aqua science engineers inc.

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WORKPLAN
for
ADDITIONAL SITE REMEDIATION
at
Former Alameda Max's Property
1357 High Street
Alameda, California

Submitted by:
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INTRODUCTION

This submittal outlines Aqua Science Engineer's, Inc. (ASE) proposed workplan for soil remediation activities at 1357 High Street in Alameda, California *(Figure 1)*. This work is being performed to satisfy the requirements outlined in the April 11, 1995 letter from the Alameda County Health Care Services Agency.

SITE HISTORY

A gasoline service station formerly occupied the site *(Figure 2)*. On March 26, 1993, ASE removed one (1) 6,000-gallon gasoline storage tank, one (1) 5,000-gallon gasoline storage tank, one (1) 4,000-gallon gasoline storage tank, one (1) 550-gallon gasoline storage tank, one (1) 150-gallon waste oil storage tank and one (1) 150-gallon oil and water separator from the site. All of the tanks were steel. The 550-gallon gasoline storage tank had a hole in the tank upon inspection, and strong petroleum odors were present around the tank. The 150-gallon waste oil storage tank did not contain any apparent holes or cracks, however, a strong petroleum odor was emanating from the excavation. No holes, cracks or petroleum odors were identified upon inspection of the other tanks. Up to 140 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G), 2,200 ppm total petroleum hydrocarbons as diesel (TPH-D) and 12,000 ppm oil and grease (O&G) were detected in soil samples collected from the tank pits.

On November 22, 1993, ASE overexcavated soil from the former waste-oil storage tank pit and removed the soil stockpiles that were generated during the tank removal operations. A total of approximately 88 tons of contaminated soil were overexcavated and removed from the site. Only 2 ppm O&G were detected in a confirmation sample collected at the bottom of northern sidewall of the waste oil tank excavation.

On March 31, 1994, ASE drilled borings BH-A through BH-C at the site and installed groundwater monitoring wells MW-1 through MW-3 in the borings. Up to 7,500 ppm O&G and 1,400 ppm TPH-D were detected in a soil sample collected from boring BH-B near the waste oil tank. Relatively low TPH-G concentrations (7.4 ppm) were detected in shallow unsaturated soil from boring BH-C. No hydrocarbons were detected in the soil sample collected in boring BH-A.

On April 4, 1994, ASE collected groundwater samples from the wells. 6,200 parts per billion (ppb) O&G, 150 ppb TPH-G and low benzene, toluene, ethylbenzene and total xylenes (BTEX) and trichloroethene (TCE)

concentrations were in groundwater samples from monitoring well MW-2, located near the waste oil tank. 1,200 ppb TPH-G, 180 ppb TPH-D and between 3 and 230 ppb BTEX were detected in groundwater samples collected from monitoring well MW-3, at the downgradient edge of the site.

On August 2, 1994, monitoring well MW-2 contained 0.16-feet of oil floating on the groundwater surface. 60 ppb TPH-G, 500 ppb TPH-D and no BTEX were detected in monitoring well MW-1. 2,700 ppb TPH-G and between 6 ppb and 470 ppb BTEX were detected in the groundwater sample collected from monitoring well MW-3.

On September 30, 1994, ASE drilled soil boring BH-D and installed monitoring well MW-4 in the boring. This boring is located in High Street downgradient of the site. No hydrocarbons were detected in a soil sample collected from the capillary zone in this boring, and 500 ppb TPH-G, 200 ppb TPH-D and between 2 and 70 ppb BTEX were detected in groundwater samples collected from this well on October 4, 1994.

On July 31, 1995, ASE drilled six soil borings in High Street to determine whether groundwater contamination extended across High Street or whether contamination may have migrated along underground utility lines buried under High Street. The analytical results showed that the hydrocarbon plume had not yet crossed High Street and that it appeared that underground utility lines have not acted as a conduit for the spread of contamination along High Street.

Between September 15, 1995 and November 7, 1995, an oil skimmer operated in monitoring well MW-2 to remove the free-floating oil that had been present in that well. Approximately 65 gallons of oil and water were removed from the well during this period. Only a slight sheen is now present on the surface of groundwater in that well.

