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Air Sparging and Soil-Vapor Extraction Pilot Test Completion Report at the Former Pacific Electric Motors Site 1009 66th Avenue, Oakland, California (Fuel Leak Case No. RO0000411)

November 21, 2008
003-09155-01

Prepared by
LFR Inc.
1900 Powell Street, 12th Floor
Emeryville, California 94608

November 21, 2008

Mr. Paresh Khatri
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Subject: Pilot Air Sparging and Soil-Vapor Extraction Pilot Test Completion Report at the Former Pacific Electric Motors Site, 1009 66th Avenue, Oakland, California (Fuel Leak Case No. RO0000411)

Dear Mr. Khatri:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or comments, please call me at (925) 698-1118 or Ron Goloubow of LFR Inc. at (510) 652-4500.

Sincerely,

Charles Robitaille

LFR ENVIRONMENTAL MANAGEMENT & CONSULTING ENGINEERING

November 21, 2008 003-09155-01

Mr. Paresh Khatri
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
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Subject: Air Sparging and Soil-Vapor Extraction Pilot Test Completion Report at the Former Pacific Electric Motors Site, 1009 66th Avenue, Oakland, California (Fuel Leak Case No. RO0000411)

Dear Mr. Khatri:

On behalf of Aspire Public Schools, LFR Inc. (LFR) is submitting this report documenting the results of the air sparging and soil-vapor extraction (AS/SVE) pilot test conducted at the Former Pacific Electric Motors site located at 1009 66th Avenue, Oakland, California ("the Site"; Fuel Leak Case No. RO0000411). This report is presented in accordance with LFR's "Work Plan to Conduct an Air Injection and Soil-Vapor Extraction Pilot Test," dated September 23, 2008. The objective of the pilot test was to collect field data to assess whether air/ozone injection in conjunction with SVE is a potentially viable remediation technology to address petroleum-affected groundwater in the vicinity of a former underground storage tank at the Site. The AS/SVE pilot test and related field activities (e.g., well installation and sampling) were conducted at the Site in October 2008. This report also presents a work plan for the next phase of pilot testing, which will help select the final remedies to be presented in a future corrective action plan for the Site.

Please contact either of the undersigned at (510) 652-4500 if you have questions regarding the scope of work presented in this work plan.

Sincerely,

Lucas Goldstein, P.E., P.G.
Senior Associate Engineer

Ron Goloubow
Senior Associate Geologist

cc: Mr. Charles Robitaille – Aspire Public Schools

Attachment

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TABLES

FIGURES

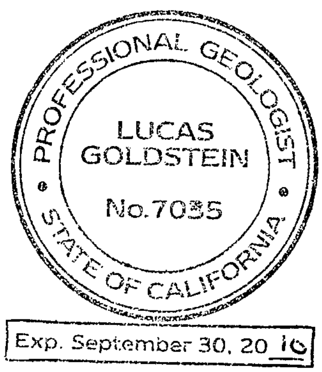
APPENDICES

CERTIFICATION

All information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by an LFR Inc. California Professional Geologist and Civil Engineer.

November 21, 2008

Lucas Goldstein, P.G., P.E. — Date
Senior Associate Engineer
California Professional Geologist (7035)
California Professional Civil Engineer (72455)



1.0 INTRODUCTION

On behalf of Aspire Public Schools, LFR Inc. (LFR) is submitting this report documenting the results of the air sparging and soil-vapor extraction (AS/SVE) pilot test conducted at the Former Pacific Electric Motors Site located at 1009 66th Avenue, Oakland, California ("the Site"; Fuel Leak Case No. RO0000411). This report is presented in accordance with LFR's "Work Plan to Conduct an Air Injection and Soil-Vapor Extraction Pilot Test," dated September 23, 2008 (LFR 2008). The objective of the pilot test was to collect field data to assess whether air/ozone injection in conjunction with SVE is a potentially viable remediation technology to address petroleum-affected soil and groundwater in the vicinity of a former underground storage tank (UST) at the Site. The AS/SVE pilot test and related field activities (e.g., well installation and sampling) were conducted at the Site in October 2008. This report also presents a work plan for the next phase of pilot testing, which will help select the final remedies to be presented in a future corrective action plan (CAP) for the Site.

2.0 BACKGROUND

The Site is located on the northwestern side of 66th Avenue between East 14th Street and San Leandro Street (Figure 1). The area around the Site is developed with a mixture of commercial, industrial, government, and multi-family residential buildings. The Site was previously used for manufacturing and warehousing. Past operations at the Site included manufacturing of specialty magnets, power supplies, and components used in high-energy physics and repairing and rebuilding of motors, generators, transformers, and specialty magnets. Additional historical land use information for the Site was presented in LFR's report entitled "Additional Supplemental Site Investigation," dated January 23, 2006 (LFR 2006).

This pilot test was conducted as a first step to evaluate whether air/ozone injection in conjunction with SVE represents a potentially viable technology to address soil and groundwater affected by total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl tertiary-butyl ether (MTBE) in the southwestern warehouse area ("the SWW Area") and in the vicinity of a former UST at the Site (Figure 2). For the purposes of this report, the above-listed constituents of concern (COCs) will be referred to as "Targeted SWW Area COCs."

As presented in previous reports, other COCs at this Site include polychlorinated biphenyls (PCBs), lead, arsenic, and polynuclear aromatic hydrocarbons (PAHs). The remedial approach that is the subject of this report does not attempt to address all of these other COCs within the SWW Area, or COCs in other areas of the Site. Those COCs will be addressed in a future CAP for the Site. This CAP will incorporate the results of the pilot testing presented in this report, and will include a proposed remedial approach to address all site COCs.

3.0 OCTOBER 2008 AS/SVE PILOT TEST

The overall objective of the AS/SVE pilot test was to collect field data to assess whether air/ozone injection in conjunction with SVE is a potentially viable remediation approach to address the Targeted SWW Area COCs.

The following specific tasks were developed to satisfy the more general objectives described above:

- Collect unsaturated-zone air flow and pressure response data to assess SVE well spacing requirements.
- Attempt to inject air into shallow saturated sediments (as deep as 27 feet below ground surface [bgs]) at reasonable flow rates (i.e., flow rates between 2 cubic feet per minute [ft^3/min] and 20 ft^3/min) at a pressure below the soil overburden (i.e., fracturing) pressure.
- Assess the distribution of injected gas into the formation through the collection of groundwater elevation, dissolved oxygen (DO), volatile organic compound (VOC) concentrations (using a photoionization detector [PID]), and helium tracer gas data.
- Analyze the collected data to develop injection well spacing requirements for the design of a full-scale air/ozone sparging system to address Targeted SWW Area COCs, if deemed viable.
- Collect soil-vapor concentration data to estimate the VOC mass removal rates. The laboratory analytical data will be used to assess the Targeted SWW Area COC mass loading rates for sizing of the emission control systems during the design phase of a full-scale system. Soil-vapor concentration data are also useful for estimating total system operating time frames.

3.1 Field Activities

Field activities consisted of the following:

- Installing, developing and sampling a total of six new pilot test wells
- Conducting an AS/SVE pilot test, including:
  - SVE step test
  - AS tests for both “Intermediate” and “Deep” groundwater
  - Re-starting the SVE system on a second vadose-zone well

3.1.1 Installation, Development, and Sampling of Wells

LFR installed six new wells to perform and/or monitor both SVE and AS as illustrated on Figure 3. In the vadose zone, one SVE well was installed and an SVE monitoring well was installed approximately 10 to 13 feet away to monitor for vacuum influence when extracting soil vapor from the SVE well. Two AS wells were installed (one in the “intermediate” groundwater and one in ”deep” groundwater, and two corresponding AS monitoring wells were installed to observe the effects of air sparging on the nearby aquifer. Figure 3 shows the layout of the wells used for the pilot test.

Well nomenclature for the pilot test is provided in Table 1.

The site-specific Health and Safety Plan (HSP) prepared by LFR for previous subsurface investigations at the Site was updated to address health and safety concerns specific to the planned field activities. Daily health and safety tailgate meetings were conducted by the LFR field geologist prior to beginning fieldwork, and fieldwork was monitored to ensure that appropriate health and safety procedures were followed during the field investigations.

Prior to the well drilling and installation work, LFR obtained drilling permits from the Alameda County Public Works Agency-Water Resources (Appendix C). LFR contacted Underground Service Alert and notified them of the surface drilling work, and a private underground utility clearance contractor was subcontracted to clear the well locations and nearby areas. Down-hole drilling equipment was appropriately cleaned with high-pressure hot water (steam cleaned) before use at each new drilling location. Waste soil generated during drilling was placed in 55-gallon drums, which were labeled appropriately and stored on-site. Once profiled, they will be disposed of at a licensed landfill facility. Wastewater generated during drilling and well development and sampling has been temporarily placed in 55-gallon steel drums, properly labeled as nonhazardous wastewater, and has been sampled to properly characterize it for off-site disposal.

All six new wells were installed using the hollow-stem auger drilling method. The drilling was completed by Gregg Drilling, a California-licensed drilling subcontractor, under the direction of an LFR field geologist. Continuous soil cores were collected during drilling. The soil cores were visually logged and screened in the field using a PID to evaluate the presence of hydrocarbons or other VOCs. The LFR field geologist classified the soils encountered using American Society for Testing and Materials Method D 2488-00, based on the Unified Soil Classification System. Lithologic soil descriptions and field screening results were recorded on field boring logs that are provided in Appendix B.

All of the new wells were constructed using 2-inch-diameter, solid polyvinyl chloride (PVC) casing and slotted well screen. The well screen was surrounded by sand pack to approximately 1 foot above the screen for the ASMW wells. Sand pack was extended approximately 6 inches above the screen in the AS, SVMW, and SVE wells. Approximately 2 feet of hydrated bentonite were placed on top of the sand pack. The annular space between the bentonite and the surface was sealed using a bentonite and cement grout to limit short-circuiting of the AS/SVE system from the surface. The surface completions consisted of a flush-mounted, 12-inch, traffic-rated well box installed in concrete.

