25280-15299.8, Underground Storage of Hazardous Substances, as amended on January 1, 2011;
- SWRCB Resolution 2009-0081, *Directing Additional Actions to Improve Administration of the UST Cleanup Fund and UST Cleanup Program*, adopted November 17, 2009;
- SWRCB Resolution 2009-0042, *Actions to Improve Administration of the UST Cleanup Fund and UST Cleanup Program*, adopted May 19, 2009;
- SWRCB Resolution 1992-0049, *Policies and Procedures for the Cleanup and Abatement of Discharges under California Water Code Section 13304*, as amended on April 21, 1994 and October 2, 1996.

Application of Case Review Tools

ACEH's case closure evaluation was also guided by the application of the principles and strategies presented in the *Leaking Underground Fuel Tank Guidance Manual* (CA LUFT Manual), dated September 2012, developed by the SWRCB "... [t]o provide guidance for implementing the requirements established by the Case Closure Policy" (Low Threat Closure Policy or LTCP) and associated reference documents including but not limited to:

- *Technical Justification for Vapor Intrusion Media-Specific Criteria*, SWRCB dated March 21, 2012;
- *Technical Justification for Groundwater Media-Specific Criteria*, SWRCB dated April 24, 2012;
- *Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways*, SWRCB dated March 15, 2012;
- *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, Final* DTSC, dated October, 2011.

ACEH also utilized other case review tools developed by the SWRCB to aid in determining compliance of the subject fuel leak site with LTCP criteria, including both paper and electronic policy checklists. While ACEH has found the CA LUFT Manual to be a valuable tool, we are concerned that the over simplicity of the SWRCB checklists can result in erroneous conclusions regarding recommendations for case closure and a lack of transparency regarding the decision making process. Therefore, to attempt to address this issue, ACEH staff have enhanced the LTCP checklist by integrating the requisite level of questioning to enable consistent application of the LTCP, ensure that decisions are founded in appropriate technical basis, identify impediments to closure, improve the efficiency of the UST cleanup program, and document the decision making process as transparently as possible for all interested parties. This enhanced checklist, entitled the *UST Low-Threat Case Closure Policy Compliance and Identification of Impediments to Case Closure Checklist*, was utilized by ACEH staff during our evaluation of the USTCF's *UST Case Closure Summary* and the appropriateness of the Fund's recommendation for case closure of the subject site, and is included as an attachment to this response letter. ACEH is committed to implementing the LTCP and continuing to develop this tool to facilitate case review and identification of impediments to case closure, and thereby make the cleanup and closure process more efficient.

Summary of ACEH's Review of the USTCF's UST Case Closure Summary

The results of ACEH's case closure review, indicates the USTCF's *UST Case Closure Summary* and closure recommendation under the LTCP to be lacking an appropriate technical basis. ACEH does not agree with the USTCF's technical analysis presented in their *UST Case Closure Summary*, nor do we agree with the analysis and conclusions presented in the *Case Closure Summary Closure Report*, dated November 11, 2011, prepared by ARCADIS, Inc. on behalf of Atlantic Richfield Company (ARCO).

Our review indicates that the Conceptual Site Model (CSM) is deficient and that the site is uncharacterized in a number of elements. Our concerns include but are not limited to the omission and misrepresentation of data; inadequacy of the vapor intrusion risk assessment and use of soil gas data

from samples collected using outdated sampling protocols to assess the risk to residential homes, apartment buildings, and a school in close proximity to the site; lack of analysis of the quality and validity of data obtained by the groundwater monitoring well network including potential sample biases (dilution), and the inability to monitor the status of free product at the site due to submerged well conditions; lack of evaluation of rising groundwater elevation trends and potential impact on contaminant migration (free product, groundwater, and soil gas) in subsurface utility trenches present beneath and adjacent to the site; lack of evaluation of historic groundwater flow direction variability and its influence on off-site plume migration and plume stability; and resultant validity of conclusions. Details of our analysis are provided in the narrative section below and in the accompanying attachments including the *UST Low-Threat Case Closure Policy Compliance and Identification of Impediments to Case Closure Checklist*.

ACEH met with representatives of ARCO and their consultants to present our analysis of site data and discuss our concerns about the technical analysis and recommendations for case closure of the subject site presented in the *Case Closure Summary Report* prepared by ARCADIS, as well as similar concerns on other ARCO UST sites under the regulatory oversight of ACEH. During our meetings, ARCO assured ACEH that they were concerned about the errors and quality issues identified in the subject site's case document files, and would take action to identify and rectify problems on ARCO UST sites under ACEH regulatory oversight, including retracting case closure requests previously submitted to ACEH.

Subsequent to our meetings with ARCO, ACEH presented our analysis and concerns to the USTCF, and informed them of our discussions with ARCO. However, despite ACEH's and ARCO's concerns about the data and technical analysis presented in ARCADIS's *Case Closure Summary Report*, the USTCF proceeded with the issuance of a *Case Closure Summary* and recommendation for case closure that inappropriately oversimplifies ACEH's technical evaluation.

ARCO has withdrawn five of the six requests for closures for UST cases previously submitted to ACEH. The unfortunate exception to this is that for the subject site, due to the USTCF's decision to recommend the case for closure under the LTCP.

ACEH's Review of the USTCF's Compliance with Public Notification Requirements

While the USTCF has made the *UST Case Closure Summary* available for public comment on the SWRCB's website, it appears to have failed to notify in a timely basis all interested parties, *including all owners and occupant of property potentially impacted by the petroleum release*, as required by the LTCP, CCR Chapter 16, and Chapter 6.7 of the H&SC. According to the LTCP Notification Requirements "municipal and county water districts, water replenishment districts, special act districts with groundwater management authority, agencies with authority to issue building permits for land affected by the petroleum release, owners and occupants of the property impacted by the petroleum release, and owners and occupants of all parcels adjacent to the impacted property shall be notified of the proposed case closure and provided a 60 day period to comment. The regulatory agency shall consider any comments when determining if the case should be closed or if site specific conditions warrant otherwise."

Further, it appears the USTCF has not conducted public notification requirements in accordance with the SWRCB and Regional Water Quality Control Boards April 2005 guidance document entitled *Final Draft Public Participation at Cleanup Sites*. According to this document "the level of public participation effort at a particular site should be based on the site's threat (to human health, water quality, and the environment), the degree of public concern or interest in site cleanup, and any environmental justice factors associated with the site. There may be more public concern or interest about a site when: contaminants have migrated or are likely to migrate off-site…".

The USTCF's *Revised Notice of Opportunity for Public Comment*, dated September 10, 2012, states that "a copy of the *Case Closure Summary* has been provided to the owner/operator, environmental consultant of record, the local agency that has been overseeing corrective action, the local water purveyor, and the water district specified by H&SC section 25299.39.2 subdivision (a)(1)." Concerned by this limited list of parties, ACEH contacted the USTCF and requested the list of recipients that the *Revised Notice of Opportunity for Public Comment* was sent to. Our review of the list of recipients (received by ACEH on October 22, 2012) indicates a lack of notification of many of the owners and residents of surrounding properties potentially affected by off-site migration of free product, contaminated groundwater, and/or soil gas, including residents of parcels owned by the Oakland Housing Authority. The

USTCF's list of recipients and an appropriate public notification area map and a list of owners and tenants identified by ACEH's search of the County of Alameda Assessor's Office Property Value System who should receive notification of the USTCF's recommendation for case closure is provided as attachments to this response letter.

Case Closure Analysis Using the LTCP General and Media Specific Criteria

ACEH's case closure analysis for the subject site is provided in the narrative section below and in the accompanying attachments including the *UST Low-Threat Case Closure Policy and Identification of Impediments to Case Closure Checklist.*

General Criteria a: The unauthorized release is located within the service area of a public water system

The policy is limited to areas with available public water systems to reduce the likelihood that new wells in developing areas will be inadvertently impacted by residual petroleum in groundwater.

Although the site is located within the service area of East Bay Municipal Utility District, a well search conducted in October 2004 located 11 domestic wells, seven irrigation wells, and one industrial well within a one-mile radius of the site. No wells were identified within a 2,000 foot radius of the site, however the complexity of the site hydrogeology (see General Criteria e below) and the possible influence of pumping of wells with respect to apparent changes in groundwater flow direction have not been addressed. A current Department of Water well search should be conducted, and potentially a backyard survey of wells in the area to rule out the possibility of impacts to or influence of nearby wells.

General Criteria b: The unauthorized release consists only of petroleum

The unauthorized release consists of petroleum hydrocarbons originating from gasoline underground storage tanks (USTs).

General Criteria c: The unauthorized ("primary") release from the UST system has been stopped

In 1987, three single-walled steel gasoline USTs (one 10,000-gallon, one 8,000-gallon, and one 5,000-gallon) were removed from the southwestern portion of the site and replaced with three double-walled fiberglass unleaded gasoline USTs (two 10,000-gallons and one 12,000-gallon). In 1998, the UST system including tanks, pipes, and dispensers were permanently removed from the site.

General Criteria d: Free product has been removed to the maximum extent practicable

Free product has been historically detected in wells MW-1 and RW-1 at maximum thicknesses exceeding 3 feet in MW-1 and 1.6 feet in RW-1 (see ***Tables 1*** and ***Table 2***). Although free product has been removed by several techniques including passive floating product removal systems and bailing in MW-1 and RW-1, and operation of a soil vapor extraction (SVE) system and groundwater extraction and treatment (GWET) system in RW-1, it is not clear from the data presented in the case files whether free product remains at the site or whether it has been removed to the maximum extent practicable.

ACEH is concerned about misrepresentation of data by ARCO, ARCADIS, and Broadbent and Associates, lack of evaluation of data contained in historical reports, and the validity of conclusions presented about free product in the November 30, 2011 *Case Closure Summary Report* prepared by ARCADIS on behalf of ARCO, and the October 4, 2011 Second Five Year Review Report and the August 31, 2012 *UST Case Closure Summary* prepared by the USTCF staff.

Our concerns include the following:

- **Submerged Wells.** All of the site wells with the exception of vapor extraction wells VEW-6 and VEW-7 have been submerged during 6 percent to 80 percent of monitoring

General Criteria d: Free product has been removed to the maximum extent practicable (continued)

events conducted at the site, thereby making data about free product in the wells suspect (see ***Table 3*** for well construction details and ***Table 4*** for submerged condition statistics). If the water table rises above the top of the well screen, it is not possible to use the well for detection of light non-aqueous phase liquids (LNAPLs). Therefore, reliance on data collected from of a submerged well may provide a false indication of the absence of LNAPL. Although ARCADIS presents hydrographs for select wells (AW-1, AW-2, AW-3, AW-4, AW-5, AW-6, AW-8, MW-1, MW-3) in the *Case Closure Summary Report* which show the submerged condition of the wells, no evaluation or discussion regarding the submerged wells and the effect on data quality has been conducted or even mentioned. Additionally, hydrographs for groundwater monitoring wells MW-2 and AW-9, remediation and pilot test wells RW-1, IW-1, IW-2, IW-3, and OW-1, and soil vapor extraction wells VW-1 through VW-3, and VEW-4 through VEW-9 were not presented nor were the submerged conditions in these wells evaluated.

- **Preferential Pathways.** The depth to water in vapor extraction wells VW-2 and VW-3 has ranged between 0.25 to 6.06 feet below ground surface (bgs) during all monitoring events in which water levels were measured (i.e., from 2008 to 2011). These wells are adjacent to a sanitary sewer line that runs beneath the site at approximately the same depths and are within the estimated limits of free product and capillary fringe residual hydrocarbon footprint prepared by RESNA and presented in the Remedial Action Plan for the site in 1993. Although this sanitary sewer line was identified in a utility survey conducted in 2005 by URS, there is no evaluation of its potential to act as a preferential pathway in the case files.

- **Data Misrepresentation/Omission.** Free product thicknesses are falsely reported as 0.00 feet or omitted (i.e., reported as not analyzed, applicable, measured, or available) in groundwater monitoring reports prepared by Broadbent and Associates on behalf of ARCADIS (see ***Table 1*** and ***Table 2***). Free product data was also omitted from summary tables contained in reports prepared by other consultants (i.e., free product observed in well RW-1 at a thickness of 1.6 feet subsequent to the shutdown of the SVE and GWET systems in 1998 was reported in the 2nd quarter 1999 groundwater monitoring report, however reference to the measurement was omitted from subsequent monitoring reports).

- **Product Removal Data.** Free product was removed from wells MW-1 and RW-1 from 1993 until 2001 (see ***Table 1*** and ***Table 2***). Product removal data often conflicts with reported free product thickness data measured in wells during monitoring events (e.g., free product thickness reported as zero in summary tables are made without reference to product removal occurring immediately prior to well monitoring).

- **Free Product Measurement.** ARCADIS states that 0.70 gallons of free product were removed from well MW-1 between 1993 and 1996, and measureable free product has not been observed at this well since 1998; and approximately 161 gallons of free product were removed from well RW-1 between 1993 and 2001, and measurable free product has not been observed at this well since 2001. A review of the data presented in ***Table 1*** and ***Table 2***, indicates that "sheen" and/or "heavy sheen" has been observed repeatedly in monitoring wells MW-1 and RW-1 since 1998 and 2001, respectively, with the most recent observations occurring in March 2010. During this event the wells were under submerged conditions and thus an observation of sheen may be indicative of the bottom of the column of free product in the wells. Additionally, although sheen was not observed in the subsequent monitoring events conducted in 2010 and 2011 in wells MW-1 and RW-1, a review of the data presented in ***Table 1*** and ***Table 2*** indicates MW-1 was under submerged conditions in 1 out of the 4 events, and well RW-1 was submerged during 3

General Criteria d: Free product has been removed to the maximum extent practicable (continued)

out of the 5 events. As discussed above, submerged wells may provide a false indication of the absence of LNAPL in a well. This data has not been evaluated.

- **Corrective Action Effectiveness.** No evaluation has been presented regarding the success or infeasibility of corrective actions implemented at the site, including presentation of valid long-term monitoring data (as discussed above and in General Criteria e below) to demonstrate that concentrations have not rebounded following the cessation of corrective action. For example, although the GWET and SVE systems were reportedly successful at removing approximately 13,495 pounds of total petroleum hydrocarbons as gasoline (TPH-g) vapors and 345 pounds of dissolved TPH-g from groundwater, no assessment was found in the case files regarding the subsequent observation of 1.6 feet of free product in recovery well RW-1 two months after the system was shutdown. Additionally, due to the observation of sheen in wells MW-1 and RW-1 in March 2010 and the submerged conditions of the monitoring wells (including the SVE wells) as discussed above, it is not clear whether the corrective actions implemented at the site have removed free product to the maximum extent possible or resulted in abatement of free product migration.

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed

In the *Case Closure Summary Report*, ARCADIS contends that case closure is warranted for the site based on the following:

- The site has been adequately characterized through regular groundwater monitoring and various soil and/or soil vapor sampling events.
- Petroleum hydrocarbon sources and residual hydrocarbons in site soil have been removed as evidenced by the most recent site analytical data, and the absence of high concentrations of constituents of concern (COCs) observed in soil and groundwater suggests that residual hydrocarbons in soil have been removed via previous remedial activities and through natural attenuation. COCs in site soil were either non-detect or detected at very low concentrations below their respective environmental screening levels (ESLs), with the exception of methyl tertiary butyl ether (MTBE) which was detected slightly above the applicable ESL.
- COCs in site groundwater have exhibited decreasing trends and this trend is expected to continue. Review of historical groundwater data indicates that concentrations of these analytes have declined and this trend is expected to continue.
- Active remediation was conducted at the site between 1994 and 1998.
- The plume is not migrating offsite as evidence by the non-detect or low detected COC concentrations in downgradient monitoring wells.
- No sensitive receptors are likely to be impacted, including surface water bodies, municipal wells, and drinking water sources.
- The site presents no significant risk to human health and the environment.

  Groundwater collected during the third quarter 2011 sampling event generally indicate that COCs in site wells are either non-detect or detected at concentrations below their respective ESLs. Exceptions included low levels of TPH-g in MW-1, AW-1, and RW-1; benzene in AW-1 and AW-4; MTBE in AW-1 and AW-6; and ethylbenzene and tert butyl alcohol (TBA) in AW-1.

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed (continued)

Based on our review of the case files, these conclusions are not supported by a conceptual site model (CSM). Although components of a CSM have been presented in pieces in historical reports, significant data gaps exist and include an accurate geologic and hydrogeologic assessment, identified stratigraphic and manmade migration pathways, delineation of the lateral and vertical extent of contamination in all affected media, an adequate assessment of vapor intrusion pathways, an evaluation of the effectiveness of corrective actions implemented at the site, and an evaluation of whether any site contamination is present in locations that have the potential to pose nuisance conditions during common or reasonably expected activities.

A summary of identified data gaps is presented below and in subsequent General and Media Specific Criteria sections.

- **Plume Delineation and Stability**. The horizontal and vertical extent of the plume has not been adequately defined. ARCADIS presents plots of decreasing concentrations in select wells to demonstrate plume stability. However, while data presented in these plots generally show decreasing trends in concentrations of COCs in the wells, ACEH is concerned that the data has not been adequately been validated and therefore the analysis is not sufficient. Plume stability must be demonstrated using a technical analysis that considers the following factors that can affect data quality.

- **Well Placement within the Plume.** ACEH has concerns regarding the effectiveness of the remediation and monitoring well network at the site. A total of 26 wells have been installed in the vicinity of the site, including 12 groundwater monitoring wells (MW-1 through MW-3, and AW-1 through AW-9), one groundwater extraction well (RW-1), nine vapor extraction wells (VW-1 through VM-3, and VEW-4 through VEW-9), three pilot study injection wells (IW-1 through IW-3), and one pilot study observation well (OW-1). Details of the well locations and construction are provided in Table 3. Although a similar table is provided in Section IB in the USTCF's Second Five Year Review Summary Report, the table contains errors and omits information pertinent to the evaluation of effectiveness of the remediation wells, and the monitoring well network to provide reliable measurements of chemical parameters and hydraulic head at each monitoring point (i.e., well type, installation date, screen interval and length, and type of geologic formations the wells are screened across). No such table is presented in *Case Closure Summary Report* prepared by ARCADIS.

- **Submerged Groundwater Monitoring Wells.** Historical depth to water measurements in the sites 13 groundwater monitoring wells indicate that the wells have been under submerged conditions during 6 percent to 80 percent of monitoring events conducted (see ***Table 4***). Six of the wells, including three on-site wells (MW-2, AW-5, and AW-6), and three off-site wells (AW-2, AW-7, and AW-8), have been submerged during more than 50 percent of monitoring events. As previously discussed, conclusions regarding the absence of free product based on observation collected from submerged wells may be misleading.

- **Groundwater Flow Directions.** In the 2005 Soil and Water investigation Report, URS presents groundwater flow direction data between July 1992 and July 2005. Based on this data URS reports that groundwater flow directions in the western and eastern sections of the site have predominantly been easterly and westerly, respectively, converging to a generally northwest-southeast trending potentiometric depression or trough across the center of the site, with groundwater flow direction along the axis of the trough generally to the east and southeast, which represents the overall predominant groundwater flow direction at the site. In the *Case Closure Summary Report*, ARCADIS

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed (continued)

states that the groundwater flow direction has been highly variable, but is predominantly from the east to the west. ARCADIS provides a summary of historical groundwater flow directions and gradients from which they base their conclusions, however, as seen in the data presented in ***Table 5***, ARCADIS presents groundwater flow directions and gradient data for 2006 through 2011, and omits data from 1989 to 2006 that is pertinent to understanding contaminant transport at the site. The missing data, included by ACEH in ***Table 5***, shows that groundwater at the site has been characterized as westerly, easterly, northeasterly, southerly, southeasterly, southwesterly, radially inwards towards the site, and radially outward from the site. The historic groundwater elevation contour maps demonstrate the widely variable interpretation of hydraulic head from water level measurements and the resultant conclusions about site hydrogeology and groundwater flow directions. Upon examination of the groundwater contour maps, it can be seen that the variability in reported groundwater flow direction has been due to use of different wells to generate the contour lines. Reported reasons for not using data from all monitoring wells include "anomalous" water levels, use of off-site wells only due to the complex hydrogeology beneath the site, free product in wells, well inaccessibility due to parked cars, and the inability to locate off-site well AW-7. Based on ACEH's review, characterization of data as "anomalous" has been used to exclude data that has been consistent over time, without adequate justification for doing so. ACEH is concerned that the reported "anomalous" data has never been investigated and that the site hydrogeology and potential anthropogenic influences in hydraulic conditions (e.g., leaking sewer/storm drain/water lines, groundwater pumping from nearby water supply and remediation wells) has not been adequately characterized.

- **Groundwater Levels.** Depth to groundwater in the on-site monitoring wells has historically varied by up to 14 feet across the site during a single monitoring event. Groundwater elevations at the site have exhibited an increasing trend since monitoring began in the late 1980's. Water level measurements in select site wells have been consistently and inappropriately labeled as "anomalous" data. Rather than investigating hypothesis for the rising trends over time and large deltas seen in water level measurements across the site during the same monitoring event, the site has been largely characterized as having "complex hydrogeology". ACEH's review of the case files reveals two conflicting hypothesis:

  - The first hypothesis surmises that there are two separated, shallow water-bearing zones underlying the site, based on the relatively high water levels observed in MW-1 through MW-3 as compared to the lower levels observed in the other wells (a delta of ranging from 7 to 14 feet across a short distance).

  - The second hypothesis, presented in the Remedial Action Plan prepared in 1993, surmises that shallow groundwater underlying the site to the depth explored occurs in one hydraulically connected water-table aquifer, and that the apparently "anomalous" water levels observed in wells MW-1 through MW-3 are the result of external circumstances unrelated to natural hydrogeologic conditions (e.g., leakage from a water line or sewer along Bancroft Avenue, or perching of groundwater in the tank cavity).

Based on ACEH's review of water level measurements, site maps showing the locations of underground utilities, and boring and monitoring well logs, each of these hypothesis are plausible, have not been validated, and warrant further investigation.

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed (continued)

- **Sample Biases and Cross Contamination.** ACEH has concerns related to potential sample biases due to the construction of the wells and subsurface conditions at the well locations. These concerns include:

  - **Long-Screen Monitoring Wells.** All of the wells at the site can be classified as conventional single interval long-screened monitoring wells screened across multiple geologic formations (see ***Table 3***). Water samples collected from types of monitoring wells are actually blended or composite samples of groundwater within the vertical interval of the aquifer screened by the wells. If the dissolved contaminants are stratified within the aquifer, compositing in long screen wells during sampling results in underestimation of the maximum concentrations present in the aquifer. By using results obtained from composite samples, the risk to the downgradient receptors may be underestimated, including the risk posed to vapor receptors. Additionally, borehole flow and transport of contaminants in long-screen wells may contaminate parts of the aquifer that would not otherwise become contaminated in the absence of a long-screen well.

