aqua science engineers inc.

RO0479
EH02

September 30, 2004

Alameda County
OCT 05 2004
Environmental Health

Mr. Amir Gholami
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

EH02

SUBJECT: ADDENDUM TO CORRECTIVE ACTION PLAN

SITE: Fuel Leak Case RO0000479
Lim Property
250 8th Street
Oakland, CA 94607

Dear Mr. Gholami:

On behalf of our client, Mr. Russell Lim, Aqua Science Engineers (ASE) is pleased to submit this addendum to our Corrective Action Plan (CAP), dated August 26, 2002, for the subject site.

This addendum is to provide a detailed descrpition of the dual phase extraction (DPE) pilot test which will be followed by a DPE interim remediation event that is scheduled for October 2004. The request for this addendum came in the form of a letter from Barney Chan of your agency, dated March 4, 2004.

SCOPE OF WORK

This addendum outlines the scope of work to perform both a DPE pilot test and a 14-day DPE interim remediation event at the site. Together, the two tasks will utilize a high vacuum DPE (HVDPE) system that will be piped to, at a minimum, monitoring well MW-3, which currently contains approximately 1-foot of free-floating hydrocarbons. The purpose of the DPE pilot test is to determine, within a 24-hour period, the optimum operating parameters for the system as it relates to the subsurface conditions at the site. Once the DPE pilot test is completed, the optimized operatimg parameters

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will be dialed into the DPE system for the extended DPE interim remediation event. It is the intent of ASE that the DPE interim remediation event will remove contaminated vapors and groundwater at high vacuum from extraction wells to remediate trapped hydrocarbons in the soil and groundwater that have been evident at the site for years.

Since the time of the August 2002 CAP, ASE has collaberated with Mr. Noel Shenoi of CalClean, the company that actually supplies and operates the DPE system. CalClean is the industry leader in performance of DPE pilot tests and remediation events. Based on Mr. Shenoi's extensive experience in dealing with highly-polluted gasoline sites, and his close work with the Underground Storage Tank Cleanup Fund (USTCF), the 5-day DPE event detailed in the CAP has been replaced by a 15-day DPE event. Mr. Shenoi has counseled ASE and our client in the fact that an effective interim remediation event requires a greater amount of time to reach the boundaries of the affected soil and groundwater. The 15-day event was therefore recommended by Mr. Shenoi and selected by ASE and our client.

ASE's basic scope of work is as follows:

- Secure permits from the City of Oakland for encroachment on a city street, closure of a sidewalk, and closure of parking spaces.

- Secure a Special Discharge Permit from EBMUD to discharge the treated groundwater to the on-site sanitary sewer.

- Mobilize to the site with CalClean personnel to perform the HVDPE event.

- Connect the HVDPE equipment to monitoring well MW-3 located within the parking strip of 8th street. Other wells, such as Injection Wells IW-1 through IW-5 may also be used as extraction points.

- Extract free-product, groundwater and vapors from the extraction well.

- Destroy the free-product and petroleum-hydrocarbon laden vapors with the truck-mounted thermal oxidizer.

- Treat the hydrocarbon-laden groundwater with the activated carbon water treatment system.

- Discharge the treated groundwater to the EBMUD sanitary sewer.

- Collect groundwater and vapor samples from the influent stream at the start, end and at key points during the HVDPE event.

- Analyze water and vapor samples at a State of California Department of Health Services (CA DHS) certified analytical laboratory for total petroleum hydrocarbons as gasoline (TPH-G), benzene toluene, ethylbenzene and xylenes (collectively known as BTEX), MTBE and oxygenates, and lead scavengers by EPA Method 8260B. Analyze the water samples also for total petroleum hydrocarbons as diesel (TPH-D) by EPA Method 8015M.

- Collect data to determine a radius of influence of the HVDPE system on several outlying wells at the start, end and at key points during the HVDPE event.

- Using a subcontrated vacuum-truck service, dispose of any free-product that could not be treated by the thermal oxidizer.

To implement both the DPE pilot test and the DPE interim remediation event, ASE proposes to complete the following tasks:

TASK #1 PERMITTING

ASE will secure permits from the City of Oakland for encroachment on a city street, closure of a sidewalk, and closure of parking spaces. ASE will also secure a Special Discharge Permit from EBMUD to discharge the treated groundwater to the on-site sanitary sewer. ASE will obtain an exemption from the Bay Area Air Quality Management District (BAAQMD) for operation of the thermal

oxidizer used to treat extracted soil vapor during the DPE pilot test and the DPE interim remediation event.