The SVE and SVMW wells were installed to a depth of 8 feet bgs with a 5-foot screen extending to 3 feet bgs. The intermediate AS well (AS-1I) was installed to a depth of approximately 18 feet bgs with a 2-foot-long well screen. The intermediate AS monitoring well (ASMW-2I) was installed to a 0depth of approximately 17 feet bgs with a 7-foot-long well screen. The deep AS well (AS-1D) was installed to a depth of approximately 26 feet bgs with a 3-foot-long well screen. The deep AS monitoring well (ASMW-2D) was installed to a depth of approximately 27 feet bgs with an 8-foot-long screen. Table 2 is a summary of specifications for the wells used in the pilot test.

The cement grout around the new wells was allowed to cure for a minimum of 24 hours, after which the new AS wells were developed by surging, pumping, and bailing. The development was to remove any sediment left in the well during construction for the purpose of enhancing the hydraulic communication between the well and surrounding sediments. Observations concerning the quantity and clarity of water withdrawn were recorded during development. Indicator parameters (pH, temperature, and specific conductance) were recorded during well development and are presented as Appendix D. Approximately 10 well casing volumes of groundwater were removed from each well during the development process.

A set of groundwater samples was collected from the new AS wells (AS-1I and AS-1D) and AS monitoring wells (ASMW-2I and ASMW-2D) after well development. The containers were labeled with the well identification number, the time and date of collection, the analysis requested, and the initials of the sampler. The samples were stored in an ice-chilled cooler and maintained under strict chain-of-custody protocols until they were submitted to Curtis & Tompkins, Ltd., a state-certified laboratory. The samples were analyzed for TPHg using Environmental Protection Agency (EPA) test Method 8015, modified. The samples were also analyzed for BTEX and fuel oxygenates using EPA test Method 8260B. Appendix E contains the full laboratory report and the chain-of-custody forms for these samples. Summary results are provided in Table 3.

3.1.2 AS/SVE Pilot Test Activities and Monitoring

Table 4 outlines the sequence of pilot test events. Monitoring activities are discussed in the following sections.

The following parameters were monitored and recorded during the SVE test:

- air pressure (vacuum)
- air flow rate
- extracted/injected air temperature

- VOC concentrations (by PID, and for laboratory analysis)
- Depth to water
- DO

Baseline Monitoring

Soil-vapor samples were collected for laboratory analysis from the extraction well and from the SVE monitoring point (SVMW-2) before the start of the test. In addition, one sample for laboratory analysis was collected from the extraction well at the beginning of the test, and near the end of the extraction period. An additional sample was collected from the extraction well after the end of the AS test and at the beginning of the SVE system restart. Samples for laboratory analysis were collected in clean, 1-liter Summa™ canisters provided by SunStar Laboratories, a state-certified laboratory. Pre- and post-sampling vacuum data were recorded (Table A6, Appendix A), and the canister was shipped to the laboratory under standard chain-of-custody protocols. Samples were analyzed for Targeted SWW Area COCs by a California-certified analytical laboratory using EPA Method TO-15.

SVE Step Test Monitoring

A pre-packaged, skid-mounted SVE system was used to apply a vacuum to the well as described below. LFR performed an SVE pilot step test at well SVE-1 to provide data to assess the most efficient vacuum and flow rate combination for the Site. This step test included applying a series of increasing levels of vacuum to the extraction well, and measuring resultant flow rates and vacuum responses. Each step of the pilot test continued until vacuum rates stabilized in the SVE well. The data were then plotted on a graph in Table A1 of Appendix A along with a best-fit curve to illustrate the relationship between vacuum and flow. This curve is useful in assessing the full-scale system equipment requirements and performance. Extracted vapor was treated by passing the SVE system exhaust through two vapor-phase carbon canisters connected in series.

The subsurface response to the applied vacuum was monitored by measuring the vacuum at SVE monitoring point SVMW-2 (Figure 3). Field monitoring of organic vapors using Tedlar™ bags and a handheld PID was also conducted from the extraction well. Table A1 of Appendix A contains the recorded PID, vacuum, and flow values during the SVE step test.

Water-level measurements were collected using a water-level meter from groundwater monitoring wells ASMW-2I, ASMW-2D, AS-1I, NW-2I, NW-2D, MW-4, and EW-1. Water-level measurements were recorded on field sheets and collected before a vacuum or pressure was applied, and at the times listed in Table A2 of Appendix A.

AS Test Monitoring

After the initial SVE step test was completed, LFR initiated injection of air into the newly installed injection wells (AS-1I and AS-1D) and measured responses in the formation, as described below.

AS wells AS-1I and AS-1D were each tested at a flow rate of approximately 10 ft^3/min although the recorded flows were as low as approximately 2.7 standard cubic feet per minute (scfm) and as high as approximately 22 scfm (Tables A3 and A4 of Appendix A). AS was conducted for approximately an hour and a half in each injection well.

Injection pressures were regulated using a vent valve. This valve was fully open at the beginning of the test and was slowly closed while monitoring pressure and flow rate increase to the desired flow rate. The AS pressure and flow rate were recorded and are provided in Tables A3 and A4 of Appendix A.

The air stream was amended with helium at a concentration of approximately 10% helium. A Marks Product helium detector with a range of 25 parts per million (ppm) to 100% was used to monitor for the presence of helium at monitoring wells surrounding the injection well. Tables A3 and A4 of Appendix A contain the helium concentration values recorded during those tests.

SVE Re-Start Monitoring

The SVE system was briefly re-started after the two AS tests to evaluate the Targeted SWW Area COC concentrations that may have been volatilized into the vadose zone during AS. A sample for laboratory analysis was collected from SVE-1 in a clean, 1-liter Summa™ canister provided by SunStar Laboratories. In addition to the re-start of the SVE system, a brief constant-rate SVE test was performed using SVMW-2 as an extraction well and monitoring at SVE-1 using both a vacuum gauge and a flexible thin-walled nitrile glove to discern if there was any vacuum influence at SVE-1.

4.0 AS/SVE PILOT TEST RESULTS

The following is a summary and discussion of the parameters monitored during the pilot test.

4.1 SVE Pilot Test Results

SVE Step Test Vacuums and Air Removal Rates

Table A1 of Appendix A provides the vacuum and flow data recorded during the SVE step test. The three applied vacuum levels at vapor extraction well SVE-1 were approximately 2.3, 4.3, and 5.8 inches of mercury. A stabilized flow rate was achieved at each of these vacuum levels. Flow at the approximately 6 inches of mercury level was approximately 11 scfm, a flow rate that is high enough to practice SVE remediation. The results of the SVE step test indicate that SVE technology can be successfully applied to the vadose zone at the Site.

The resultant flow rates achieved when applying a vacuum at SVE-1 were plotted vs. the applied vacuum and are presented on a graph in Table A1 of Appendix A. The "best fit" curve applied to the data points begins flattening out toward the higher range of applied vacuum. The optimal operation point for the system is sometimes defined by an inflection point on the curve. This inflection point indicates the vacuum and flow rate at which a significantly greater vacuum is required to achieve another increment of flow. The maximum efficiency is achieved at a vacuum that is equal to or less than the inflection point vacuum. While the data for this test do not provide a clear inflection point, the curve does noticeably flatten out between approximately 4.5 and 6 inches of mercury of applied vacuum. This range corresponds to an extraction flow rate of approximately 10 scfm, and these values (approximately 4.5 inches of mercury of applied vacuum and 10 scfm of flow) could be used as vacuum and flow values for the design of a full-scale system.

SVE Step Test Vacuum Influence at Monitoring Well SVMW-2

During the extraction of soil vapor from extraction well SVE-1, a relatively small vacuum influence was measured at observation vapor monitoring well SVMW-2. The two wells are about 13 feet apart and screened in the same zone (3 to 8 feet bgs). The vacuum influence in the observation well (SVMW-2) was only observed during the start of operation of the SVE system, indicating that the radius of influence (ROI) for SVE at the tested vacuum levels is less than approximately 13 feet.

SVE Test VOC Removal Rates (by PID and laboratory analysis)

VOC concentrations in the vapor samples collected for PID analysis from SVE-1 stayed within a narrow range from baseline (pre-SVE system activation) through the end of the SVE step test (Table A1 of Appendix A). All PID readings from these samples were between 383 ppm and 457 ppm, and the differences did not correspond to changes in the extraction rate or applied vacuum. The sustained removal of VOC-affected soil vapor from the vadose zone is another indicator that SVE can successfully be employed at the Site.

SVE Test Laboratory Sample Collection and Analysis

Four soil-vapor samples were collected at different times from extraction well SVE-1, and one baseline sample was collected from SVE monitoring well SVMW-2. Table 5 provides a summary of SWW Area Targeted COC concentrations detected in the samples, and Appendix E includes the complete laboratory report for these samples.

The baseline sample collected from extraction well SVE-1 contained elevated levels of SWW Area Targeted COCs with the exception of TPHg and MTBE, which were not present in concentrations above their respective analytical reporting limits. As sparging began, sample SVE-1-9:50 was collected from extraction well SVE-1 over an approximately 10-minute period. After approximately one hour of SVE operation, sample SVE-1-10:50 was collected and an apparent large drop-off in SWW Area Targeted COC concentrations occurred (Table 5). This drop-off may indicate that the VOC-laden soil vapor within the ROI of extraction well SVE-1 was largely captured and removed during the hour of SVE operation or that there was a leak in the sampling tubing. The final sample collected from extraction well SVE-1 was upon re-start of the SVE system after conducting the air injection tests. The results yielded the highest concentrations of the four samples collected from SVE-1. Regardless of the fluctuation in laboratory data, the elevated concentrations reported in two of the samples collected from SVE-1 and the consistently elevated field screening concentrations (discussed in the previous section) indicate that air sparging successfully volatilized SWW Area Targeted COCs and caused them to migrate upwards into the vadose zone where they were captured by the SVE system. This is an important finding as it demonstrates that each step required for the successful application of air injection with SVE is achievable at the Site.