  - **Local Vertical Flow Systems.** As discussed previously, the reasons for the observed variations in hydraulic head in monitoring wells across the site has not been adequately evaluated and may be due to vertical gradients. Installation of a monitoring well may set up a local vertical flow system because of the natural vertical gradient at the well location. The well can act as a "short circuit" along this gradient, with the resulting flow in the wellbore often of significant magnitude to compromise the integrity of any samples collected from the well. Therefore samples could yield biased and misleading data concerning solute concentration, source location, and plume geometry.

  - **Groundwater Recharge.** A review of historic groundwater elevation contour maps indicates areas of localized mounding. Groundwater recharge at a site could create a layer of clean water atop a deeper dissolved contaminant plume. The layer of clean water may constitute an effective diffusion barrier that impedes the upward migration of volatile contaminants from the dissolved plume.

- **Remediation System Design.** The GWET and SVE system operated intermittently from 1994 until 1998. The system was initially connected to eight vapor extraction wells (VEW-1 through VEW-8) and one groundwater extraction well (RW-1). Although no boring logs or details of the monitoring well construction for the SVE wells were found in the case files, the total depths and screen intervals of the wells are inferred to be 20 feet below ground surface (bgs), and 5 to 20 feet bgs, respectively, based on the work plan for well installation. Off-site well VEW-9 was installed and connected to the SVE and GWET system in April 1996. This well is screened from 6 to 20 feet bgs. Water level measurements taken in 2008 through 2011 indicate that many of these well are submerged. Although the SVE and GWET systems were reportedly successful at removing approximately 13,495 pounds of TPH-g vapors and 345 pounds of dissolved TPH-g from groundwater, no assessment was found in the case files regarding the impacts of the submerged wells on the effectiveness of the SVE system or the subsequent observation of 1.6 feet of free product in recovery well RW-1 two months after the system was shutdown. Effective remediation systems can be designed only if the concentration and distribution of the contaminants are accurately defined.

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed (continued)

- **Preferential Pathway Study.** ACEH is concerned given the uncertainty in the hydrogeology at the site and rising groundwater elevation trends, that the subsurface utilities have not been adequately investigated as discussed below:

  - During a preferential pathway study conducted in July 2005, URS measured measured depth to water and collected groundwater samples, from three soil vapor extraction wells (VEW-4, VEW-5, and VEW-8) located in the vicinity of the sanitary sewer line (running beneath the north and northwestern section of the site at approximately 6.5 to 7 feet bgs) to assess the potential for the sewer line to act as a preferential pathway for contaminant migration. At the time of measurement in July 2005, the depth to water in wells VEW-4, VEW-5, and VEW-8 was 14.04 feet bgs, greater than 20 feet bgs, and 16.10 feet bgs, respectively. Analytical results from groundwater samples collected from wells with water (VEW-4 and VEW-8) reported concentrations of total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and xylenes (BTEX) in well VEW-4 at concentrations of 680 micrograms per liter (µg/L), 41 ug/L, 24 µg/L, 20 µg/L, and 67 µg/L, respectively. No analytes were detected above laboratory reporting limits in well VEW-8. Based on this data it was concluded that the sewer line in the north and northwestern section of the site did not act as a preferential pathway for contaminant migration. However, given the rising groundwater elevations at the site, ACEH is concerned that this potential pathway has not been adequately evaluated.

  - Although other underground utilities were identified beneath and adjacent to the site, no investigation activities were conducted in their vicinity to evaluate the potential for the utility trenches to serves as preferential pathways for contaminant migration. As previously discussed, our review of the case files indicates the depth to water in vapor extraction wells VW-2 and VW-3 has ranged between 0.25 to 6.06 feet bgs during all monitoring events in which water levels were measured (i.e., from 2008 to 2011). These wells are adjacent to a sanitary sewer line that runs beneath the southeastern portion of the site near the UST pit at approximately the same depths as the other sewer line bisecting the site and are within the estimated limits of free product and capillary fringe residual hydrocarbons prepared by RESNA and presented in the Remedial Action Plan for the site. Although this sanitary sewer line was identified in a utility survey conducted in 2005, there is no evaluation of it acting as a preferential pathway in the case files.

- **Analytical Detection Limits**. A review of site data indicates that analytical reporting limits have been higher than the corresponding environmental screening levels (ESLs) presented in the revised May 2008 Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater guidelines (RWQCB, 2008) for some of the COCs and thus reports of non-detects are incorrect. For example, the reporting limits for 1,2-DCA consistently exceed the ESLs and therefore claims that this COC is below its corresponding ESL are not validated.

- **Changes in Areal Extent of the Plume**. Historic isoconcentration contour maps for MTBE, benzene, and TPH-g groundwater plumes indicate the plumes have migrated offsite beyond the perimeter of the site in all directions with the maximum estimated

General Criteria e: A conceptual site model that assesses the nature, extent, and mobility of the release has been developed (continued)

plume length exceeding 300 feet in the southwest direction. Plume maps should be provided to show the current spatial distribution of contaminants in the subsurface. The maps should display the contaminant distribution for soil gas, soil matrix, and groundwater for all the COCs. All data used to construct the contour maps should beclearly annotated on the maps. Ideally the base map for plume presentation should be provided on an aerial photograph.

- **Geologic Cross Sections.** Geologic cross sections illustrating the subsurface lithology, water levels, and distribution of contaminants in soil based on available boring logs, were provided in the 2005 Feasibility Study Report prepared by URS. However, since that time new data has been generated and should be presented on new cross-sections. This data should show the relationship between utility trenches and groundwater elevations at the site.
- **Well Survey.** A recent well survey that uses all available well from both the Department of Water Resources and local agencies (Zone 7 Water Agency or Alameda County Public Works as appropriate) should be conducted. Water supply wells located within 2,000 feet of the site should to be presented on a site figure with a table identifying each well along with the well construction details.

General Criteria f: Secondary source has been removed to the extent practicable

The secondary source is the petroleum-impacted soil, free product, or groundwater that acts as a long-term source releasing contamination to the surrounding area. Unless site conditions prevent secondary source removal (e.g., physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible), petroleum-release sites are required to undergo secondary source removal to the extent practicable.

According to the LTCP, to the extent practicable means implementing a cost-effective corrective action which removes or destroys-in-place the most readily recoverable fraction of source-area mass within one year or less. Following removal or destruction of the secondary source, additional removal or active remedial actions shall not be required by regulatory agencies unless (1) necessary to abate a demonstrated threat to human health or (2) the groundwater plume does not meet the definition of low threat as described in this policy.

Although corrective action at the site has included soil excavation, free product removal, and operation of an SVE and GWET systems, it is not clear from our review of the case files whether the secondary source(s) at the site have been removed to the maximum extent practicable. As described in General Criteria e above and in the Media Specific Criteria sections below, ACEH has concerns about the quality of soil, soil gas, and groundwater data and lack of a site conceptual model, and therefore the effectiveness of the corrective actions at removing secondary sources of petroleum hydrocarbons. Our concerns regarding the adequacy of secondary source removal include the following:

- No evaluation has been presented of the areas of success or infeasibility of corrective actions implemented at the site, including presentation of valid long-term monitoring data after the subsurface has reached equilibrium to demonstrate that concentrations have not rebounded following the cessation of corrective action. For example, although the GWET and SVE systems were reportedly successful at removing approximately 13,495 pounds of TPH-g vapors and 345 pounds of dissolved TPH-g from groundwater, no assessment was found in the case files regarding the subsequent observation of 1.6 feet of free product in recovery well RW-1 two months after the system was shutdown.
- The SVE and GWET systems were connected to nine vapor extraction wells and recovery well RW-1, Although the drilling and installation activities associated with five of the SVE wells (VEW-4 through VEW-8) are not in the case files, no assessment has been made regarding the effectiveness of the wells. Even though groundwater data has

General Criteria f: Secondary source has been removed to the extent practicable (continued)

been collected from all of the site's eight soil vapor extraction wells on a quarterly basis from January 2008 until July 2009, and then on a semi-annual basis from 2010 through 2011, no analysis has been presented to assess the effects of submerged conditions identified in two of the on-site soil vapor extraction wells (VW-2, VW-3) during 100% of the monitoring events, and one off-site soil vapor extraction well (VEW-9) during 30% of the monitoring events. Depth to water in on-site well VW-2 has ranged from 0.25 feet bgs to 1.99 feet bgs during all monitoring events in which depth to water measurements were reported.

- No subsurface confirmation sampling has been conducted to demonstrate the effectiveness of secondary source removal and verify that cleanup activities have reduced subsurface volatile chemical concentrations to levels protective of human health, including receptors subject to vapor intrusion. Site soil was last sampled in 2005.
- In 2009, groundwater contaminant concentrations exhibited an increasing trend in monitoring well AW-1. At that time, ACEH did not concur with USTCF staff that case closure should be considered in light of elevated concentrations of TPH-g and benzene and observations of a sheen in wells MW-1 & AW-1 during the 1st quarter 2010 monitoring event, indicating that the site may pose a potential risk to human health and the environment, an elementary school located directly down-gradient of the site, and adjacent residences. Subsequently, ACEH directed ARCO to implement the approved corrective action to abate elevated concentrations of petroleum hydrocarbons and sheen and proceed with a three month pilot study for the injection of nutrients to enhance biodegradation of TPH-g in soil and groundwater.
- In September 2010, ARCADIS installed three injection wells (IW-1 through IW-3) and one observation well (OW-1) at the site. Following the well installation activities, downgradient injection well IW-3 was sampled to further delineate the plume in the vicinity of the pilot study area. Based on the reported low levels of COCs (benzene at 5.8 µg/L, ethylbenzene at 8.3 µg/L, toluene at 2.9 µg/L, xylenes at 8.5 µg/L, MTBE at 2.5 µg/L, and TPHg at 1,000 µg/L) in groundwater samples collected from the well, ARCADIS requested that implementation of the pilot test be postponed until after additional sampling was conducted to evaluate groundwater concentrations in the wells in the vicinity injection wells. Results of groundwater samples collected from AW-1, AW-2, and MW-1 indicated that MTBE, benzene, and TAME were present in AW-1 at low concentrations of 4.4 µg/L, 0.92 µg/L, and 0.80 µg/L, respectively; AW-2 contained MTBE at a concentration of 0.52 ug/L; and MW-1 contained TPHg at a concentration of 230 µg/L. Based on the low COC levels in these wells, ARCADIS recommended the postponement of the pilot injection test until third quarter 2011 sampling results could be reviewed. ARCADIS did not present data nor include a discussion regarding the potential low bias of the analytical results due to submerged conditions of the newly installed wells.
- The pilot study was never implemented as claimed by the USTCF staff in the Second Five Year Review Summary Report.

General Criteria g: Soil and groundwater have been tested for MTBE and results reported in accordance with Health and Safety Code section 25296.15

The primary source of release at the site has been determined to be from the gasoline underground storage tank system including piping and dispensers. MTBE was included in the list of analytes in 1993.

General Criteria h: Nuisance as defined by Water Code section 13050 does not exist at the site

Water Code section 13050 defines "nuisance" as anything which meets all of the following requirements:

General Criteria h: Nuisance as defined by Water Code section 13050 does not exist at the site (continued)

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes. For the purpose of the Policy, waste means a petroleum release.

Based on ACEH's review of the case files, and the fact that the site is located in a commercial and residential community, sufficient data has not been presented to support whether a nuisance condition currently exists or potentially could exist in the future. A nuisance evaluation should been incorporated into the CSM and should describe whether any site contamination is present in locations that have the potential to pose nuisance conditions during common or reasonably expected activities. The types of data relevant to determining whether nuisance exists at the site include:

- Descriptions of the type and vertical and lateral extent of shallow soil or lateral extent of surface soil contamination
- Depths to contamination
- Analytical results for surface soil, shallow soil, and groundwater samples
- Discussion of any odors or visual evidence of contamination
- Preferential pathway and utility conduit surveys
- Review of potential points for exposure (such as groundwater seeps into basements)
- Expected future use of site
- Description of surface water runoff from the property to storm drains or other sites

Please refer to the CSM discussion presented in General Criteria e above for details.

Unique site attributes or site-specific conditions that demonstrably increase the risk associated with residual petroleum constituents

The land use in the vicinity of the site is mixed commercial and residential with residential homes and an apartment building located immediately adjacent to the northeastern and southeastern property lines, residential and commercial property located across 98th Avenue to the northwest, and a school located across Bancroft Ave approximately 0.15 miles southwest of the site.

Media-Specific Criteria 1. Groundwater

In order to meet the low-threat groundwater-specific criteria, if groundwater with an existing or potential designated beneficial use is affected by an unauthorized release, the contaminant plume that exceeds water quality objectives must be:

- Stable or decreasing in areal extent (i.e., the contaminant mass that has expanded to its maximum extent: the distance from the release where attenuation exceeds migration)
- Meet all of the additional characteristics of one of the five classes of sites (groundwater-specific criteria) listed in the LTCP.

In the Second Five Year Review Summary Report, USTCF staff recommends closure of the site on the contention that based on the concentrations of other water quality parameters such as alkalinity,

Media-Specific Criteria 1. Groundwater (continued)

hardness, total dissolved solids, metals, nutrients, methane and carbon dioxide, the groundwater has no current or future beneficial use. USTCF further concludes that considering the poor water quality, this site should be considered for closure providing the land use remain commercial. This statement is not consistent with state policy for water quality control as prescribed in Resolution 92-49 (*Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*) nor "the fundamental tenet of the LTCP that if the closure criteria described in this policy are satisfied at a petroleum unauthorized release site, attaining background water quality is not feasible, establishing an alternate level of water quality not to exceed that prescribed in the applicable Basin Plan is appropriate, and that water quality objectives will be attained through natural attenuation within a reasonable time, prior to the expected need for use of any affected groundwater.

Although, ARCADIS contends in the *Case Closure Summary Report* that the plume is not migrating offsite as evidenced by the non-detect or low detected COC concentrations in downgradient monitoring wells, ACEH review of the case files indicates that sufficient data has not been presented to base a determination that threats to existing and anticipated beneficial uses of groundwater have been mitigated or are de minimis. Additional site characterization activities are required to adequately define the groundwater-specific criteria (i.e., contaminant plume length, status of free product removal, distance to the nearest groundwater or surface water receptor from the plume boundary, and dissolved concentrations of MTBE and benzene).

Please refer to the CSM discussion presented in General Criteria e above for details.

Media-Specific Criteria 2. Petroleum Vapor Intrusion to Indoor Air

The low-threat vapor-intrusion criteria in the Policy apply to release sites and impacted or potentially impacted adjacent parcels when:

(1) existing buildings are occupied or may be reasonably expected to be occupied in the future, or

(2) buildings for human occupancy are reasonably expected to be constructed in the near future.

According to the LTCP, petroleum release sites must be considered low-threat for the vapor-intrusion-to-indoor-air pathway if they satisfy the following media-specific criteria:

- Site-specific conditions satisfy all the assumptions, characteristics, and screening criteria of scenarios 1 through 3 as applicable, or all of the characteristics and screening criteria of scenario 4 of the Policy; or
- A site-specific risk assessment for the vapor intrusion pathway is conducted and demonstrates that human health is protected to the satisfaction of the regulatory agency; or
- As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, the regulatory agency determines that that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health.

The land use in the vicinity of the site is mixed commercial and residential with residential homes and an apartment building located immediately adjacent to the northeastern and southeastern property lines, residential and commercial property located across 98th Avenue to the northwest, and a school located across Bancroft Ave approximately 0.15 miles southwest of the site. Therefore, the vapor-intrusion criteria in the Policy must be satisfied to consider the site for low-threat closure under the LTCP.

Both ARCADIS and the USTCF staff use the results of an October 2001 soil gas investigation and Risk Based Corrective Action (RBCA) Tier 1 through 3 evaluations conducted in May 2002, to support their recommendation for site closure. Both the 2001 investigation and the RBCA evaluations were conducted

Media-Specific Criteria 2. Petroleum Vapor Intrusion to Indoor Air (continued)

to address the potential for inhalation potential risks from residual subsurface hydrocarbon concentration particularly to off-site residents. ARCADIS and the USTCF staff state that the results of the RBCA study indicate that the theoretical upper-bound incremental lifetime cancer hazard indices associated with levels of TPH, BTEX and MTBE in on-site soils and groundwater are below acceptable risks. Accordingly, it was concluded that no further action is necessary for the protection of human health at the site. However, ACEH has the following concerns regarding the adequacy of 2001 investigation and the 2002 RBCA evaluation:

- The methods used to evaluate the fate and transport of contaminants in the 2002 RBCA evaluation are outdated. The 2002 RBCA evaluations were guided by applicable standards at the time including the American Society for Testing and Materials (ASTM) Standard Guide for Risk-Based Corrective Acton Applied at Petroleum Release Sites (e1739-95e1; ASTM 1999), the Oakland Risk-Based Corrective Acton: Technical Background Document (2000), the Oakland Urban Land Redevelopment Program: Guidance Document (2000), the California Regional Water Quality Control Board – San Francisco Bay Region Application of Risk Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater (2001), and the U.S. Environmental Protection Agency's Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (EPA, 1989). Guidance for collecting soil gas samples and evaluating the risks from vapor intrusion has changed significantly since the 2001 investigation and 2002 RBCA evaluation were conducted.
- Technical justification for the input parameters used in the evaluations is not adequately supported by a CSM, including:
  - **Depth to Groundwater.** The depth to groundwater was assumed to range from 10 to 22 feet bgs; however groundwater elevations at the site have exhibited a rising trend since the evaluations were conducted.
  - **Maximum Soil Concentrations.** Samples collected during the second UST removal in 1998 (SW1, SW2, SW3, SW4) were considered representative of the current soil conditions in the pit area. However, a review of the data indicates that the 1998 samples were collected at 12 feet bgs whereas samples collected from soil beneath the tanks during the 1987 tank removal (A1, A2, B1, and C1) were collected at a depth of 13.5 feet bgs. A concentration of 33 mg/kg (detected at well RW-1 at 25 feet bgs) was used in the RBCA evaluations as the maximum TPH-g concentration in soil; however our review indicates TPH-g has been detected in six samples (collected at depths ranging from 11 to 25 feet bgs) above 33 mg/kg, up to a maximum concentration of 420 mg/kg at boring A1 at a depth of 13.5 feet bgs. The RBCA also states that TPHg was detected in one deep off-site soil location (AW-4 at 21 feet bgs); however historic soil data indicates that TPHg was also detected in off-site soil location AW-3 at depths of 21 and 26 feet bgs.
  - **Groundwater Flow Direction.** A westward flow direction was used in the evaluations; however groundwater flow direction has been variable at the site and has not yet been adequately characterized.
  - **Free Product.** The evaluation was based on the assumption that no free product remained at the site. Site characterization activities have not adequately justified this assumption.
  - **Soil Vapor Concentrations.** The RBCA evaluations used soil vapor data collected during a 2001 site investigation, to evaluate exposure to the residential properties adjacent to the site. The soil vapor samples used in the

Media-Specific Criteria 2. Petroleum Vapor Intrusion to Indoor Air (continued)

evaluation were collected from six borings located adjacent to a sanitary sewer line and thus may have been biased low due to vapor migration in the trench materials.

- The site-specific risk assessment for the vapor intrusion pathway used to satisfy the criteria under the LTCP, should be done in accordance with current industry standards as contained in the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (October 2011). The DTSC Guidance recommends the following:
  - Use of multiple lines of evidence (i.e., soil gas, soil matrix and groundwater data) to reasonably estimate the level of risk posed by vapor intrusion;
  - Use of maximum contaminant concentration (i.e., data collected above the source);
  - Use of reasonable site-specific input parameters in the California version of USEPA's Vapor Intrusion Model by Johnson and Ettinger, created by the DTSC to include California-specific chemical toxicity factors;
  - Preferential pathways should not exist at the site;
  - Knowledge of adjacent building construction (slab-on-grade, crawl spaces, etc.);
  - Calculation of cumulative health effects;
  - Use of data representing seasonable variability before making a final risk determination as short term measurements rarely represent long-term conditions.

In the absence of an adequate site-specific risk assessment that demonstrates that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health, site-specific conditions must satisfy all the assumptions, characteristics, and screening criteria of Scenarios 1 through 3 as applicable, or Scenario 4 of the LTCP.

- Scenarios 1 and 2 pertain to sites with unweathered LNAPL in groundwater. Unweathered LNAPL is defined by the LTCP to mean petroleum product that has not been subjected to significant volatilization or solubilization, and therefore has not lost a significant portion of its volatile or soluble constituents (e.g., comparable to recently dispensed fuel).
- Scenario 3 provides low threat criteria based on the dissolved phase concentration of benzene in groundwater and characteristics of the bioattenuation zone including oxygen content and separation distance between building foundations and groundwater.
- Scenario 4 provides low threat criteria based on soil gas sampling data for benzene, ethylbenzene, and naphthalene.

Our review of the case files indicates that additional site characterization activities are required in order to define the characteristics of the bioattenuation zone and concentrations of COCs in groundwater (Scenario 3), or soil vapor concentration in soil (Scenario 4), and adequately assess the potential for human health risk due to vapor-intrusion into residential and commercial buildings in the vicinity of the site. Scenarios 1 and 2 do not apply to the site as the primary release occurred prior to 1998. ACEH is concerned about the data representativeness, data quality, spatial distribution relative to current or potential receptors and sources, temporal variability, and resultant conclusions.

Media-Specific Criteria 2. Petroleum Vapor Intrusion to Indoor Air (continued)

Examples of our concerns include:

- **Misrepresentation of Soil Vapor Data.** In the *Case Closure Summary Report*, ARCADIS states that soil vapor slightly exceeded the ESL for TPHg (6.9 parts per million by volume [ppmv]) in two of 18 samples collected in 2001. One sample (B-3-V1) was collected at 5 feet bgs and contained 7.0 ppmv, the second sample (B-1-V2) was collected at 10 feet bgs and contained 9.0 ppmv. ARCADIS fails to identify a third soil vapor sample that exceeded the ESL for TPHg in the sample collected from B-2-V2 at 11 feet bgs. They also fail to identify one sample collected at 15 feet bgs from B-6-V3 that exceeded the ESL for benzene (0.089 ppmv) at a detected concentration of 0.340 ppmv.
- **Lack of Seasonal and Temporal Soil Gas Data.** Our review of the case files indicates that soil gas data is limited to the analytical data collected during the October 2001 investigation only, and therefore does not adequately determine long-term stability of contaminant concentrations.
- **Spatial Distribution of Soil Vapor Data.** Soil vapor samples were collected from six borings (B-1 through B-6) drilled in the eastern and southeastern property boundaries adjacent to a 2-story apartment building and a single story residence in October 2001. Although the locations of the borings were in the vicinity of a sanitary sewer line, no assessment was made on the potential dilution of samples in those locations due to migration of soil gas in the trench materials. Additionally, no borings were advanced along the northern property boundary adjacent to two additional single story residences.
- **Bioattenuation Zone Determination.** Results from preferential pathway and utility conduit surveys need to be presented and evaluated to determine whether a continuous bioattenuation zone is present.
- **Soil Gas Sampling Methodology.** ARCADIS concludes that based on the depth and the years since the samples were collected it is unlikely a soil vapor threat to human health or the environment remains at the site. ACEH is concerned about the lack of discussion of the sampling methodology used to collect the soil gas samples and the validity of the data with respect to current protocols for conducting soil gas investigations in accordance with the DTSC's April 2012 Advisory – Active Soil Gas Investigations.
- **Assessment of all COCs.** There is a lack of an assessment of analytical data for all COCs in soil, including total petroleum hydrocarbons and MTBE, in order to determine whether unique conditions not considered in the Policy may exist at the site.