TASK #2 HEALTH AND SAFETY PLAN

Prior to conducting all field activities, a Health and Safety Plan will be prepared outlining all field activities to be performed at the site during the HVDPE activities. A copy of the Health and Safety Plan will be available onsite during all field activities.

TASK #3 INITIATION OF DPE PILOT TEST

A brief DPE step and pilot test (approximately 4 per well) will be conducted on the extraction well, MW-3, to address residual adsorbed contamination in the shallow soil zone and in the deep "smear" zone below the current water table elevation.

For the DPE pilot test, ASE and its subcontractor CalClean will use a truck-mounted high vacuum mobile treatment system capable of extracting soil vapor and groundwater from the subsurface. The mobile treatment system will be coupled to a thermal oxidizer used to treat extracted soil vapor in accordance with conditions established by the BAAQMD.

ASE will conduct the DPE pilot test according to the following procedures outlined in this section. These procedures include pre-test activities, step test procedures, soil vapor mass removal pilot test, groundwater mass removal, and extended period mass removal procedures for the deeper smear zone. Copies of field data sheets and data tables used during the pilot tests are included in Attachment A.

Pre-Test Activities

Prior to initiating the DPE pilot test, ASE will perform the following:

1. Measure the distance from the extraction well (at a minimum MW-3) to the selected observation wells (Injection Wells IW-1

through IW-5 and the remaining monitoring wells at the site) and record the measurements in Table A.

2. Gauge the depth to water in the extraction and observation wells.

3. Collect a grab groundwater sample from the extraction well (MW-3) before initiation of groundwater extraction.

4. Install well seals in each observation well to prevent atmospheric short-circuiting during the test. Well seals will consist of a labcock sample port equipped with a butterfly valve. The well seal will be installed and an air compressor attached to the sample port with a hose. The well casing will be pressurized using the air compressor to approximately 25 pounds per square inch (psi). Using the pressure gauge attached to the well seal, the technician will observe the time and pressure drop and record the information on Table B. Well seals will be pressure tested before and after completion of the pilot test to ensure proper transmitting of airflow and to check for changes in seal integrity.

5. Perform a visual observation of the pavement surface in the vicinity of the extraction and observation wells and identify any significant cracks or unsealed penetrations and record observations. Visually check the well head conditions and well seals for any apparent lack of integrity and record observations. In addition, the technician will record pertinent local weather data that could account for possible changes in soil gas pressure in the vadose zone. Record observations on Comments section of Table B.

Step-Test Procedures

An interval step test will be performed to determine the optimum range of applied vacuum to maximize the removal of soil vapor, and to develop a significant cone of depression in the groundwater during the DPE pilot test. The step test intervals for the DPE pilot test will be: 1 hour, 2 hours, and 3 hours from the start time for

both the shallow zone soils and those below the current water table elevation of approximately 9-feet below ground surface. Prior to startup of step tests the following tasks will be completed:

1. Determine the sequence of monitoring for observation wells in the well field.

2. Measure the depth to groundwater (feet below top of casing) in all wells and record data on Table C.

3. The DPE drop tube will be measured and marked with permanent ink at 5, 10, 15, 20, and 25 feet intervals. Note the starting depth of the drop tube (which will be 3-feet below the starting water level) on Field Data Sheets.

4. Prior to startup, place the well seals on the observation wells, close the labcock valves, and measure the observation wellhead vacuum (in H_2O) and repeat the measurements every 15 minutes during the step test. Record the data on Table C.

5. Turn on the vacuum pump at low vacuum (e.g., 1 to 5 inches Hg) and observe and record the airflow rates (scfm) at the extraction wellhead, well casing seal, and DPE manifold using a hot wire anemometer or other flow instruments. Record time on Field Data Sheets.

6. Collect an initial influent vapor sample from the extraction well. The influent vapor samples will be submitted to a California Certified laboratory under chain-of-custody documentation for analysis of TPH-G, BTEX, and fuel oxygenates by EPA Method 8260B.

7. Measure influent vapor concentration (parts per million by volume [ppmv]) using a photo ionization detector (PID) or equivalent meter every 15 minutes during the step test and record the time on the Field Data Sheets.

