From:	Soo, Kit, Env. Health
To:	"Carolyn Fong"
Cc:	"Peter Sims"; "Kris Larson"; Roe, Dilan, Env. Health; Khatri, Paresh, Env. Health
Subject:	RO0382 - Bill Chun Service Station, 2301 Santa Clara, Alameda - September 2, 2016 Meeting Summary and Action Items
Date:	Monday, October 31, 2016 4:25:00 PM

Dear Ms. Fong (Trustee to the Lily A. Chun Trust),

Thank you for attending the meeting on September 2, 2016. Attendees of the meeting included Carolyn Fong (Trustee to the Lily A. Chun Trust), Wayne Chun (Brother of Trustee); Peter Sims (Ninyo & Moore Geotechnical and Environmental Sciences Consultants, Ninyo &Moore); Dilan Roe and Kit Soo (Alameda County Environmental Health, ACDEH). The purpose of the meeting was to discuss the remediation status, groundwater monitoring, and soil vapor and indoor air sampling of adjacent buildings.

ACDEH has reviewed the case file for the above referenced site including the three most recent groundwater monitoring reports: 4th Quarter 2015 Quarterly Groundwater Monitoring Report and System Evaluation Report; 1st Quarter 2016 Quarterly Groundwater Monitoring Report and System Evaluation Report; and 2nd Quarter 2016 Quarterly Groundwater Monitoring Report and System Evaluation Report, dated February 12, 2016, May 4, 2016 and October 7, 2016, respectively, which were prepared by Ninyo & Moore, on your behalf. The reports presents the following: 1) results from groundwater monitoring 2) information on operation of the groundwater remediation system; 3) recommendations regarding continued operation of the remediation system (groundwater recirculation and enhanced bioremediation), and continued evaluation of the oxygen injection rates and injection pressures of the remediation system with the goal of producing positive ORP values and increased DO concentrations in the wells; and 4) recommendations to modify the analyte list for performance monitoring and eliminate certain redundant bioattenuation indicators.

The site is a former gasoline service station. It is our understanding that the site is currently occupied by a small vacant kiosk, canopy and a garage. The site is located in a mostly commercial area with some residences in downtown Alameda, and is bordered by Oak Street to the northwest, a meeting hall and residences to the northeast and east, a retail store to the southeast, and Santa Clara Avenue is located on the southwest. A groundwater recirculation and enhanced remediation system was installed at the site in October/November 2014. The remedial system consists of a network of groundwater extraction wells, injection wells, horizontal injection piping, and the Dissolved Oxygen In-Situ Treatment (DO-IT) system manufactured by ETEC, The DO-IT system is an insitu bioremediation system that supplies dissolved oxygen and proprietary biological amendment nutrients to the groundwater plume to remediation petroleum hydrocarbons including Total Petroleum Hydrocarbons as gasoline (TPH–gas), benzene, toluene, ethylbenzene and total xylenes (BTEX) and naphthalene. Groundwater is extracted from the within the outer edges of the constituents of concern (COC) impacted plume and injected within the plume source area on site to create a subsurface groundwater remediation cell to achieve a water balance (i.e., extraction rate equals injection rate). The extracted groundwater is supplemented monthly with biological amendments and is continuously supplemented with dissolved oxygen before it is re-injected into the subsurface. Extracted groundwater is treated using granular activated carbon (GAC) stored in

vessels with a 500-pound capacity to remove dissolved phase COCs prior to the introduction of biological amendments. Biological amendments consists of biosurfactants and a nutrient mix, designed to maximize microbial growth and activity in the subsurface and enhance desorption of COCs, making them more amenable to biodegradation.

Based on our review of the above-mentioned reports and our discussions during the September 2, 2016 meeting, ACDEH request that you address the technical comments listed below.

TECHNICAL COMMENTS

Performance Monitoring Program

Post-system startup groundwater monitoring consists of groundwater level measurements, collection of groundwater samples for chemical analyses, and measuring groundwater field parameters including pH, temperature, electrical conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and collection and chemical analyses of system samples. Operation of the recirculation system creates a radial groundwater flow pattern due to injection of surfactant and nutrient in the center of the site and extraction on the perimeter of the site to control plume migration. A network of groundwater monitoring wells surrounds the site to monitor the plume.