The site has been on a quarterly groundwater sampling plan since December 1994. During this period, hydrocarbon concentrations have been generally consistent at the site. Monitoring well MW-2 has consistently contained a layer of free-floating hydrocarbons which appear to be an unused motor oil. Groundwater samples collected from monitoring well MW-1 have contained up to 200 ppb TPH-G, 1,600 ppb TPH-D and low BTEX concentrations. Groundwater samples collected from monitoring well MW-3 have contained up to 2,700 ppb TPH-G, 300 ppb TPH-D, 9 ppb benzene, 30 ppb toluene, 78 ppb ethylbenzene and 470 ppb total xylenes. Groundwater samples collected from monitoring well MW-4 have contained up to 2,900 ppb TPH-G, 620 ppb TPH-D, 9 ppb benzene, 48 ppb

toluene, 180 ppb ethylbenzene, and 450 ppb total xylenes. Groundwater has consistently flowed to the southeast toward High Street during this period.

PROPOSED SCOPE OF WORK (SOW)

ASE's proposed SOW is as follows:

1) Obtain all necessary permits from the appropriate agencies to destroy monitoring well MW-2 from the Alameda County Flood Control and Water Conservation District (Zone 7);

2) Destroy monitoring well MW-2 to allow access for overexcavation activities;

3) Overexcavate and stockpile contaminated soil at the site;

4) Collect confirmation soil samples from each sidewall;

5) Analyze the confirmation soil samples for total petroleum hydrocarbons as gasoline (TPH-G), total petroleum hydrocarbons as diesel (TPH-D), oil and grease (O&G), and benzene, toluene, ethylbenzene and total xylenes (BTEX);

6) Profile the soil stockpiles for disposal at an appropriate disposal facility;

7) Transport the soil stockpiles to an appropriate disposal facility;

8) Backfill and compact the excavation;

9) Replace monitoring well MW-2; where?

10) Develop the new monitoring well;

11) Survey the top of casing elevation of the new well relative to the elevations of the pre-existing site wells;

12) Report the methods and findings of this remediation project.

Each of these tasks are described in detail below.

TASK 1 - OBTAIN ALL NECESSARY PERMITS FROM THE APPROPRIATE AGENCIES FOR MONITORING WELL DESTRUCTION

ASE will obtain a well destruction permit from the Alameda County Flood Control and Water Conservation District (Zone 7). ASE will send a notification card to the California Department of Water Resources (DWR). ASE will contact Underground Service Alert (USA) to mark all known utilities in the immediate site vicinity. After the well destruction, ASE will send well completion reports to Zone 7 and the DWR as required.

TASK 2 - DESTROY MONITORING WELL MW-2

ASE will destroy monitoring well MW-2 at the site to allow for overexcavation in this area. Monitoring well MW-2 will be destroyed by drilling around and removing the casing, sand pack and sanitary seals. The remaining boring will be backfilled will neat cement placed by tremie pipe. All cuttings produced during the well destruction will be placed with the soil stockpiles that will be produced during overexcavation activities.

TASK 3 - OVEREXCAVATE THE REMAINING CONTAMINATED SOIL

Using a backhoe, overexcavate the remaining contaminated soil at the site. The removed soil will be examined by an ASE geologist or engineer to determine the relative extent of contamination. The soil will be segregated and stockpiled on plastic sheeting based on the relative contamination determined from Organic Vapor Meter (OVM) readings, petroleum-hydrocarbon odor and obvious staining. If deemed necessary, the excavation will be dewatered using a vacuum truck service. The water will then be transported to a treatment facility for recycling under manifest.

TASK 4 - COLLECT CONFIRMATION SOIL SAMPLES

Confirmation soil samples will be collected from the excavation sidewalls and/or bottom to confirm that all significant contamination has been removed. If the Alameda County Health Care Services Agency wishes, the samples will be collected from locations along the excavation bottom and/or sidewalls at their direction. Otherwise, the samples will be collected from the bottom and sidewalls at a rate of one sample per twenty feet. All samples that cannot be collected directly by hand will be collected from the backhoe bucket. The samples will be contained in laboratory provided glass jars. All samples will be labeled and placed on ice for transport to a Cal-EPA certified analytical laboratory under chain of custody.