8. Measure groundwater extraction rates by measuring the rise of groundwater in the sight glass on the knockout tank DPE unit.

9. Collect a Step 1 ending influent vapor sample from the extraction well.

Repeat the procedure above for mid-range vacuum (e.g., 5 to 7 inches Hg) and again at maximum vacuum (e.g., 10 inches Hg or higher) for the time intervals noted above. During the DPE step test, the drop tube will be raised to the starting depth (which will be 3-feet below the starting water level) at the beginning of each step. Dilution adjustments may not be made during the step test unless specified by the site engineer. The step test will be stopped once the DPE unit has reached the end of the final step at maximum vacuum. At the completion of the DPE step test, a grab groundwater sample will be collected from the purge water tank for waste characterization.

Soil Vapor Mass Removal Pilot Test Procedures

After conclusion of the step test, determine the optimum range of vacuum to be applied during the extended period extraction tests. Perform the soil-only vapor mass removal pilot test by the following procedure:

1. Prior to startup, measure depth to groundwater in all wells and record data in Table D.

2. Connect the observation flow tube to the drop tube at the wellhead. Make observations of flow based on annular, slug, and churn conditions. Record observations in Table D.

3. Turn on vacuum pump at optimum vacuum, based on information determined during the step test. Observe and record vapor flow rates (scfm) using a hot wire anemometer or other flow meter at the extraction wellhead and manifold. Repeat flow measurements every 30 minutes for the first 2 hours, then every hour thereafter. Record data on Field Data Sheets.

4. Measure influent concentration (ppmv) using a PID every 30 minutes and record data on Field Data Sheets.

5. Collect a temporal midpoint and concluding influent vapor sample from the extraction well using a Tedlar™ bag.

6. After operation of the soil-only vapor extraction test for a designated period of the pilot test, turn off the system. For the soil and groundwater (dual-phase) pilot test, remove the drop tube and record water level recovery data by collecting periodic water level measurements. Once the water level in the well has recovered completely, collect a groundwater sample from the extraction well using a disposable bailer.

Groundwater Mass Removal

Groundwater extraction during the DPE pilot testing will be performed using a drop tube and vacuum generated by the treatment system pump. The following procedures will be performed during the dual-phase step and pilot tests:

1. Prior to startup, measure depth to groundwater in all wells and record data in Table D.

2. Install data logger pressure transducers in all observation wells. Preset the pressure transducers to record data on 1-minute intervals and record several hours of background data before initiating groundwater extraction. Record observations and field data on Table D.

3. Record the start time of the transducer.

4. Adjust the drop tube so that it is approximately 3 feet below the water level in the extraction well and begin groundwater extraction. Record the start time and observe the flow type in the flow tube.

5. Measure the groundwater extraction rates with a flow meter/totalizer every 30 minutes for 8 hours, then once per hour thereafter. Check the flow rate with a bucket test at the storage tank every few hours. Record observations on the Field Data Sheets.

6. Make periodic adjustments to the drop tube depth to maintain the tube approximately 3 feet below the water level. Make adjustments to the flow rate based on the observations.

7. At the conclusion of the DPE groundwater extration pilot test, collect a groundwater grab sample from the extraction well using a disposable bailer.

8. At the conclusion of the DPE groundwater extration pilot test, remove the drop tube from the extraction well and record the depth to water (feet below top of casing) in the extraction well using an interphase probe and record the time. The pressure transducers in the observation wells will continue to record data until groundwater levels have recovered to their pre-test equilibrium water levels. Periodically check the pressure transducers using the computer interface to monitor recovery to pre-extraction pressure readings. Wait for a minimum of 1 hour for vadose zone pressures and groundwater levels to equilibrate.

Extracted groundwater from the extraction wells used during the DPE groundwater extration pilot test and eventual DPE interim remediation event will be immediately treated by CalClean's on-site activated carbon treatment unit. The treated groundwater will then be temporarily stored on-site in a 6,000-gallon baker tank. The treated water will then be tested on a 24-hour RUSH analysis by a CA DHS certified analytical laboratory for TPH-G, BTEX, MTBE and oxygenates, and lead scavengers by EPA Method 8260B, and TPH-D by EPA Method 8015M. Upon receipt of favorable analytical results, discharge the treated groundwater to the on-site sanitary sewer for eventual final disposition with EBMUD.

