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September 20, 2005

Project No. 053-7020

Ms. Donna Drogos
Alameda County Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Alameda County
SEP 22 2005
Environmental Health

RE: WORKPLAN FOR UPDATE TO SCM (REV. 2.0) AND SOURCE ZONE CHARACTERIZATION, FUEL LEAK CASE NO. RO0000278, DESERT PETROLEUM, 2008 1ST STREET, LIVERMORE, CA

Dear Ms. Drogos :

In accordance with your request, we have prepared the following workplan responding to your letter dated July 5, 2005 from Alameda County Environmental Health. The scope of work for the supplemental investigation required by the County is outlined below and generally follows the itemized list provided in the County letter. We recognize that the County requested an update to the Site Conceptual Model (SCM Revision 2.0) followed by a workplan for additional characterization of the site source zone. Upon reviewing the requested scope of work we believed it would be more efficient and cost effective to complete the work as one project. Therefore, we intend to collect the data requested for SCM Revision 2.0 in parallel with planning and implementing the source zone investigation and complete a single revision to the SCM. This should save both time and cost and allow us to move quickly to a program of source zone remediation.

SCOPE OF WORK

The work is divided into three main tasks: (1) data compilation and analyses, (2) supplemental source zone investigation, and (3) updating of the SCM. The work proposed for each of these tasks is presented in more detail below.

TASK 1 – DATA COMPILATION AND ANALYSES

Task 1 incorporates all tasks that require additional compilation and/or review of data to address questions or data gaps remaining from SCM Revision 1.1.

Subtask 1.1 – Update Regional Groundwater Pumping Data

- Obtain pumping and analytical data since August 2003 for water supply well CWS-8 from Zone 7 Water Agency.
- Compile, analyze and summarize CWS-8 pumping and contaminant data (if applicable). Compare monthly pumping with water level data for the CMT transect.

- Incorporate data into revised SCM Revision 2.0 and quarterly monitoring reports.

Subtask 1.2 – Detailed Well Study

- Obtain updated electronic database well search from EDR for 1 mile radius downgradient from site.
- Meet with Zone 7 Water Agency to review and obtain available well records.
- Compile all data regarding installation date, well construction, decommissioning information, etc. in table format for all water supply wells.
- Incorporate data into revised SCM Revision 2.0.

Subtask 1.3 – Utility Survey

- Update information from City of Livermore re: underground utilities.
- Evaluate Sanborn maps for any utility information.
- Compile all data onto map bases and evaluate potential preferential pathways.
- Incorporate data into revised SCM Revision 2.0.

Subtask 1.4 - Risk Evaluation of Off-site MTBE Plume

- Evaluate data prepared by County re: breakthrough curves and potential for detached plume of MTBE. Evaluate historical chemistry trends to validate the County's detached plume hypothesis.
- Evaluate local and regional scale groundwater flow to analyze rate, trajectory and current position of possible detached plume.
- Meet with Zone 7 to obtain updated information on water supply wells and future plans for water supply and new wells.
- Evaluate possible risk of detached plume being intercepted by downgradient supply wells.
- Incorporate data into revised SCM Revision 2.0.

Subtask 1.5 - Evaluate Natural Attenuation of BTEX

- Evaluate historical chemistry trends in downgradient wells.
- Evaluate natural attenuation parameters and evidence for natural attenuation of BTEX.
- Evaluate and illustrate change in plume over time.
- Incorporate data into revised SCM Revision 2.0.

Subtask 1.6 - Evaluate Need for Additional Downgradient Wells

- Evaluate results of well survey and risk assessment for BTEX.
- Prepare revised recommendations for downgradient wells as needed.
- Incorporate data into revised SCM Revision 2.0.

Subtask 1.7 - Update Groundwater Monitoring Tables/Revise Groundwater Monitoring Plan

- Update proposed groundwater monitoring schedule and plan.
- Update historical groundwater monitoring tables into requested format (Task Completed)
- Perform QA/QC of historical data and address Agency comments (Task Completed).
- Incorporate data into revised SCM Revision 2.0 and include with quarterly reports.

