

From: Roe, Dilan, Env. Health
To: ["Phillips, Hollis"](#)
Cc: ["Wager, Janet J."](#); ["Ralston, Ed C.: \(P66\)"](#)
Bcc: [Drogos, Donna, Env. Health](#)
Subject: Fuel Leak Case No. RO00000066, BP Station # 11126, 1700 Powell St, Emeryville, CA
Date: Thursday, February 14, 2013 1:37:00 PM

Hi Hollis:

A brief summary of some of my comments is provided below. However, given the extent of my review comments, I will provide more details in our meeting.

Feasibility Study and Corrective Action Plan (FS/CAP) - In a letter dated December 6, 2011, ACEH approved implementation of ISCO and EAB as the recommended remediation alternative presented in the FS/CAP, however expressed concerns that there may be a potential for vapor migration along subsurface utility corridors or other subsurface preferential pathways as a result of in-situ chemical oxidation (ISCO), which may adversely affect off-site properties. Therefore, ACEH required that soil vapor monitoring points be installed in the vicinity of the injection wells near utility corridors so that adequate soil gas samples can be collected before, during, and after remediation, and required ARCADIS to provide a discussion and a revised site figure in the Final CAP.

In response to the soil vapor monitoring requirement, ARCADIS submitted the document entitled *EAB Implementation*, dated October 9, 2012. In this document ARCADIS clarifies that the preferred remedial alternative identified in the FS/CAP is not in-situ chemical oxidation (ISCO) but rather enhanced aerobic bioremediation (EAB). According to ARCADIS, unlike ISCO, EAB does not induce vapor migration due to the limited rate kinetics of the EAB compound (calcium peroxide) and therefore requests that soil vapor monitoring not be required.

I acknowledge that ACEH misinterpreted the preferred alternative in our December 6, 2011 directive letter. However, I am concerned that the FS/CAP was prepared prematurely as it does not appear to be based on a site conceptual model that adequately addresses all of the identified contaminants of concern (COCs) and potential contaminants of concern (PCOCs), sensitive receptors, source area(s) characterization, free product evaluation, data spikes and potential unauthorized releases due to tank overfilling and/or other causes, groundwater flow directions and historical observations of groundwater mounding resulting in radial flow, the extent of the groundwater contaminant plume, and preferential pathways for contaminant migration due to shallow groundwater conditions at the site.

Therefore, ACEH will be requesting that ARCADIS prepare a revised Draft FS/CAP that incorporates the results of a preferential pathway study, and is based on a current site conceptual model. If EAB is still recommended as the preferred remedial alternative, an evaluation of potential impacts to sensitive receptors due to the migration of groundwater with elevated levels of pH due to the application of the calcium peroxide via preferential pathways would be required.

COCs and PCOCs. In the *FS/CAP*, ARCADIS reports that "COCs at the site include TPH-g, MTBE, TBA, and, to a lesser extent, BTEX". However a review of the case files indicates that although soil and groundwater have also been impacted by TPH-d, TPH-mo, and metals, and potentially other related SVOCs including naphthalene, no discussion regarding these COC/PCOCs is presented in the FS/CAP.

Historic analytical data indicates that prior to June 2011, DRO/TPH-d has been analyzed only in monitoring well MW-3, located south of the former and current waste oil USTs. A review of data collected from MW-3 since 1992 indicates there have been several cycles of TPH-d concentration spikes followed by decreasing trends in TPH-d concentrations, with a maximum concentration of 3,700 µg/L detected in July 1996, and the last spike occurring in June 2010 at a concentration of 2,700 µg/L.

In June 2011, Broadbent and ARCADIS added TPH-d to the list of analytes for groundwater samples

collected from three additional monitoring wells including MW-4 (located to west of the dispenser islands), MW-6 (located to the west of the former waste oil UST pit), and MW-8 (located to the north of the fuel UST pit). During the last three semi-annual monitoring events conducted in June 2011, January 2012, and June 2012, TPH-d has been detected in MW-3 at concentrations of 250 µg/L, 160 µg/L, and 270 µg/L; MW-4 at concentrations of 610 µg/L, 530 µg/L, and 480 µg/L; MW-6 at concentrations of 2,100 µg/L, 710 µg/L, and 1,200 µg/L; and MW-8 at concentrations of 1,000 µg/L, 1,500 µg/L, and 1,100 µg/L, respectively. A review of the analytical laboratory data indicates silica gel cleanup has not been performed on samples. Based on these analytical results, the TPH-d contaminant source and the extent of soil and groundwater contamination appears to be undefined.