Please refer to the CSM discussion presented in General Criteria e above for details on the adequacy of site characterization activities with respect to evaluating vapor-intrusion potential.

Media-Specific Criteria 3. Direct Contact and Outdoor Air Exposure.

The LTCP describes conditions where direct contact with contaminated soil or inhalation of contaminants volatized to outdoor air poses a low threat to human health. According to the Policy, release sites where human exposure may occur shall be considered for closure if they meet any of the following media-specific criteria for direct contact and outdoor air exposure:

a. Maximum concentrations of petroleum constituents (i.e., benzene, ethylbenzene, naphthalene, and poly-aromatic hydrocarbons [PAHs]) in soil are less than or equal to those listed in Table 1 of the LTCP for the specified depth bgs;

b. Maximum concentrations of petroleum constituents in soil are less than levels that a site specific risk assessment demonstrates will have no significant risk of adversely affecting human health; <u>or</u>

Media-Specific Criteria 3. Direct Contact and Outdoor Air Exposure (continued)

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, the regulatory agency determines that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health.

As previously described, the land use in the vicinity of the site is mixed commercial and residential with residential homes and an apartment building located immediately adjacent to the northeastern and southeastern property lines, residential and commercial property located across 98th Avenue to the northwest, and a school located across Bancroft Ave approximately 0.15 miles southwest of the site. Therefore, human exposure through direct contact and outdoor air exposure must be evaluated.

ARCADIS and the USTCF staff use the results of the RBCA Tier 1 through 3 evaluations conducted in May 2002, to support their recommendation for site closure. As discussed previously in the Media-Specific Criteria 2 section for Petroleum Vapor Intrusion to Indoor Air, ACEH has concerns regarding the adequacy of the 2002 RBCA evaluations and technical justification of input parameters. Therefore, in lieu of an adequate site-specific risk assessment that demonstrates that maximum concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health, maximum concentrations of petroleum constituents in soil must meet the soil criteria for the prescribed depth ranges of 0 to 5 feet and 5 to 10 feet bgs listed in Table 1 of the LTCP.

Our review of the case files indicates that additional site characterization activities are required in order to adequately assess the potential for direct contact and outdoor air exposure to residential, commercial, and utility workers and determine that soil concentrations are protective of ingestion of soil, dermal contact with soil, inhalation of volatile soil emissions, and inhalation of particulate emissions. The assessment should present analytical data for all COCs in soil, including total petroleum hydrocarbons and MTBE, in order to assess whether unique conditions not considered in the Policy may exist at the site.

Please refer to the CSM discussion presented in General Criteria e above for details on the adequacy of site characterization activities.

Path to Closure Plan

ACEH believes that the data gaps identified above and in the attached *Low-Threat UST Case Closure Policy Compliance and Identification of Impediments to Closure Checklist* can be largely addressed in a single comprehensive effort which may then either allow the site to close under the LTCP, or identify conditions that require further investigation in order to support closure under the LTCP.

In accordance with the SWRCB's *Draft Plan for Implementation of Low-Threat UST Case Closure Policy and Additional Program Improvements*, ACEH has been working with ARCO and it's consultants on other UST cases under regulatory oversight by ACEH, to develop strategies for moving the sites towards closure under the LTCP in an efficient and appropriate manner. These strategies include preparation of baseline schedules with proposed milestones and timelines for resolution of impediments to closure including preparation of updated CSM's to identify data gaps warranting further investigation, and or support the validity of site data, technical analysis, and recommendations for case closure under the LTCP.

ACEH recommends that a similar Path to Closure Plan be developed and implemented for the subject site to address the data gaps discussed in our analysis above and in the attached *Low-Threat UST Case Closure Policy Compliance and Identification of Impediments to Closure Tool*.

Conclusions

The evaluations presented in the USTCF's *UST Case Closure Summary*, dated August 31, 2012, and ARCADIS' *Case Closure Summary Closure Report*, dated November 11, 2011, fail to demonstrate that this site meets the criteria for the Low-Threat Closure Policy. The technical analysis conducted by the USTCF staff and ARCADIS conflicts with "state-of-the art" practices recommended by multiple technical resources, including the SWRCB's CA LUFT Manual, dated September 2012, which has been revised in part to provide guidance for analysis of candidate sites for closure under the LTCP. While ACEH recognizes that the LTCP allows for exceptions, the subject site has not been characterized to the extent required by the policy, as presented in detail in this response letter and in conversations with the USTCF staff. The recommended closure is not supported by a valid CSM or technical analysis and therefore does not provide the requisite assurances that owners and occupants of property potentially impacted by the petroleum release are protected from contaminants that have migrated off-site as required by the LTCP.

Consequently, ACEH recommends that SWRCB not concur with closure at this time, the CSM be updated, that data gaps be addressed as identified above and in the attached ACEH *Low-Threat UST Case Closure Policy Compliance Checklist and Identification of Impediments to Case Closure Checklist,* a data gap work plan be prepared and submitted to ACEH for review and approval, and the work be conducted in order to move the site towards closure under the LTCP in an appropriate manner.

Thank you for providing ACEH with the opportunity to comment on the subject site. Should you have any questions regarding the responses above, please contact me at (510) 567-6767 or send me an electronic mail message at dilan.roe@acgov.org.

Sincerely,

Digitally signed by Donna L. Drogos
DN: cn=Donna L. Drogos, o=Alameda County Environmental Health, ou, email=donna.drogos@acgov.org, c=US
Date: 2012.11.05 11:31:51 -08'00'

Donna L. Drogos, P.E.
Division Chief

Dilan Roe, P.E.
Hazardous Materials Specialist

Attachments:
Attachment 1: Table 1 – Free Product Data for Well MW-1
Attachment 2: Table 2 – Free Product Data for Well RW-1
Attachment 3: Table 3 – Site Remediation and Monitoring Well Network
Attachment 4: Table 4 – Submerged/Dry Well Statistics
Attachment 5: Table 5 – Historic Groundwater Flow Direction Data
Attachment 6: SWRCB Public Notification Map and List of Owners and Tenants
Attachment7: SCEH Identification of Appropriate Public Notification Map and List of Owners and Tenants
Attachment 8: Technical Reference Table
Attachment 9: UST Low Threat UST Case Closure Policy Compliance and Identification of Impediments to Case Closure Checklist

cc: Mr. Terry Grayson, ConocoPhillips, 76 Broadway Street, Sacramento, CA 95818

Suncor Holdings Corp., Attention: Keith Marks, 11601 Wilshire Blvd, #700, Los Angeles, CA 90025

Chris Winsor, BP Products North America, Inc., 6 Centerpointe Drive, La Palma, CA 90623

Janet Wager, Atlantic Richfield Company, *(sent via electronic mail to: Janet.Wager@bp.com)*

Hollis Phillips, ARCADIS, Inc., 100 Montgomery Street, Suite 300, San Francisco, California 94104 *(sent via electronic mail to: Hollis.Phillips@arcadis-us.com)*

Lisa Babcock, State Water Resources Control Board, Division of Financial Assistance, 1001 I Street, Sacramento, CA 95814; *(sent via E-mail to: LBabcock@waterboards.ca.gov)*

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Mary Rose Cassa, San Francisco Regional Water Quality Control Board, 1515 Clay Street, Suite 1400, Oakland, CA 94612 *(sent via electronic email to : mcassa@waterboards.ca.gov)*

Donna Drogos, *(sent via electronic mail to donna.drogos@acgov.org)*
Dilan Roe *(sent via electronic mail to dilan.roe@acgov.org)*
Electronic File, GeoTracker

Attachment 1

Table 1 – Free Product Data for Well MW-1

Table 1 - Free Product Data for Well MW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged[1] (Y/N)	Product Removed (gallons)
12/21/1988	>3	15.86		
1/17/1988	2.5	15.46		
2/15/1989	1.08	15.17		
1/24/1990	0.2	18.07		
7/5/1990	0.22	13.31		
4/5/1991	0.22	13.31		
6/1/1991	GLOBULES	14.76		
4/1/1992	~~0.00~~ 0.01	11.25		
7/6/1992	~~0.00~~ 0.02	13.61		
10/7/1992	~~0.00~~ 0.09	15.15		
1/14/1993	~~0.00~~ 0.01	10.73		
4/22/1993	~~0.00~~ 0.16	11.64		
7/15/1993	~~0.00~~ 1.11	13.50		
10/20/1993			?	0.10
10/21/1993	~~0.00~~ 1.00	15.21		
11/10/1993			?	0.10
1/27/1994	~~0.00~~ 0.81	17.48		
4/21/1994	0.00	10.94		
9/9/1994			?	SHEEN
9/19/1994	~~0.00~~ SHEEN	13.80		
10/26/1994			?	SHEEN
11/16/1994			?	SHEEN
12/21/1994	~~0.00~~ 0.02	12.60		0.25
1/30/1995	NM	NM	?	
2/8/1995			?	0.00
4/10/1995	0.00	10.62		0.25
6/29/1994	0.00	18.72		SHEEN
9/18/1995	0.00	12.92		SHEEN
12/7/1995	0.00	13.82		SHEEN
3/28/1996	~~0.00~~ 0.01	10.03		<0.001
6/20/1996	~~0.00~~ 0.02	11.29		SHEEN
10/11/1996	~~0.00~~ 0.01	14.86		<0.001
1/2/1997	~~0.00~~ 0.01	11.03		<0.01
4/14/1997	~~0.00~~ 0.01	12.25		<0.01
4/15/1997	NM	NM	?	
7/2/1997	0.00	14.11		<0.01
9/30/1997	0.00	14.40		
1/21/1998	~~0.00~~ 0.01	7.99	Y	<0.01
4/9/1998	0.00	7.89	Y	
4/10/1998	NM	NM	?	
6/19/1998	0.00	10.31		<0.01
11/30/1998	0.00	11.16		0.00
1/21/1999	0.00	10.76		SHEEN
4/30/1999	0.00	10.78		SHEEN
7/9/1999	0.00	12.62		SHEEN
11/3/1999	0.00	14.00		0.00
1/12/2000	0.00	15.25		0.00

Table 1 - Free Product Data for Well MW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged[1] (Y/N)	Product Removed (gallons)
4/13/2000	0.00	15.57		0.00
5/24/2000	0.00	11.75		0.00
6/1/2000			?	0.00
6/8/2000	0.00	11.68		0.00
6/15/2000	0.00	11.85		0.00
6/21/2000	0.00	11.41		
7/26/2000	0.00	16.19		
10/24/2000	0.00	13.89		
1/19/2001	0.00	12.90		
7/24/2001	0.00	13.55		
1/18/2002	0.00	10.91		
8/1/2002	0.00	12.97		
1/16/2003	0.00	10.45		
7/7/2003	~~0.00~~ SHEEN	12.40		
2/5/2004	0.00	10.26		
7/1/2004	~~0.00~~ SHEEN	13.20		
3/16/2005	0.00	9.62	Y	
7/22/2005	~~0.00~~ SHEEN	11.23		
1/25/2006	~~0.00~~ SHEEN	8.75	Y	
7/6/2006	0.00	10.36		
1/8/2007	0.00	11.55		
7/10/2007	~~0.00~~ SHEEN	13.01		
1/15/2008	0.00	10.96		
7/15/2008	0.00	13.82		
10/21/2008	0.00	14.70		
1/6/2009	0.00	13.67		
4/21/2009	0.00	12.31		
7/21/2009	0.00	13.85		
3/18/2010	~~0.00~~ SHEEN	9.29	Y	
7/29/2010	0.00	12.63		
2/22/2011	0.00	15.72		
5/9/2011	0.00	8.03	Y	
7/14/2011	0.00	10.96		

Notes:

[1] MW-1 Screen Interval - 10 to 29 feet below ground surface

Highligted data not presented/evalauted by ARCADIS and Broadbent

Strikethrough data misreported by ARCADIS and Broadbent

Attachment 2

Table 2 – Free Product Data for Well RW-1

Table 2 - Free Product Data for Well RW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged (Y/N)	Product Removed (gallons)
7/5/1990	1.21			
4/5/1991	NS (Due to presence of free product)			
4/1/1992	~~0.00~~ 0.30	22.81		
7/6/1992	~~0.00~~ 0.41	26.92		
10/7/1992	~~0.00~~ 1.26	28.51		
1/14/1993	~~0.00~~ 0.25	23.75		
4/22/1993	~~0.00~~ 1.38	22.70		
7/15/1993	~~0.00~~ 0.81	26.10		
10/6/1993			?	1.00
10/21/1993	~~0.00~~ 0.49	25.40		
1/27/1994	~~0.00~~ 0.37	28.02		
4/21/1994	~~0.00~~ 0.91	23.10		
9/19/1994	~~0.00~~ 1.04	24.39		
10/14/1994			?	1.00
10/20/1994			?	18.00
10/26/1994			?	3.00
11/2/1994			?	5.00
11/10/1994			?	6.00
11/16/1994			?	2.50
11/23/1994			?	5.00
11/30/1994			?	2.00
12/7/1994			?	4.00
12/17/1993			?	1.50
1/4/1994			?	5.00
1/12/1994			?	3.50
1/20/1994			?	2.50
2/11/1994			?	4.00
2/18/1994			?	3.50
2/25/1994			?	3.00
3/4/1994			?	3.50
3/18/1994			?	5.50
3/30/1994			?	4.00
4/13/1994			?	4.60
4/21/1994			?	4.20
4/29/1994			?	4.50
5/6/1994			?	5.50
5/13/1994			?	3.50
5/20/1994			?	3.50
5/26/1994			?	4.50
6/2/1994			?	3.50
6/9/1994			?	2.50
6/16/1994			?	3.50
6/23/1994			?	4.00
6/29/1994			?	2.50
7/7/1994			?	2.00
7/12/1994			?	3.00
7/20/1994			?	1.50

Table 2 - Free Product Data for Well RW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged (Y/N)	Product Removed (gallons)
7/20/1994			?	1.50
7/29/1994			?	3.50
8/5/1994			?	1.50
8/12/1994			?	2.00
8/18/1994			?	2.50
9/9/1994			?	3.50
9/16/1994			?	4.00
9/23/1994			?	2.00
12/7/1994			?	0.00
12/21/1994	NM	NM		
1/30/1995	~~0.00~~ 1.04	25.71		
4/10/1995				
6/29/1994				
9/18/1995				
12/7/1995				
3/28/1996	~~0.00~~ 0.18	16.75		0.01
6/20/1996	~~0.00~~ 0.02	25.10		0.00
10/11/1996	0.00	25.51		
1/2/1997	~~0.00~~ 0.01	24.49		
4/14/1997	~~0.00~~ 0.04	23.99		<0.05
4/15/1997	NM	NM		
7/2/1997	~~0.00~~ 0.02	16.40		0.25
9/30/1997	0.00	27.97		<0.01
1/21/1998	~~0.00~~ 0.44	14.14	Y	0.50
4/9/1998	~~0.00~~ 0.05	25.01		
4/10/1998	NM	NM		0.09
6/19/1998	0.00	11.43	Y	<0.01
11/30/1998	0.00	7.87	Y	0.00
1/21/1999	0.00	18.90		0.00
4/30/1999	1.60	16.80		0.11
7/9/1999	0.00	18.58		0.00
11/3/1999	0.00	20.85		1.06
1/12/2000	0.00	21.20		0.53
2/14/2000				0.13
3/20/2000				0.00
4/13/2000	0.00	21.71		0.26
4/26/2000				0.00
5/17/2000				0.00
5/24/2000	0.00	21.89		0.53
6/1/2000				0.00
6/8/2000	0.00	17.88		0.26
6/15/2000	0.00	16.72		0.13
6/20/2000	0.00	21.04		0.53
6/21/2000	0.00	16.30		
6/28/2000	0.00			
7/7/2000	0.00	17.21		0.01
7/20/2000	0.00	21.87		0.11

Table 2 - Free Product Data for Well RW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged (Y/N)	Product Removed (gallons)
7/26/2000	0.00	21.45		0.13
7/31/2000	0.00	22.11		0.00
8/8/2000	0.00	17.80		0.01
8/16/2000	0.00	17.92		0.00
8/23/2000	0.00	18.11		0.13
8/31/2000				0.40
9/8/2000				0.53
9/25/2000				0.01
10/24/2000	0.00	18.93		0.00
10/25/2000	0.00	19.04		
1/19/2001	0.00	18.19		0.11
2/14/2001				0.01
3/20/2001				0.13
4/26/2001				0.00
5/17/2001				0.00
6/28/2001				0.00
7/24/2001	0.00	17.93		0.00
9/21/2001				0.01
10/23/2001				0.00
11/30/2001				0.00
1/18/2002	0.00	14.87	Y	0.00
2/7/2002				0.00
8/1/2002	0.00	16.84		
1/16/2003	0.00	14.42	Y	
7/7/2003	~~0.00~~ SHEEN	16.11		
2/5/2004				
7/1/2004	0.00	16.75		
3/16/2005	0.00	12.48	Y	
7/22/2005	~~0.00~~ HEAVY SHEEN	14.40	Y	
1/25/2006	0.00	12.00	Y	
7/6/2006	0.00	13.01	Y	
1/8/2007	0.00	14.75	Y	
7/10/2007	0.00	16.21		
1/15/2008	0.00	14.63	Y	
7/15/2008	0.00	17.04		
10/21/2008	0.00	18.44		
1/6/2009	0.00	17.50		
4/21/2009	0.00	15.37		
7/21/2009	0.00	17.20		
3/18/2010	~~0.00~~ SHEEN	12.87	Y	
7/29/2010	0.00	15.90		
11/12/2010	0.00	17.25		
2/22/2011	0.00	12.60	Y	
5/9/2011			Y	
7/14/2011	0.00	13.87	Y	

Table 2 - Free Product Data for Well RW-1
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Sampled	Free Product Thickness (feet)	Depth to Water (feet)	Well Submerged (Y/N)	Product Removed (gallons)

Notes:

[1] RW-1 Screen Interval - 15 to 40 feet below ground surface

Highligted data not presented/evalauted by ARCADIS and Broadbent

Strikethrough data misreported by ARCADIS and Broadbent

Attachment 3

Table 3 – Site Remediation and Monitoring Well Network

Table 3 – Site Remediation and Monitoring Well Network
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Well No.	Date Installed	Screen Interval (feet bgs)	Screen Length (feet)	Well Stratigraphy (USCS Description)	Type of Well	Location
MW-1	May 1988	~~NA~~ 10 to 29	19	CL, CH	Groundwater Monitoring	On-site
MW-2	May 1988	~~NA~~ 12 to 32	20	CL, SC, CH	Groundwater Monitoring	On-site
MW-3	May 1988	~~NA~~ 14 to 34	20	SC, CL	Groundwater Monitoring	On-site
AW-1	~~April 1991~~ June 1990	~~NA~~ 15 to 35	20	ML, SC	Groundwater Monitoring	On-site
AW-2	~~April 1991~~ June 1990	~~NA~~ 20 to 40	20	CL, SC	Groundwater Monitoring	Off-site
AW-3	~~April 1991~~ June 1990	~~NA~~ 15 to 35	20	CL	Groundwater Monitoring	Off-site
AW-4	~~April 1991~~ June 1990	~~NA~~ 15 to 35	20	CL	Groundwater Monitoring	Off-site
AW-5	April 1991	~~NA~~ 20 to 45	25	SM, CL	Groundwater Monitoring	On-site
AW-6	April 1991	~~NA~~ 20 to 35	15	SM, CL	Groundwater Monitoring	On-site
AW-7	April 1991	~~NA~~ 20 to 35	15	CL	Groundwater Monitoring	Off-site
AW-8	April 1991	~~NA~~ 20 to 40	20	SM, SC, CL	Groundwater Monitoring	Off-site
AW-9	January 1997	~~NA~~ 12 to 28	16	SM, GM-GC	Groundwater Monitoring	Off-site
RW-1	~~1994~~ June 1990	~~NA~~ 15 to 40	25	ML, SC, CL	Groundwater Extraction	On-site
VW-1	~~1994~~ March 1992	~~NA~~ 9 to 16	7	ML, GM	Vapor Extraction	On-site
VW-2	~~1994~~ March 1992	~~NA~~ 9 to 16	7	CL, SM, SW	Vapor Extraction	On-site
VW-3	~~1994~~ March 1992	~~NA~~ 9 to 16	7	CL	Vapor Extraction	On-site
VEW-4	1994	~~NA~~ (5 to 20)*	NA	NA	Vapor Extraction	On-site
VEW-5	1994	~~NA~~ (5 to 20)*	NA	NA	Vapor Extraction	On-site
VEW-6	1994	~~NA~~ (5 to 20)*	NA	NA	Vapor Extraction	On-site
VEW-7	1994	~~NA~~ (5 to 20)*	NA	NA	Vapor Extraction	On-site
VEW-8	1994	~~NA~~ (5 to 20)*	NA	NA	Vapor Extraction	On-site
VEW-9	~~January 2008~~ May 1996	~~NA~~ 6 to 20	14	ML, CL, SC	Vapor Extraction	Off-site
IW-1	September 2010	20 to 40	20	CL, SM-SC, ML-SC	Injection Well (Pilot Test)	On-site
IW-2	September 2010	20 to 40	20	SM-SC, CL, ML, SC	Injection Well (Pilot Test)	On-site
IW-3	September 2010	20 to 40	20	CL, SM, ML-CL, ML	Injection Well (Pilot Test)	On-site
OW-1	September 2010	20 to 40	20	ML	Observation Well (Pilot Test)	On-site

Notes:

Shaded – Additional data not included in USTCF Monitoring Well Information Table

Strikethrough – Inaccurate data presented in USTCF Monitoring Well Information Table

NA – Information Not Available

USCS – United Soil Classification System Description

* No boring/well logs or well installation report in case files. Depths and screen intervals based on information presented in the Work Plan for Installation of Vapor Extraction Wells (Alisto, 1994)