SVE Emissions Control

Extracted vapors were routed through activated carbon in two 55-gallon drums placed in series. As shown in Table A1 of Appendix A, all PID readings of the vented vapors (at the output of the drums) were 0.0 ppm, indicating nearly complete removal of all VOCs from the vapor stream by the activated carbon.

4.2 AS Pilot Test Results

AS Pressures and Air injection

One of the most important indicators of the feasibility of air injection is the ability to inject air into the subsurface. AS pressure and flow rate data are presented in Tables A3 and A4 of Appendix A. For both the intermediate and deep AS wells, the flow began at relatively low pressure (10 pounds per square inch [psi] or less), and moderate flow rates (approximately 10 scfm) were achieved and sustained at these pressures. The achievement of moderate flow rate at low pressures is a positive indicator that air or air/ozone injection technology is likely to meet with success at the Site.

SVE and AS Depth to Water Responses

During the SVE step test and the two AS tests, the depth to water was periodically recorded in seven monitoring wells (Table A2, Appendix A). There was no discernible trend in the water-level data during the SVE step test; however, both AS tests led to measurable changes in water level. All six water elevation readings taken during AS into well AS-1I (the 12:32 readings, Table A2 of Appendix A) were higher than the previous recordings taken before AS began in AS-1I. The greatest increase was in monitoring well ASMW-2I (approximately 10 feet away from injection well AS-1I), in which the groundwater rose 0.19 foot These observations indicate that AS in the intermediate zone has a significant pressure influence on wells screened in the same interval a minimum of 10 feet away from the injection point.

During sparging of well AS-1D, the increases in water level were more pronounced than they were during sparging of well AS-1I. Two monitoring wells screened in the deep zone (ASMW-2D and NW-2D) overflowed their well casings, and three wells (ASMW-2I, NW-2I, and MW-4) had increases in water levels of more than 1 foot during sparging of well AS-1D. Air bubbles were also observed in MW-4 during sparging of well AS-1D. MW-4 is a distance of approximately 11 feet from AS-1D, while ASMW-2D and NW-2D are approximately 10 feet and 14 feet from AS-1D, respectively. These observations indicate that sparging in the deep zone has a strong pressure influence on wells screened in the same interval a minimum distance of 14 feet from the injection point.

AS Test Dissolved Oxygen Responses

DO readings from monitoring wells ASMW-2I and ASMW-2D were recorded throughout the pilot test and are presented in Table A2 of Appendix A. During the SVE step test, there were no trends or changes in DO attributable to the operation of the SVE system. Similarly, no changes in DO were observed during sparging of well AS-1I. However, during sparging of well AS-1D, a sharp increase in DO was observed in both ASMW-2D and ASMW-2I. These increases are an indicator that air injected through the deep-zone injection well made its way to the two monitoring wells outfitted with DO monitoring probes (ASMW-2I and ASMW-2D).

The distance to well AS-1D from monitoring wells ASMW-2I and ASMW-2D is approximately 11 feet and 10 feet, respectively. Therefore, the ROI for a deep-zone AS well is a minimum of approximately 10 feet in the deep zone and a minimum of approximately 11 feet in the intermediate zone.

AS Helium Tracer Tests

Two helium tracer tests were performed to track the appearance and distribution of the tracer gas to assess the ROI of the air sparging well. During this test, helium gas was blended with the ambient AS stream, resulting in an average helium concentration of approximately 10% to 20% in the injected air stream. Helium concentration varied because the blending of helium into the injected air stream caused unstable readings from the anemometer monitoring the overall flow rate. Helium was blended into the injected air stream for approximately one hour during sparging into both AS-1I and

AS-1D, and monitoring for the presence of helium was performed on nine surrounding wells (Tables A3 and A4 of Appendix A).

While injecting air and helium into AS-1I, helium was detected in monitoring wells SVE-1 (2.4% or 24,000 ppm, approximately 10 feet from the injection point), SVMW-2 (1,075 ppm, approximately 14 feet from the injection point), and NW-2I (525 ppm, approximately 17 feet from the injection point; Figure 3). Other detections were within the margin of error of the helium detector. The detections of helium indicate that injected gas can migrate through the intermediate groundwater and into the soil vapor, and that injected gas can travel horizontally through the intermediate groundwater for up to 17 feet.

While injecting air and helium into AS-1D, helium was detected in monitoring wells NW-2I (12.8% or 128,000 ppm, approximately 14 feet from the injection point), SVMW-2 (3.3% or 33,000, approximately 11 feet from the injection point), SVE-1 (2.4% or 24,000 ppm, approximately 5 feet from the injection point), AS-1I (7,400 ppm, approximately 5 feet from the injection point), NW-2S (1,400 ppm, approximately 14 feet from the injection point), and ASMW-2I (650 ppm, approximately 11 feet from the injection point). The above data (also presented in Appendix A, Table A4) indicate that air or air/ozone injection into the deep zone at the Site can migrate horizontally a minimum of 14 feet and vertically up into the vadose zone. The horizontal and vertical air sweep demonstrated by the helium tracer data is among the strongest indicators that air or air/ozone injection is a viable technology for the Site.

The above helium tracer data suggest a ROI of a minimum of approximately 10 feet for intermediate-zone injection well AS-1I and a minimum of approximately 14 feet for deep-zone injection well AS-1D.

AS Screening Level VOC Concentration Response in Groundwater Monitoring Wells (by PID)

A summary of screening level VOC results measured with a PID is presented in Tables A1, A3, and A4 of Appendix A. The only well that exhibited an obvious trend in the PID readings was monitoring well NW-2I. During AS through AS-1I in the intermediate zone, the PID reading more than doubled compared to the baseline reading. Later, when air was being injected through AS-1D in the deep zone the reading continued to increase with a peak of 935 ppm, which was nine times higher than the baseline reading of 85 ppm. As with the helium tracer test, the PID readings in monitoring well NW-2I showed a strong response to AS into well AS-1D, indicating that monitoring well NW-2I is within the area of influence of AS well AS-1D. This leads to a ROI for AS-1D of not less than approximately 14 feet.

4.3 Summary of Pilot Test Findings

Positive indicators from the results discussed above include:

- SVE step testing indicated that it is possible to extract soil vapor from the subsurface containing elevated concentration of TPHg and BTEX at low to moderate flow rates while applying low-to-moderate vacuum pressures. The most efficient applied vacuum and extraction rate combination was found to be approximately 5 inches of mercury and 10 scfm, respectively.
- Air entry pressures into the aquifer were overcome at relatively low pressure (<10 psi), and steady flow of air into the "intermediate" and "deep" groundwater was achieved.
- AS into the deep groundwater (through injection well AS-1D) measurably elevated the concentration of DO in both the deep- and intermediate-zone monitoring wells outfitted with DO meters.
- Direct ROI indicators, inducing DO and helium tracer gas, show an AS ROI of a minimum of approximately 10 feet for AS-1I and a minimum of approximately 14 feet for AS-1D.

Other results to consider for the implementation of a full-scale system include:

- Relatively elevated influent BTEX and TPHg concentrations were measured in the SVE system influent. The relatively elevated concentrations indicate that adequate contaminant mass is being removed by the AS/SVE system.
- Emission control equipment consisting of activated carbon was able to successfully capture and remove BTEX and TPHg from the vapor stream.

5.0 RECOMMENDATIONS AND WORK PLAN FOR THE EXTENDED MULTI-WELL SVE AND OZONE SPARGING PILOT TEST

As discussed in Section 2, the remedial approach evaluated in this report is intended to address Targeted COCs (defined in Section 2 as hydrocarbons [TPHg and BTEX) and fuel additives [MTBE and TBA]) in soil and groundwater in the SWW Area of the Site. A remedy for other COCs (such as metals and PCBs) within the SWW Area and for other portions of the Site will be addressed in a separate report. A final remedy for each COC and/or area of concern will be addressed in a future CAP for the Site. The CAP will incorporate the results of the pilot testing presented in this report, and will include a proposed remedial approach to address all site COCs.

This section presents a scope of work for the next phase of pilot testing that will help select the final remedy for hydrocarbons and fuel additives in the SWW Area. The objective of the multi-well SVE and ozone sparging pilot test is to verify that this remedial approach will be able to reduce concentrations of hydrocarbons and fuel additives in the SWW Area in a timely manner and without the formation of undesirable ozone reaction by-products. To meet the objective, LFR proposes to perform the following during the extended pilot test:

- Install a network of approximately eight clusters of SVE and AS wells in the SWW Area.
- Install an SVE system and associated conveyance lines and emission control equipment.
- Install an air/ozone sparging system and associated conveyance lines.
- Implement air sparging concurrent with operation of the SVE for a minimum of three months.
- Perform continuous operation of the SVE wells in the vicinity of the AS wells to capture air sparging air.
- Amend air sparging air with ozone to oxidize (i.e., degrade in situ) residual fuel additives (such as MTBE) that are not readily stripped by AS alone. The addition of ozone will commence after one month of sparging with air only and will employ relatively low levels of ozone (less than 2 pounds per day) at which oxidation may not result in the generation of unacceptable concentrations of by-products such as chloride, total dissolved solids (TDS), hexavalent chromium, arsenic, or other dissolved metals.
- Implement a monitoring program to assess changes in contaminant concentration over time, VOC removal and recovery rates, and the formation and attenuation of ozone reaction by-products.

Additional details regarding the design, construction, and operation of the extended pilot test system are presented below.

5.1 AS/SVE Well Spacing and Layout

The proposed pilot test well layout is shown on Figure 4. The pilot test incorporates a total of 16 air/ozone injection wells, 8 SVE wells, and a network of 10 groundwater monitoring wells and 5 soil-vapor monitoring wells. The spacing of the proposed AS and SVE wells is based on an ROI estimate of 15 feet for each injection well. The layout of the wells is designed to target the SWW Area with the highest concentrations of SWW Area COCs. The effectiveness of the overall injection well network in remediating this area will depend on the individual well's ability to achieve the predicted ROI. In turn, the ROI is dependent on adequate design of the air delivery system (i.e., pressure and flow rates).