Preferential Pathway Study – In the *Soil and Water Investigation Report*, ARCADIS states that it “is still waiting for data to complete the preferential pathway study and therefore it will be submitted as a separate document.” However, based on a review of the case files, it does not appear that a preferential pathway evaluation has been performed at the site and therefore the site is out of compliance with directives of ACEH in a letter dated July 10, 2009. Depth to groundwater at the site has historically ranged between approximately 2.50 to 11.74 feet below ground surface (bgs). Therefore, since groundwater is relatively shallow at the site and free product has been observed in MW-9, a preferential pathway evaluation is prudent. The purpose of the preferential pathway study is to locate potential migration pathways and conduits and determine the probability of the NAPL and/or plume encountering preferential pathways and conduits that could spread contamination.

Free Product Evaluation – In the *FS/CAP* ARCADIS reports that free product has been historically observed in monitoring well MW-9 at thickness ranging from 0.01 feet 0.14 feet, however has not been reported in MW-9 since June 2001 when it was reported at a thickness of 0.13 feet. A review of the monitoring well construction log for MW-9 indicates the well is screened from a depth of 4 to 14 feet bgs, and that subsequent to the last reported observation of free product in June 2001, this well has been submerged during 22 of the 37 groundwater or 60 percent of monitoring events. Additionally, a review of tabulated groundwater monitoring data indicates sheen has continued to be observed in MW-9 with the last observation occurring in 2009.

The *Soil and Water Investigation Report* presents the results of an onsite investigation conducted in January 2011 to evaluate the potential presence of remaining source area at the site and delineate hydrocarbon contamination as free phase and residual contaminant concentrations in the subsurface, both above and below the water table. In this report ARCADIS concludes that “based on the UVOST results SPH is not present at the Site” and that “samples collected to correlate with elevated UVOST signals indicated very low levels of contamination”. However, as noted by ARCADIS in a document entitled *CPT/UVOST Field Investigation Summary Report and Additional Soil Investigation Work Plan* prepared for another BP site (Fuel Leak Case RO0000014, BP Service Station #11132), although SPH was not encountered at the select CPT/UVOST locations, free product that is encountered during monitoring events may be too weathered to fluoresce and therefore the UVOST cannot detect it.

Additionally, in the *Soil and Water Investigation Report* ARCADIS indicates that UCPT-6 was originally supposed to be advanced in the vicinity of the waste oil tank, however, reports that refusal was hit at two locations and therefore the location where it was advanced was as close to the tank as possible. Attempts were made to collect soil samples from depths between 6 to 7, 7 to 8 feet bgs, and 12 to 13 feet bgs (based on UVOST) however no samples were recovered and “because the rods had been advanced beyond the desired sampling depth no additional sample collection was attempted”. However, a review of the UVOST data for UCPT-6 indicates a spike at between 6 and 7 feet, indicating that free product or residual NAPL may be present at this location.

Groundwater Monitoring Well Network Evaluation and Contaminant Plume Delineation – In the *FS/CAP* ARCADIS states that “concentrations of COCs (including TBA and MTBE) in off-site wells MW-10 and MW-11 continue to be low to non-detect, indicating that the plume is still defined by the monitoring well network at the Site”. However, in the *Soil and Groundwater Investigation Report*, ARCADIS reports MTBE and TBA were detected at concentrations of 14 µg/L and 63 µg/L, respectively, in the sample collected at 7 feet bgs in CPT-1 and concludes that “the plume may be migrating to the southwest”, however “based on the order of magnitude difference between

groundwater samples collected from the onsite monitoring wells and the offsite CPT, it is not significantly migrating. ARCADIS additionally concludes that because analytes were not detected above the method detection limit in UCPT-2 located to the west in the Denny's parking lot, the plume is not migrating in that direction".

Although the existing off-site "downgradient" groundwater monitoring wells MW-10 and MW-11 appear to provide plume characterization to the south and southwest of the site, respectively, ACEH respectfully disagrees that the groundwater contaminant plume is adequately delineated. Our assessment is based on the lack of delineation of the TPH-d plume as discussed above, and groundwater elevation and isoconcentration contour maps presented in historic monitoring reports. Historic groundwater elevation data indicates groundwater mounding and resultant radial flow in the vicinity of several of the on-site monitoring wells including MW-9 where free product has historically been observed. Therefore, ACEH remains concerned that the groundwater contaminant plume may be migrating off-site and impacting adjacent property without being detected by the existing groundwater monitoring well network.

Unauthorized Releases. A review of historic groundwater analytical data in monitoring well MW-2 located downgradient of the UST pit indicates that several unauthorized releases may have occurred. The data spikes appear to correlate in time with at least one Notice of Violation issued by Alameda County CUPA for overfilling the tanks.

I look forward to discussing the project with you at our meeting.

Dilan Roe, P.E.

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PDF copies of case files can be reviewed/downloaded at:

<http://www.acgov.org/aceh/top/ust.htm>