Attachment 4

Table 4 – Submerged/Dry Well Statistics

Table 4 - Submerged/Dry Well Statistics
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Well ID	Location	# of Sampling Events	# of Events with Submerged Wells	# of Events with Dry Wells	Percent of Events Submerged (%)	Percent of Events Dry (%)	Notes
Groundwater Monitoring & Extraction Wells							
AW-1	On-site	70	4		6%	0%	3/5 events since 2010
AW-2	Off-site	59	47		80%	0%	5/5 events since 2010
AW-3	Off-site	65	24		37%	0%	3/5 events since 2010
AW-4	Off-site	65	4		6%	0%	1/5 events since 2010
AW-5	On-site	63	32		51%	0%	5/5 events since 2010
AW-6	On-site	61	48		79%	0%	5/5 events since 2010
AW-7	Off-site	36	19		53%	0%	Since 1,100 ug/L of MTBE detected in 9/30/1997, well was submerged in all subsequent monitoring events with ND
AW-8	Off-site	45	35		78%	0%	Since 820 ug/L of MTBE detected in 9/30/1997, well was submerged in all subsequent monitoring events with ND
AW-9	Off-site	19	4		21%	0%	4/6 events submerged before determining no off-site impacts
MW-1	On-site	63	6		10%	0%	2/5 events since 2010
MW-2	On-site	62	46		74%	0%	5/5 events since 2010
MW-3	On-site	63	21		33%	0%	4/5 events since 2010
RW-1	On-site	67	13		19%	0%	3/5 events since 2010
Vapor Extraction Wells							
VEW-4	On-site	11	0	1	0%	9%	depth to water greater than 20 feet
VEW-5	On-site	12	0	11	0%	92%	
VEW-6	On-site	11	0	0	0%	0%	
VEW-7	On-site	11	0	0	0%	0%	
VEW-8	On-site	12	0	5	0%	42%	
VEW-9	Off-site	10	3	4	30%	40%	
VW-1	On-site	11	0	9	0%	82%	
VW-2	On-site	11	11		100%	0%	All events since 2008
VW-3	On-site	11	11		100%	0%	All events since 2008
Pilot Test Injection and Observation Wells							
IW-1	On-site	1	1		100%	0%	
IW-2	On-site	1	1		100%	0%	
IW-3	On-site	1	1		100%	0%	
OW-1	On-site						

Notes:
Highlighted Data - Off site wells

Attachment 5

Table 5 – Historic Groundwater Flow Direction Data

Table 5 – Historic Groundwater Flow Direction Data
Former BP Station #11133, 2220 98th Avenue, Oakland, CA 94603
Fuel Leak Case No. RO0000403, GeoTracker Global ID T0600100210, USTCF Claim No. 5502

Date Measured	Flow Direction	Hydraulic Gradient (feet/feet)
02/15/1989	Westerly	NA
07/05/1990	West	0.01
04/05/1991	Southerly	0.08
6/28/1991	Radially inward towards site, southwest	0.01
9/26/1991	Radially inward towards site, southwest	0.03
12/11/1991	Radially inward towards site, southwest	0.015
04/01/992	Radially inward towards site	NA
07/06/1992	Radially outward from site	0.04
10/07/1992	Radially inward towards and outward from site, South-southeast	0.022 to 0.13
01/14/1993	Radially inward towards and outward from site, South-southeast	0.05 to 0.3
4/22/1993	Radially inward towards and outward from site, South-southeast	0.20
07/15/1993	Radially inward towards and outward from site, South-southeast	0.10 to 0.20
10/21/1993	Radially inward towards and outward from site, South-southeast	0.13 to 0.15
01/27/1994	Radially inward towards and outward from site, South-southeast	0.13 to 0.2
04/21/1994	Radially inward towards and outward from site, South-southeast	0.13
09/09/1994	Radially inward towards and outward from site, South-southeast	0.10
12/21/1994	Radially inward towards and outward from site, South-southeast	0.07
01/30/1995	Radially inward towards and outward from site, South-southeast	0.06
04/10/1995	Radially inward towards and outward from site, South-southeast	0.07
06/29/1995	Radially inward towards and outwards from site	0.14
09/18/1995		
12/07/1995	Southeast	0.11
03/28/1996	East	0.05
06/20/1996	East	0.07
06/20/1996	West	0.04
10/11/1996	East	0.06
01/02/1997	East	0.15
04/14/1997	East	0.08
07/02/1997	East-northeast	0.05
09/30/1997		
01/21/1998	Southeast	0.04
04/09/1998		
06/19/1998		
11/30/1998		
01/21/1999		
04/30/1999		
07/09/1999		
11/03/1999		
01/12/2000	East	0.07
01/12/2000	West	0.07
04/13/2000	East	0.05
04/13/2000	Southwest	0.05
07/26/2000	Southwest	0.03

Date Measured	Flow Direction	Hydraulic Gradient (feet/feet)
10/24/2000	Southeast	0.04
01/19/2001	East-southeast	0.04
07/24/2001	East	0.08
07/24/2001	West	0.03
01/18/2002	West	0.04
08/01/2002	East	0.05
08/01/2002	Southwest-southwest	0.04
01/16/2003	East-southeast	0.06
01/16/2003	West	0.02
03/14/2003	East	0.06
03/14/2003	West	0.02
02/05/2004	Southwest	0.03
02/05/2004	Northwest	0.06
07/07/2003	Southwest	0.03
07/07/2003	East	0.08
02/05/2004	Variable: Southwest to Northeast	Variable: 0.03 to 0.06
07/01/2004	Southwest	0.03
07/01/2004	East	0.08
03/16/2005	Variable: Southwest to Northeast	Variable: 0.03 to 0.08
07/22/2005		
01/25/2006	Variable: East to Southeast	0.03 to 0.09
07/06/2006	Variable: East to West towards Center	0.04 to 0.05
01/08/2007	Variable: East to West towards Center	0.03 to 0.05
07/10/2007	West	0.01
01/15/2008	West-Southwest	0.006
07/15/2008	West-Southwest	0.01
10/21/2008	West-Southwest	0.01
01/06/2009	West	0.009
04/21/2009	West	0.01
07/21/2009	West	0.01
03/18/2010	West	0.008
07/29/2010	West	0.008
11/12/2010	West-Southwest	0.01
02/22/2011	Variable: North to West	0.03 to 0.04
07/14/2011	West	0.01

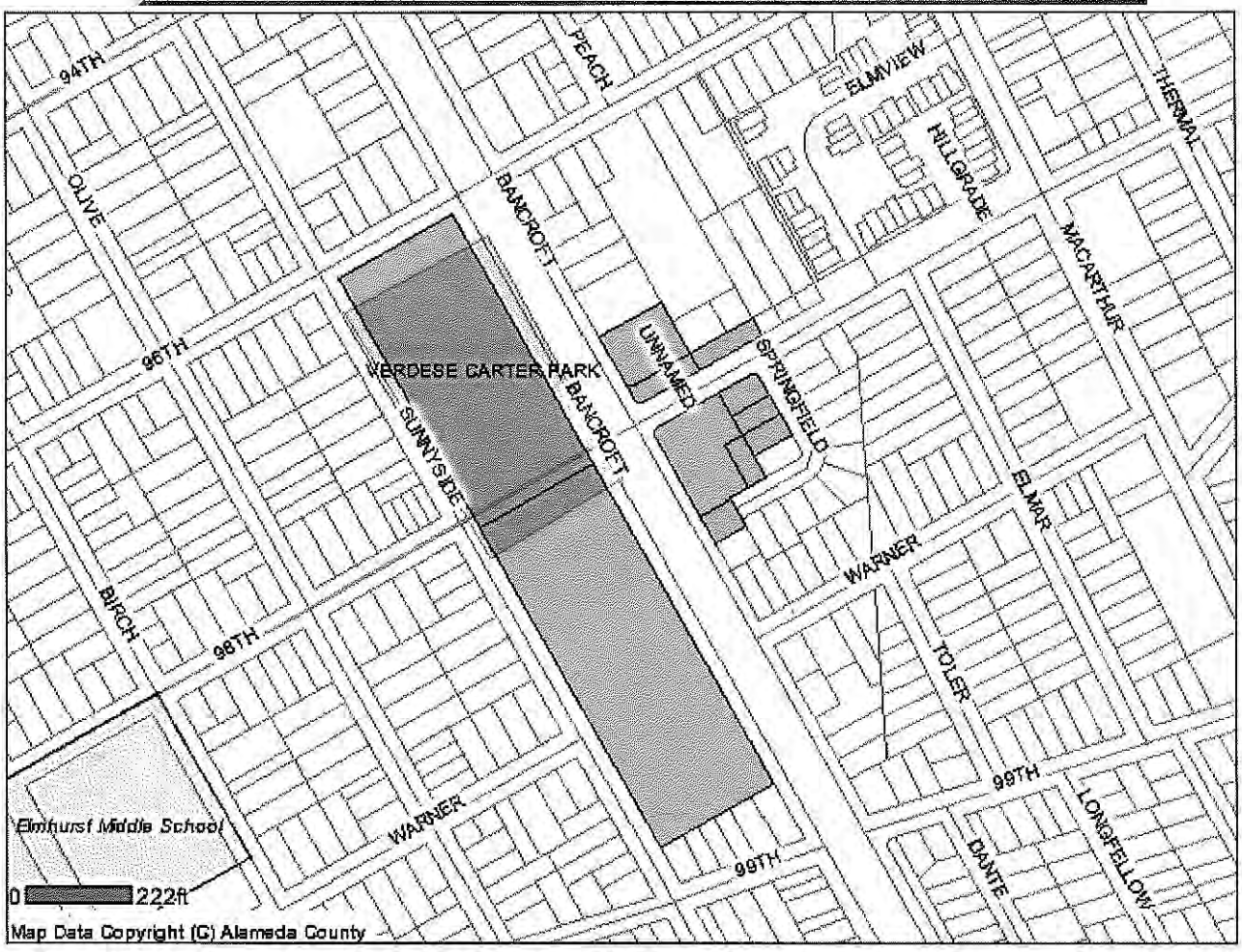
Notes:

Shaded data not presented in Case Closure Summary Report prepared by ARCADIS

Attachment 6

SWRCB Public Notification Map and List of Owners and Tenants

2220 98th Ave, Oakland, CA - Parcels Notified By SWRCB



LEGEND

- selected
- Landmark
- Landmark Name
- County Buildings
- Water Body
- Railroad
- Street Centerline
- Parcel
- Concrete Channel
- Closed Conduit
- Improved Creek
- Natural Creek
- Park

Printed: 11/5/2012

Public Notification Addresses for Claim #5502

Claimant:

BP Products North America, Inc., Assignee
Attn: Chris Winsor
6 Centerpointe Dr
La Palma, CA 90623

Suncor Holding Corp.
11601 Wilshire Blvd., #700
Los Angeles, CA 90025

Conoco Phillips
Attn: Terry Grayson
76 Broadway Street
Sacramento, CA 95818

Regional Board Contact:

San Francisco Bay RWQCB (Region 2)
Cherie McCaulou
1515 Clay Street, Suite 1400
Oakland, CA 94612

LOP Contact:

Alameda County Lop
Dilan Roe
1131 Harbor Bay Parkway
Alameda, CA 94502

Consultant:

Hollis E. Phillips
ARCADIS
100 Montgomery Street, Suite 300
San Francisco, CA 94104

Water Company:

East Bay Municipal Utility District
P O Box 24055.
Oakland, CA 94623

Building Permit Agency:

City of Oakland – Permit Center
250 Frank H. Ogawa Plaza, Rm 2114
Oakland, CA 94612-2031

Adjacent Property Owners:

Oakland Unified School District
1025 2nd Avenue, Suite 316
Oakland, CA 94606-2296

City of Oakland
250 Frank H Ogawa Plaza, Suite 4
Oakland, CA 94612-2010

Pak T & Yong G Leung
112 E Vista Avenue
Daly City, CA 94014-1826

Suncor Holdings Cop. II LLC
525 Colorado Avenue
Santa Monica, CA 90401-2407

Carl & Phyllis Rice
9801 Springfield Street
Oakland, CA 94603-2823

Joe Hathorn
5130 James Avenue
Castro Valley, CA 94546-3745

Wanda Shanks
9817 Springfield Street
Oakland, CA 94603-2823

Eliezer Diaz
9857 Springfield St.
Oakland, CA 94603-2823

Jose & Alma Ortega
9826 Bancroft Avenue
Oakland, CA 94603-2814

Current Resident
9809 Springfield Street
Oakland, CA 94603-2823

Attachment 7

ACEH Identification of Appropriate Public Notification Map
and List of Owners and Tenants

2220 98th Ave, Oakland, CA ACEH Parcel Identification For Notification

LEGEND

- selected
- Landmark
- Landmark Name
- County Buildings
- Water Body
- Railroad
- Street Centerline
- Parcel
- Concrete Channel
- Closed Conduit
- Improved Creek
- Natural Creek
- Park

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9826 SPRINGFIELD ST
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BROUSSARD EDWARD &
Parcel #: 46-5477-17
2379 WEST ST
BERKELEY CA 94702

CITY OF OAKLAND
Parcel #: 46-5475-7-2
250 FRANK H OGAWA PLZ #4
OAKLAND CA 94612

CITY OF OAKLAND
Parcel #: 46-5475-6-14
250 FRANK H OGAWA PLZ #4
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CITY OF OAKLAND
Parcel #: 46-5468-3-3
250 FRANK H OGAWA PLZ #4
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CITY OF OAKLAND
Parcel #: 46-5475-3-1
250 FRANK H OGAWA PLZ
OAKLAND CA 94612

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Parcel #: 46-5475-4-1
250 FRANK H OGAWA PLZ
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CITY OF OAKLAND
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250 FRANK H OGAWA PLZ #4
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DAVIS FLOYD & MELVERDIA
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1055 RINGWOOD AVE
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DIAZ ELIEZER
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DICKERSON HENRY T &
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2301 WARNER AVE
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EDWARDS VIKKIE L
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9808 SPRINGFIELD ST
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EOFF SIDNEY J SR
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1433 WASHO DR
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FULLER JAMES & THERESIE &
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2231 WARNER AVE
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HATHORN JOE C TR
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5130 JAMES AVE
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HILL CHARLES D JR
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HOUSING AUTHORITY OF THE
Parcel #: 46-5475-6-12
1619 HARRISON ST
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HOUSING AUTHORITY OF THE
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837 ARLINGTON AVE
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2243 WARNER AVE
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3577 FRUITVALE AVE
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2249 WARNER AVE
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Parcel #: 46-5467-1-2
1025 2ND AVE #316
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Parcel #: 46-5477-24-14
9824 BANCROFT AVE
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RESIDENT
Parcel #: 46-5475-19-1
2250 96TH AVE
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RESIDENT
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BANCROFT AVE
OAKLAND CA 94603

RESIDENT
Parcel #: 46-5467-1-2
2124 98TH AVE
OAKLAND CA 94603

RESIDENT
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9750 BANCROFT AVE
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RESIDENT
Parcel #: 46-5477-9
9850 SPRINGFIELD ST
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RESIDENT
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9836 BANCROFT AVE
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RESIDENT
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2301 98TH AVE
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RESIDENT
Parcel #: 46-5475-4-2
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2219 WARNER AVE
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RESIDENT
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RESIDENT
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RESIDENT
Parcel #: 46-5477-7
9862 SPRINGFIELD ST
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RESIDENT
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RESIDENT
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RESIDENT
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RESIDENT
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RESIDENT
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Attachment 8

Technical Reference Table

Technical References Table

TOPIC	KEY CONCEPT	QUOTATION	REFERENCE CITATION
Selection of Appropriate Screen Interval for LNAPL Detection	**Wells intended to monitor for LNAPL can have long (10 - 15 ft) well screens that MUST extend across the interface; shorter well screens are recommended as appropriate for depth specific sampling (see further below).**	For wells installed specifically to monitor the presence of LNAPLs, well screen length must be determined by the degree of water table fluctuation. ...the screen must be long enough to keep the water table within it during extreme highs as well as extreme lows, which means the...historical water-level data for the site or surrounding data [must be considered]. If the water table rises above the top of the screen, or falls below the bottom of the screen, it is not possible to use the well for LNAPL detection. Additionally, if a sediment sump is used on a well in which the bottom of the screen is above the water table, the sump may remain filled with water and the well may provide a false indication of the absence of LNAPL. Therefore, the well screen must be long enough to extend above the historical high (at least 3 feet), and below the historical low (at least 2 feet) and, if a sediment sump is used, it should have a drain hole to allow water to escape in the event the water level drops below the bottom of the screen. ...wells that are used for LNAPL detection, and in which LNAPLs are found, should not be used to collect groundwater samples for determination of dissolved-phase concentrations.	***Practical Handbook of Environmental Characterization and Groundwater Monitoring; David Nielson; 2006; 2nd ed.***
		(pg 643; paraphrasing) ... well screens that monitor groundwater quality at the top of the water table usually are 10 to 15 ft long, depending on anticipated long-term changes in groundwater elevation, and that some of the screen remains above the water table in the vadose zone. Wells with this design are used to monitor for the presence of LNAPLs (and well yield is sufficient to obtain a reliable water sample – e.g. is not a production well). This same paragraph also states that well screens (non-water table implied) are typically 5 to 10 ft in length because samples should come from specific depths (again because well yield is not the main objective).	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
		To avoid dilution, well screens should be kept to the minimum length appropriate for intercepting a contaminant plume, especially in a high-yielding aquifer. The screen length should generally not exceed 10 feet. If construction of a water table well is the objective, either for defining flow gradient or detecting the presence of floating non-aqueous phase liquid (NAPL), then a longer screen spanning the water table is acceptable, to account for NAPL's or seasonal water table fluctuations. The RP should not use screen lengths that create a conduit for contaminant transport across hydraulically separated geologic units.	***Monitoring Well Design and Construction for Hydrogeologic Characterization; CalEPA; July 1995***
		...the well screen must be designed to prevent clogging and intercept the water table at both high- and low-groundwater conditions....	***40 CFR Section 280.43(f) and Preamble***
		Section 8.2.7, Screen Length and Setting, pp 385 - 388, it states " To monitor the position of the water table or to detect the presence of LNAPLs, the screen must be set so that it intersects the water table. The screen must be long enough to intersect the water table over the range of annual fluctuation..." See Figure 8.6 for examples of screens set incorrectly and correctly.	***Contaminant Hydrogeology, C.W. Fetter; 2008, 2nd ed.***
The Absence of LNAPL in a Well	**LNAPL Myths (In-Well LNAPL Thickness Dilemmas)**	The absence of LNAPL in a monitoring well means that LNAPL is not present at that Location. *Not necessarily true* : The presence of LNAPL in a well in an LNAPL-affected area is highly dependent on the water table elevation, in relation to the LNAPL impacts, as well as many other factors relating to the characteristics of the LNAPL and soil. In an unconfined setting, in-well LNAPL thicknesses often vary inversely with water table elevation. Hence, an increase in water table elevation typically results in a decrease in in-well LNAPL thickness. Sometimes, during high water tables, the LNAPL becomes entirely submerged, and no LNAPL remains in the well. However, as the water table elevation decreases over time, the LNAPL reappears in the well. In a confined setting, in-well LNAPL thickness varies directly with potentiometric surface elevation. Hence, as the potentiometric surface elevation increases, in-well LNAPL thicknesses also tend to increase.	***Evaluating LNAPL Remedial Technologies for Achieving Project Goals; ITRC LNAPLs Team; December 2009; Appendix D***
		LNAPL showing up in a well(s) where it hasn't been detected in an extended period of time (months or years) suggests that the plume is migrating or that a new release has occurred. *Not necessarily true* : Water table elevations/fluctuations may precent LNAPL from appearing in a given well for months or years. The LNAPL has not necessarily moved away; it may simply be submerged and does not have the ability to displace water and flow into the well screen.	***Evaluating LNAPL Remedial Technologies for Achieving Project Goals; ITRC LNAPLs Team; December 2009; Appendix D***

Technical References Table

Contaminant Dilution	**Contaminant dilution is a factor of screen length**	If the objective of a monitoring program is to define the true nature and distribution of groundwater contamination and hydraulic heads at a site where complex geologic and hydraulic conditions and contaminant distribution patterns occur...multiple wells with short screens placed at close intervals, or multilevel monitoring systems are needed. Wells screens should generally be between 2 and 5 feet, rarely exceeding 10 feet in length. On the other hand if the objective of the well is to monitor for gross presence of contaminants in an aquifer, a longer screen might be selected. This type of well would provide both an integrated water sample and an integrated hydraulic head measurement, and would thus serve only as a screening tool.	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
		...concentration of chemical constituents in samples collected from wells are composited over the length of the screen, typically representing a weighted average of concentrations across the screen. Concentrations are normally skewed toward zones of highest hydraulic conductivity, which will yield more water to the well when it is purged and sampled. Because the highest hydraulic conductivity zones are the most important contaminant transport pathways, it may be rationalized that such samples are acceptable in terms of accurately representing conditions in the formation. However, significant dilution of samples, caused by screens penetrating zones in which contaminants may not be present (e.g., lower hydraulic conductivity zones) and by inappropriate purging and sampling practices (e.g., purging large volume of water prior to sampling) is bound to occur.....in fact concentrations in water table wells can vary by several orders of magnitude, depending on well screen placement and length.	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
		Seasonal variations in concentrations of dissolved-phase hydrocarbons can be extreme, because the vertical profiles of contamination below the water table essentially remain constant as the water table rises (when concentrations are typically more dilute) and falls (when concentrations are typically higher). Complicating this situation is the fact that in water table wells, samples represent a smaller interval of the saturated zone when the water table is lower, and a larger interval when the water table is higher. This makes accurate interpretation of sampling results, in terms of defining contaminant plumes, very difficult at best.	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
		...because of heterogeneities in geologic material that control contaminant transport, contaminant concentrations often vary by one to three orders of magnitude over vertical distances ranging from a few inches to a few feet.	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
		The length of the well screens in wells installed to define these conditions [groundwater chemistry, contaminant distribution, and hydraulic head] is the most important element in the success of a contaminant detection and monitoring program.	***Groundwater & Wells; Robert J. Sterrett; 2007; 3rd ed. (The new Johnson Screen Book)***
Conceptual Site Model	**The Official ASTM Definition: A CSM is not scattered**	ASTM Method 1689-95 describes development of an CSM. Section 1, Scope, states that this guide is intended to assist in the development of CSMs to be used for *integration* of technical information from various sources. Section 6.1, Assembling Information, under Procedure, calls for assembling information from numerous types of data. Per a dictionary "assembling" is an antonym for "scatter".	***ASTM 1689-95***
DTSC Vapor Guidance	**The State of the Practice - The collection of valid vapor data**	Quoting the DTSC Website: "DTSC's Vapor Intrusion Guidance provides a stepwise and sometimes iterative process for the investigation of vapor intrusion and describes procedures for screening and site-specific evaluation of potential risks associated with this exposure pathway. Indoor air concentrations estimated from soil gas or groundwater concentrations by fate and transport models for vapor intrusion and/or measured indoor air concentrations are used in the assessment. Models for estimating indoor air concentrations include default attenuation factors for vapor migration from soil gas or groundwater to indoor air, and default and site-specific inputs to the U.S. EPA version of the Johnson and Ettinger vapor intrusion model."	Final Guidance for the Evaluation & Mitigation of Subsurface Vapor Intrusion to Indoor Air (October 2011) http://www.dtsc.ca.gov/SiteCleanup/Vapor_Intrusion.cfm

Attachment 9

UST Low Threat UST Case Closure Policy Compliance and Identification of Impediments to Case Closure Checklist

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

CHECKLIST KEY:

☐ UND = Undetermined of Unknown ☐ NE = Not evaluated ☐ NA = Not applicable

General Criteria a: Is the unauthorized release located within the service area of a public water system? ☒ Yes ☐ No ☐ UND

LTCP Statement: "This policy is protective of existing water supply wells. New water supply wells are unlikely to be installed in the shallow groundwater near former UST release sites. However, it is difficult to predict, on a statewide basis, where new wells will be installed, particularly in rural areas that are undergoing new development. This policy is limited to areas with available public water systems to reduce the likelihood that new wells in developing areas will be inadvertently impacted by residual petroleum in groundwater. Case closure outside of areas with a public water system should be evaluated based upon the fundamental principles in this policy and a site specific evaluation of developing water supplies in the area. For purposes of this policy, a public water system is a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year."