- **Modification to Analyte List**. Based on performance monitoring events to date, Ninyo & Moore has requested a modification of the analyte list to eliminate sulfate, manganese, potassium, and phosphate. ACDEH approves the modification to the analyte list based on the following qualifications:
    - Continued addition of dissolved oxygen to the subsurface currently creates an aerobic environment in the subsurface.
    - Sulfate and manganese are typically monitored to demonstrate that reducing conditions are significant contributors to bioattenuation in an anaerobic environment. As a result, these analyses are redundant given the aerobic environment that dominates at the site.
    - Potassium and phosphate are general attenuation nutrients typically monitored together with other constituents such as iron, nitrate, nitrite, ferric iron, and physical parameters such as ORP, DO, etc. that are being monitored to indicate whether the subsurface conditions are suitable for bioattenuation. Because the bioattenuation of the groundwater plume has already been demonstrated using other parameters, potassium and phosphate are redundant and not required at this time.

- **Plume Migration to the Southeast/East**. Since startup of the remediation system, the concentration of dissolved petroleum hydrocarbons including TPH-gas and BTEX have increased in groundwater collected in perimeter monitoring wells (MW-4R, MW-5R, MW-14 and MW-11R) as a result of the injection of surfactant in the center of the plume. Additionally, although the monitoring wells located further southeast/east (MW-13, MW-15 and MW-16) contain non-detected concentrations, a review of the screened interval indicates that these well are not screened in the same interval as MW-14 and MW-11R, as well as most of the other wells located at the site. The majority of monitoring wells are

generally screened from 5 and 20 feet below ground surface (bgs) while MW-13, MW-15 and MW-16 are screened across a deeper interval. Additionally, due to the radial groundwater flow from the site as a result of the injection activities, the plume downgradient of MW-4R and MW-5R is not defined. As a result, the evaluation of the potential expansion of the plume and the adequacy of the perimeter monitoring network (i.e. screened interval, location with respect to extraction and injection wells, etc.) is required.

Include this evaluation and findings in the next quarterly groundwater monitoring, system evaluation and optimization strategy report mentioned below.

System Evaluation and Optimization Strategy

Due to the expanding plume as discussed above, an evaluation of the remediation is required. The evaluation should include at a minimum, an assessment of the extent of the plume before and after remediation began, evaluation of whether there are enough extraction wells for plume control, assessment of system run and injection rates, and an assessment as to why EW-20 is biofouling. The evaluation should consider discrete sampling at extraction wells to assess effectiveness of system objectives, etc. and make recommendations for system optimization. Include the results and findings of the above evaluations in the next quarterly groundwater monitoring, system evaluation and optimization strategy report mentioned below.

Continue to run the system until the system evaluation and optimization strategy are performed, presented, submitted to and approved by ACDEH. In the meantime, do not increase the regular dosage of surfactant and nutrients that are added to the remediation system on a biweekly basis. It is our understanding that the current dosage is 5 gallons of biosurfactant and 50 pounds of nutrient mix are added to the mixing tank of the system on a biweekly basis.

Vapor Intrusion Assessment

Due to the expanding plume and increasing concentration of TPH – gas and BTEX in perimeter wells, a vapor intrusion to indoor air assessment must be conducted to verify that occupants in adjacent buildings are not at risk. The assessment must include a survey of foundation types (i.e. basements, crawlspaces, slabs, etc.), other subsurface features such as elevator shafts and underground parking structures, and subsurface utilities within and in the vicinity of the plume boundary which may act as preferential pathways for vapor migration. Please review historical soil vapor sampling data to assess and determine locations for soil vapor, crawlspace and/or sub-slab vapor sampling at 1510 Oak Street (Meeting Hall and Basement), and the property boundary of 2309 Santa Clara Avenue. If warranted, indoor air sampling shall be recommended as well.

Include the findings and rationale for sampling in the Work Plan mentioned below.

Sensitive Survey Receptor

Due to the expanding plume boundary and high concentrations of BTEX in perimeter wells, please

review historic sensitive receptor survey data, including wells, surface water bodies, and other sensitive receptors (i.e. schools, daycares, senior facilities, etc.) to assess the adequacy of the data files. As discussed in the meeting, please include the details of the well located at the high school. Incorporate the findings as appropriate, into the Vapor Intrusion Assessment Work Plan and the next groundwater monitoring, system evaluation and optimization strategy report mentioned below (3Q2016).

TECHNICAL REPORT REQUEST

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

- December 6, 2016 - Vapor Intrusion Assessment Work Plan
  File to be named: WP_R_yyyy-mm-dd RO0382

- December 13, 2016 – Groundwater Monitoring, System Evaluation and Optimization Strategy Report
  File to be named: GWM_R_yyyy-mm-dd RO0382

If you have any questions, please call me at (510) 567-6791 or send me an e-mail at kit.soo@acgov.org. Online case files are available for review at the following website: http://www.acgov.org.aceh/index/htm.

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