5.2 Air Sparging Operational Design Parameters and Mobilization Activities

The proposed air/ozone injection system was designed so that substantial flexibility in operation is possible. While single well sparging parameters have been selected for compressor and ozone generator selection and sizing of the conveyance piping, it is assumed that all wells may not be operated at the same time. Indeed, to achieve optimum efficiency, the system will allow for a pulsed operation schedule controllable on a well-by-well basis. This flexibility will facilitate any additional optimization of the system throughout the life of operation.

The sparging wells were designed based on LFR's pilot testing conducted in October 2008. Optimum injection pressures will be set at approximately 10 psi, and it is anticipated that the flow rate will be approximately 10 scfm. The air compressor and ozone generator will be sized to handle simultaneous injection into a minimum of four wells; as discussed above, valves will be installed to allow for pulsed operations for optimized delivery of ozone and air to the entire network of injection wells. Furthermore, to prevent formation fracturing, the injection pressure will not exceed approximately 25 pounds per square inch gauge (psig), based on a depth to top of screened interval of approximately 25 feet and a rule of thumb of 1 psig per foot.

Operation of the SVE system will require a permit from the Bay Area Air Quality Management District (BAAQMD). The BAAQMD requires a minimum of three weeks to review and approve permits.

Before any subsurface work is conducted, Underground Service Alert will be notified to alert utility companies with facilities in the site vicinity. A private utility locating subcontractor will also assist in locating underground utilities and clearing all trenching locations for subsurface utilities.

All system installation, start-up, and operation and maintenance activities will be conducted in accordance with LFR's site-specific HSP. This HSP will be distributed to on-site field personnel, who will be briefed on the contents and procedures of the HSP. Fieldwork will be monitored to ensure that appropriate health and safety procedures are followed.

5.3 Well Installation

The proposed new air/ozone sparging wells will be installed in the SWW Area using a hollow-stem auger drill rig. An LFR geologist will record a description of the lithology as drilling progresses, based on drill cuttings, and the boring will be continuously cored and logged for the deep well locations. The SVE and SVMW wells will be installed to a maximum depth of 8 feet bgs with a 2-foot screen extending to approximately 3 feet bgs. The intermediate air injection wells (AS-*I) will be installed to a maximum depth of approximately 16 feet bgs with a 2-foot-long well screen. The intermediate air injection monitoring well (ASMW-*I) will be installed to a maximum depth of approximately 16 feet bgs with a 6-foot-long well screen. The deep air injection well (AS-*D) will be installed to a maximum depth of approximately 28 feet bgs with a 2-foot-long well screen. The deep air injection monitoring well (ASMW-*D) will be installed to a maximum depth of approximately 28 feet bgs with a 10-foot screen. Final well depths will be assessed in the field at the time of installation with the objective of installing the air injection points within the two more permeable or sandy sediments units located between 14 to 16 feet bgs and 22 to 32 feet bgs.

The well screen and the formation will be filled with No. 2/12 Monterey sand to a depth approximately level with the top of the screened interval. Approximately 2 feet of bentonite pellets will be placed above the sand pack and hydrated to form a coherent seal. The remaining annular space above the bentonite seal will be filled with cement grout. A locking well cap will be placed on top of the well casing, and the well will be completed using a traffic-rated Christy box. The grout around the new wells will be allowed to cure for a minimum of 24 hours, after which the new wells will be developed by bailing, swabbing, or pumping. The development will remove any sediment left in the well during construction and will enhance the hydraulic communication between the well and surrounding sediments. Observations concerning the quantity and clarity of water withdrawn will be recorded during this process. Indicator parameters (pH, temperature, and specific conductance) will be recorded during well development. Approximately 3 to 10 well casing volumes will be removed from each well during the development process. This process will continue until the indicator parameters stabilize.

5.4 SVE System Installation

The design of the proposed SVE pilot test system incorporates a system of eight SVE wells. Figure 4 presents the location of the proposed SVE wells. The anticipated average extraction rate for each of the eight SVE wells is estimated to be approximately 10 scfm, based on the 10 scfm extraction rate recorded during the single-well pilot test adjusted slightly upwards to 100 scfm for a multiple extraction well scenario. The blower will be sized to handle a maximum design flow of approximately 150 scfm at approximately 5 inches of mercury vacuum; however, components will be designed so that the system can be configured for operation at higher and lower operating flow/vacuum as required. For example, the AMETEK Rotron regenerative blower model DR6D5 (powered by a 5-horsepower, single-phase, 230-volt, and 21-amp electric motor) is capable of meeting the aforementioned performance requirements. Extraction wells will be connected to the blower, moisture separator, and emission controls with 2-inch-diameter PVC hose and piping. All conveyance hose and piping will be sized adequately to minimize flow restriction and pressure losses to the extraction system. The blower system will include a dilution inlet valve for increased optional flexibility. Given the current site usage, the conveyance piping will be aboveground and protected by standard traffic barricades and signage.

Emission control will consist of two Vent Scrub™ Series carbon adsorption vessels with 4-inch fittings and approximately 400 pounds of granular reactivated vapor-phase carbon connected in series.

5.5 AS/Ozone Sparging System Installation

The design of the proposed AS/ozone sparging pilot test system incorporates a system of 16 AS wells. Figure 4 presents the location of the proposed AS wells. The AS equipment will consist of an air compressor, ozone generator, cooling components, flow meters, pressure gauges, and associated controls. The system's conveyance piping will be aboveground (i.e., placed flat on the ground surface). The compressor that will be used to provide injection air will be placed near the shed housing the ozone generation equipment. A 15-scfm, oilless, rotary-screw compressor has been sized to supply the air/ozone sparge system.

The compressed air will be delivered from the air compressor described above, to a stainless steel manifold. One-half-inch-diameter Silicone Per Fluoro Alkoxy (PFA) supply hoses will run from the ports on the manifold to each of the 16 well heads. The manifold will be equipped with a minimum of 16 ports (one port for each injection well), each fitted with a solenoid valve and a valve. The ozone system Programmable Logic Controller (PLC) will control the solenoid valves.

The ozone equipment will be housed in the existing structure located at the Site and will consist of an oxygen concentrator, an ozone generator and booster compressor, flow meters, an ambient ozone detector, cooling fans, and associated controls all packaged as an integral system.

Ozone concentrations generated from oxygen are in the range of 5% to 10% (by weight). Ozone generator capacities are typically expressed in terms of mass output (i.e., pounds ozone per day). The ozone generator capacity is expected to be approximately 2 pounds per day. The ozone will be delivered from the ozone generation equipment described above, via ½-inch-diameter PFA tubing. Ozone will be conveyed from the ozone generating equipment, through the distribution manifold, and onto the wells. Mixing of the ozone with compressed sparging air will occur prior to entry into the manifold. To balance flow across the 16 wells, the process discussed above for AS will be utilized; however, only compressed air (no ozone) will be injected during the balancing procedure, as the addition of ozone will not add appreciably to the delivery pressure.

Several interlocks (i.e., fail-safes) will be installed to prevent the system from operating if there are significant leaks in the system. Since ozone is a strong oxidant gas, safety procedures must be followed when performing in situ or process monitoring to avoid contact with concentrated ozone gas. The Occupational Safety and Health Administration requires that workers not be exposed to an average concentration of more than 0.10 ppm for eight hours. The National Institute of Occupational Safety and

Health recommends an upper limit of 0.10 ppm, not to be exceeded at any time. EPA's National Ambient Air Quality Standard for ozone is a maximum eight-hour average outdoor concentration of 0.08 ppm (see the Clean Air Act - www.epa.gov/air/caa/title1.html#ib). When amended with air, ozone concentrations in the conveyance lines are expected to be above these recommended ozone concentration thresholds. Therefore, the following interlocks will be installed to prevent the ozone generator from operating:

- **Air compressor operation interlock.** This interlock would prevent the ozone generator from operating when the air compressor is off-line. This would prevent elevated concentrations of ozone that may result from the operation of the ozone generator without the blending of ambient air.
- **Ozone leak detector and interlock.** The ozone generator will be equipped with ambient ozone sensors for automatic shutdown in the event of a leak at the generator (before blending with the air stream) or the manifold.

It is anticipated that warning alarms will be displayed for incidents such as power failure to the compressor, ambient detector readings of above 0.10 ppm of ozone, and power failure to the ozone system. Power to the system will be terminated automatically in the event an alarm is activated.

5.6 System Start-up and Periodic Monitoring Program

Existing groundwater monitoring wells were incorporated into the system start-up and periodic monitoring program. Monitoring locations are presented in Table 6. The monitoring well network consists of (a) 16 air/ozone sparging wells, (b) 11 groundwater monitoring wells, (c) SVE system influent, and (d) four SVE vapor monitoring wells.

The parameters that will be measured during the system start-up and/or routine operation include:

- SVE performance:
  - vacuum
  - air flow rate
- AS performance:
  - pressure
  - air flow rate
- Groundwater parameters:
  - groundwater elevation
  - VOC concentration

    - geochemical parameters, dissolved oxygen, ph, oxidation-reduction potential, temperature, and conductivity
- Soil-vapor parameters:
    - VOC concentration

Monitoring frequency is presented in Table 6. Descriptions of each type of measurement are presented below.

In advance of the addition of ozone to air sparging air, baseline metals present in groundwater will be evaluated prior to the start of the pilot test because ozone sparging treatment technology can oxidize some metals, including arsenic, iron, chromium, and selenium, to a more soluble form, thereby increasing their migration potential. This process also creates an additional demand for the oxidant. In addition, hexavalent chromium will be tested using EPA Method 7199, since chromium(III) can be temporarily converted to chromium(VI) under oxidizing conditions. If these conditions occur, they are expected to attenuate rapidly. A general minerals analysis for groundwater, including TDS, bromide, bromate, and chloride, will also be performed for water samples collected from the four groundwater monitoring wells designated for AS monitoring; specifically, this monitoring will be performed in sparge area wells ASMW-2I and ASMW-2D and downgradient area wells ASMW-5I and ASMW-5D only.