CA LUFT Manual Guidance Statement:

Approaches for evaluation of sites outside a public water supply system. "These sites should be evaluated based upon the fundamental principles in this policy and a site-specific evaluation of developing water supplies in the area. The following list includes additional characteristics to consider that might result in a low-threat designation even for a site outside a public water supply:

- Impacted groundwater that is shallower than the sanitary seal requirement for supply wells in the applicable county.
- Impacted perched water zones are not a viable potential water supply
- High salinity or low yield that negate the impacted groundwater from drinking water beneficial use per State Water Board Resolution 1988-0063, or de-designated areas in various Basin Plans.
- Groundwater plumes where WQOs will be attained through natural attenuation within a reasonable time, prior to the expected need for use of any affected groundwater."

Name of public water system:

☒ East Bay Municipal Utility District ☐ Zone 7 ☐ Hayward Water

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☒ **Yes** ☐ **No** ☐ **UND**

*****End of General Criteria a Evaluation*****

General Criteria b: Does the unauthorized release consist only of petroleum? ☒ Yes ☐ No ☐ UND

LTCP Statement: "For purposes of this policy, petroleum is defined as crude oil, or any fraction thereof, which is liquid at standard conditions and temperature and pressure, which means 60 degrees Fahrenheit and 14.7 pounds per square inch absolute including the following substances: motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents and used oils, including any additives and blending agents such as oxygenates contained in the formulation of the substances."

CA LUFT Manual Guidance Statement:

Approaches for evaluation sites with petroleum releases that are not from a UST system. "This policy may still be used to evaluate whether a petroleum-only site that is not associated with USTs is low-threat as long as the exposure assumptions are equivalent to those in this policy, or are shown to be low-threat by a site-specific analysis. For example, site with petroleum releases form natural gas/oil field operations, pipelines, or aboveground storage tanks (ASTs) may be evaluated using this policy as long as these sites meet all of the criteria and the impacted soil is less than 82 feet by 82 feet in areal extent (to meet the direct contact CSM), or a site-specific risk assessment shows that the impacted soil is low-risk for direct contact pathway."

Approaches for evaluation of sites with crude oil releases. "Although this policy was developed for fuel releases, crude oil releases could also be evaluated using this policy, as long as data for BTEX, naphthalene, and PAHs have been collected. This is because the carbon range for crude oil overlaps the combined carbon ranges for gasoline, diesel, and bunker fuel."

Approaches for sites containing non-petroleum chemicals (e.g., solvents) in soil. "These sites should be evaluated using a traditional risk assessment. Risk can be evaluated in several ways, but is often evaluated using a tiered approach in which the complexity of the evaluation increases with each tier (or step) in the process."

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☒ **Yes** ☐ **No** ☐ **UND**

End of General Criteria b Evaluation

General Criteria c: Has the unauthorized ("primary") release from the UST system been stopped?	☒ Yes ☐ No ☐ UND

LTCP Statement: "The tank, pipe, or other appurtenant structure that released petroleum into the environment (i.e. the primary source) has been removed, repaired or replaced. It is not the intent of this policy to allow sites with ongoing leaks from the UST system to qualify for low-threat closure."

CA LUFT Manual Guidance Statement:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☒ **Yes** ☐ **No** ☐ **UND**

End of General Criteria c Evaluation Section

General Criteria d: Has free product been removed to the maximum extent practicable?

☐ Yes ☐ No ☒ UND
☐ FP Not Encountered

LTCP Statement: "At petroleum unauthorized release sites where investigations indicate the presence of free product, free product shall be removed to the maximum extent practicable. In meeting the requirements of this section:

(a) Free product shall be removed in a manner that minimizes the spread of the unauthorized release into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable laws;

(b) Abatement of free product migration shall be used as a minimum objective for the design of any free product removal system; and

(c) Flammable products shall be stored for disposal in a safe and competent manner to prevent fires or explosions."

CA LUFT Manual Guidance Statement:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☒ **No** ☐ **UND**

End of General Criteria d Evaluation

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? ☐ Yes ☒ No ☐ UND

LTCP Statement: "The Conceptual Site Model (CSM) is a fundamental element of a comprehensive site investigation. The CSM establishes the source and attributes of the unauthorized release, describes all affected media (including soil, groundwater, and soil vapor as appropriate), describes local geology, hydrogeology and other physical site characteristics that affect contaminant environmental transport and fate, and identifies all confirmed and potential contaminant receptors (including water supply wells, surface water bodies, structures and their inhabitants). The CSM is relied upon by practitioners as a guide for investigative design and data collection. Petroleum release sites in California occur in a wide variety of hydrogeologic settings. As a result, contaminant fate and transport and mechanisms by which receptors may be impacted by contaminants vary greatly from location to location. Therefore, the CSM is unique to each individual release site. All relevant site characteristics identified by the CSM shall be assessed and supported by data so that the nature, extent and mobility of the release have been established to determine conformance with applicable criteria in this policy. The supporting data and analysis used to develop the CSM are not required to be contained in a single report and may be contained in multiple reports submitted to the regulatory agency over a period of time."

CA LUFT Manual Guidance Statement:

"The objectives of a CSM are:

- To convey an understanding of the origin, nature, and lateral and vertical extent of contamination.
- To identify potential contaminant fate-and-transport processes and pathways. See the Fate and Transport chapter for further details.
- To identify potential human and environmental receptors that may be impacted by contamination associated with the site.
- To guide site investigation activities and identify additional data needed (if any) to draw reasonable conclusions regarding the source(s), pathways, and receptors.
- To frame the evaluation of risk to human health, safety, and the environment posed by releases at a LUFT site.

The objectives emphasize the need for an approach where a CSM is developed early and is iteratively refined through the project life cycle. Each piece of data that is collected should serve to refine the CSM. The Interstate Technology & Regulator Council (ITRC) Vapor Intrusion Pathway Guidance document (ITRC 2007) provides additional information on developing a CSM."

Has a CSM that adequately assesses the nature, extent and mobility of the release in affected media at in the vicinity of the site been developed? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Groundwater Assessment	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Surface Water Assessment	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Soil Assessment	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Soil Vapor Assessment	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Indoor Air Assessment	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Potential Receptors Identified	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Exposure Pathways Identified	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Hydrogeology Defined	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Contaminant Transport Assessment	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Source(s) Defined	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA

(General Criteria e evaluation continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND

Has the CSM been developed in accordance with industry standards?	☐ **Yes** ☒ **No** ☐ **UND** ☐ **NE** ☐ **NA**
SWRCB CA LUFT Manual, September 2012	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
ITRC Vapor Intrusion Pathway Guidance document (ITRC 2007)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
ASTM Method 1689-95 - Standard Guide for Developing Conceptual Site Models for Contaminated Sites	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
ASTM Method 2531-6 - Standard Guide for Development of Conceptual Models for Light Nonaqueous-Phase Liquids Released to the Subsurface	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
DTSC Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (October 2011)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Is the CSM presented in one comprehensive document? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA	
If no, then has a summary document been submitted that identifies the documents where the requisite CSM elements are located?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Is the CSM current?	☐ **Yes** ☒ **No** ☐ **UND** ☐ **NE** ☐ **NA**
Is the CSM representative of current site conditions?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does the final closure review validate the CSM?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Have the requisite components of the CSM been submitted?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Hydrogeologic Setting Evaluation	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Source Evaluation	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Contaminant Transport and Exposure Pathways Evaluation	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Receptors Evaluation	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have data gaps been identified that require further investigation during subsequent phases of work?	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA

(General Criteria e evaluation continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Hydrogeologic Setting Been Adequately Evaluated?	☐ Yes ☒ No ☐ UND

CA LUFT Manual Guidance Statement:

Hydrogeologic Setting – "The hydrogeology (geologic factors that affect groundwater flow) of a site generally controls contaminant migration. Gaining an understanding of the geologic setting will also help to determine the pathways of migration. Much of the geologic information for a LUFT site can be gathered from historical reports, state and federal environmental databases (including boring logs obtained from cases in the GeoTracker database), and electronic and paper files covering the site and adjacent properties from various federal, state, and local agencies. Geologic aspects to consider when conceptualizing the geology at a LUFT site include:

- Site topography.
- Regional and local geologic conditions, including key aquifer and aquitard units.
- Site-specific soil texture/lithology (e.g., identify the predominant types of soil at the site, such as clay, sand, gravel, fractured bedrock, sediments, etc.), stratigraphy, and structures (dipping strata, faults, etc.) that may affect contaminant transport.

An understanding of the regional hydrogeology is also important in developing the CSM, especially if groundwater could potentially become impacted or is already impacted. Hydrogeologic features to be considered when developing the CSM include:

- Depth to the water table and its seasonal and known historical fluctuation.
- Groundwater flow within the shallowest aquifer (gradient direction, hydraulic conductivity, flow velocity), vertical gradient and degree of interconnection between unconfined, semi-confined, and confined groundwater.
- Whether or not the source is beneath a low-permeability surface (such as asphalt or concrete).
- Designated beneficial uses of groundwater beneath the site.
- Location of proximal supply wells that may influence groundwater flow or be potential receptors.
- Location of nearby surface-water bodies (if any) and potential transport pathways to surface-water bodies."

A description of the monitoring well network at the site for collecting soil gas and groundwater data?	**GW:** ☐ **Yes** ☒ **No** ☐ **UND** ☐ **NE** ☐ **NA** **SG:** ☐ **Yes** ☒ **No** ☐ **UND** ☐ **NE** ☐ **NA**
Summary table listing all wells in the monitoring network and providing construction details including date installed, screen intervals, screen length, formations screened, type of wellhead (i.e., flush-mounted or stove top), date of last well development, and date of last survey and survey datum?	GW: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA SG: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
An analysis of the quality and validity of data obtained by the monitoring well network including the appropriateness of field sampling protocols and use of appropriate laboratory reporting limits?	GW: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA SG: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Identification of submerged/dry well conditions and an analysis of the effects on sample bias due to dilution and ability to detect free product?	GW: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA SG: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Monitoring well construction logs?	GW: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA SG: ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Hydrogeologic Setting Evaluation continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Hydrogeologic Setting Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Analysis of anomalous water-level data? ☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

Analysis of contours on a site plan showing groundwater elevations which do not make sense? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Analysis of operator error? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Inclusion of water-level elevations in nearby wells which are not consistent and from which there cannot be calculated any obvious flow direction or gradient?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Contouring water-level elevations using data obtained from multiple aquifers (perched, water table, confined)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Contouring water-level elevations using data obtained from aquifers with larger vertical upward or downward gradients?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Collecting water-level data before wells have had time to equilibrate after opening the well cap?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Failing to measure depths to water with sufficient speed in areas with significant tidal influences?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Using measurements from wells which have filled with sediment or have become plugged in some manner?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Computer-generated contour maps that have not allowed for professional geologic interpretation of site specific features?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Analysis of hydrogeologic site conditions causing error? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Abrupt changes in stratigraphy across a site, such as a stream channel meandering with coarse material adjacent to and interlaced with fine-grained material?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Pods of low-permeability material creating a semi-confined condition in an otherwise water-table (unconfined) aquifer that cause water-level elevation to not track evenly across the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Wells located next to buried utilities where well perforations have hydraulic continuity with the utility backfill?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Wells located near and in continuity with a former or current UST pit resulting in anomalous high or low water levels?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Perched water zone on a portion of a site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Wells perforated across two or more water-bearing zones with different hydraulic heads?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Well measurements taken immediately after a major rainfall event and before the aquifer system has time to equilibrate?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Hydrogeologic Setting Evaluation continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Hydrogeologic Setting Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Analysis of anomalous water-level data? (continued) ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Analysis of consistent data points?

Depth-to-water-level measurements in a monitoring well or wells that is always the same, or varies very little when other wells at a site show variance, signaling that water levels have fallen below the screened interval of the monitoring well and that only residual water in the well's end cap is being measured.	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have water level measurements been compared with the known total depth of the well, or has the bottom of the well been measured and compared to the water-level results.	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Analysis of anomalous gradients?

Data from adjacent or nearby sites differs significantly from what the site data?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have wells casings been cut?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have well casings sank due to high traffic in the area?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have well casings been accurately surveyed for top-of-casing elevations?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Interpretation of Data

A statement about data validation	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Conformance with quality assurance/quality control (QA/QC) limits	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Conformance with data quality objectives (DQOs)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
If DQOs have not been met than a statement regarding whether the data are still valid and useable, and the underlying rationale for the conclusion	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Analysis of the hydraulic flow system in the vicinity of the site? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Rose diagrams which depict groundwater flow direction on groundwater elevation contour maps?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
An evaluation of changes in hydraulic flow system due to seasonal precipitation and groundwater pumping	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
An evaluation for potential interconnection between shallow and deep aquifers	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
An analysis of vertical hydraulic gradients, and effects of pumping rates on hydraulic head from nearby water supply wells	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Cross sections depicting the piezometric surface in different water bearing zones	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Hydrographs of all monitoring wells	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Hydrogeologic Setting Evaluation continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☐ No ☐ UND
Has the Hydrogeologic Setting Been Adequately Evaluated? (continued)	☐ Yes ☐ No ☐ UND

Plume (soil gas and groundwater) development and dynamics?	☐ **Yes** ☐ **No** ☒ **UND** ☐ **NE** ☐ **NA**
Evaluation of aging of source(s)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Evaluation of phase distribution (NAPL, dissolved, vapor, residual)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Evaluation of diving plumes	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Evaluation of attenuation mechanisms	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Evaluation of migration routes	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Presentation of magnitude of COCs	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Evaluation of spatial and temporal changes in concentrations	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Two-dimensional plan view maps of the source distribution and of groundwater and soil vapor plumes depicting the contaminant distribution of each COC	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Cross sections depicting the vertical delineation of groundwater plumes and source distribution	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Summary tables of chemical concentrations in different media (i.e., soil, groundwater, and soil vapor)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Environmental screening levels on all tables	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Graphs of contaminant concentrations versus time	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
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).	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Current site maps	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Current and historic site operations/ (e.g., parts cleaning, chemical storage areas, manufacturing, etc.)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Historic site maps	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Other contaminant release sites in the vicinity of the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Summary of work and technical findings from nearby release sites?	☐ Yes ☒ No ☐ UND ☐ **NE** ☐ NA

End of Hydrogeologic Setting Evaluation section

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated?	☐ Yes ☒ No ☐ UND

CA LUFT Manual Guidance Statement:

Source – "A "source" is/are the environmental medium/media containing elevated contaminant concentrations associated with a release. Some risk-based corrective action (RBCA) programs define the source to be the original cause of the contamination; however, it is possible that, by the time a site becomes a LUFT site, the original source has been eliminated and the current source of contamination is soil and/or groundwater. Items to consider when determining the source are included in the list below. Some of the specifics may be determined based on historical information; others will need to be determined during site assessment.

- The origin(s) of the release (e.g., a leaking UST, dispenser, product piping, and/or surface spill).
- The number of USTs, the capacity of the tanks (e.g., 12,000 gallons), the products stored, the date of installation, and the removal date(s) (if applicable).
- The location of historical and active USTs, dispensers, and product piping.
- Details about the specific release location(s) (e.g., spill locations and time frame/dates if known).
- The type of fuel released and the constituents of concern (COCs) associated with the fuel. The Fate and Transport chapter of this Manual presents guidance on identifying potential COCs associated with fuel.
- The historical use of fuel additives (e.g., methyl tertiary butyl ether [MTBE] or other fuel oxygenates, lead, lead scavengers).
- The media that are impacted (e.g., soil, groundwater).
- Other potential sources such as surface spills, aboveground storage tank (AST) leakage, or pipeline leakage.

The information needed to define the source—to be obtained during the site assessment—includes the following:

- Lateral and vertical extent of:
  - light non-aqueous-phase liquid (LNAPL)
  - COCs in unsaturated-zone soil
  - COCs in saturated-zone soil and the smear zone
  - COCs in groundwater
- The distribution of the COCs in the impacted media.

After evaluating the information obtained during site characterization, the extent and magnitude of the contamination can be defined. This is not an exact science; usually some assumptions will need to be made. In these cases, it is important, from a risk-evaluation perspective, to be conservative."

Free Product Evaluation

Has the presence of free product been evaluated?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has a preferential pathway study been conducted to determine the probability of free product encountering geologic and anthropogenic preferential pathways and conduits that can act as contaminant migration pathways to or from the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Is monitoring well construction adequate to detect the presence of free product?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Free product evaluation section continued on next page)

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☐ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☐ No ☐ UND

Free Product Evaluation (continued)

Has free product removal been implemented?	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA
If yes, removal method tried?	☐ Absorbent Materials ☒ Bailing ☐ Skimmer ☐ HVDPE ☒ Other
Is free product removal still being conducted?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does data indicate rebound of free product subsequent to product removal?	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA

Has MTBE soil and groundwater contamination been adequately characterized?

Sufficient data including tables and figures to assess whether MTBE is or was present in soil at the site	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA
Sufficient data including tables and figures to assess whether MTBE is or was present in groundwater at the site	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA

Has Pertinent Information Been Provided?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Description of investigation and monitoring activities that have been undertaken to assess whether free product is present?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Data including tables and figures showing any observation and measurements of free product?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Preferential pathway study results and conclusions?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Description of corrective action(s) that were taken to remove product, dates of removal actions, and volumes removed?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
An evaluation of whether free product removal is practicable, or if not practicable, a description of the conditions that prevent free product removal?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Discussion for monitoring well network and appropriateness of screen interval to detect free product?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Tabulation and evaluation of historic groundwater levels and flow direction and identification of smear zone?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has groundwater contamination been fully characterized? ☒ **Yes** ☐ **No** ☐ **UND** ☐ **NE** ☐ **NA**

Have petroleum hydrocarbons been detected in groundwater? ☐ **Yes** ☐ **No** ☐ **UND** ☐ **NE** ☐ **NA**

Motor Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Leaded Gasoline ☐ Unleaded Gasoline	☐ Undifferentiated
TPH Middle Distillates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Diesel ☐ Stoddard Solvent ☐ Jet Fuel	☐ Kerosene ☐ Home Heating Fuel ☐ Others
Residual Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Bunker C ☐ Waste Oils ☐ Hydraulic Oil	☐ Lubricating Oil ☐ Oil and Grease ☐ Others
Fuel Oxygenates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ MTBE ☐ ETBE ☐ TAME	☐ TBA ☐ DIPE ☐ Others
Lead Scavengers: ☐ Yes ☐ No ☐ NE ☐ NA	☐ EDB ☐ EDC	
Aromatic Compounds: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Benzene ☐ Toluene ☐ Ethylbenzene	☐ Xylenes ☐ Others
PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Naphthalene ☐ Others	

Have other contaminants been detected in In groundwater? ☐ **Yes** ☐ **No** ☐ **UND** ☐ **NE** ☐ **NA**

VOCs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ PCE ☐ TCE ☐ VC	☐ Chloroform ☐ Chlorobenzene ☐ Others
SVOCs: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Dioxans & Furans: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Other PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Creosote ☐ PNAs	
PCBs: ☐ Yes ☐ No ☐ NA ☐ NE	List:	
Phenols: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Phenol ☐ Others	
Metals: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Lead ☐ Cadmium ☐ Chromium	☐ Zinc ☐ Nickel ☐ Other
Organo Chlorine Herbicides and Pesticides: ☐ Yes ☐ No ☐ NE ☐ NA	List:	

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has soil contamination been fully characterized? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Have petroleum hydrocarbons been detected in soil? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Motor Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Leaded Gasoline ☐ Unleaded Gasoline	☐ Undifferentiated
TPH Middle Distillates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Diesel ☐ Stoddard Solvent ☐ Jet Fuel	☐ Kerosene ☐ Home Heating Fuel ☐ Others
Residual Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Bunker C ☐ Waste Oils ☐ Hydraulic Oil	☐ Lubricating Oil ☐ Oil and Grease ☐ Others
Fuel Oxygenates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ MTBE ☐ ETBE ☐ TAME	☐ TBA ☐ DIPE ☐ Others
Lead Scavengers: ☐ Yes ☐ No ☐ NE ☐ NA	☐ EDB ☐ EDC	
Aromatic Compounds: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Benzene ☐ Toluene ☐ Ethylbenzene	☐ Xylenes ☐ Others
PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Naphthalene ☐ Others	

Have other contaminants been detected in soil? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

VOCs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ PCE ☐ TCE ☐ VC	☐ Chloroform ☐ Chlorobenzene ☐ Others
SVOCs: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Dioxans & Furans: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Other PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Creosote ☐ PNAs	
PCBs: ☐ Yes ☐ No ☐ NA ☐ NE	List:	
Phenols: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Phenol ☐ Others	
Metals: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Lead ☐ Cadmium ☐ Chromium	☐ Zinc ☐ Nickel ☐ Other
Organo Chlorine Herbicides and Pesticides: ☐ Yes ☐ No ☐ NE ☐ NA	List:	

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Have the tank(s), piping, dispenser islands, or other appurtenant structures that released petroleum into the environment been removed, repaired or replaced? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Tanks	☐Removed	☐ Repaired	☐Replaced	☐ NA
Piping	☐Removed	☐ Repaired	☐Replaced	☐ NA
Dispenser Islands	☐Removed	☐ Repaired	☐Replaced	☐ NA
Other Structures	☐Removed	☐ Repaired	☐Replaced	☐ NA

Were/are the tanks permitted by a local regulatory agency having jurisdiction over USTs? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Have the operating records been reviewed (i.e., operating permit, types of products dispensed, tanks construction, tank capacity, tank tightness tests, etc)?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA

Have the USTs been properly decommissioned ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Was a tank removal permit issued by the local regulatory agency?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Was a tank removal report submitted and reviewed?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA

Were confirmation soil samples collected to confirm the presence or absence of an unauthorized release? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Were confirmation soil samples collected from the tank pit?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were confirmation soil samples collected from beneath the tank piping?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were confirmation soil samples collected from beneath the dispensers?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were the confirmation soil samples collected in accordance with the recommendations presented in the CA LUFT Manual (Tables 12-1 and 12-2)	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were the confirmation soil samples analyzed for the recommended minimum verification analysis for USTs (Tri Regional, October 10, 2006)?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA

Was groundwater encountered in the excavation? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Was the tank pit purged and allowed to refill before sampling?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Was impacted groundwater extracted from the pit?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were groundwater samples collected in accordance with the recommendations presented in the CA LUFT Manual?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA
Were the results evaluated for potentially negative bias in detected COCs due to aeration during excavation activities, or positive bias in detected COCs due to turbidity, sheen and product globules?	☐ Yes ☐ No ☐ UND ☐ NE ☐NA

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Have the tank(s), piping, dispenser islands, or other appurtenant structures that released petroleum into the environment been removed, repaired or replaced? (continued) ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Was stockpiled soil characterized and disposed of properly? ☐ Yes ☐ No ☐ NE ☐ NA

Were confirmation samples collected in accordance with the CA LUFT Manual? (i.e., one sample per 100 cubic yards of soil linearly and between 2 and 4 feet below the surface of the stockpile)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Was the stockpiled soil disposed of at an off-site permitted disposal site?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Was the stockpiled soil used as backfill in the tank pit?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Was the stockpiled soil treated on-site?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Was the stockpiled soil characterized and reused on site in accordance with the technical reference document entitled Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste (RWQCB, October 2006)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Was the tank pit and piping trench excavations backfilled with imported material? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Was the former tank pit backfilled with clean material with physical properties similar to the native material?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Was the former tank pit backfilled with clean material in accordance with the DTSC Information Advisory for Clean Imported Fill Material?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Is their evidence that a "bathtub" effect has been created in the former tank pit (i.e., groundwater mounding and dispersion)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Has Pertinent Information Been Provided?

