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January 2, 2009

Councilmember Desley Brooks
City Hall
1 Frank Ogawa Plaza
Oakland, CA 94612

Subject: Fuel Leak Case No. RO0000175 and GeoTracker Global ID T0600102286, Interim Remedial Action Evaluation for Foothill Mini-mart, 6600 Foothill Boulevard, Oakland, CA 94605

Dear Councilmember Brooks:

Alameda County Environmental Health (ACEH) has prepared this response to your requests, during the December 19, 2008, meeting with you, Darryl Stewart, Mark Gomez, Mark Arniola, Gregory Hunter, Daniel Firth, and Paresh Khatri, for immediate implementation of interim remedial actions (IRA) on the subject site and on the adjacent LeBlanc property (6620 Foothill Blvd.). We have evaluated your suggestions that IRA may accelerate the cleanup at the subject site as well as neighboring properties. We also understand that you are concerned with the presence of contamination in the city owned right of way. Groundwater pump and treat at the subject site and in-situ chemical oxidation consisting of hydrogen peroxide injection at the groundwater contaminant plume boundary at LeBlanc's property was suggested by Mr. Gomez as an immediate interim measure to reduce petroleum hydrocarbon concentrations off-site in lieu of or concurrent to conducting additional site assessment as currently planned.

Background

The subject site had a petroleum hydrocarbon release of gasoline fuel containing methyl tertiary butyl ether (MTBE) resulting in a dissolved phase petroleum hydrocarbon contaminant plume containing MTBE that extends from the subject site migrating down-gradient in a southeasterly direction across Foothill Boulevard. The southwest corner of the LeBlanc property contains low concentrations of dissolved-phase petroleum hydrocarbons (PHC) from the cross-gradient boundary of the plume. Specifically, MW-4, located on the LeBlanc property, contains 2,000 ppb Total Petroleum Hydrocarbons as Gasoline (TPHG), 0.58 ppb Benzene (slightly above the detection limit), and 31 ppb MTBE. These values, along with data from the subject site, and the lack of significant levels of benzene, indicate the presence of primarily an MTBE plume undergoing degradation with a TPHG component the core of which appears to have migrated to a location across Foothill Blvd. We understand that the LeBlanc's believe that their property is negatively impacted due to the presence of dissolved phase PHC and consequently they and the City of Oakland's redevelopment agency are precluded from developing their property. The data collected to date are insufficient to justify a determination that the LeBlanc property is substantially adversely affected and that all development is precluded. Development of the LeBlanc property may be possible depending on site development plans. We understand that an exact description of the proposed LeBlanc development is to be provided to ACEH by the City at a future date.

Dissolved phase MTBE plumes travel faster and further in groundwater, can migrate to deeper water-bearing zones, and can detach under certain circumstances more readily than other gasoline constituents. MTBE poses a risk to human and ecological receptors via direct ingestion. Therefore, MTBE plumes pose a risk to drinking water supplies (drinking water wells) and aquatic systems (creeks, rivers, lakes, etc.). Because MTBE is highly soluble in water risk of volatilization (to indoor/outdoor air) from groundwater is not considered a risk pathway. This is in contrast to volatilization of both adsorbed and dissolved phase benzene which can pose a human health risk via volatilization to indoor/outdoor air. However, data to date do not indicate volatilization from benzene is a risk pathway on the LeBlanc property.

IRA is typically implemented at sites that contain free-phase petroleum hydrocarbons or at sites where contaminants pose an imminent threat to public health or the environment. At this late stage in site assessment, IRA does not appear to be appropriate as it is not a technically or economically justifiable course of action. Furthermore, as ACEH explained, implementing interim remedial measures without adequate site knowledge has the potential to adversely affect known site conditions. The best course of action for the subject site and neighboring properties is completion of the next phase of investigative fieldwork and the development and implementation of a Corrective Action Plan for the final cleanup method. Nonetheless, the two possible IRA technologies suggested by Mr. Gomez have been evaluated to determine whether implementation will accelerate site cleanup.

Groundwater Pump & Treat

The intent of a groundwater pump and treat system is to stop groundwater contaminant plume migration and depending on the contaminant, potentially reduce the contaminant mass in groundwater, ideally resulting in an overall reduction in contaminant concentrations within the groundwater contaminant plumes. However, without adequate site characterization, there is a potential to create a "detached" groundwater contaminant plume where the contaminant plume is reduced in the vicinity of the treatment system's capture zone, but a residual contaminant plume outside the capture zone would remain, potentially unaddressed. Also, lacking sufficient data to appropriately design a system, there is a possibility that the contaminant plume may (or may not) be captured in the first water-bearing zone, but may remain unaddressed in the second water-bearing zone. Data to address this concern will be obtained in the next investigative fieldwork event.

