aqua science engineers inc.

May 12, 2000

WORKPLAN
for a
SOIL AND GROUNDWATER ASSESSMENT
at
Lim Family Property
250 8th Street
Oakland, California

Submitted by:
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1.0 INTRODUCTION

This submittal outlines Aqua Science Engineers, Inc. (ASE's) workplan for a soil and groundwater assessment at 250 8th Street in Oakland, California (Figure 1). The proposed site assessment activities have been designed to further define the extent of soil and groundwater contamination in 8th Street downgradient of the site (Figure 2).

2.0 BACKGROUND INFORMATION

A gasoline service station previously occupied the site. In May 1992, ASE removed ten underground fuel storage tanks (USTs) from the site. The USTs consisted of one (1) 10,000-gallon gasoline tank, one (1) 5,000-gallon diesel tank, three (3) 2,000-gallon gasoline tanks, one (1) 2,000-gallon diesel tank, three (3) 500-gallon gasoline tanks and one (1) 250-gallon waste oil tank. Up to 10,000 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G) and 5,900 ppm total petroleum hydrocarbons as diesel (TPH-D) were detected in soil samples collected during the tank removal.

Between December 1992 and March 1993, All Environmental of San Ramon, California overexcavated 1,762 cubic yards of soil from the site and off-hauled the soil to the BFI Landfill in Livermore, California. Analytical results show that all on-site soil with hydrocarbon concentrations greater than 10 ppm was removed from the site with the exception of soil along the 8th Street shoring. Up to 1,800 ppm TPH-G and 120 ppm TPH-D were detected in soil samples collected along the shoring indicating that contamination likely extends below 8th Street. This contamination left in place may still be a source for groundwater contamination.

In January 1995, ASE installed monitoring wells MW-1 and MW-2 at the site (Figure 2). High hydrocarbon concentrations were detected in monitoring well MW-2, downgradient of the site. Moderate hydrocarbon concentrations were detected in on-site monitoring well MW-1.

In July 1996, ASE sampled groundwater from each monitoring well and drilled borings BH-C and BH-D to further define the width of the hydrocarbon plume downgradient of the site. Relatively high hydrocarbon concentrations continued to be detected in groundwater samples collected from monitoring well MW-2, downgradient of the site. Slightly lower but still very high hydrocarbon concentrations were detected in groundwater samples collected from boring BH-D, west of

monitoring well MW-2. Very low hydrocarbon concentrations, below California Department of Toxic Substances Control (DTSC) maximum contaminant levels (MCLs) and recommended action levels (RALs) for drinking water, were detected in groundwater samples collected from monitoring well MW-1, located on the site, and boring BH-C, east of monitoring well MW-2. Based on these findings, the plume appears to be moving to the south of Excavation I on the site and not toward the Lum property south-southeast of the site.

Between April 1995 and January 1996, the site was on a quarterly groundwater monitoring schedule. The site is currently on a semi-annual groundwater monitoring schedule with volatile organic compound (VOC) analyses only being performed annually.

On June 5, 1997, ASE prepared a remedial action plan (RAP) addressing the need for groundwater remediation at the site, describing the appropriateness of several remedial options and choosing an option. Hydrogen peroxide injection was chosen as the groundwater remediation option of choice for the site.

On February 2 and 3, 1999, five (5) injection wells were installed at the site (Figure 2). On February 18, 1999, the injection system was started by ASE. It has been delivering a water and hydrogen-peroxide solution to each injection well on a constant basis. Since the injection activities, dissolved oxygen (DO) concentrations within the injection wells has risen to above 20 ppm. The DO concentration in the downgradient monitoring well, MW-2, has yet to show a measurable increase.