Calculated mass remain in situ and contaminant degradation rate	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tables showing the maximum soil and groundwater concentrations detected at the site, and highest soil and groundwater concentration levels and deepest soil and groundwater concentrations remaining at the site after remediation	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Site maps showing maximum detected groundwater concentrations and current groundwater conditions in each well	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Site maps and cross section(s) showing lithology, boring and well locations and depths, sampling results, contaminant contours, and remediation locations	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tables and graphs showing vapor concentrations as well as periodic and cumulative vapor hydrocarbon removal rates and volumes, if vapor extraction has been conducted	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tables and graphs showing periodic and cumulative free product and groundwater removal rates and volumes, if free product and/or groundwater remediation has been conducted at the site	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Disposal information concerning any impacted materials generated at the site, such as manifests (when available)	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☐ No ☐ UND

Is there indication that a new release(s) have occurred subsequent to the initial release? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Soil	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Groundwater	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Soil Vapor	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Surface Water	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If yes, then,

Is the site currently an active commercial fueling station?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Have the tanks, piping, and/or dispenser islands moved to a different location at the site?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Are there spikes or increasing concentration trends in historic data subsequent to the initial release?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Are there new detections of free product subsequent to the initial release in historic data?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Have new contaminants been detected in historic data subsequent to the initial release?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Have new petroleum hydrocarbon or other hazardous products been dispensed of at the site since the initial release occurred?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
For active commercial fueling facilities, have the tanks failed tank tightness tests?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Is there indication of new impacts from offsite sources?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

A description of the release history, including potential source(s) of releases, potential COCs associated with each potential release, confirmed source locations, confirmed release locations, and existing delineation of release areas? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Primary leak source(s) (e.g., a tank, sump, pipeline, etc.)	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Secondary sources (e.g., high-concentration contaminants in low-permeability lithologic soil units that sustain groundwater or vapor plumes)	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Local and regional plan view maps that illustrate the location of sources (former facilities, piping, tanks, etc.)	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has the petroleum-impacted groundwater, at or immediately beneath the point of release from the primary source, been removed to the extent practicable? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If yes, then describe remediation method(s):

☐ AS/SVE	☐ DPE	☐ Excavation	☐ SVE	☐ P&T
☐ In-situ Injection	☐ Ozone Sparge	☐ PRB	☐ Other	

Is site remediation in progress? ☐ Yes ☐ No ☐ NA

If yes, then describe remediation method(s)

☐ AS/SVE	☐ DPE	☐ Excavation	☐ SVE	☐ P&T
☐ In-situ Injection	☐ Ozone Sparge	☐ PRB	☐ Other	

Estimated time frame to complete remediation:

☐ ≤ 6 months ☐ > 6 months and ≤ 1 year ☐ > 1 year and ≤ 5 years ☐ > 5 years

Identify impediments to removing petroleum-impacted groundwater:

☐ Remediation Was Designed Incorrectly	☐ Poor Remediation O&M
☐ Remediation Was Shut Off Prematurely	☐ Other
☐ Site conditions prevent secondary source (e.g., physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible)	

Are additional removal or active remedial actions Necessary to abate a demonstrated threat to human health? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If yes, then describe:

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has petroleum-impacted soil, at or immediately beneath the point of release from the primary source, been removed to the extent practicable? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If yes, then describe remediation method(s):

☐ AS/SVE	☐ DPE	☐ Excavation	☐ SVE	☐ P&T
☐ In-situ Injection	☐ Ozone Sparge	☐ PRB	☐ Other	

Is site remediation in progress? ☐ Yes ☐ No ☐ NA

If yes, then describe remediation method(s)

☐ AS/SVE	☐ DPE	☐ Excavation	☐ SVE	☐ P&T
☐ In-situ Injection	☐ Ozone Sparge	☐ PRB	☐ Other	

Estimated time frame to complete remediation:

☐ ≤ 6 months ☐ > 6 months and ≤ 1 year ☐ > 1 year and ≤ 5 years ☐ > 5 years

Identify impediments to removing petroleum-impacted groundwater:

☐ Remediation Was Designed Incorrectly	☐ Poor Remediation O&M
☐ Remediation Was Shut Off Prematurely	☐ Other
☐ Site conditions prevent secondary source (e.g., physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible)	

Are additional removal or active remedial actions Necessary to abate a demonstrated threat to human health? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If yes, then describe:

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has sufficient data been presented to demonstrate that site characterization activities have defined the horizontal and vertical extent of the plume?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Has plume stability been demonstrated using a valid technical analysis that considers the following?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
The accuracy of data from the wells	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Placement within the plume	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Changes in areal extent of the plume	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Valid concentration trends within the plume (Note: plotting of decreasing concentrations using data from a single well is not likely to be sufficient)	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Have the following factors been considered?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Seasonal variability	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Water level changes	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Sampling methods	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Well construction	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Other factors that can affect data	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Has a recent well survey that uses all available wells from the following agencies been presented?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Department of Water Resources	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Zone 7 Water Agency	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Alameda County Public Works	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Is data on supply wells located within 2,000 feet of the site presented?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Figure (with rose diagram) identifying each well	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Table with the well construction details	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has the following pertinent information been provided?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
History of pilot tests conducted at the site including the types of tests conducted, dates of actions, and results?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
History of corrective actions for the site including the types of cleanup actions taken, dates of the actions, and mass removed?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Figures depicting the location of the removal action?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Confirmation sampling results which demonstrate the effectiveness of secondary source removal?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Narrative description of the actions and areas of success or infeasibility of actions?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Long-term monitoring data for in-situ corrective actions that demonstrate the concentrations have not rebounded following the cessation of corrective actions?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Has pertinent information been provided to assess if contamination consists only of petroleum?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Phase I Reports identifying potential COCs?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Description of site history, types of products or chemical used at the site?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Historic site /facilities maps showing locations of chemical storage, releases, underground utilities, and storm drains?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Historic aerial photos?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Sanborn Maps?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
History of types of releases?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Hazardous Material Business Plans?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Figures and tabulation and discussion of sampling results for all chemicals other than petroleum?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Data including figures and, tables and discussion of off-site sources?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Discussion of whether detected COCs in soil, soil vapor and groundwater are consistent with reported site uses and documented facility COCs?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

(Source Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Has the Source(s) Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has Pertinent Information Been Provided?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Description of the history of release(s) and the actions that were were taken to stop each release not provided or incomplete?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Evaluation and accounting for changing contaminant?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tabulation and discussion of sampling results and evaluation of increasing/decreasing concentration trends over the full time period of site investigation?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Concentration graphs versus time?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tank Removal Report?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Tank Tightness Tests?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Initial Unauthorized Release report?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
UST Permit (current)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Hazardous Materials Business Plans (historic and current)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Data from other sites in the vicinity with unauthorized releases of petroleum hydrocarbons or other hazardous materials?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

*****End of Source Evaluation Section*****

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☑ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated?	☐ Yes ☑ No ☐ UND

CA LUFT Manual Guidance Statement:

Contaminant Transport and Exposure Pathways – "Pathways are the mechanisms by which a receptor may contact the COCs at a site. Exposure pathways consist of: (1) a source of contaminants (as described previously), (2) contaminant transport or the physical migration of the contaminants, (3) a point of exposure where the receptor may come into contact with contaminants, and (4) an exposure route (such as ingestion or inhalation).

The Fate and Transport chapter of this Manual provides guidance on the various phases of petroleum constituents and how they behave in the subsurface. This information is critical for evaluating migration pathways or indirect exposure pathways. Typical migration pathways for LUFT sites include:

- LNAPL migration from the source area through soil.
- Dissolved-phase migration of COCs in the groundwater zone.
- Vapor migration of COCs from soil, groundwater, or LNAPL.
- Migration of COCs with groundwater and discharging of COCs to surface water.

In the surface-water example, the receptors may include ecological receptors as well as human receptors."

Points of Exposure – "A "point of exposure" is where a receptor comes into contact with contamination. The exposure point may, or may not, be at the same location as the source. Exposure points should include potential future uses of the land, including adjacent land if there is a potential for exposure to off-site receptors (e.g., groundwater containing LNAPL moving downgradient, or volatilization into a future residence). Some examples of points of exposure include:

- Surface soil
- Water faucet used for drinking water
- Air inside a residence or commercial/industrial building
- Outdoor (ambient) air (from volatilization from surface soil to air)

For ecological receptors, the exposure point may be surface water or sediment that has been impacted (or could become impacted) from the source.

Exposure Route - Exposure routes are the mechanisms by which receptors may come into contact with contamination. Exposure routes at LUFT sites include:

- Dermal contact with contaminated soil
- Ingestion of contaminated soil
- Inhalation of outdoor air impacted by volatile emissions
- Ingestion of contaminated groundwater
- Inhalation of vapors (in indoor air at a residence or commercial building) from contaminated soil, groundwater, or LNAPL
- Dermal contact with impacted surface water and/or sediments

While developing the CSM, each of the elements of a pathway should be considered and investigated as necessary. For example, if groundwater at the site is not potable and the COCs in groundwater are not expected to migrate and impact a current or future potable water source above established limits, then the groundwater migration pathway may be eliminated."

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has soil gas contamination been fully characterized? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Have petroleum hydrocarbons been detected in soil gas? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Motor Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Leaded Gasoline ☐ Unleaded Gasoline	☐ Undifferentiated
TPH Middle Distillates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Diesel ☐ Stoddard Solvent ☐ Jet Fuel	☐ Kerosene ☐ Home Heating Fuel ☐ Others
Residual Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Bunker C ☐ Waste Oils ☐ Hydraulic Oil	☐ Lubricating Oil ☐ Oil and Grease ☐ Others
Fuel Oxygenates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ MTBE ☐ ETBE ☐ TAME	☐ TBA ☐ DIPE ☐ Others
Lead Scavengers: ☐ Yes ☐ No ☐ NE ☐ NA	☐ EDB ☐ EDC	
Aromatic Compounds: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Benzene ☐ Toluene ☐ Ethylbenzene	☐ Xylenes ☐ Others
PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Naphthalene ☐ Others	

Have other contaminants been detected in soil gas? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

VOCs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ PCE ☐ TCE ☐ VC	☐ Chloroform ☐ Chlorobenzene ☐ Others
SVOCs: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Dioxans & Furans: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Other PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Creosote ☐ PNAs	
PCBs: ☐ Yes ☐ No ☐ NA ☐ NE	List:	
Phenols: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Phenol ☐ Others	
Metals: ☐ Yes ☒ No ☐ NE ☐ NA	☐ Lead ☐ Cadmium ☐ Chromium	☐ Zinc ☐ Nickel ☐ Other
Organo Chlorine Herbicides and Pesticides: ☐ Yes ☐ No ☐ NE ☐ NA	List:	

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☑ No ☐ UND

Has surface water contamination been fully characterized? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Have petroleum hydrocarbons been detected in surface water? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Motor Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Leaded Gasoline ☐ Unleaded Gasoline	☐ Undifferentiated
TPH Middle Distillates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Diesel ☐ Stoddard Solvent ☐ Jet Fuel	☐ Kerosene ☐ Home Heating Fuel ☐ Others
Residual Fuels: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Bunker C ☐ Waste Oils ☐ Hydraulic Oil	☐ Lubricating Oil ☐ Oil and Grease ☐ Others
Fuel Oxygenates: ☐ Yes ☐ No ☐ NE ☐ NA	☐ MTBE ☐ ETBE ☐ TAME	☐ TBA ☐ DIPE ☐ Others
Lead Scavengers: ☐ Yes ☐ No ☐ NE ☐ NA	☐ EDB ☐ EDC	
Aromatic Compounds: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Benzene ☐ Toluene ☐ Ethylbenzene	☐ Xylenes ☐ Others
PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Naphthalene ☐ Others	

Have other contaminants been detected in surface water? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

VOCs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ PCE ☐ TCE ☐ VC	☐ Chloroform ☐ Chlorobenzene ☐ Others
SVOCs: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Dioxans & Furans: ☐ Yes ☐ No ☐ NE ☐ NA	List:	
Other PAHs: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Creosote ☐ PNAs	
PCBs: ☐ Yes ☐ No ☐ NA ☐ NE	List:	
Phenols: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Phenol ☐ Others	
Metals: ☐ Yes ☐ No ☐ NE ☐ NA	☐ Lead ☐ Cadmium ☐ Chromium	☐ Zinc ☐ Nickel ☐ Other
Organo Chlorine Herbicides and Pesticides: ☐ Yes ☐ No ☐ NE ☐ NA	List:	

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: **Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed?** (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has the site been evaluated for vapor intrusion? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Guidance Statement: Analyte List. Indoor air should be analyzed for all known and potential subsurface contaminants so that contaminants in the subsurface and indoor air can be correlated in the evaluation of vapor intrusion and the cumulative health risks associated with vapor intrusion can be characterized. Limiting the indoor air testing to a few target analytes is not recommended, particularly for initial sampling events. Subsequent to the initial sampling event, limiting target analytes might be justified on a case-by-case basis for sites that are fully characterized and all contaminants are known with certainty. Analyzing air samples for a large suite of analytes may detect vapor intrusion-derived contaminants not previously detected in the subsurface. Contaminants may not have been detected in the subsurface for various reasons, including but not limited to, a) elevated detection limits resulting from high concentrations of co-contaminants, b) sampling and analytical errors, c) temporal and spatial variation, d) inappropriate sampling locations and depths, and e) generation of unanticipated degradation and transformation products. Multiple lines of evidence should be used to determine vapor intrusion-derived contaminants. Data for indoor sources may indicate a potential background risk that should be communicated to occupants and considered in risk management decisions concerning the subsurface contamination. It is generally desirable to conduct concurrent sampling of other media, such as sub-slab soil gas, and/or groundwater, when sampling indoor air. Sampling all media concurrently will give a more accurate representation of contaminant migration and reduce the uncertainty associated with the temporal variability in contaminant concentration data."

"The chemicals in Table 1 [see next page] are volatile and toxic enough to pose an indoor air risk. If a site contains any of the chemical listed in Table 1, the site should be evaluated for vapor intrusion."

(DTSC, October 2011)

Does the site contain any of the chemicals listed in Table 1 (see next page)?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Table 1 – List of Chemicals to be Considered for the Vapor Intrusion Pathway (DTSC, Vapor Intrusion Guidance Manual)

Chemical	Chemical	Chemical
☐ 1,1,1,2-Tetrachloroethane	☐ Benzylchloride	☐ Hexachlorobenzene
☐ 1,1,1-Trichloroethane	☐ beta-Chloronaphthalene	☐ Hexachlorocyclopentadiene
☐ 1,1,2,2-Tetrachloroethane	☐ Biphenyl	☐ Hexachloroethane
☐ 1,1,2-Trichloro-1,2,2-trifluoroethane	☐ Bis(2-chloroethyl)ether	☐ Hexane
☐ 1,1,2-Trichloroethane	☐ Bis(2-chloroisopropyl)ether	☐ Hydrogen cyanide
☐ 1,1-Dichloroethane	☐ Bis(chloromethyl)ether	☐ Isobutanol
☐ 1,1-Dichloroethylene	☐ Bromodichloromethane	☐ Mercury (elemental)
☐ 1,2,3-Trichloropropane	☐ Bromoform	☐ Methacrylonitrile
☐ 1,2,4-Trichlorobenzene	☐ Carbon disulfide	☐ Methoxychlor
☐ 1,2,4-Trimethylbenzene	☐ Carbon tetrachloride	☐ Methyl acetate
☐ 1,2-Dibromo-3-chloropropane	☐ Chlordane	☐ Methyl acrylate
☐ 1,2-Dibromoethane	☐ Chlorobenzene	☐ Methyl bromide (bromomethane)
☐ 1,2-Dichlorobenzene	☐ Chlorodibromomethane	☐ Methyl chloride (chloromethane)
☐ 1,2-Dichloroethane	☐ Chlorodifluoromethane	☐ Methyl tert-butyl ether (MTBE)
☐ 1,2-Dichloropropane	☐ Chloroethane (ethyl chloride)	☐ Methylcyclohexane
☐ 1,3,5-Trimethylbenzene	☐ Chloroform	☐ Methylene bromide
☐ 1,3-Butadiene	☐ Chrysene	☐ Methylene chloride
☐ 1,3-Dichlorobenzene	☐ cis-1,2-Dichloroethylene	☐ Methylethylketone (2-butanone)
☐ 1,3-Dichloropropene	☐ Crotonaldehyde (2-butenal)	☐ Methylisobutylketone
☐ 1,4-Dichlorobenzene	☐ Cumene (isopropylbenzene)	☐ Methylmethacrylate
☐ 1,4-Dioxane	☐ DDE	☐ Monochlorobiphenyl (PCB)
☐ 1-Chlorobutane	☐ Dibenzofuran	☐ m-Xylene
☐ 2-Chloro-1,3-butadiene (chloroprene)	☐ Dichlorobiphenyl (PCB)	☐ Naphthalene
☐ 2-Chlorophenol	☐ Dichlorodifluoromethane	☐ n-Butylbenzene
☐ 2-Chloropropane	☐ Dieldrin	☐ Nitrobenzene
☐ 2-Methylnaphthalene	☐ Diisopropyl ether (DIPE)	☐ N-Nitroso-di-n-butylamine
☐ 2-Nitropropane	☐ Endosulfan	☐ n-Propylbenzene
☐ Acenaphthene	☐ Epichlorohydrin	☐ o-Nitrotoluene
☐ Acetaldehyde	☐ Ethyl ether	☐ o-Xylene
☐ Acetone	☐ Ethyl tert-butyl ether (ETBE)	☐ p-Xylene
☐ Acetonitrile	☐ Ethylacetate	☐ Pyrene
☐ Acetophenone	☐ Ethylbenzene	☐ sec-Butylbenzene
☐ Acrolein (propenal)	☐ Ethylene oxide	☐ Styrene
☐ Acrylonitrile	☐ Ethylmethacrylate	☐ Tert-amyl methyl ether (TAME)
☐ Aldrin	☐ Fluorene	☐ Tert-butyl alcohol (TBA)
☐ alpha-HCH (alpha-BHC)	☐ Furan	☐ tert-Butylbenzene
☐ Benzaldehyde	☐ gamma-HCH (lindane)	☐ Tetrachloroethylene
☐ Benzene	☐ Heptachlor	☐ Toluene
☐ Benzo(b)fluoranthene	☐ Hexachloro-1,3-butadiene	☐ trans-1,2-Dichloroethylene

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Mitigation Measures and Engineering Controls:

As a result of controlling exposure through the use of mitigation measures and/or engineering controls, has it been determined that the concentrations of petroleum constituents in soil will haveno significant risk of adversely affecting human health? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Are there existing mitigation measures and engineering controls at the site? ☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

☐ Vapor Intrusion Barriers	☐ Subslab Ventilation	☐ Interceptor Trench
☐ Cap	☐ Permeable Reactive Barrier	☐ Other

If other, then describe:

Are there proposed mitigation measures and engineering controls at the site?

☐ Vapor Intrusion Barriers	☐ Sub-slab Ventilation	☐ Interceptor Trench
☐ Cap	☐ Permeable Reactive Barrier	☐ Other

If other, then describe:

Has Pertinent Information Been Provided?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Financial assurance Requirements	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Soil Management Plan	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Mitigation or Engineering Control System Documentation	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

- ☐ Design documents
- ☐ Construction documents
- ☐ As-built Documentation
- ☐ Operations & Maintenance Plans
- ☐ Monitoring and Reporting Plan
- ☐ Contingency Plans

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Institutional Controls:

As a result of controlling exposure through the use of Institutional controls (existing or proposed), has it been determined that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health? ☐ Yes ☐ No ☐ UND ☐ NE ☒ NA

Are proprietary controls in place or proposed:

☐ Easements ☐ Covenants ☐ Other

Are governmental controls in place or proposed?