TASK 5 - ANALYZE THE CONFIRMATION SOIL SAMPLES

The confirmation soil samples will be analyzed at a CAL-EPA certified environmental laboratory for TPH-G by modified EPA Method 5030/8015, TPH-D by modified EPA Method 3510/8015, O&G by Standard Method 5520 and BTEX by EPA Method 8020.

TASK 6 - PROFILE THE SOIL STOCKPILES FOR DISPOSAL

The stockpiles of overexcavated soil will be profiled for disposal at a local landfill or disposal facility. Four soil samples will be collected from each 100 cubic yards of stockpiled soil. These soil samples will be collected in laboratory provided glass jars, sealed, labeled, placed on ice, and transported to a Cal-EPA certified analytical laboratory under chain of custody. Each set of four samples collected per 100 cubic yards of soil will be composited at the analytical laboratory prior to analysis. The samples will be analyzed for TPH-G by modified EPA Method 5030/8015, TPH-D by modified EPA Method 3510/8015, O&G by Standard Method 5520 and BTEX by EPA Method 8020. One sample from the stockpile will also be analyzed for reactivity, corrosivity and ignitability (RCI). Other analyses will be performed if required by the disposal facility. It is assumed that this material will be suitable for disposal at a Class III landfill. If the concentrations exceed those allowable for disposal in a Class III facility, the soil will either be profiled into a Class II facility or the soil will be remediated on-site to a point in which it would be acceptable for Class III disposal.

TASK 7 - OFF-HAUL AND DISPOSE OF THE OVEREXCAVATED SOIL

ASE will arrange for the loading and off-haul of the overexcavated material to the soil disposal facility based on the results of the profiling in Task 6. The soil will be off-hauled from the site by a licensed trucking company under manifest.

TASK 8 - BACKFILL AND COMPACT THE EXCAVATIONS

The excavations will be backfilled with clean, imported, highly compactable fill. The fill will be compacted using a backhoe, sheepsfoot and/or wacker as necessary in order to achieve 90% compaction.

TASK 9 - REPLACE MONITORING WELL MW-2

ASE will replace monitoring well MW-2 with a new 2-inch diameter groundwater monitoring well. The new well will be located in the same location as the previous MW-2. The well will be constructed with 2-inch diameter, flush-threaded, schedule 40, O.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 about 1-foot above the screened interval. Approximately 1-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. 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 3 - Typical Monitoring Well).

The well will be screened to monitor the first water-bearing zone encountered. The well will be screened with approximately 2-feet of screen above the water table and 10-feet of screen below the water table. Because of the high water table at the site, a full 5-feet of screen above the water table will probably not be able to be installed.

TASK 10 - DEVELOP THE NEW MONITORING WELL

The new well will be developed after waiting at least 72 hours after well construction. The well will be developed using at least two episodes of surge block agitation and bailer 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 will be sampled at the time of the regularly scheduled quarterly sampling event.

TASK 11 - SURVEY TOP OF CASING ELEVATION

ASE will survey the top of casing elevation of the new well relative to elevations of the existing site wells.

TASK 12 - PREPARE A SUBSURFACE INVESTIGATION REPORT

ASE will submit a report outlining the methods and findings of well destruction, overexcavation and well replacement activities. The report will be submitted under the seal of state registered civil engineer or

geologist. This report will include a summary of the results, the site background and history, overexcavation methodologies and results, description of the well construction and development and data collected during the well development. Formal boring logs, analytical reports, and chain of custodies will be included as appendices.

SCHEDULE

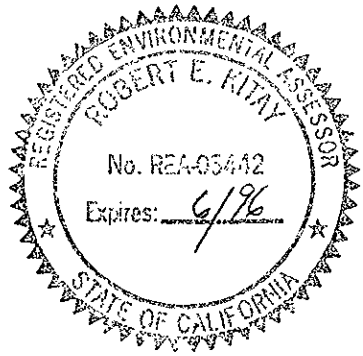
We will begin work on this project immediately upon approval of this workplan from the Alameda County Health Care Services Agency.

Should you have any questions or comments, please feel free to call us at (510) 820-9391.

Respectfully submitted,

AQUA SCIENCE ENGINEERS, INC.

Robert E. Kitay, R.E.A.
Project Geologist



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