Although pump and treat can be effective for dissolved phase MTBE plume control and mass removal, based upon what is currently known about the geometry and magnitude of the MTBE plume, immediate implementation of pump and treat will not effectively or efficiently capture or cleanup the contamination associated with this site. Pump and treat is generally not efficient or effective for TPH mass removal and is not an appropriate remediation technology for TPH contamination at this site. ACEH does not recommend groundwater pump and treat as an immediate interim remedial measure. However, groundwater pump and treat, for specific contaminants, may be a more viable option to evaluate once the next investigation phase has been completed and sufficient data to evaluate remediation technologies is obtained.

Regarding the LeBlanc property, the dissolved phase TPH concentrations currently detected in the LeBlanc MW are generally categorized as "nuisance levels" with risk considered to be limited to direct contact potentially occurring during excavation activities. If contamination at the lower

levels of what has been detected to date was determined appropriate to be left in place, the risk associated with these concentrations is generally mitigated with the donning of protective clothing (gloves, coveralls, etc.) during activities where groundwater will be encountered.

In-situ Chemical Oxidation (Hydrogen Peroxide Injection)

Chemical oxidation technologies are predominantly used to address contaminants in the source area saturated zone and capillary fringe. In this case, Mr. Gomez suggested that hydrogen peroxide be applied in a non-typical application of injection at the groundwater contaminant plume boundaries.

Hydrogen peroxide is a strong oxidant that can be injected into a contaminated source zone to destroy petroleum contaminants. When injected into groundwater, hydrogen peroxide is unstable, and reacts with organic contaminants and subsurface materials[1]. It decomposes to oxygen and water within hours of its introduction into groundwater generating heat in the process. Hydrogen peroxide is particularly effective when it reacts with ferrous iron (Fe2+) to produce Fenton's Reagent. Ferrous iron may be naturally present in the subsurface soils and/or groundwater, or it can be added as a catalyst solution together with the hydrogen peroxide to produce this aggressive chemical reaction. Adequate site specific data is necessary to evaluate and design this remediation alternative.

Fenton-like reactions are exothermic and can raise the temperature of groundwater. Fenton's-like reactions can lead to explosive conditions and present safety concerns that need to be promptly and effectively managed. In addition, migration of explosive vapors along preferential pathways (utility corridors) may pose an explosion hazard. Any plan for Fenton's application requires thorough evaluation of preferential pathways and adequate plans for human health protection. (Please note that the next phase of subsurface investigation includes evaluation of preferential pathways on and off-site and the data collected will be utilized to prepare a comprehensive Corrective Action Plan to cleanup the entire soil and groundwater contaminant plumes to acceptable levels). In addition, bench studies as well as direct site application experience in California have shown that hydrogen peroxide injection can precipitate naturally occurring heavy metals in the soil such as chromium and cause hexavalent chromium groundwater plumes exacerbating site conditions[2]. Adequate additional testing and a performance monitoring system needs to be installed prior to and incorporated throughout the application process. Therefore, based on published guidelines for implementing chemical oxidation, ACEH does not recommend the immediate implementation of chemical oxidation since adequate knowledge of site conditions, such as concentrations and types of metals in soil, and evaluation of preferential pathways, is unknown at this time and implementing IRA may cause additional harm on and off-site. Additionally, ACEH does not deem the non-typical application of chemical oxidation injection at the groundwater contaminant plume boundaries as technically justifiable.

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[1] *How to Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites: A Guide For Corrective Action Plan Reviewers*, EPA May 2004.

[2] *Do No Harm*, E-mail correspondence from Kevin Graves, State Water Resources Control Board (SWRCB) May 15, 2002 & *DRAFT-Potential of Hexavalent Chromium Generation Resulting from the use of Hydrogen Peroxide (H_2O_2) or other Strong Oxidants During Remediation of UST Cleanup Site,* SWRCB May 2002

Conclusion

To be protective of human health, the environment, and the stakeholders in the City of Oakland, ACEH has directed the RP to implement the next phase of investigative fieldwork to address data gaps that currently exist at the site. This is the most prudent course of action to address contamination at the subject site and neighboring properties. The data obtained from the pending site investigation is necessary to design a Corrective Action Plan for cleanup of petroleum hydrocarbon constituents that is protective of human health both during implementation and ultimately at final cleanup. At this late stage in site investigation, IRA in general as well as the specific IRA proposals by Mr. Gomez are neither technically nor economically justifiable and would appear to provide a very limited benefit to on or offsite cleanup. The best course of action for this site is completion of the scheduled site investigation activities, preparation of a Corrective Action Plan, and implementation of final cleanup activities. This plan of action is more efficient and will provide better long term protection of human health and the environment.

If you have any questions, please call me at (510) 777-2478 or send me an electronic mail message at paresh.khatri@acgov.org.

Sincerely,

Paresh C. Khatri
Hazardous Materials Specialist

Donna L. Drogos, PE
Supervising Hazardous Materials Specialist

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