On June 22, 1999, while measuring the DO content within the injection wells, ASE discovered that the DO probe had a very strong gasoline odor when removed from injection well IW-5. A clear bailer was inserted into IW-5 to check for the presence of floating product. The bailer contained approximately 18-inches of what appeared to be aged gasoline. On June 24, 1999, ASE returned to the site with an interface probe to accurately measure the thickness of the product. On that day, 1.75-feet of product was measured floating on the water surface in IW-5. Injection well IW-4 (15-feet east of IW-5) was measured with the interface probe and did not contain a measurable amount of floating product. On June 24, 1999, ASE bailed the product from IW-5 until only a sheen was present on the water surface. Approximately 3 gallons of product was removed from IW-5. The product is currently stored on-site in a labeled 55-gallon drum. ASE has continued to measure and bail the floating product within well IW-5 on a

bi-weekly basis. The thickness of product has decreased to less than 1-foot.

In January 2000, ASE installed groundwater monitoring wells MW-3 and MW-4 east of the injection well IW-5 and monitoring well MW-2. High hydrocarbon concentrations were detected in groundwater samples collected from both of these wells, including up to 140,000 ppb TPH-G, 13,000 ppb TPH-D and 22,000 ppb benzene.

In April 2000, ASE collected groundwater samples from all four site monitoring wells. Elevated hydrocarbon concentrations were detected in groundwater samples collected from monitoring wells MW-2, MW-3 and MW-4, including up to 240,000 ppb TPH-G, 700,000 ppb TPH-D and 35,000 ppb benzene. Monitoring well MW-3 contained free-floating hydrocarbons.

3.0 PROPOSED SCOPE OF WORK (SOW)

Due to the presence of floating product and elevated hydrocarbon concentrations in groundwater samples collected off-site, ASE has prepared the following scope of work (SOW) to define the extent of elevated hydrocarbon concentrations downgradient of the site.

1) Prepare a workplan for approval by Mr. Seto of the ACHCSA.

2) Obtain a drilling permit from the Alameda County Public Works Agency (ACPWA). Obtain an excavation and encroachment permit from the City of Oakland.

3) Drill three (3) soil borings to 30-feet below ground surface (bgs) in 8th Street downgradient of the site.

4) Analyze one soil sample collected from each soil boring at a CAL-EPA certified environmental laboratory for total petroleum hydrocarbons as gasoline (TPH-G) by modified EPA Method 5030/8015M, total petroleum hydrocarbons as diesel and motor-oil (TPH-D/MO) by modified EPA Method 3510/8015M, benzene, toluene, ethyl benzene and total xylenes (collectively known as BTEX) and methyl tertiary butyl ether (MTBE) by EPA Method 8020, oil and grease (O&G) by Standard Method 5520, and volatile organic compounds (VOCs) by EPA Method 8260.

5) Install 2-inch diameter groundwater monitoring wells in each boring described in task 3.

6) Develop the monitoring wells.

7) Collect groundwater samples from each monitoring well for analyses.

8) Analyze the groundwater samples at a CAL-EPA certified analytical laboratory for TPH-G, TPH-D, TPH-MO, BTEX, MTBE, O&G and VOCs.

9) Survey the top of casing elevation of each well, and determine the groundwater flow direction and gradient beneath the site.

10) Prepare a report detailing the methods and findings of this assessment.

Details of the assessment are presented below.

TASK 1 - PREPARE A WORKPLAN AND HEALTH AND SAFETY PLAN

Based on the site history and the analytical results of the soil and groundwater samples collected during previous assessments at the site, ASE has prepared this workplan as well as a site-specific health and safety plan. A nearby hospital is designated in the site safety plan as the emergency medical facility of first choice. A copy of the site specific Health and Safety Plan will be present at the site at all times.

TASK 2 - OBTAIN NECESSARY PERMITS

ASE will obtain a drilling permit from the ACPWA, and encroachment and excavation permits from the City of Oakland. ASE will also notify Underground Service Alert (USA) to have underground utility lines marked in the site vicinity.