☐ Zoning Ordinances	☐ Waste Discharge Requirements
☐ Building Modification Restrictions	☐ Financial Assurance Mechanisms
☐ Groundwater Use Restrictions	☐ Enforcement Mechanisms
☐ Air Permits	☐ Other
☐ Excavation Restrictions	

Are informational devices in place or proposed:

☐ Health Advisories	☐ SWRCB GeoTracker Website
☐ Deed Notices	☐ Other State Registries or Tracking Systems

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has a utility corridor assessment been conducted to determine if utility corridors (sewer, electrical, fiber optic cable, cable, water, etc) are present?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have facility and public records showing the spatial locations of existing utility corridors been reviewed?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Is there enough information for a CSM?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Do future development activities include new utility corridors or covering of large areas of the site with pavement that may significantly alter vapor migration and concentrations?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Do these conduits lead from subsurface contamination to occupied buildings	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does a continuous low permeability surface (such as pavement or surface clay layers) cover the ground between the contamination and the building?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does the vadose zone have very high gas permeability due to fracturing?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has a field investigation been conducted of utility corridors (active and/or passive soil gas survey)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Are vapors present in the utility corridors?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Do vapors pose and unacceptable risk to indoor occupants?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have remedial actions been developed and implemented to mitigate vapors in the utility corridors?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Vapor Intrusion Evaluation

Has the subsurface contamination reached steady state state conditions (i.e., have the subsurface soil gas and groundwater plumes reached the maximum migration potential)?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Has data been collected over a sufficient period of time to determine contaminant trends of groundwater monitoring plumes?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Do temporal contaminant trends of data collected from routine sampling of groundwater monitoring wells indicate stable or decreasing treads?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Has data been collected over a sufficient period of time to determine contaminant trends of soil gas plumes?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Do temporal contaminant trends of data collected from routine sampling of permanent or temporary soil gas sampling points indicate stable or decreasing treads?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
If there is minimal temporal soil gas data, has the length of time to reach steady-state conditions been estimated from the date that the chemical releases ceased at the site using the methods in Johnson and others (1999)	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

Have Existing and Future Buildings been Evaluated?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have existing buildings within 100 feet of soil gas or groundwater plumes been evaluated for vapor intrusion?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have existing buildings greater than 100 feet from a plume boundary, with a preferential pathway(either natural or anthropogenic) that link the buildings with the contaminant plume been evaluated for vapor intrusion been evaluated for vapor intrusion?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
For future buildings, do development activities include new utility corridors or covering of large areas of the site with pavement that may significantly alter vapor migration and concentrations?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
At sites where unacceptable contaminant levels are left in the subsurface, are engineering controls proposed for future buildings within 100 feet from contamination?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does a continuous low permeability surface (such as pavement or surface clay layers) cover the ground between the contamination and the building?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Does the vadose zone have very high gas permeability due to fracturing?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has a site specific risk assessment been conducted in accordance the risk assessment guidance documents referenced in the SWRCB Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways (SWRCB, 2012)?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
USEPA "Risk Assessment Guide for Superfund (RAGS) Volume I Human Health Evaluation Manual (Part A)", EPA/540/1/89/002, December 1989	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
ASTM "Standard Guide to Risk-Based Corrective Action Applied at Petroleum Release Sites", E1739-95,1995	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
DTSC Office of Human and Ecological Risk (HERO) "Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities", May 2011	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
USEPA "Integrated Risk Information System (on-line database of toxicity parameters (May 2011)	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Was the risk assessment conducted in accordance with the DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (October 2011)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Were the following DTSC Guidance recommendations followed?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Use of multiple lines of evidence (i.e., soil gas, soil matrix, and groundwater data) to reasonably estimate the level of risk posed by vapor intrusion?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Use of maximum contaminant concentrations (i.e., data collected above the source)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Use of reasonable site-specific input parameters in the California version of the USEPA's Vapor Intrusion Model by Johnson and Ettinger, created by the DTSC to include California-specific chemical toxicity factors?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Calculation of cumulative health effects conducted?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Use of data representing seasonable variability before making a final risk determination as short term measurements rarely represent long-term conditions?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
No preferential pathways exist at the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Knowledge of adjacent building construction (e.g., slab-on-grade, crawl spaces, etc.)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Contaminant Transport and Exposure Pathways Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Contaminant Transport and Exposure Pathways Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Preferential pathway study to determine the potential probability of non-aqueous phase liquid (NAPL) and/or plumes (groundwater and/or soil vapor) encountering preferential pathways and conduits (geologic and anthropogenic) that can act as contaminant migration pathways to or from the site? ☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Evaluation of historic land uses at and in the vicinity of the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Identification of underground utility lines and trenches (e.g., sewers, storm drains, water, electric, gas, remediation piping, trench backfill, etc.) and wells that could act as preferential pathways within and near the site and plume area(s)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Maps and cross-sections illustrating historic groundwater elevations at the site and location and depth of all utility lines and trenches within and near the site and plume areas(s)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Identification of all active, inactive, standby, decommissioned (sealed with concrete), unrecorded, and abandoned (improperly decommissioned or lost) wells including monitoring, remediation, irrigation, water supply, dewatering, drainage, and cathodic protection wells within a one mile radius of the subject site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Copies of historical maps, such as Sanborn maps, aerial photographs, etc.?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

*****End of Contaminant Transport and Exposure Pathways Evaluation Section*****

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☐ No ☐ UND
Have Receptors Been Adequately Evaluated?	☐ Yes ☐ No ☐ UND

CA LUFT Manual Guidance Statement:

Receptors – "A receptor is a human or other living organism with the potential to be exposed to and adversely affected by contaminants as a result of contact with contaminated media either at the source or along a contaminant migration pathway. Potential receptors at LUFT sites may include:

- Adults and children in a residential scenario
- Adults in an occupational scenario
- Adults in a construction/utility worker scenario
- Adults and children using groundwater that has been contaminated by a release at the site as a potable water supply
- Aquatic receptors such as fish and benthic invertebrates

"Sensitive" human receptors are not evaluated separately, because the California Environmental Protection Agency (Cal/EPA) and the United States Environmental Protection Agency (EPA) toxicity values used in risk evaluations already consider sensitive subgroups.

Terrestrial ecological receptors may not be a very common type of receptor, considering that LUFT sites are typically small, paved, and located in largely urban and/or otherwise disturbed environments. Significant impacts to ecological receptors are unlikely to occur in most cases. However, if the potential to impact sensitive habitats or nearby surface water exists, these receptors should be included in the CSM. Situations in which potential impacts to ecological receptors may warrant evaluation include cases in which impacted groundwater may migrate and discharge to nearby surface-water bodies and cases in which the LUFT site is located in areas where special-status ecological receptors may reside.

It is important to consider the current and reasonably likely future uses of the site and adjacent properties when identifying receptors. Local zoning and planning agencies can generally assist in these determinations. Determining conditional uses at the LUFT site and adjacent properties is important, because changes in use may require consideration of different receptors. For example, a light-industrial park being re-developed for residential living needs to be evaluated for both adults and children who may live on the property.

Receptor Identification - The types of potential receptors located on adjacent properties should be identified if they could come onto the site or be exposed to the chemicals at the site. The extent of the area where receptors should be identified will vary based on the exposure pathways, as well as the extent and type of contamination.

In order to identify whether receptors may be drinking potentially impacted groundwater, a survey of water supply wells near the site may be conducted. (See the Fate and Transport chapter for more information on potential plume lengths.) This survey is generally based on reviewing Department of Water Resources (DWR) well records and asking local water district and applicable City and/or County staff if they are aware of any wells within the search radius. Areas with known multiple private wells nearby may require door-to-door contact of local residents to determine their source of water.

Information about water-supply wells can often be obtained from the well owner. Desired information includes:

- Current status of the well (operational or idle) and pumping rate.
- Purpose of the well, such as drinking water, irrigation, industrial, livestock, etc.
- Well construction details (i.e., the depth and length of the well screen and sand pack interval)."

(Receptors Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Receptors Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has the following pertinent information been provided?

Has sufficient data been presented to demonstrate that site characterization is complete for the prescribed depth ranges of 0 to 5 feet in order to assess protection from ingestion of soil, dermal contact with soil, and inhalation of volatile soil emissions and inhalation of particulate emissions?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has sufficient data been presented to demonstrate that site characterization is complete for the prescribed depth ranges of 5 to 10 feet in order to assess protection from inhalation of volatile soil emissions?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has analytical data for all chemicals of concern including total petroleum hydrocarbons been presented in order to assess whether unique conditions not considered in the Policy may exist at the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have figures and tables showing the soil data for each of the prescribed depth ranges with a comparison to the screening levels for each exposure scenario been presented?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has data representativeness, quality, and spatial distribution relative to current or potential receptors and sources, and temporal variability been considered in the evaluation?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Has a description of current and expected future land use, redevelopment, or construction for the site been presented?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Sufficient data to evaluate whether site contamination is present in locations that currently exist or potentially could exist in the future to pose nuisance conditions during common or reasonably expected site activities?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Descriptions of the type and vertical and lateral extent of shallow soil?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Data on the lateral extent of surface soil contamination?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Discussion of odors or visual evidence of contamination?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Preferential pathway and utility conduit surveys?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Review of potential points for exposure such as groundwater seeps into basements?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Current use of the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Expected use of the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Description of surface water runoff from the property to storm drains or other sites?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Receptors Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☐ No ☐ UND
Have Receptors Been Adequately Evaluated? (continued)	☐ Yes ☐ No ☐ UND

If Yes, then Describe Nuisance Condition:

Is injurious to health, indecent or offensive to the senses, or is an obstruction to the free use of property so as to interfere with the comfortable enjoyment of life or property?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Occurs during, or as a result of, the treatment or disposal of wastes?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

(Receptors Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Receptors Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Are indoor air concentrations in existing buildings acceptable? ☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

Is the site a candidate for vapor intrusion?	☒ Yes ☐ No ☐ UND ☐ NE ☐ NA
Has a site-specific evaluation of vapor intrusion been conducted in accordance with the USEPA Vapor Intrusion model?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Have the geotechnical parameters in the model been adequately determined to reduce uncertainty concerning human health exposure (i.e., have physical properties (i.e., bulk density, grain size distribution, total porosity, moisture content, fraction of organic carbon) of the vadose zone been determined)?	☐ Yes ☒ No
Has the average soil and groundwater temperature been used to correct Henry's law constant for the chemical of concern?	☐ Yes ☐ No
Is there an imminent hazard in existing buildings?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Has an emergency remedial action been conducted?	☐ Yes ☒ No
Does the site pass a screening evaluation?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Has a Building Survey been conducted?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Have indoor air samples been collected and data evaluated?	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

(Receptors Evaluation section continued on next page)

General Criteria e: Has a conceptual site model that adequately assesses the nature, extent, and mobility of the release been developed? (continued)	☐ Yes ☒ No ☐ UND
Have Receptors Been Adequately Evaluated? (continued)	☐ Yes ☒ No ☐ UND

Has the following Pertinent Information been Provided? (continued)

Land uses and exposure scenarios on the facility and adjacent properties?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Beneficial resources (e.g., groundwater classification, wetlands, natural resources, etc.)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Resource use locations (e.g., water supply wells, surface water intakes)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Subpopulation types and locations (e.g., schools, hospitals, day care centers, etc.)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Exposure scenarios (e.g. residential, industrial, recreational, farming)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Exposure pathways and potential threat to sensitive receptors	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Analysis of the contaminant volatilization from the subsurface to indoor/outdoor air exposure route (i.e., vapor pathway)?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Sanborn maps?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Aerial photographs?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Site development plans?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

Are there existing water supply wells or other sources of water in the vicinity of the site? ☐ Domestic Water Supply Wells ☐ Irrigation Wells ☐ Other Capture Systems	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Are these supply wells or other sources of water used by property owners/tenants in the vicinity of the site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have these supply wells or other sources of water been sampled for chemicals of concern (COCs) associated with the release site?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Have these supply wells or other sources of been properly abandoned?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA
Could these other water sources be reasonably anticipated to be relied on by property owners in the site vicinity during drought conditions or post emergency situations?	☐ Yes ☒ No ☐ UND ☐ NE ☐ NA

DWR Well Search	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Alameda County Public Works Well Search	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Neighborhood backyard domestic water/irrigation well assessment including canvassing/survey results	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Agreements between Responsible Parties (RPs) and property owners to discontinue operation of domestic well use	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Results of domestic well sampling and analytical results	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Well destruction records	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

*****End of Receptors Evaluation Section*****

*****End of General Criteria e Evaluation Section*****

General Criteria f - Has secondary source been removed to the extent practicable?

☐ Yes ☒ No
☐ UND

LTCP Statement: "Secondary source" is defined as petroleum-impacted soil or groundwater located at or immediately beneath the point of release from the primary source. Unless site attributes prevent secondary source removal (e.g. physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible), petroleum-release sites are required to undergo secondary source removal to the extent practicable as described herein. "To the extent practicable" means implementing a cost-effective corrective action which removes or destroys-in-place the most readily recoverable fraction of source-area mass. It is expected that most secondary mass removal efforts will be completed in one year or less. Following removal or destruction of the secondary source, additional removal or active remedial actions shall not be required by regulatory agencies unless (1) necessary to abate a demonstrated threat to human health or (2) the groundwater plume does not meet the definition of low threat as described in this policy."

CA LUFT Manual Guidance:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ Yes ☒ No ☐ UND

End of General Criteria f evaluation section

General Criteria g - Has soil or groundwater been tested for MTBE and results reported in accordance with Health and Safety Code Section 25296.15?	☐ Yes ☒ No ☐ UND

LTCP Statement: "Health and Safety Code section 25296.15 prohibits closing a UST case unless the soil, groundwater, or both, as applicable have been tested for MTBE and the results of that testing are known to the Regional Water Board. The exception to this requirement is where a regulatory agency determines that the UST that leaked has only contained diesel or jet fuel. Before closing a UST case pursuant to this policy, the requirements of section 25296.15, if applicable, shall be satisfied."

CA LUFT Manual Guidance:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☒ **No** ☐ **UND**

*****End of General Criteria g Evaluation Section*****

General Criteria h: Does a nuisance as defined by Water Code section 13050 exist at the site?	☐ Yes ☒ No ☐ UND

LTCP Statement: "Water Code section 13050 defines "nuisance" as anything which meets all of the following requirements:

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

For the purpose of this policy, waste means a petroleum release."

CA LUFT Manual Guidance:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☒ **No** ☐ **UND**

*****End of General Criteria h Evaluation Section*****

1. **Media Specific Criteria: Groundwater**: Does the site meet the LTCP criteria for groundwater?	☐ Yes ☐ No ☐ UND

LTCP Statement: "This policy describes criteria on which to base a determination that threats to existing and anticipated beneficial uses of groundwater have been mitigated or are de minimis, including cases that have not affected groundwater.

State Water Board Resolution 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304* is a state policy for water quality control and applies to petroleum UST cases. Resolution 92-49 directs that water affected by an unauthorized release attain either background water quality or the best water quality that is reasonable if background water quality cannot be restored. Any alternative level of water quality less stringent than background must be consistent with the maximum benefit to the people of the state, not unreasonably affect current and anticipated beneficial use of affected water, and not result in water quality less than that prescribed in the water quality control plan for the basin within which the site is located. Resolution No. 92-49 does not require that the requisite level of water quality be met at the time of case closure; it specifies compliance with cleanup goals and objectives within a reasonable time frame.

Water quality control plans (Basin Plans) generally establish "background" water quality as a restorative endpoint. This policy recognizes the regulatory authority of the Basin Plans but underscores the flexibility contained in Resolution 92-49.

It is a fundamental tenet of this low-threat closure policy that if the closure criteria described in this policy are satisfied at a petroleum unauthorized release site, attaining background water quality is not feasible, establishing an alternate level of water quality not to exceed that prescribed in the applicable Basin Plan is appropriate, and that water quality objectives will be attained through natural attenuation within a reasonable time, prior to the expected need for use of any affected groundwater.

If groundwater with a designated beneficial use is affected by an unauthorized release, to satisfy the media-specific criteria for groundwater, the contaminant plume that exceeds water quality objectives must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites listed below. A plume that is "stable or decreasing" is a contaminant mass that has expanded to its maximum extent: the distance from the release where attenuation exceeds migration."

CA LUFT Manual Guidance:

(Media Specific Criteria for Groundwater Evaluation section continued on next page)

1. **Media Specific Criteria: Groundwater**: Does the site meet the LTCP criteria for groundwater?	☐ Yes ☒ No ☐ UND
Does the Site Qualify for the Soil Only Case Exemption (Release has not Affected Groundwater)?	☐ Yes ☒ No ☐ UND

LTCP Statement: "Sites with soil that does not contain sufficient mobile constituents [leachate, vapors, or light non-aqueous-phase liquids (LNAPL)] to cause groundwater to exceed the groundwater criteria in this policy shall be considered low-threat sites for the groundwater medium. Provided the general criteria and criteria for other media are also met, those sites are eligible for case closure. For older releases, the absence of current groundwater impact is often a good indication that residual concentrations present in the soil are not a source for groundwater pollution."

CA LUFT Manual Guidance:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☒ **Yes** ☐ **No** ☐ **UND**

*****End of Soil Only Exemption evaluation section*****

(Media Specific Criteria for Groundwater Evaluation section continued on next page)

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

1. **Media Specific Criteria: Groundwater:** Does the site meet the LTCP criteria for groundwater?	☐ Yes ☒ No ☐ UND
If Site Does Not Qualify for Soil Only Exemption, then, **Is the contaminant plume that exceeds water quality objectives stable or decreasing in areal extent, and meets all of the additional characteristics of one of the five classes of sites listed below?**	☐ Yes ☐ No ☒ UND

LTCP Statement: "A plume that is stable or decreasing is a contaminant mass that has expanded to its maximum extent: the distance from the release where attenuation exceeds migration."

CA LUFT Manual Guidance:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☒ **No** ☐ **UND**

*****End of Plume Stability Evaluation Section*****

(Media Specific Criteria for Groundwater Evaluation section continued on next page)

1. **Media Specific Criteria: Groundwater**: Does the site meet the LTCP criteria for groundwater?	☐ Yes ☒ No ☐ UND
Is the contaminant plume that exceeds water quality objectives stable or decreasing in areal extent, and meets all of the additional characteristics of one of the five classes of sites listed below? (continued)	☐ Yes ☐ No ☒ UND

CA LUFT Manual Guidance:

(Plume Characteristics Evaluation continued on next page)

(Media Specific Criteria for Groundwater Evaluation section continued on next page)

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

1. **Media Specific Criteria: Groundwater**: Does the site meet the LTCP criteria for groundwater?	☐ Yes ☒ No ☐ UND
Is the contaminant plume that exceeds water quality objectives stable or decreasing in areal extent, and meets all of the additional characteristics of one of the five classes of sites listed below? (continued)	☐ Yes ☐ No ☒ UND

Class 1	☐ Yes ☐ No ☒ UND
Is < 100 feet in length	☐ Yes ☐ No ☒ UND
There is no free product	☐ Yes ☐ No ☒ UND
The nearest existing water supply well is > 250 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The nearest existing surface water body is > 250 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND

Class 2	☐ Yes ☐ No ☒ UND
Is < 250 feet in length	☐ Yes ☐ No ☒ UND
There is no free product	☐ Yes ☐ No ☒ UND
The nearest existing water supply well is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The nearest existing surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The dissolved concentration of benzene is <3,000 µg/L	☐ Yes ☐ No ☒ UND
The dissolved concentration of MTBE is <1,000 µg/L	☐ Yes ☐ No ☒ UND

Class 3	☐ Yes ☐ No ☒ UND
Is < 250 feet in length	☐ Yes ☐ No ☒ UND
Free product has been removed to the maximum extent practicable, may still be present below the site where the release originated, but does not extend off-site	☐ Yes ☐ No ☒ UND
The plume has been stable or decreasing for a minimum of 5 years	☐ Yes ☐ No ☒ UND
The nearest existing water supply well is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The nearest existing surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The property owner is willing to accept a land use restriction if the regulatory agency requires a land use restriction as a condition for closure	☐ Yes ☐ No ☒ UND

Class 4	☐ Yes ☐ No ☒ UND
Is < 1,000 feet in length	☐ Yes ☐ No ☒ UND
There is no free product	☐ Yes ☐ No ☒ UND
The nearest existing water supply well or surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The nearest existing surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No ☒ UND
The dissolved concentration of benzene is <1,000 µg/L	☐ Yes ☐ No ☒ UND
The dissolved concentration of MTBE is <1,000 µg/L	☐ Yes ☐ No ☒ UND

Class 5	☐ Yes ☐ No ☒ UND
The regulatory agency determines, based on an analysis of site specific conditions, that the site under current and reasonable anticipated near-term future scenarios, the contaminant plume poses a low threat to human health and safety and to the environment and water quality objectives will be achieved within a reasonable time frame	☐ Yes ☐ No ☒ UND

1. **Media Specific Criteria: Groundwater**: Does the site meet the LTCP criteria for groundwater?	☐ Yes ☒ No ☐ UND
Is the contaminant plume that exceeds water quality objectives stable or decreasing in areal extent, and meets all of the additional characteristics of one of the five classes of sites listed below? (continued)	☐ Yes ☒ No ☐ UND

Indicate those conditions that do not meet the characteristics of one of the five classes of sites listed above.

Plume Length (That Exceeds Water Quality Objectives)	☐ ≥ 100 feet and < 250 feet
	☐ ≥ 250 feet and < 1,000 feet
	☐ ≥ 1,000 feet
	☐ Unknown
Free Product in Groundwater	☐ Yes
	☐ No
	☐ Unknown
Free Product Has Been Removed to the Maximum Extent Practicable	☐ No
	☐ Unknown
For Sites with Free Product, the Plume has Been Stable or Decreasing for 5-Years	☐ No
	☐ Unknown
For Sites with Free Product, owner Willing to Accept a Land Use Restriction (if Required)	☐ No
	☐ Unknown
Free Product Extends Offsite	☐ Yes
	☐ Unknown
Benzene Concentration	☐ ≥ 1,000 µg/L and < 3,000 µg/L
	☐ ≥ 3,000 µg/L
	☐ Unknown
MTBE Concentration	☐ ≥ 1,000 µg/L
	☐ Unknown
Nearest Supply Well (From Plume Boundary)	☐ ≤ 250 Feet
	☐ > 250 Feet and ≤ 1,000 Feet
	☐ Unknown
Nearest Surface Water Body (From Plume Boundary)	☐ ≤ 250 Feet
	☐ > 250 Feet and ≤ 1,000 Feet
	☐ Unknown

*****End of Evaluation of Media Specific Criteria for Groundwater Section*****

2. **Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air:** Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☐ No ☐ UND

Policy Statement: "Exposure to petroleum vapors migrating from soil or groundwater to indoor air may pose unacceptable human health risks. This policy describes conditions, including bioattenuation zones, which if met will assure that exposure to petroleum vapors in indoor air will not pose unacceptable health risks. In many petroleum release cases, potential human exposures to vapors are mitigated by bioattenuation processes as vapors migrate toward the ground surface. For the purposes of this section, the term "bioattenuation zone" means an area of soil with conditions that support biodegradation of petroleum hydrocarbon vapors.

The low-threat vapor-intrusion criteria described below apply to sites where the release originated and impacted or potentially impacted adjacent parcels when:

(1) existing buildings are occupied or may be reasonably expected to be occupied in the future, or

(2) buildings for human occupancy are reasonably expected to be constructed in the future.

Appendices 1 through 4 (attached) illustrate four potential exposure scenarios and describe characteristics and criteria associated with each scenario. Petroleum release sites shall satisfy the media-specific criteria for petroleum vapor intrusion to indoor air and be considered low-threat for the vapor-intrusion-to-indoor-air pathway if:

a. Site-specific conditions at the release site satisfy all of the characteristics and criteria of scenarios 1 through 3 as applicable, or all of the characteristics and criteria of scenario 4 as applicable; or

b. A site-specific risk assessment for the vapor intrusion pathway is conducted and demonstrates that human health is protected to the satisfaction of the regulatory agency; or

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, the regulatory agency determines that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health."

EXEMPTION – Active Commercial Petroleum Facility: Is the site an active commercial petroleum fueling facility?	☐ Yes ☐ No ☐ UND

LTCP Statement: "Exposures to petroleum vapors associated with historical fuel system releases are comparatively insignificant relative to exposures from small surface spills and fugitive vapor releases that typically occur at active fueling facilities. Therefore, satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities, except in cases where release characteristics can be reasonably believed to pose an unacceptable health risk."