System performance metrics. Two lines of evidence will be used to evaluate the overall effectiveness of the AS/SVE system.

- Targeted SWW Area COCs concentration in groundwater monitoring wells. Existing groundwater monitoring wells and proposed groundwater monitoring wells will be monitored for changes in concentration over time.
- Targeted SWW Area COCs mass removal by SVE. Mass removal rates will be estimated using SVE influent and flow rate data. These parameters will be routinely monitored in accordance with the schedule outlined in Table 7 to determine mass of Targeted SWW Area COCs removed by air/ozone sparging over time.

6.0 SCHEDULE

The proposed pilot test implementation schedule is shown in Table 7. The schedule also assumes Alameda County Environmental Health (ACEH) concurrence will be issued in December 2008 and that the BAAQMD permit will be issued in January 2009 and that no unexpected events will occur that would delay implementation of this work.

In accordance with ACEH, all reports will be uploaded to the ACEH file transfer protocol site and to the Regional Water Quality Control Board GeoTracker database.

7.0 LIMITATIONS

The opinions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by LFR and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that LFR relied upon any information prepared by other parties not under contract to LFR, LFR makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared for a particular purpose. Only the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

Results of any investigations or testing and any findings presented in this report apply solely to conditions existing at the time when LFR's investigative work was performed. It must be recognized that any such investigative or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the Site may vary from those at the locations where data were collected. LFR's ability to interpret investigation results is related to the availability of the data and the extent of the investigation activities. As such, 100% confidence in environmental investigation conclusions cannot reasonably be achieved.

LFR, therefore, does not provide any guarantees, certifications, or warranties regarding any conclusions regarding environmental contamination of any such property. Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

8.0 REFERENCES

LFR Inc. (LFR). 2006. Additional Supplemental Site Investigation Report, Proposed Aspire Charter High School, 1009 66th Avenue, Oakland, Alameda County. January 23.

———. 2008. Work Plan to Conduct an Air Injection and Soil-Vapor Extraction Pilot Test at the Former Pacific Electric Motors Site, 1009 66th Avenue, Oakland, California (Fuel Leak Case No. RO0000411). September 23.

Table 1
Well Identification Nomenclature for Pilot Test Wells
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Well ID Designation	Description/Purpose
AS	Air Sparging/Injection Well
SVE	Soil-Vapor Extraction Well
ASMW	Air Injection Monitoring Well
SVMW	Soil-Vapor Monitoring Well
S	Well Screened in Shallow Unsaturated Zone (less than 8 feet bgs)
I	Well Screened in Intermediate Groundwater (well screened across the top of the water table approximately 10 to 18 feet bgs)
D	Well Screened in Deep Groundwater (well screened in “deeper” groundwater approximately 20 to 32 feet bgs)

Note:
bgs = below ground surface

Table 2
Summary of Pilot Test Well Construction Specifications
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Well ID	Approximate Distance from AS-1D (feet)	Screened Interval (feet)	Baseline Depth to Water (feet)
New October 2008 Wells			
SVE-1	5	3 - 8	dry
SVMW-2	11	3 - 8	7.35*
AS-1I	5	16 – 18	5.28
AS-1D	0	23 – 26	4.96
ASMW-2I	11	10 – 17	5.40
ASMW-2D	10	19 – 27	5.29
Previously Existing Wells Monitored during the AS/SVE Pilot Test			
MW-4	11	15 – 25	5.17
NW-2S	14	3 – 6	4.69
NW-2I	14	10 – 15	5.15
NW-2D	14	20 – 30	5.19

Notes:

* = most likely water trapped in well sump, not groundwater

AS/SVE = air sparging and soil-vapor extraction

Table 3
Summary of Analytical Results for Groundwater Samples
Collected from New Site Monitoring Wells and
Historical Results from Existing SWW Area Wells
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Sample ID and Location	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	TBA	TPHg (C7-C12)
AS-1D	October-08	25	19	12	70	240	570	530
AS-1I	October-08	9,900	930	1,600	3,030	11,000	41,000	50,000
ASMW-2D	October-08	<13	<13	<13	<13	1,800	470	140
ASMW-2I	October-08	430	960	180	1,020	<17	22,000	6,700
NW-1 S	December-05	<0.5	<0.5	<0.5	<0.5	<2.0	NA	<50
NW-1 I	December-05	<0.5	<0.5	<0.5	<0.5	8.0	NA	<50
NW-1 D	December-05	<0.5	<0.5	<0.5	<0.5	37	NA	<50
NW-2 S	December-05	570	570	62	1,530	1,600	NA	7,100
NW-2 I	December-05	22,000	24,000	2,100	1,280	120,000	NA	120,000
NW-2 D	December-05	300	13	<2.5	178	1,600	NA	1,400
DUP-1 (NW-2D)	December-05	320	11	<2.5	218	1,500	NA	1,600
NW-3 S	December-05	<0.5	<0.5	<0.5	<0.5	<2.0	NA	<50
NW-3 I	December-05	<0.5	<0.5	<0.5	<0.5	<2.0	NA	<50
NW-3 D	December-05	<0.5	<0.5	<0.5	<0.5	<2.0	NA	<50
MW-1	March-05	<0.5	<0.5	<0.5	<0.5	<200	NA	230
MW-2	March-05	<0.5	<0.5	<0.5	<0.5	15	NA	<50
MW-3	March-05	<0.5	<0.5	<0.5	<0.5	<2.0	NA	<50
MW-4	March-05	22,053	17,310	3,980.70	13,969	5,841	NA	162,800
EW-1	March-05	<0.5	<0.5	<0.5	<0.5	8	NA	105

Notes:

All concentration values are given in micrograms per kilogram.
NA = not analyzed for the listed analyte
MTBE = methyl tertiary-butyl ether
SWW Area = Southwestern Warehouse Area
TBA = tertiary butyl alcohol
TPHg = total petroleum hydrocarbons as gasoline

Table 4
Sequence of Events During Pilot Test, October 29, 2008
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Time (24hr)	Events
7:30	System setup. Installed DO meters and collected baseline readings. Set up compressor, blower, and generator and attached hoses to appropriate wells. Baseline soil-vapor samples for laboratory analysis were collected from SVE-1 and SVMW-2 (to be analyzed by laboratory by EPA Method TO-15).
9:50	Initiated SVE from well SVE-1. Sampled vapor extracted from SVE-1 (to be analyzed by laboratory by EPA Method TO-15).
9:50 – 11:25	Performed SVE step test on extraction well SVE-1 at vacuum of approximately 2.3, 4.3, and 5.8 inches of mercury.
11:41 – 13:50	Performed AS test through injection well AS-1I. VOC data collected by PID, helium tracer test conducted, water levels monitored, DO data collected.
14:28 – 16:06	Performed AS test through injection well AS-1D. VOC data collected by PID, helium tracer test conducted, water levels monitored, DO data collected.
16:10 – 16:27	Brief re-start of SVE system. Post-AS vapor sample collected upon re-start of SVE system from extraction well SVE-1.
17:11 – 17:30	Attached SVE blower to SVMW-2 and performed short pressure/flow test while monitoring for influence at SVE-1.
17:30	All testing completed.

Notes:

AS = air sparging

DO = dissolved oxygen

PID = photoionization detector

SVE = soil-vapor extraction

VOC = volatile organic compounds

Table 5
Summary of Analytical Results of
SWW Area Targeted COCs in Soil Vapor
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Sample ID	TPHg	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
SVMW-2 -baseline	400,000	13,000	1,400	<50	158	<50
SVE-1 -baseline	<100	43	68	80	1,490	<1.0
SVE-1-09:50	56,000	6,700	1,600	<50	62	<50
SVE-1-10:50	<50	7.5	48	37	390	<1.0
SVE-1-16:00	220,000	11,000	11,000	2,600	12,800	<50

Notes:

All concentrations are in parts per billion by volume (ppbv).

COCs = constituents of concern

MTBE = methyl tertiary-butyl ether

SWW Area = Southwestern Warehouse Area

TPHg = total petroleum hydrocarbons as gasoline

Table 6
Summary of Monitoring Program
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

Data Collection	AS Wells	AS Monitoring Wells	SVE Wells	SVE Monitoring Well	SVE Influent
	Existing wells AS-1I and AS-1D and proposed wells AS-2I through AS-8I and AS-2D through AS-8D (16 wells total)	Existing wells NW-2I, NW-2D, MW-4, ASMW-2I, and ASMW-2D and proposed wells ASMW-3I though ASMW-5I and ASMW-3D through and MW-5D (11 wells total)	Existing well SVE-1 and proposed wells SVE-2 through SV-8 (8 wells total)	Existing well SVMW-2 and proposed wells SVMW-3 through SVMW-5 (4 wells total)	At treatment compound (one influent location
SWW Area COCs (EPA 8260 or TO-14)	--	Baseline, M	M	M	Baseline, M
SWW Area Selected Metals and Metalloids* (EPA 6020)	--	Baseline, M	--	--	--
VOCs (PID Screening)	--	--	W/M(1)	W/M(1)	W/M(1)
Flow	W	--	W	--	W/M(1)
Pressure/Vacuum/Water Levels	W/M(1)	W/M(1)	W	W/M(1)	W/M(1)
General Equipment inspection	W	--	W	--	W

Notes:
-- = NA = test not applicable
W= weekly, M= monthly, W/M(1) = weekly during first month of operation and monthly thereafter, M = monthly[
Selected metals and metalloids, including arsenic, iron, chromium (III and VI), selenium, bromide, and bromate, will be monitored in sparge area wells ASMW-2I and ASMW-2d and downgradient area wells ASMW-5I and ASMW-5D only.
AS = air sparging
COCs = constituents of concern
PID = photoionization detector
SVE = soil-vapor extraction
VOCs = volatile organic compounds