TASK 3 - DRILL THREE SOIL BORINGS AT THE SITE

ASE will drill three (3) soil borings at the locations shown on Figure 3. The borings will be drilled using a drill rig equipped with 8-inch diameter hollow-stem augers. The drilling will be directed by a qualified ASE geologist. Undisturbed soil samples will be collected at least every 5-feet, at lithographic changes, and from just above the water table for subsurface hydrogeologic description and possible chemical analysis. The samples will be described by the ASE geologist according to the Unified

Soil Classification System. The samples will be collected in brass tubes using a split-barrel drive sampler advanced ahead of the auger tip by successive blows from a 140-lb. hammer dropped 30-inches. Each sample will be immediately removed from the sampler, trimmed, sealed with Teflon tape and plastic caps, secured with duct tape, labeled with the site location, sample designation, date and time the sample was collected, and the initials of the person collecting the sample. The samples will be placed into an ice chest containing wet ice for delivery under chain of custody to a CAL-EPA certified analytical laboratory.

Soil from the remaining tubes not sealed for analysis will be removed for hydrogeologic description and will be screened for volatile compounds with an organic vapor meter (OVM). The soil will be screened by emptying soil from one of the tubes into a plastic bag. The bag will be sealed and placed in the sun for approximately 10 minutes. After the hydrocarbons have been allowed to volatilize, the OVM will measure the vapor through a small hole punched in the bag. These OVM readings will be used as a screening tool only since these procedures are not as rigorous as those used in an analytical laboratory.

All sampling equipment will be cleaned in buckets with brushes and a trisodium phosphate (TSP) or Alconox solution, then rinsed twice with tap water. Rinsates will be contained on-site in 55-gallon steel drums until off-site disposal can be arranged.

TASK 4 - ANALYZE AT LEAST ONE SOIL SAMPLE FROM EACH BORING

At least one soil sample from each boring will be analyzed at a CAL-EPA certified environmental laboratory for TPH-G by modified EPA Method 5030/8015M, TPH-D and TPH-MO by modified EPA Method 3510/8015M, BTEX and MTBE by EPA Method 8020, O&G by Standard Method 5520, and VOCs by EPA Method 8260.

TASK 5 - COMPLETE THE BORINGS AS MONITORING WELLS

ASE will complete the borings described in task 3 as 2-inch diameter groundwater monitoring wells. The wells will be constructed with 2-inch diameter, flush-threaded, schedule 40, 0.020-inch slotted PVC well screen and blank casing. The well casing will be lowered through the augers and #3 Monterey sand will be placed in the annular space between the well casing and the borehole to approximately 1-foot above the screened interval. Approximately 0.5-foot of bentonite pellets will be placed on top of the sand pack and hydrated with deionized water. This bentonite layer

will prevent the cement sanitary seal from infiltrating into the sand pack. Portland cement will be used to fill the annular space between the bentonite layer and the surface to prevent surface water from infiltrating into the well. The well head will be protected by a locking well plug and an at-grade, traffic-rated well box (See Figure 4 - Typical Monitoring Well).

The well will be screened to monitor the first water-bearing zone encountered. Wells are typically screened with 5-feet of screen above the water table and 10 to 15-feet of screen below the water table.

TASK 6 - DEVELOP THE MONITORING WELLS

The monitoring wells will be developed after waiting at least 72 hours after well construction. The wells will be developed using at least two episodes of surge block agitation and bailer or pump evacuation. At least ten well casing volumes of water will be removed during the development, and development will continue until the water appears to be reasonably clear. The well development purge water will be stored temporarily on-site in sealed and labeled 55-gallon steel drums until off-site disposal can be arranged.