TASK #4 EXTENDED PERIOD DPE INTERIM REMEDIATION EVENT (15 DAYS TOTAL)

1. Turn on vacuum pump at optimum vacuum. Observe and record vapor flow rates (scfm) using a hot wire anemometer or other flow meter at the extraction wellheads and manifold. Repeat flow and vacuum measurements every 30 minutes and record information on Field Data Sheets.

2. Measure influent vapor concentration in ppmv using a PID every 30 minutes.

3. Continue to optimize operating parameters as the DPE interim remediation event proceeds. This task will occur continuously until the event is completed. Field personnel will work in 12-hour shifts so that the equipment is manned at all times

4. Change extraction wells as needed based on PID field measurements.

5. Collect influent vapor sample using Tedlar bag at the conclusion of the DPE interim remediation event.

6. Continuously treat extracted hydrocarbon vapors with the truck-mounted thermal oxidizer unit.

7. Continuously treat extracted groundwater with the truck-mounted activated carbon units. Sample groundwater in batches to determine its suitability for discharge down the EBMUD sanitary sewer.

8. Should a significant volume of free-product form on the DPE system temporary holding tank, the product may be decanted off the surface of the groundwater and temporarily stored within a drum for future offsite disposal as hazardous waste. ASE has a contract with Clearwater Environmental for handling of such wastes.

9. At the conclusion of the event, well seals are to be pressure tested again to check for changes in seal integrity. Compare results to pre-test seal pressures. Record results on Table E.

ASE believes the 15 days of DPE pilot testing and interim remediation tasks will be sufficient for remediation of impacted soils and groundwater at the site. The emphasis of the event will be centered on extraction well MW-3 due to its current and historical volume of free-product. Should influent vapor concentrations begin to drop dramatically and remain low in MW-3 (based on PID concentrations), the remaining days of the DPE interim remediation event will be dedicated to constant-rate performance tests using several or all of the Injection Wells. The goal of this DPE interim remediation event is to remediate the hydrocarbons trapped in soil and groundwater beneath the site. The event will conclude early only if influent vapor concentrations are measured at insignificant levels for an extended period of time (24-48 hours) in all of the extraction wells.

TASK #5 SAMPLE COLLECTION

Field measurements of influent vapor concentration in ppmv will be obtained periodically using a PID or equivalent analyzer throughout the DPE pilot test and the DPE interim remediation event and record the data on the Field Data Sheet. This tool will be used to determine at which point in time the DPE equipment should be switched from one extraction well to the next.

Soil vapor samples collected during the DPE pilot test and the DPE interim remediation event will be collected in laboratory supplied Tedlar™ bags. Water samples will be collected in new, unused 40-ml VOA vials and 1-liter amber bottles. All samples will be labeled with the sample ID and location, date and time, and name of sampler. The vapor samples will be stored at ambient temperature in a cooler that protects the samples from direct sunlight. The water samples will be stored with a cooler containing wet ice. The samples will be shipped to the laboratory under chain-of-custody documentation immediately and analyzed on a standard turn-around-time. Selected vapor and water samples will be analyzed by a state-certified laboratory for the

presence of TPH-G and BTEX compounds by EPA Method 8015, and fuel oxygenates by EPA Method 8260B. The water ssamples will also be analyzed for TPH-D by EPA Method 8015.

TASK #6 DATA ANALYSIS AND REPORT PREPARATION

Field data collected during the DPE pilot test and the DPE interim remediation event will include applied vacuum, air-flow rates, soil pressures, offgas moisture levels and amount of moisture, and effluent contaminant concentrations.

The tabulated data collected during the DPE pilot test and the DPE interim remediation event will be used to generate the following plots/ diagrams:

- Soil vapor cumulative removal rate versus time;
- Influent vapor concentrations versus time;
- System flow diagram and description of system used for the DPE pilot test and the DPE interim remediation event
- applied vacuum and flow rate data versus time; and
- effluent vapor concentration data versus time.

Following completion of the DPE pilot test and the DPE interim remediation event and data analysis, ASE will prepare a Remediation Feasibility Study report. The report will document the DPE pilot test and the DPE interim remediation event activities and provide conclusions and recommendations for further remedial activities or monitoring, whichever is determined to be appropriate.