Subtask 1.8 - Evaluate Deep Detections in CMT-4

- Review historical chemistry data for CMT-4.
- Prepare plots of head versus depth over time.
- Develop working hypotheses for low level detections below aquiclude.
- Evaluate risk posed by the detections to downgradient wells.
- Incorporate data into revised SCM Revision 2.0.

TASK 2 – FIELD INVESTIGATION OF SOURCE ZONE

Additional work is required to investigate the extent of the source zone associated with the B&C release. Specifically, additional subsurface investigations are proposed to the west and northwest of the site (Groth Brothers and Mill Springs Park Apartments) to define the horizontal and vertical limits of petroleum hydrocarbon (NAPL) associated with the release. In addition, a vapor survey is also proposed to better define potential health risks associated with vapor in the unsaturated zone associated with the petroleum hydrocarbons. It is our understanding that the City of Livermore intends to redevelop this area with residential housing as part of larger redevelopment plan for the downtown area (Livermore Redevelopment Project Area). Consequently, there is heightened focus on the source area associated with the site and, specifically, moving quickly to a remediation program for the source zone.

Subtask 2.1 – Pre Field Preparation

This task includes all preparations necessary prior to conducting the field investigation. This includes:

- Prepare letters requesting access permission from City of Livermore, Groth Brothers and Mill Springs Park Apartments. Follow up with County for assistance with access request.
- Follow up with City regarding traffic control issues and work requirements.
- Coordination and scheduling of drilling subcontractors.
- Identification and field marking of final locations for each proposed boring.
- Preparation of well permits.
- Utility clearance for all subsurface exploratory locations.
- Preparation of a program specific site health and safety plan (HSP).

- Coordination with site owners and personnel regarding schedule, boring locations, and access requirements.

Subtask 2.2 – Field Investigation

Membrane Interface Probe (MIP)

We will perform Membrane Interface Probe (MIP) sampling at approximately 13 to 15 locations (Figure 1) to define the horizontal and vertical extent of the petroleum hydrocarbon source area. We anticipate that additional MIP locations may also be required to the west of the transect shown along South M Street. The decision for additional probes will be made based on the results of the South M Street transect. Additional probes may also be added to fill in potential data gaps on the Groth Brothers Property. It is our intention to review the findings of the MIP investigation on a real time basis with the County to attempt to complete the three dimensional definition of the source in this mobilization.

The MIP is an advanced site investigation tool developed for the logging of total volatile organic compounds (VOCs) while classifying soil lithology in the subsurface. As the MIP is driven to depth using direct push equipment, a permeable membrane on the side of the probe is heated at desired intervals to volatilize organic compounds. The VOCs permeate the membrane and are delivered to the surface using an internal carrier gas. At the surface, total VOC readings are provided by using a single detector or a series of detectors, such as a PID, FID or ECD. The real time log also provides a depth/speed graph, an electrical conductivity log of the formation (lithology), and a temperature log of the heated sensor. The MIP log provides semi quantitative/qualitative information on contaminant levels and allows contaminated zones to be targeted for sampling.

Soil Sampling

To confirm the horizontal and vertical limits of the source zone defined by the MIP tool, and to develop a rough correlation between total VOCs and petroleum hydrocarbon concentrations and species, we will select approximately six locations to obtain confirmatory soil samples. We anticipate selecting two vertical intervals in each boring targeting the highest VOC detections by the MIP. A direct push rig will be used to advance the exploratory borings to evaluate the extent of petroleum hydrocarbons in the selected locations. A piston sampler, or similar, will be used to sample the zones of interest in each boring. The soil core from each boring will be logged by Golder staff according to the Unified Soil Classification System (USCS) under the supervision of a California Professional Geologist. Depending on the depth to groundwater at the time of sampling, and the thickness and elevation of the smear zone, we will attempt to collect one sample to characterize the NAPL remaining in the vadose zone and one sample to characterize the submerged smear zone. Note, however, that based on the findings from CPT-4, the highest concentrations of petroleum hydrocarbon in soil are between 35 and 40 feet bgs (which is likely below the water table based on recent groundwater level measurements).

All soil will be contained for proper disposal. All down-hole equipment will be steam cleaned before use and between borings. Rinsate will be collected in 55-gallon drums for proper disposal. These materials will be properly disposed of consistent with analytical results.