TASK 7 - SAMPLE THE MONITORING WELLS

After waiting 72 hours after the well development, ASE will sample the monitoring wells. Prior to purging and sampling, the groundwater surface in each well will be checked for sheen or free-floating hydrocarbons. The thickness of any free-floating hydrocarbons will be measured with an interface probe. ASE will also measure the depth to groundwater in all site wells prior to purging water from any well. Prior to sampling, each well will be purged of at least four well casing volumes of groundwater. The temperature, pH and electrical conductivity of evacuated water will be monitored during the well purging, and purging will continue beyond four well casing volumes if these parameters have not stabilized. Groundwater samples will be collected from each well using disposable polyethylene bailers. Groundwater samples to be analyzed for volatile compounds will be decanted from the bailers into 40-ml glass volatile organic analysis (VOA) vials, preserved with hydrochloric acid, and sealed without headspace. Samples to be analyzed for non-volatile compounds will be contained in 1-liter amber glass containers. All samples will be labeled with the site location, sample designation, date and time the samples were collected, and the initials of the person collecting the samples. The samples will then be placed into an ice chest with wet ice

for transport to the analytical laboratory under chain of custody. Purged groundwater will be stored temporarily on-site in sealed and labeled 55-gallon steel drums until off-site disposal can be arranged.

TASK 8 - ANALYZE THE GROUNDWATER SAMPLES

The groundwater samples will be analyzed by a CAL-EPA certified analytical laboratory for TPH-G, TPH-D, TPH-MO, BTEX, MTBE, O&G and VOCs.

TASK 9 - SURVEY THE TOP OF CASING ELEVATION OF EACH WELL

ASE will survey the top of casing elevation of each well relative to the other wells at the site.

TASK 10 - PREPARE A SUBSURFACE ASSESSMENT REPORT

ASE will prepare a subsurface assessment report outlining the methods and findings of this assessment. This report will include a summary of the results, the site background and history, description of the well construction, development and sampling, tabulated soil and groundwater analytical results, conclusions and recommendations. Formal boring logs, analytical reports, and chain of custody documents will be included as appendices. This report will be submitted under the seal of a California registered civil engineer or geologist.