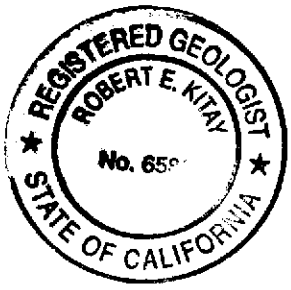
SCHEDULE OF ACTIVITIES

ASE has begun permitting since the receipt of the approval letter from Alameda County Health Care Services Agency. Upon receiving the permits, ASE will implement the workplan and this addendum immediately. The DPE pilot test and the DPE interim remediation event is tentatively scheduled for the latter part of October 2004.

ASE would like to thank you in advance for your assistance and prompt attention to this matter. Please feel free to call us if you have any questions or comments.

Sincerely,
Aqua Science Engineers, Inc.

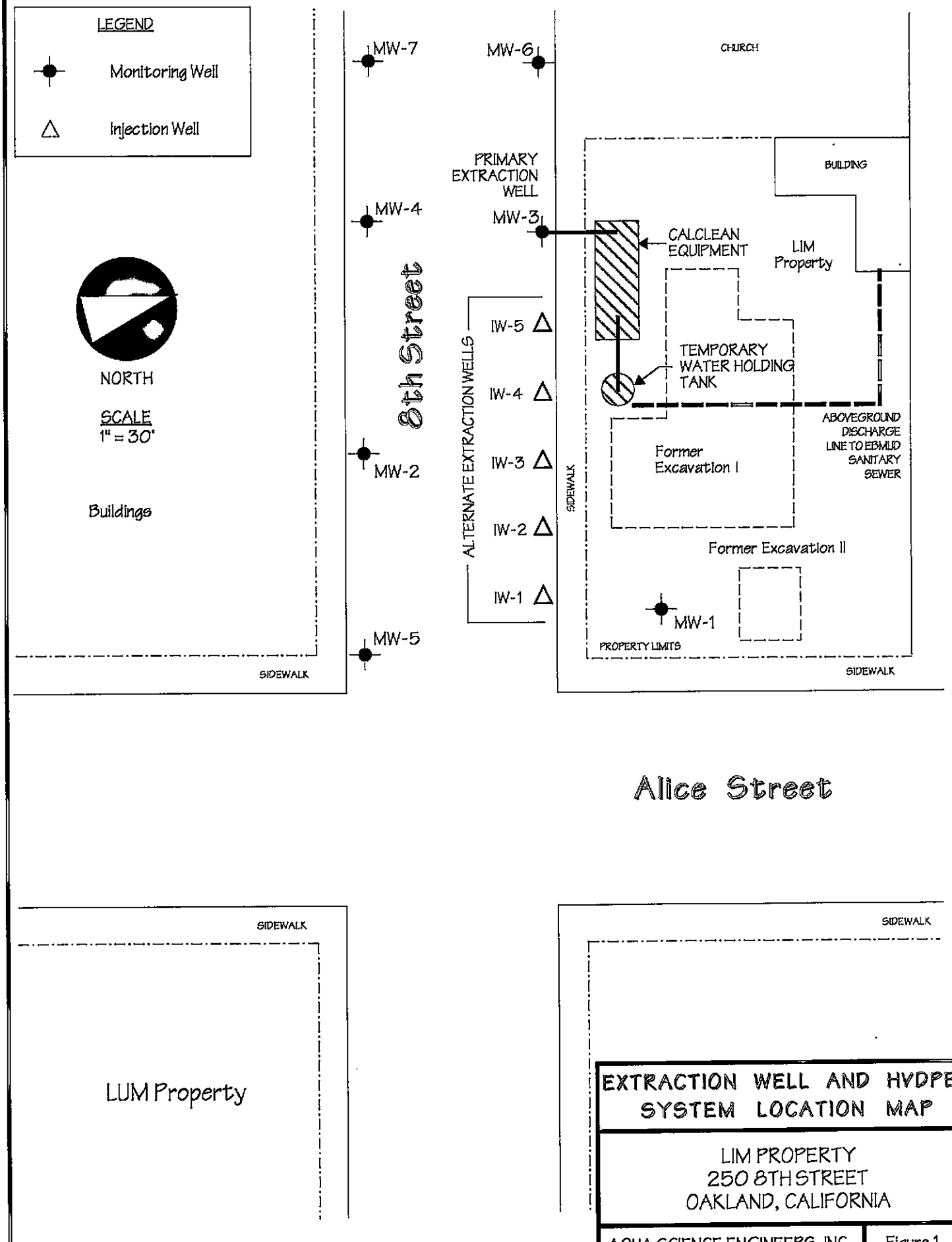
David Allen, R.E.A.
Project Engineer



Robert Kitay, R.G., R.E.A.
Senior Geologist

Figures: 1 –Site Map
2 –Flow Diagram for the DPE Process

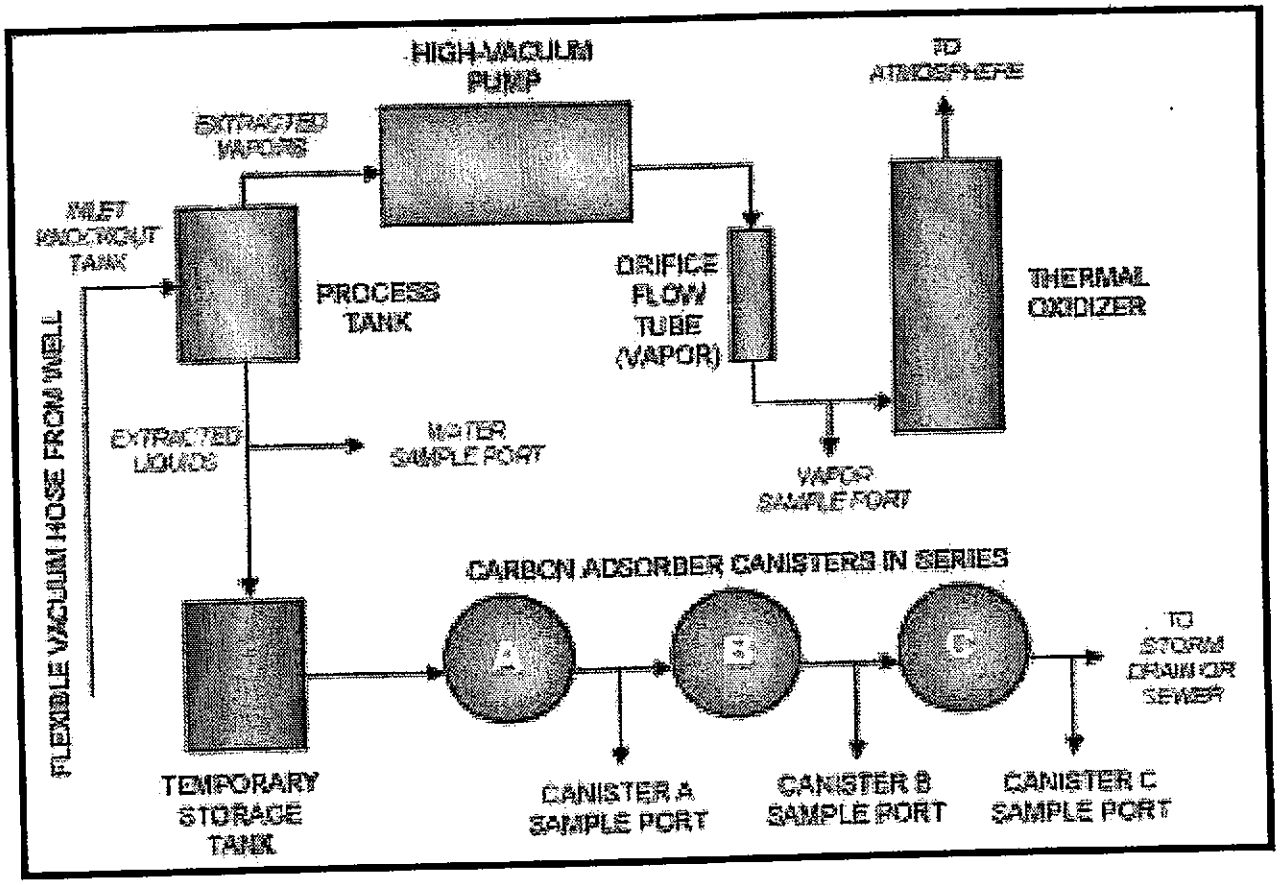
cc: Mr. Russell Lim, 3111 Diablo Road, Lafayette, CA 94549



EXTRACTION WELL AND HVDPE SYSTEM LOCATION MAP

LIM PROPERTY
250 8TH STREET
OAKLAND, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | Figure 1



HVDPE SYSTEM
PROCESS FLOW DIAGRAM

LIM PROPERTY
250 8TH STREET
OAKLAND, CALIFORNIA

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