Groundwater Sampling

Grab groundwater samples will be collected from the highest VOC interval in each boring to evaluate concentrations of dissolved-phase hydrocarbons and the potential for free-phase hydrocarbons (if any) in the first encountered water-bearing zone. Prior to groundwater grab sample collection; the borings will be gauged with an oil-water interface probe to monitor each boring for the presence of

free-phase hydrocarbons. The samples will be collected using new, disposable Teflon[®] bailers. Following completion of work at each location, each boring will be grouted from the bottom up to the ground surface with bentonite-cement slurry via tremie pipe.

Groundwater and Soil Sample Analysis

All soil and groundwater samples will be properly containerized, labeled, and preserved upon collection. Chain of custody documentation will accompany the samples to the laboratory for analysis. Sequoia Analytical, a state-certified laboratory, will analyze the soil and groundwater samples for TPHg, BTEX, MTBE and fuel oxygenates by US EPA Method 8260.

In addition to chemical analyses, a suite of three to five soil samples will also be selected for analysis of physical parameters. The intent of collecting these samples will be to provide physical soil data for input into a vapor migration model, if needed to assess indoor inhalation risk, and for feasibility evaluation of potential remedial methods. The physical soil parameters include:

- Permeability (native and intrinsic) via American Petroleum Institute (API) method RP40 or American Standard Testing Method (ASTM) D425M
- Porosity (total, effective, air-filled, water-filled), grain density, dry bulk density via ASTM 2937 and API RP40
- Volumetric air and water, and moisture content via API RP40
- Soil classification (grain size and Atterberg Limits) via ASTM D2487
- Total organic carbon (f_{oc}) using the Walkley-Black method

Soil Vapor Sampling

To evaluate whether subsurface contamination presents a potential indoor inhalation risk, soil vapor samples will be collected and analyzed for petroleum hydrocarbon constituents from six locations. Golder proposes to conduct the soil vapor assessment by using direct-push probes. We will conduct this work in parallel with the soil sampling (i.e., at the same locations as the soil confirmation samples) and will sample locations in the areas of highest known subsurface contamination as documented by the MIP evaluation. The results will be compared to ESLs derived for using soil-vapor concentrations to assess potential indoor inhalation risk.

Soil gas sampling and vapor analysis will be conducted in accordance with Department of Toxics Substance Control guidance¹. Site soil lithology as determined by the MIP will be used to determine appropriate locations and depths for soil gas probes. A minimum sampling depth of 5 feet below ground surface will be utilized to minimize potential sample dilution with atmospheric air.

Direct push probe rods with a vapor point holder will be advanced to the target sample depth, then the tool string will be pulled back to expose the vapor inlet. A PRT fitting will be attached to 1/4" OD Polyethylene Tubing, lowered down the tool string and threaded into the vapor point holder. The PRT fitting is fitted with an o-ring to prevent infiltration of ambient air. At ground surface a hydrated bentonite seal will be placed around the probe rods and the ground surface to prevent ambient air intrusion from occurring. The tubing will be discarded after each sample. Samples will not be

¹ Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, Department of Toxic Substances Control, California Environmental Protection Agency, (Interim Final). February 7, 2005.

collected for 20 minutes to allow subsurface conditions to equilibrate. After each use, reusable components will be properly decontaminated to prevent cross contamination.

Prior to sampling, sampling points will be purged with a vacuum pump. The flow rate is regulated with a flow meter, a maximum flow rate of 200 cc/min. or lower will be used during sample collection whenever possible. Vacuum readings from the line gauge will be recorded on field data sheets. A leak test will be conducted at every Soil Gas Sampling Probe Installation. Shaving cream containing isopropanol, isobutene, and/or propane (common propellants) will be placed on all sample line fittings, as a means of quality control for leaks in the sample train prior to collecting a sample.

To ensure stagnant or ambient air is removed from the sampling point that samples are representative of subsurface conditions, a purge volume versus contaminant concentration test will be conducted at the first boring of the day. The purge test location will be selected as near as possible to the contamination source. Purge volumes of one (1), three (3), and seven (7) will be conducted. During purging, oxygen and volatile hydrocarbons will be measured in the field using an Innova LS gas meter. The sample yielding the highest concentration for total VOCs will determine the standard purge volume. If VOC's are not detected, a default of three (3) purge volumes will be used.