4.0 SCHEDULE

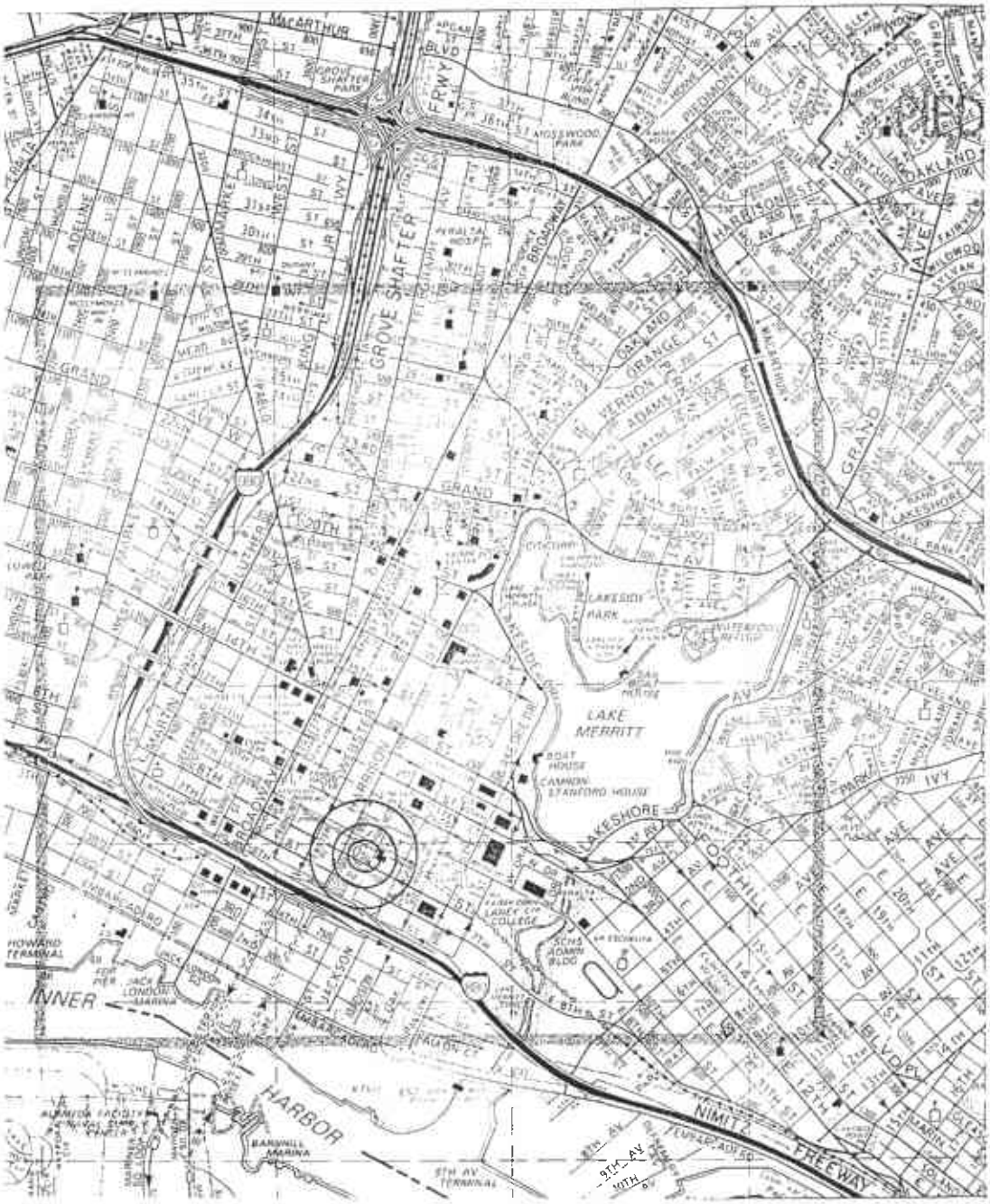
ASE plans on drilling these monitoring wells upon receipt of approval of this workplan from the ACHCSA, pre-approval of the costs from the Underground Storage Tank Cleanup Fund (USTCF) and obtaining permits.

Should you have any questions or comments, please call us at (925) 820-9391.

Respectfully submitted,

AQUA SCIENCE ENGINEERS, INC.

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



SITE LOCATION MAP

Lim Property
250 8th Street
Oakland, California

Aqua Science Engineers | Figure 1

BASE: The Thomas Guide, Alameda and Contra Costa Counties Street Guide & Directory, 1990

RESIDENTIAL

BUILDING

FENCE

LIM
Property

FORMER
EXCAVATION II

EXISTING
UNOCAL
SERVICE STATION

800 Harrison

CHURCH

FORMER
EXCAVATION I

MW-1

SIDEWALK

FENCE

SIDEWALK

HP SOLUTION TANK

FENCED
COMPOUND

PUMPS

PROPERTY LIMITS

BURIED
TUBING

SIDEWALK

SIDEWALK

Alice Street

SIDEWALK

MW-3

IW-5 IW-4 IW-3 IW-2 IW-1

8th Street

Harrison Street

Unocal MW-7

Unocal MW-8

MW-4

MW-2

SIDEWALK

726 Harrison St
Kin Chan

BUILDINGS

SIDEWALK

SIDEWALK

LUM Property

LUM-1

MW-4

FORMER
SHELL
SERVICE STATION

MW-1

BUILDING

MW-3

MW-2

LEGEND

- Proposed Monitoring Well
- ASE Monitoring Well
- AEI Monitoring Well
- HP Injection Well
- Unocal Monitoring Well
- Former Shell Monitoring Well

NORTH

0 30 60 90

SCALE IN FEET

↓ Bo Gin / ARCO

PROPOSED MONITORING WELL LOCATION MAP

LIM PROPERTY
250 8TH STREET
OAKLAND, CALIFORNIA

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