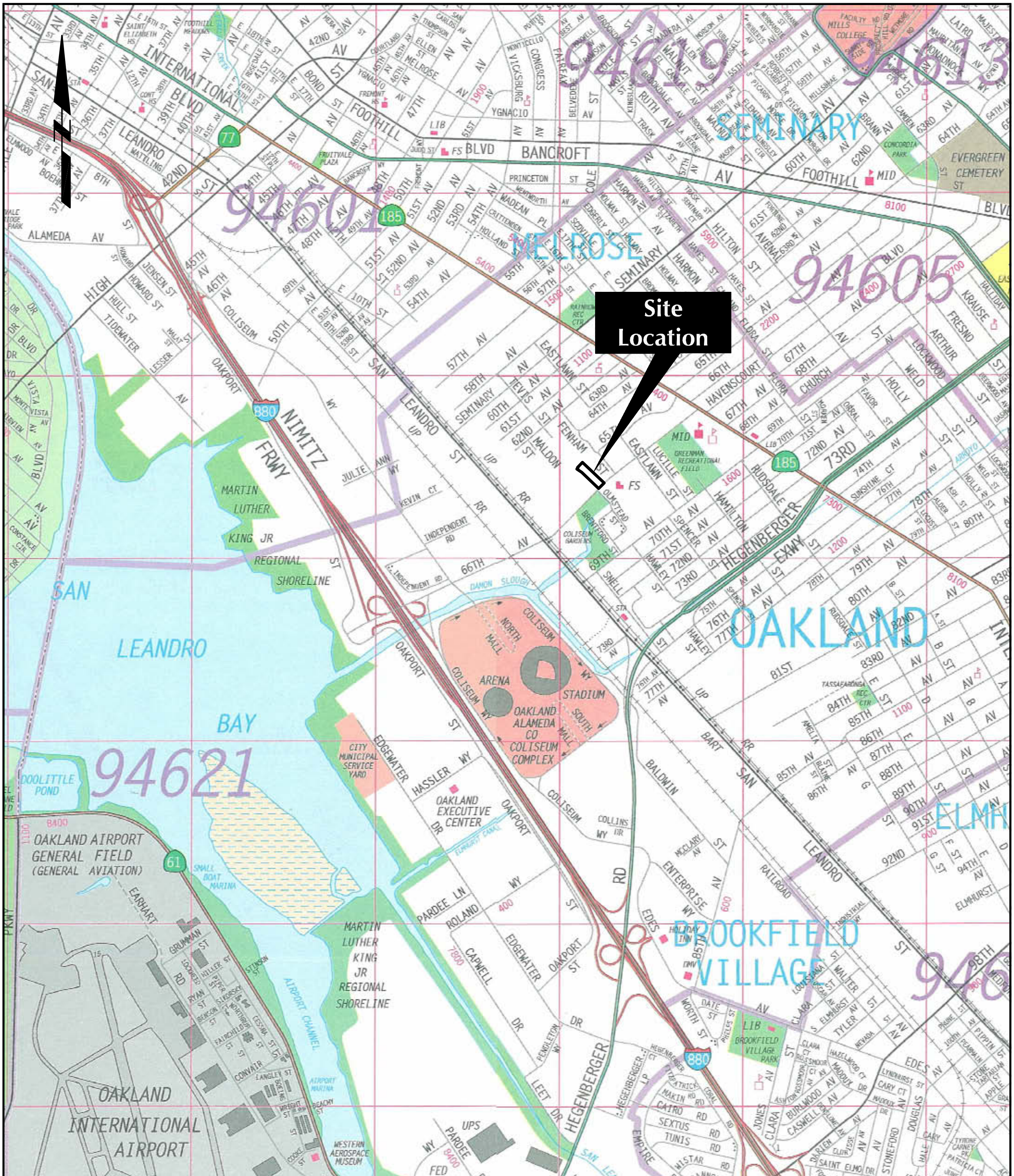
Table 7
Proposed Pilot Test Implementation Schedule
Former Pacific Electric Motors Site
1009 66th Avenue, Oakland, California

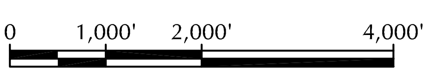
Activity	Action Date
Install AS/SVE and monitoring wells	January 2009
Start extended pilot test	February 2009
Start ozone amendment	March 2009
Submit pilot test report and CAP, if applicable	May 2009

Notes:

AS/SVE = air sparging and soil-vapor extraction

CAP = corrective action plan





Source: Thomas Guide 2001

Site Location Map

1009 66th Ave, Oakland, California

LFR

Figure 1

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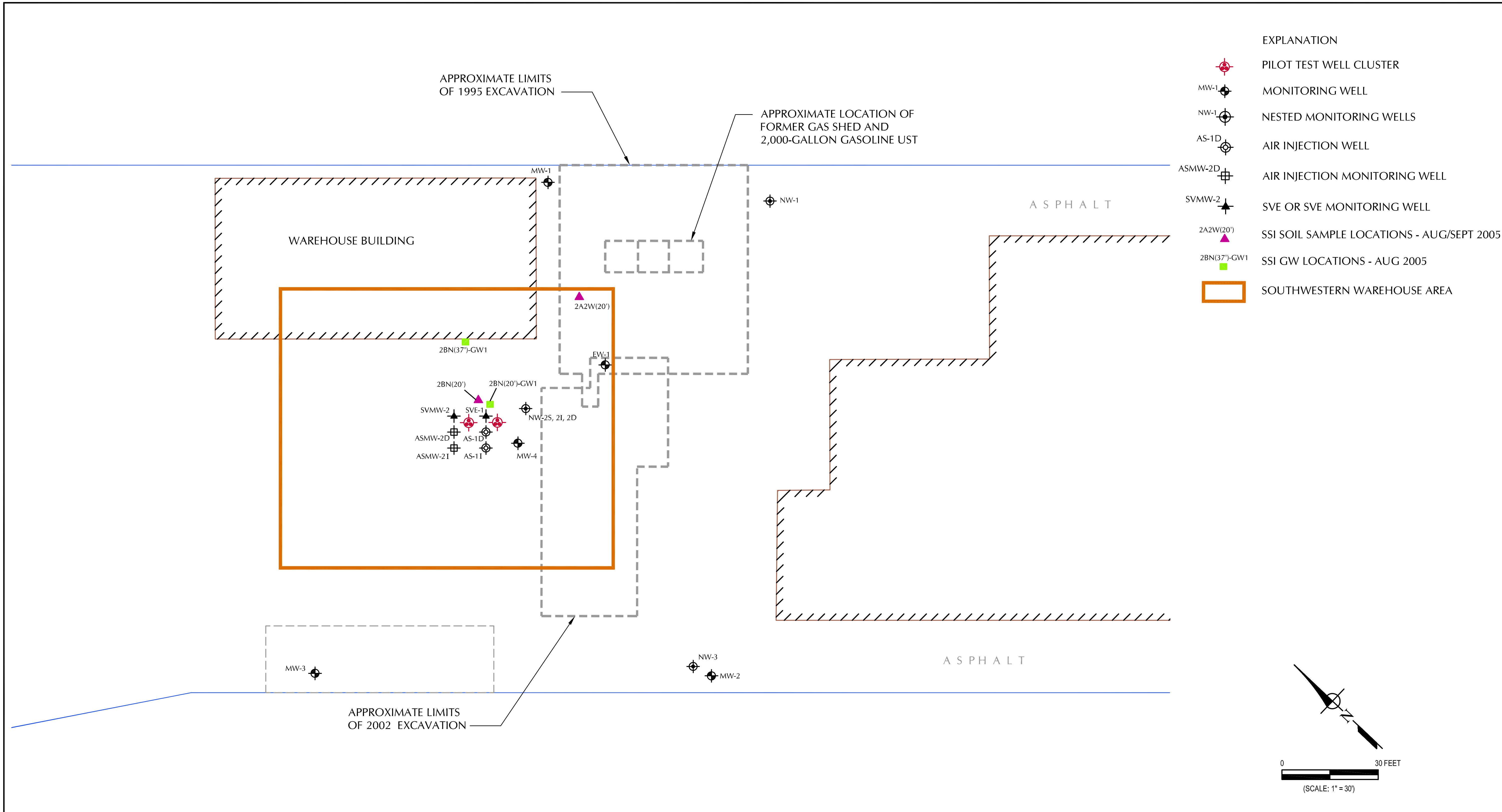