After the sampling point has been adequately purged, samples will be collected with a Summa canister. The soil vapor sample will be collected at a flow rate of 100 to 200 milliliters/minute to inhibit partitioning or short circuiting. One duplicate sample will be collected. The Summa canister sample will be properly labeled and transported (non-chilled) to a state-certified laboratory with chain-of-custody documentation.

Soil Vapor Analyses

The soil vapor samples will be analyzed by modified EPA Method TO-3 for TPHg, and modified EPA Method TO-15 for BTEX, MTBE, and the leak detection compound (isopropanol, isobutene, and/or propane) by Air Toxics of Sacramento (at a reporting limit of less than 10 µg/L). Air Toxics will also analyze the samples for oxygen, carbon dioxide, and methane by modified ASTM D-1946 (the laboratory reporting limits shall be below the concentration of these gases in the atmosphere).

TASK 3 – PREPARATION OF UPDATED SCM VERSION 2.0

Following completion of Task 1 and Task 2 the SCM will be updated. This will include the findings of the specific data gap work performed in Task 1 and the findings of the source zone characterization effort. The goal of the SCM will be to (1) address remaining questions regarding risk to groundwater resources associated with the dissolved phase plume, and (2) provide sufficient characterization and data to design a source zone remediation plan.

PROPOSED SCHEDULE

We intend to start work on Task 1 by October 1, 2005 and estimate the work will require four to six weeks to complete. We request that the County review and approve the Task 2 field investigation workplan by October 15 and also be available to support Golder in obtaining authorization to work on the Groth Brothers and Mill Springs Park Apartment complexes. We would like to initiate the Task 2 field work by November 15 assuming that authorization can be obtained. We estimate that the Task 2 work will require two to three weeks of field time and an additional two weeks to obtain laboratory results. Compilation and analysis of the resulting data will require an estimated four to six weeks. We therefore anticipate that the revised SCM 2.0 can be completed by January 31, 2006.

CLOSURE

We look forward to working closely with you to expeditiously move this site into remediation and to facilitate the activities of the Livermore Redevelopment Agency. Please call Bill Fowler at (650) 386-3828 if you would like to discuss any aspect of our workplan. x601

Sincerely,

GOLDER ASSOCIATES INC.



William L. Fowler, R.G., C.E.G.
Senior Consultant

Attachments: Figure 1 – Source Area Exploration Plan

Cc: Mr. Balaji Angle



BANK OF AMERICA

VACANT PROPERTY

NORTH L

RAILROAD AVENUE

SUSPECTED SOURCE AREA

GROTH BROTHERS OLDSMOBILE

SOUTH L ST.

MILL SPRINGS PARK APARTMENTS

(VALLEY GAS) B & C GAS MINI MART

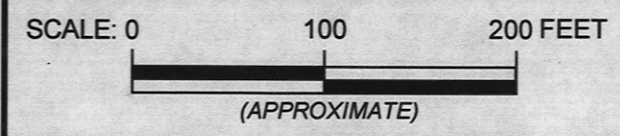
KNOWN SOURCE AREA

FIRST STREET

SOUTH M ST.

EXPLANATION

- ⊙ Groundwater monitoring well
- ⊙ Groundwater monitoring well (other regulated site)
- Soil boring with grab groundwater sample (1997)
- Soil boring with grab groundwater sample (1995)
- Tank excavation soil sample (1996)
- [1.6 @ 25'] Total Petroleum Hydrocarbons (TPH) concentration in parts per million (ppm) at depth shown in feet below ground surface (bgs)
- [NA] Not analyzed at depth (feet, bgs) shown
- Historical observation of free product
- TPH isoconcentration in soil contour (ppm)
- ⊙ Proposed MIP location



MTBE PLUME EVALUATION
B & C GAS MINI MART
LIVERMORE, CALIFORNIA

SOURCE AREA EXPLORATION PLAN

FIGURE 1
PROJECT NO. 053-7466

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