Are release characteristics reasonably believed to pose an unacceptable health risk to facility users or nearby facilities? ☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

On-site Users or Workers	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Residences	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Day Care Facilities	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Schools	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Mixed-Use Developments	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Hospitals	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Senior Facilities	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA
Commercial Sites	☐ Yes ☐ No ☒ UND ☐ NE ☐ NA

End of active commercial petroleum fueling facility evaluation

(Media Specific Criteria for Vapor Intrusion to Indoor Air Evaluation continued on next page)

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air: Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☒ No ☐ UND
Does the release site meet one of the three petroleum vapor intrusion to indoor air specific criteria listed below (a, b, or c)?	☐ Yes ☒ No ☐ UND

Scenario 1: Unweathered LNAPL in Groundwater ☐ Yes ☐ No

The bioattenuation zone is a continuous zone provides a separation of at least 30 feet vertically between the LNAPL in groundwater and the foundation of existing or potential buildings; and	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Total TPH (TPH-g and TPH-d combined) are less than 100 mg/kg throughout the entire depth of the bioattenuation zone	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Scenario 2: Unweathered LNAPL in Soil ☐ Yes ☐ No

The bioattenuation zone is a continuous zone that provides a separation of at least 30 feet vertically between the LNAPL in soil and the foundation of existing or potential buildings; and	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Total TPH (TPH-g and TPH-d combined) are <100 mg/kg throughout the entire lateral and vertical extent of the bioattenuation zone	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Scenario 3: Dissolved Phase Benzene Concentrations in Groundwater ☐ Yes ☐ No

Defining the Bioattenuation Zone For Sites without Oxygen Data or Where Oxygen is <4% ☐ Yes ☐ No

Figure A: For Benzene concentrations < 100 µg/l ☐ Yes ☐ No

The bioattenuation zone is a continuous zone that provides a separation of at least 5 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings; and	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Contains total TPH (TPH-g and TPH-d combined) < 100 mg/kg throughout the entire depth of the bioattenuation zone	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

-OR-

Figure B: For Benzene concentrations ≥ 100 µg/L but < 1,000 µg/L ☐ Yes ☐ No

The bioattenuation zone is a continuous zone that provides a separation of at least 10 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Defining the Bioattenuation Zone For Sites with Oxygen ≥ 4% ☐ Yes ☐ No

Figure C: For Benzene concentrations < 1,000 µg/L ☐ Yes ☐ No

A continuous zone that provides a separation of at least 10 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Contains total TPH (TPH-g and TPH-d combined) < 100 mg/kg throughout the entire depth of the bioattenuation zone	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

(Vapor Intrusion Criteria a evaluation continued on next page)

(Media Specific Criteria for Vapor Intrusion to Indoor Air Evaluation continued on next page)

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air: Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☒ No ☐ UND
Does the release site meet one of the three petroleum vapor intrusion to indoor air specific criteria listed below (a, b, or c)?	☐ Yes ☒ No ☐ UND

Scenario 4: Direct Measurement of Soil Gas Concentrations ☐ Yes ☐ No

Were appropriate soil gas sampling protocols followed? ☐ Yes ☐ No

Were soil gas samples obtained from the following locations? ☐ Yes ☐ No

Beneath or adjacent to an existing building: Soil gas samples collected at least 5 feet below the bottom of the building foundation	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Future construction: Soil gas samples from at least five feet below ground surface	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

Were soil gas samples collected in accordance with DTSC Advisory with DTSC Advisory – Active Soil Gas Investigations (April 2012)? ☐ Yes ☐ No

Are all of the following criteria for a bioattenuation zone satisfied? ☐ Yes ☐ No

There is a minimum of five vertical feet of soil between the soil vapor measurements and the foundation of an existing building or ground surface of future construction; and	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
TPH (TPHg + TPHd) is less than 100 mg/kg (measured in at least two depths within the five-foot zone; and	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Oxygen is ≥ 4% measured at the bottom of the five-foot zone	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If the bioattenuation zone criteria are all satisfied, then

Do soil gas concentrations meet the following criteria? ☐ Yes ☐ No

	Residential	Commercial
Constituent	**Soil Gas Concentration (µg/m^3)**	
Benzene	<85,000	<280,000
Ethylbenzene	<1,100,000	<3,600,000
Napthalene	<93,000	<310,000

If the bioattenuation zone criteria are not satisfied, then

Do soil gas concentrations meet the following criteria? ☐ Yes ☐ No

	Residential	Commercial
Constituent	**Soil Gas Concentration (µg/m^3)**	
Benzene	<85	<280
Ethylbenzene	<1,100	<3,600
Napthalene	<93	<310

*****End of Vapor Intrusion Criteria a evaluation *****

(Media Specific Criteria for Vapor Intrusion to Indoor Air Evaluation continued on next page)

2. **Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air:** Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☒ No ☐ UND
Does the release site meet one of the three petroleum vapor intrusion to indoor air specific criteria listed below (a, b, or c)?	☐ Yes ☒ No ☐ UND

CA LUFT Manual Guidance Statement:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☐ **No** ☐ **UND**

*****End of Vapor Intrusion Criteria b evaluation section*****

(Media Specific Criteria for Vapor Intrusion to Indoor Air Evaluation continued on next page)

2. **Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air**: Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☒ No ☐ UND
Does the release site meet one of the three petroleum vapor intrusion to indoor air specific criteria listed below (a, b, or c)?	☐ Yes ☒ No ☐ UND

CA LUFT Manual Guidance Statement:

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ Yes ☐ No ☐ UND

*****End of Vapor Intrusion Criteria c evaluation section*****

(Media Specific Criteria for Vapor Intrusion to Indoor Air Evaluation continued on next page)

2. **Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air**: Does the site meet the LTCP criteria for petroleum vapor intrusion to indoor air?	☐ Yes ☐ No ☐ UND
Additional questions for sites that do not meet the LTCP criteria (a, b, or c)	

Indicate those conditions that do not meet the policy criteria:

Soil Gas Samples	☐ Insufficient number to be representative	☐ Not taken at two depths within 5 foot zone
	☐ Temporal variability not evaluated	☐ High spatial or temporal variability
	☐ No soil gas samples	☐ Insufficient analytes
	☐ Taken incorrectly	
Exposure Type	☐ Residential	☐ Commercial
Free Product	☐ In Groundwater	☐ In Soil
	☐ Unknown	
TPH in the Bioattenuation Zone	☐ ≥ 100 mg/kg	☐ Unknown
Bioattenuation Zone Thickness	☐ < 5 feet (No Biozone)	☐ ≥30 Feet
	☐ ≥5 feet and < 10 feet	☐ 30 Feet BioZone compromised
	☐ ≥10 feet and < 30 feet	☐ Unknown
Oxygen Data in Bioattenuation Zone	☐ No Oxygen Data	
	☐ Oxygen < 4%	☐ Oxygen ≥ 4%
Benzene in Groundwater	☐ ≥ 100 µg/L and < 1,000 µg/L	☐ Unknown
	☐ ≥ 1,000 µg/L	☐ ≥ 280,000 $\mu g/m^3$
Soil Gas Benzene	☐ ≥ 85 $\mu g/m^3$ and < 280 $\mu g/m^3$	☐ ≥ 85,000 $\mu g/m^3$ and < 280,000 $\mu g/m^3$
	☐ ≥ 280 $\mu g/m^3$ and < 85,000 $\mu g/m^3$	☐ Unknown
Soil Gas Ethylbenzene	☐ ≥ 1,100 $\mu g/m^3$ and < 3,600 $\mu g/m^3$	☐ ≥ 3,600,000 $\mu g/m^3$
	☐ ≥ 3,600 $\mu g/m^3$ and < 1,100,000 $\mu g/m^3$	☐ Unknown
	☐ ≥ 1,100,000 $\mu g/m^3$ and < 3,600,000	
Soil Gas Napthalene	☐ ≥ 93 $\mu g/m^3$ and < 310 $\mu g/m^3$	☐ ≥ 310,000 $\mu g/m^3$
	☐ ≥ 310 $\mu g/m^3$ and < 93,000 $\mu g/m^3$	☐ Unknown
	☐ ≥ 93,000 $\mu g/m^3$ and < 310,000 $\mu g/m^3$	

*****End of Evaluation of Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air*****

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

1. **Media-Specific Criteria: Direct Contact and Outdoor Air Exposure** - Does the site meet satisfy the media-specific criteria for direct contact and outdoor air exposure (a, b, or c)?	☐ Yes ☒ No ☐ UND
LTCP Statement: "This policy describes conditions where direct contact with contaminated soil or inhalation of contaminants volatized to outdoor air poses a low threat to human health. Release sites where human exposure may occur satisfy the media-specific criteria for direct contact and outdoor air exposure and shall be considered low-threat if they meet any of the following (a, b, or c. below)."	
CA LUFT Manual Guidance Statement: "If a site does not meet the media-specific criteria for direct contact and outdoor air exposure, then a medium-specific analysis may need to be performed to demonstrate that the medium and its associated exposure pathways are low-threat. For an evaluation of direct contact and volatilization to outdoor air, calculate a more reasonable exposure concentration by averaging the measured concentration over an appropriate (conservative) exposure area. The Case Closure Policy indicates that the maximum concentrations should be used in this analysis, so be sure to include the maximum values when calculating the average. For a residential exposure, a reasonable exposure area may correspond to the size of a small backyard."	
Exemption – Is the upper 10 feet of soil free of petroleum contamination?	☐ Yes ☒ No ☐ UND
LTCP Statement:	
CA LUFT Manual Guidance:	
Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☐ **No** ☐ **UND**	
a. **Are maximum concentrations of petroleum constituents in soil less than or equal to those listed in Table 1 for the specified depth below ground surface (bgs)?**	☐ Yes ☐ No ☒ UND
LTCP Statement: "Maximum concentrations of petroleum constituents in soil are less than or equal to those listed in Table 1 for the specified depth below ground surface (bgs). The concentration limits for 0 to 5 feet bgs protect from ingestion of soil, dermal contact with soil, and inhalation of volatile soil emissions and inhalation of particulate emissions. The 5 to 10 feet bgs concentration limits protect from inhalation of volatile soil emissions. Both the 0 to 5 feet bgs concentration limits and the 5 to 10 feet bgs concentration limits for the appropriate site classification (Residential or Commercial/Industrial) shall be satisfied. In addition, if exposure to construction workers or utility trench workers is reasonably anticipated, the concentration limits for Utility Worker shall also be satisfied."	
(Criteria a evaluation continued on next page) **(Media Specific Criteria for Direct Contact and Outdoor Air Evaluation continued on next page)**	

3. **Media-Specific Criteria: Direct Contact and Outdoor Air Exposure** - Does the site meet satisfy the media-specific criteria for direct contact and outdoor air exposure? (continued)	☐ Yes ☒ No ☐ UND
a. Are maximum concentrations of petroleum constituents in soil less than or equal to those listed in Table 1 for the specified depth bgs? (continued)	☐ Yes ☐ No ☒ UND

Table 1 – Concentrations of Petroleum Constituents in Soil That will Have No Significant Risk of Adversely Affecting Human Health

	Residential		Commercial/Industrial		Utility Worker
Chemical	0 to 5 ft bgs (mg/kg)	5 to 10 ft bgs (mg/kg)	0 to 5 ft bgs (mg/kg)	5 to 10 ft bgs (mg/kg)	0 to 10 ft bgs (mg/kg)
Benzene	1.9	2.8	8.2	12	14
Max Soil Conc[1]	*Insert*	*Insert*	*Insert*	*Insert*	*Insert*
Ethylbenzene	21	32	89	134	314
Max Soil Conc[1]	*Insert*	*Insert*	*Insert*	*Insert*	*Insert*
Napthalene	9.7	9.7	45	45	219
Max Soil Conc[1]	*Insert*	*Insert*	*Insert*	*Insert*	*Insert*
PAH	0.063	NA	0.68	NA	4.5
Max Soil Conc[1]	*Insert*	*Insert*	*Insert*	*Insert*	*Insert*

Notes:

1. The maximum concentrations of petroleum constituents in soil should be compared to those listed in Table 1 (Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways, SWRCB)
2. Based on the seven carcinogenic poly-aromatic hydrocarbons (PAHs) as benzo(a)pyrene toxicity equivalent [BaPe]. Sampling and analysis for PAHs is only necessary where soil is affected by either waste oil or Bunker C oil.

Are both the 0 to 5 feet bgs concentration limits 5 to 10 feet bgs concentration limits for the appropriate site classification satisfied?	☐ Yes ☐ No ☐ UND
Residential:	☐ Yes ☐ No ☐ UND
Commercial/Industrial:	☐ Yes ☐ No ☐ UND

If exposure to construction or utility trench workers is reasonably anticipated, are the concentration limits for the Utility Worker satisfied?	☐ Yes ☐ No ☐ UND

Have the requirements for using the screening levels in Table 1 been satisfied (i.e., have the model assumptions presented in the SWRCB document entitled *"Technical Justification for Soil Screening Levels for Direct Contact and Outdoor Air Exposure Pathways"* been met? ☐ Yes ☐ No ☐ UND

Is the area of impacted soil where a particular exposure occurs ≤ 82 feet by 82 feet?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Is the receptor located at the downgradient edge for inhalation exposure?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Is the wind speed < 2.25 meters per second (7.38 feet per second) on average?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA
Are there different exposure scenarios than residential, commercial/industrial, utility worker) at the site?	☐ Yes ☐ No ☐ UND ☐ NE ☐ NA

If no, then is a site-specific risk analysis warranted? ☐ **Yes** ☐ **No** ☐ **UND**

Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information)	☐ **Yes** ☐ **No** ☐ **UND**

End of Criteria a evaluation

(Media Specific Criteria for Direct Contact and Outdoor Air Evaluation continued on next page)

3. <u>Media-Specific Criteria: Direct Contact and Outdoor Air Exposure</u> - Does the site meet satisfy the media-specific criteria for direct contact and outdoor air exposure? (continued)	☐ Yes ☒ No ☐ UND
b. Are maximum concentrations of petroleum constituents in soil less than or equal to those listed in Table 1 for the specified depth bgs? (continued)	☐ Yes ☐ No ☒ UND
Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☐ **No** ☐ **UND** ***End of Criteria b evalaution***	
c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, has the regulatory agency determined that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health?	☐ Yes ☒ No ☐ UND
Guidance Document: Institutional Controls A Guide to Planning Implementing Maintaining and Enforcing Institutional Controls at Contaminated Sites, Interim Final. USEPA Nov 2010 540-R-09-001 EPA defines institutional controls as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human health exposure to contamination and/or protect the integrity of a response action. ICs are typically designed to work by limiting land or resource use or by providing information that helps modify or guide human behavior at a site.	
Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ **Yes** ☐ **No** ☐ **UND**	
End of Criteria c evaluation **(Media Specific Criteria for Direct Contact and Outdoor Air Evaluation continued on next page)**	

3. **Media-Specific Criteria: Direct Contact and Outdoor Air Exposure** - Does the site meet satisfy the media-specific criteria for direct contact and outdoor air exposure? (continued)	☐ Yes ☐ No ☐ UND
Additional questions if the site does not meet any of the Direct Contact and Outdoor Air Exposure scenarios	

Indicate only those conditions that do not meet the policy:

Exposure Type:	☐ Residential	☐ Utility Worker
	☐ Commercial	
Petroleum Constituents in Soil:	☐ ≤ 5 feet bgs	☐ Unknown
	☐ > 5 feet bgs and ≤ 10 feet bgs	☐ > 12 mg/kg and ≤ 14 mg/kg
Soil Concentrations of Benzene:	☐ > 1.9 mg/kg and ≤ 2.8 mg/kg	☐ > 14 mg/kg
	☐ > 2.8 mg/kg and ≤ 8.2 mg/kg	☐ Unknown
	☐ > 8.2 mg/kg and ≤ 12 mg/kg	
Soil Concentrations of Ethylbenzene:	☐ > 21 mg/kg and ≤ 32 mg/kg	☐ > 134 mg/kg and ≤ 314 mg/kg
	☐ > 32 mg/kg and ≤ 89 mg/kg	☐ > 314 mg/kg
	☐ > 89 mg/kg and ≤ 134 mg/kg	☐ Unknown
Soil Concentrations of Naphthalene:	☐ > 9.7 mg/kg and ≤ 45 mg/kg	☐ > 219 mg/kg
	☐ > 45 mg/kg and ≤ 219 mg/kg	☐ Unknown
Soil Concentrations of PAH:	☐ > 0.063 mg/kg and ≤ 0.68 mg/kg	☐ > 4.5 mg/kg
	☐ > 0.68 mg/kg and ≤ 4.5 mg/kg	☐ Unknown
Area of Impacted Soil:	☐ Area of Impacted Soil > 82 by 82 Feet	☐ Unknown

This case should be closed in spite of not meeting policy criteria ☐ **Yes** ☐ **No**

Explanation:

***** End of Media Specific Criteria: Direct Contact and Outdoor Air Exposure Evaluation*****

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

Low-Threat Case Closure Notification Requirements - Has the regulatory agency recommending closure complied with the Low Threat Closure Policy public notification requirements?	☐ Yes ☒ No ☐ UND

LTCP Statement: "Cases that meet the general and media-specific criteria established in this policy pose a low threat to human health, safety and the environment and satisfy the case-closure requirements of Health and Safety Code section 25296.10, and case closure is consistent with State Water Board Resolution 92-49 that requires that cleanup goals and objectives be met within a reasonable time frame. If the case has been determined by the regulatory agency to meet the criteria in this policy, the regulatory agency shall notify responsible parties that they are eligible for case closure and that the following items, if applicable, shall be completed prior to the issuance of a uniform closure letter specified in Health and Safety Code section 25296.10. After completion of these items, and unless the regulatory agency revises its determination based on comments received on the proposed case closure, the regulatory agency shall issue a uniform closure letter within 30 days from the end of the comment period.

Municipal and county water districts, water replenishment districts, special act districts with groundwater management authority, agencies with authority to issue building permits for land affected by the petroleum release, owners and occupants of the property impacted by the petroleum release, and the owners and occupants of all parcels adjacent to the impacted property shall be notified of the proposed case closure and provided a 60 day period to comment. The regulatory agency shall consider any comments received when determining if the case should be closed or if site specific conditions warrant otherwise.

Municipal and county water districts, water replenishment districts, special act districts with groundwater management authority, agencies with authority to issue building permits for land affected by the petroleum release, owners and occupants of the property impacted by the petroleum release, and the owners and occupants of all parcels adjacent to the impacted property shall be notified of the proposed case closure and provided a 60 day period to comment. The regulatory agency shall consider any comments received when determining if the case should be closed or if site specific conditions warrant otherwise."

Name of the Regulatory Agency Making Recommendation for Case Closure:

☐ Alameda County Environmental Health	☐ Regional Water Quality Control Board
☒ Underground Storage Tank Cleanup Fund	☐ State Water Resources Control Board

Does ACEH Concur with Closure Recommendation? ☐ Yes ☐ No

Have the appropriate parties been notified of the proposed closure? Yes ☐ No ☐ UNK
closure and provided a 60 day period to comment?

Municipal and County Water Districts? ☐ Yes ☐ No ☒ UNK

☐ EBMUD	☐ Zone 7	☐ City of Hayward

Water Replenishment Districts? ☐ Yes ☐ No ☒ UNK

☐ EBMUD	☐ Zone 7	

Agencies with authority to issue building permits for land affected by the petroleum? ☐ Yes ☐ No ☒ UNK

County: ☐ Alameda County

City:

☐ Alameda	☐ Dublin	☐ Hayward	☐ Piedmont
☐ Albany	☐ Emeryville	☐ Livermore	☐ Pleasanton
☐ Alameda		☐ Oakland	☐ San Leandro

Owners and Occupants of all parcels adjacent to the impacted property? ☐ Yes ☒ No ☐ UNK

Owners:	☐ Yes	☐ No	☐ UNK	Occupants:	☐ Yes ☐ No ☐ UNK

(Low Threat Notification Requirements Evaluation Section continued on next page)

Low-Threat Case Closure Notification Requirements - Has the regulatory agency recommending closure complied with the Low Threat Closure Policy public notification requirements? (continued) ☐ Yes ☒ No ☐ UND

Has the regulatory agency given public notice to other affected parties or potentially affected parties beside the owners and occupants of adjacent parcels in compliance with the public participation requirements of Chapter 16 of Division 3 of Title 23 of the California Code of Regulations and Chapter 6.7 of Division 20 if the Health and Safety Code? ☐ Yes ☐ No ☒ UNK

Owners: ☐ Yes ☐ No ☐ UNK	Occupants: ☐ Yes ☐ No ☒ UNK

Has public participation been conducted in accordance with the SWRCB and Regional Water Quality Control Boards April 2005 guidance document entitled "*Final Draft Public Participation at Cleanup Sites*"? ☐ Yes ☐ No ☐ UNK

Guidance Statement: The level of public participation effort at a particular site should be based on the site's threat (to human health, water quality, and the environment), the degree of public concern or interest in site cleanup, and any environmental justice factors associated with the site. There may be more public concern or interest about a site when: contaminants have migrated or are likely to migrate off site, cleanup could generate dust and noise, or cleanup is linked to redevelopment of the property.

Category 1 Public Participation Requirements

Guidance Statement: Category 1 includes most leaking underground fuel tank (LUFT) sites and many small commercial facilities. Category 1 sites are characterized by soil or groundwater contamination that does not pose an immediate human health threat and does not extend off-site onto neighboring properties. Off-site groundwater plumes that extend only into the public right of way are also included in this category.

Have surrounding property owners and residents within an appropriate distance of the site been notified (e.g., 200 foot radius in an urban setting, 1,000 foot in a rural setting per the April 2005 document)? (The term "site" refers to the full extent of known contamination)	☐ Yes ☐ No ☒ UNK
Have other interested parties or groups, including other public agencies and environmental and community groups been notified?	☐ Yes ☐ No ☒ UNK

Category 2 Public Participation Requirements

Guidance Statement: Category 2 includes larger industrial or commercial sites with significant soil and groundwater contamination. At these sites, the groundwater plume extends off-site beyond the public right of way (or is assumed to extend off-site until investigation shows otherwise.) This category includes many solvent sites. A few LUFT sites will fall into this category. This category also includes California Land Reuse and Revitalization Act (CLRRA) sites, where a buyer or landowner has applied for liability relief pursuant to this Brownsfield legislation.

Have all property owners and residents affected, or potentially affected by offsite migration of the plume been notified?	☐ Yes ☐ No ☒ UNK

*****End of Low-Threat Case Closure Notification Requirements Evaluation*****

LOW THREAT UST CASE CLOSURE POLICY COMPLIANCE AND IDENTIFICATION OF IMPEDIMENTS TO CASE CLOSURE CHECKLIST
ALAMEDA COUNTY ENVIRONMENTAL HEALTH LOCAL OVERSIGHT PROGRAM

Low-Threat Case Closure Monitoring Well Destruction and Waste Removal Requirements - Have all wells and borings installed for the purpose of investigating, remediating, or monitoring the unauthorized release been properly destroyed?	☐ Yes ☐ No ☐ UND
Have all monitoring wells and borings been properly destroyed?	☐ Yes ☐ No ☐ UND
LTCP Statement: "All wells and borings installed for the purpose of investigating, remediating, or monitoring the unauthorized release shall be properly destroyed prior to case closure unless a property owner certifies that they will keep and maintain the wells or borings in accordance with applicable local or state requirements."	
If all wells and borings have not been properly destroyed, then	
Has the property owner certified that they will keep and maintain the wells or borings in accordance with applicable local or state requirements? ☐ Yes ☐ No ☐ UNK	
Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ Yes ☐ No	
End of Monitoring Well Destruction Requirements Evaluation	
Have all waste piles, drums, debris, and other investigation or remediation derived materials been removed from the site and properly managed in accordance with regulatory agency requirements?	☐ Yes ☐ No ☐ UND
Policy Statement: All waste piles, drums, debris and other investigation or remediation derived materials shall be removed from the site and properly managed in accordance with regulatory agency requirements.	
Has pertinent information been provided in the CSM for compliance evaluation? (refer to General Criteria e for specific information) ☐ Yes ☐ No	
End of Waste Removal Requirements Evaluation	
End of Low Threat Closure Policy and Impediment Identification Checklist	