Site Layout with Approximate Extent of the Southwestern Warehouse Area

1009 66th Ave, Oakland, California

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Figure 2

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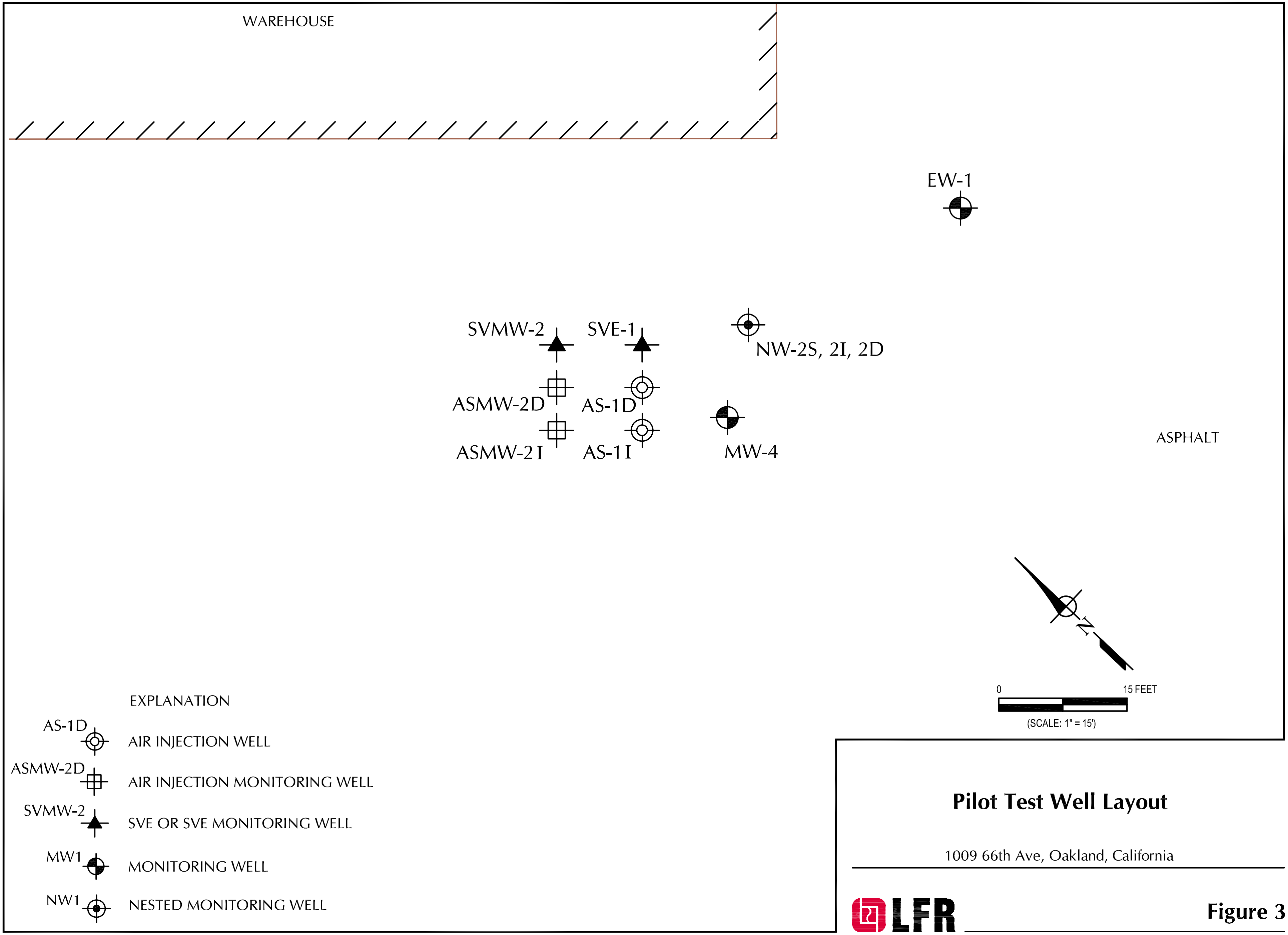

Pilot Test Well Layout

1009 66th Ave, Oakland, California

LFR

Figure 3

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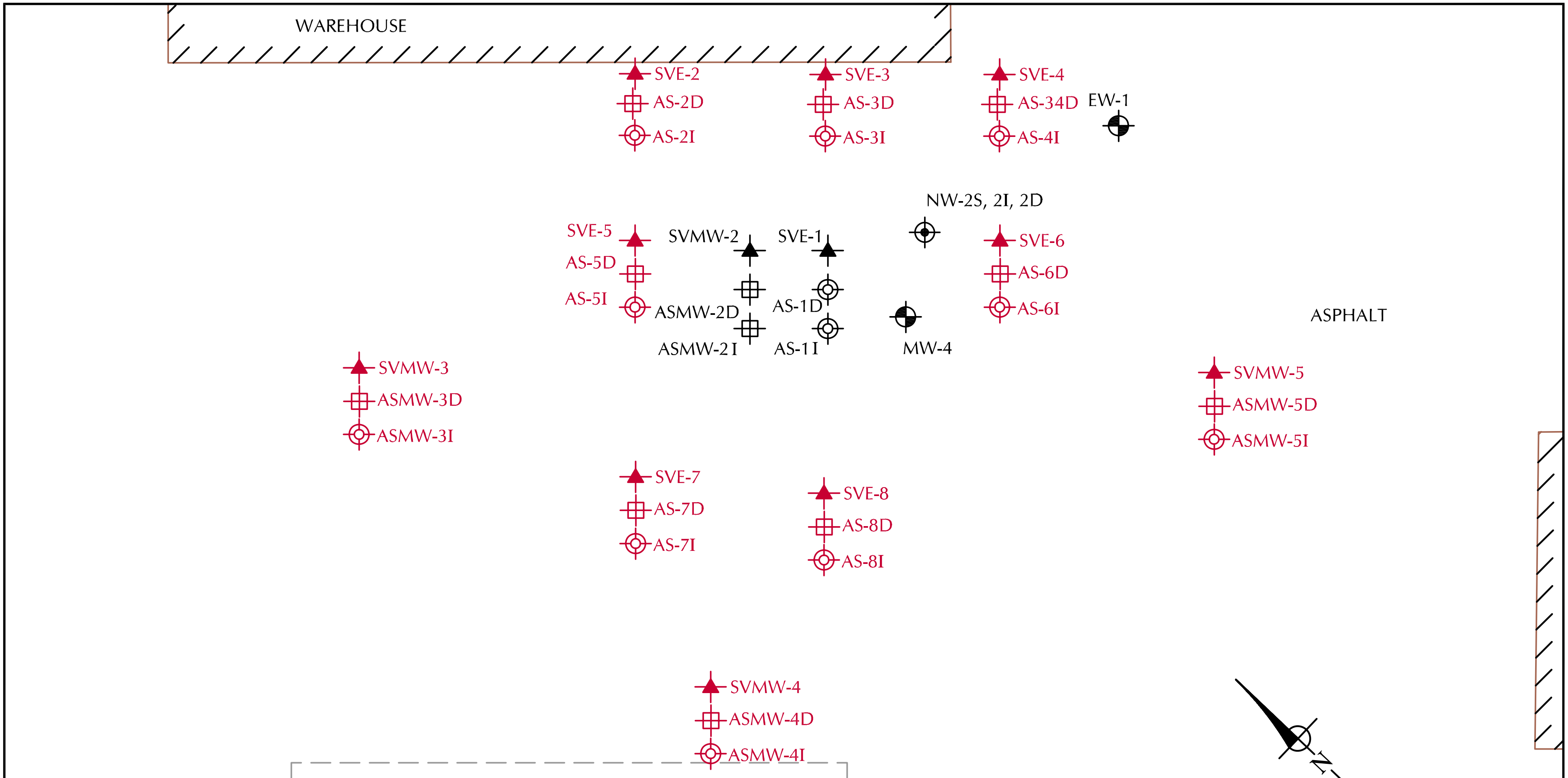

EXPLANATION

SVMW-4	PROPOSED DEEP GROUNDWATER AIR INJECTION OR AIR INJECTION MONITOR WELL
ASMW-4D	PROPOSED INTERMEDIATE GROUNDWATER AIR INJECTION OR AIR INJECTION MONITORING WELL
ASMW-4I	PROPOSED SVE OR SVE MONITORING WELL
AS-1D	DEEP GROUNDWATER AIR INJECTION OR AIR INJECTION MONITOR WELL
ASMW-2D	INTERMEDIATE GROUNDWATER AIR INJECTION OR AIR INJECTION MONITORING WELL
SVMW-2	SVE OR SVE MONITORING WELL
MW1	MONITORING WELL
NW1	NESTED MONITORING WELL

0 20 FEET

(SCALE: 1" = 20')

Proposed Air/Ozone and Soil Vapor Extraction Pilot Test Well Layout

1009 66th Ave, Oakland, California

LFR

Figure 4

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APPENDIX A

Tables Presenting Data Collected during the Pilot Test

Table A1
Recorded Values for SVE Step Test
Aspire Charter School
1009 66th Avenue, Oakland, California

Time	SVE Step Test							Remarks
	SVE-1					NW-2I	SVMW-2	
Measurement	Vacuum	Flow	Inf. PID	Eff. PID	Temp.	Vacuum	Vacuum	
Units	inches Hg	cfm (gauge)	ppm	ppm	^{o} F	inches H_20	inches H_20	
9:50	2.2	6.15	NR	NR	57.5	0.00	0.02	
10:03	2.3	6.0	388	0.0	59.8	0.00	0.01	
10:13	4.3	9.8	383	0.0	61.8	0.00	0.01	Increased vacuum to 4.3
10:24	4.3	9.6	457	0.0	62.8	0.00	0.01	
10:37	5.8	11.1	393	0.0	64.1	0.00	0.00	Increased vacuum to 5.8
10:46	5.7	10.6	401	0.0	65.5	0.00	0.00	
11:25	6.2	11.4	384	0.0	69.0	0.00	0.00	Increased vacuum to maximum (no dilution air)

Notes:
Eff. = effluent
Inf. = influent
Hg = mercury
H_2O = water
NR = not recorded
cfm = cubic feet per minute
PID = photoionization detector
ppm = parts per million

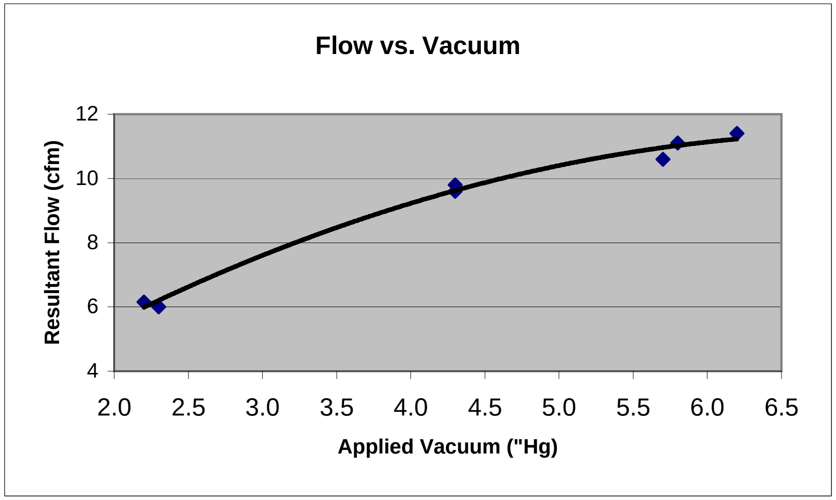


Table A2
Recorded Depth-to-Water and Dissolved Oxygen Readings
Aspire Charter School
1009 66th Avenue, Oakland, California

Time	DTW and DO Readings									Remarks
	ASMW-2I		ASMW-2D		NW-2I	NW-2D	MW-4	EW-1	AS-1I	
Measurement	DTW	DO	DTW	DO	DTW	DTW	DTW	DTW	DTW	
Units	feet	mg/l	feet	mg/l	feet	feet	feet	feet	feet	
8:10	5.40	NR	5.29	NR	5.15	5.19	5.17	4.60	5.28	Baseline - pre-injection, pre-SVE
9:58	5.22	1.66	5.24	0.21	5.10	5.15	5.14	4.62	NR	
10:13	5.29	1.57	5.30	0.19	5.15	5.20	5.19	4.62	NR	Increased vacuum to 4 inches Hg
10:25	5.28	0.13	5.29	0.04	5.15	5.20	5.19	4.62	NR	
10:44	5.26	unstable	5.24	0.06	5.15	5.18	5.18	4.61	NR	
11:25	5.26	0.26	5.24	0.11	5.14	5.17	5.15	4.60	NR	
12:32	5.07	0.22	5.22	0.08	5.12	5.11	4.97	4.57	NR	Injecting air through AS-1I @ ~10 scfm
14:14	5.1	0.2	5.16	0.05	4.92	5.06	4.99	4.55	NR	
14:38	2.71	1.36	2.43	5.76	4.87	0.00	2.70	4.53	3.29	Water overflowing NW-2D - bubbles in MW-4
15:22	2.08	1.60	0	NR	4.11	NR	2.15	4.50	2.90	Water overflowing ASMW-2D

Notes:
NR = not recorded
DTW = depth to water
DO = dissolved oxygen
mg/l = milligrams per liter

Table A3
Recorded PID and Helium Detector Readings While Injecting Air Through AS-1I
Aspire Charter School
1009 66th Avenue, Oakland, California

Time	Vapor Monitoring While Air Injecting Through AS-1I																					Remarks
	AS-1I			SVMW-2		NW-2S		ASMW-2I		ASMW-2D		NW-2I		NW-2D		EW-1		SVE-1		MW-4		
Measurement	Press.	Flow	% He	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	
Units	psi	scfm	%	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	
11:41	0	0	0	92	NR	90	NR	37	NR	0.0	NR	85	NR	4.5	NR	8	NR	NR	NR	NR	NR	Baseline Reading
~12:00	NR	NR	NR	98	NR	NR	NR	NR	NR	9.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Begin Air Injection
12:13	~5	9.4	0	102	NR	83	NR	13	NR	0.0	NR	115	NR	13	NR	0.0	NR	NR	NR	NR	NR	
12:30	8	9.4	0	108	NR	91	NR	31	NR	7	NR	167	NR	13	NR	0.0	NR	294	NR	NR	NR	
12:45	8	8.1	0	114	NR	88	NR	101	NR	2	NR	156	NR	1	NR	0.0	NR	286	NR	NR	NR	Begin flow of Helium @ ~ 13:00
13:16	3 [1]	7.75 [1]	1.3 [2]	42	125	89	0	150	0	35	25	229	0	2	0	NR	NR	472	100	NR	NR	
13:31	1 [1]	21.9 [1]	10 - 25%	100.5	0	92.4	0	89.7	0	13.9	75	244	425	22.0	0	NR	NR	317	2.4%	28.3	0	
13:50	1 [1]	2.66 [1]	0	NR	1,075	NR	25	NR	0	NR	0	NR	525	NR	0	NR	NR	NR	11,975	NR	0	

Notes:
NR = No reading was collected.
~ = Approximately
VOCs = PID reading
psi = pounds per square inch
scfm = standard cubic feet per minute
% or ppm = Value is in parts per million (ppm) unless there is a percentage sign indicating a percent measurement.
(1) = Readings may be influenced by helium concentration in air stream.
(2) = Incomplete mixing of air and helium may have caused reading to be lower than true value.

Table A4
Recorded PID and Helium Detector Readings While Injecting Air Through AS-1D
Aspire Charter School
1009 66th Avenue, Oakland, California

Time	Vapor Monitoring While Air Injecting Through AS-1D																					Remarks
	AS-1D			SVMW-2		NW-2S		ASMW-2I		ASMW-2D		NW-2I		NW-2D		MW-4		SVE-1		AS-1I		
Measurement	Press.	Flow	% He	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	VOCs	Helium	
Units	psi	scfm	%	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	ppm	% or ppm	
14:28	10	~6	0	1.9	NR	81	NR	31.1	NR	4.1	NR	203.5	NR	5.1	NR	6.0	NR	170.1	NR	50.5	NR	14:38 NW-2D overflowed - well capped
14:52	10	~10	0	113.7	NR	81.7	1,200	9.01	NR	NR	NR	294	2.5%	NR	NR	313	2.6%	99.1	13.9%	NR	NR	
14:57	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Stopped sparging - resumed by 15:12
15:12	12	14.4	~20%	131.3	1.38%	89.1	375	14.5	75	NR	NR	735	5.5%	NR	NR	236	13.4%	102.7	2.4%	267	4,775	15:22 ASMW-2D overflowed - well capped
15:41	9	9.9	~10%	109.7	3.3%	95.5	1,400	14	650	NR	NR	578	12.8%	NR	NR	99.4	8,800	NR	NR	87.9	7,400	
16:06	5	7.75	NR	102.7	NR	97.4	NR	7.7	NR	NR	NR	471	NR	NR	NR	115.3	NR	NR	NR	178.3	NR	Blower failed

Notes:
NR = not recorded
~ = approximately
VOCs = PID reading
% or ppm = Value is in parts per million (ppm) unless there is a percentage sign indicating a percent measurement
psi = pounds per square inch
scfm = standard cubic feet per minute

Table A5
SVE Restart Test
Aspire Charter School
1009 66th Avenue, Oakland, California

Time	SVE Restart Test							Remarks
	AS-1D (air injection point)			SVE Manifold				
Measurement	Pressure	Flow	Helium	Vacuum	Flow	VOCs	Helium	
Units	psi	cfm gauge	%	inches Hg	cfm gauge	ppm (inf/eff)	ppm/%	SVE-1 started and sampled at 16:00
16:10	5	~8	0			NR/NR	NR	
16:11	NR	NR	NR	NR	NR	NR/NR	NR	blower shut down
16:16	NR	NR	NR	NR	NR	NR/NR	NR	blower back on
16:20	5	8	11.8	4.4	~9	128.0/0.0	1,525	
16:27	NR	NR	NR	NR	NR	NR/NR	NR	blower shut down

Notes:
NR = not recorded
~ = approximately
inf = influent
eff = effluent
cfm = cubic feet per minute
Hg = mercury
ppm = parts per million
psi = pounds per square inch
VOCs = volatile organic compounds

Table A6
Record of Vapor Sampling
Aspire Charter School
1009 66th Avenue, Oakland, California

Sample ID	Sample Location	Begin Sample Time	Beginning Vacuum*	Ending Vacuum*	End Sample Time
SVMW-2	SVMW-2	8:51	30+" Hg	8" Hg	8:59
SVE-1 Baseline	SVE-1	9:02	30+" Hg	8" Hg	9:08
SVE-1- 09:50	SVE-1	9:50	30+" Hg	NR	NR
SVE-1-10:50	SVE-1	10:50	30+" Hg	NR	11:05
SVE-1-16:00	SVE-1	16:00	30+" Hg	12" Hg	16:16

Notes:
" Hg = Inches of mercury vacuum
NR = not recorded
* = gauge apears to be faulty. Reading is 8" Hg under atmospheric conditions.

APPENDIX B

Soil Boring Lithology and Well Construction Field Logs

Lithology and Sample Data

LFR LEVINE•FRICKE

Project Number: 003-09155-00

Project Name: Proposed Aspire Charter High School Site

Page 1 of 1

Date: 12/19/2005

WELL CONSTRUCTION | LITHOLOGY | SAMPLE DATA

Depth, feet	Time of Sample	Graphic Log	Description	Sample Number	Interval	Penetration Rate (blows/ft.)	PID/FID (ppm)
0		asphalt / Fill	0-5' Hand Auger				
			0-2' Fill, sand, gravel, hard, moist				—
		ML	2-5' silt, little sand and clay and gravel moist, stiff, olive-gray				
5 / 5-6.5			5-6.5" - 5.0-5.5 Silt, little clay, trace sand and gravel, wet, 5.5-6.5 - Silt, little sand and gravel, light olive-brown to olive gray (bottom)			8,13,19 N=32	0.0ppm
6.5-8			6.5-8 17/18 Silt and Clay, little sand and gravel (top) olive-gray transition to olive-brown clay			8,12,16 N=28	0.0ppm
8-10			8-10 17/18 CLay, little silt, trace gravel, moist, stiff			6,8,8,9 N=16	0.0ppm
10 / 10-11.5			10-11.5' Same as above w/ trace organics Light olive-brown			6,8,9 N=17	0.0ppm
11.5-13			11.5-13 same as above, no gravel			4,7,7 N=14	0.0ppm
13-15	SM →	CL / SAND	13-15 - Clay and Silt, little sand (Layer 14-14.5') and Gravel, wet, Lt. olive-brown			5,8,9,11 N=17	0.0ppm
15 / 15-16.5		Silt	15-16.5 Silt, some clay, little sand, trace gravel moist/wet Lt. olive-brn			6,8,10 N=18	0.1ppm
16.5-18			16.5-18 Silt, some clay, little sand and gravel (Layer 17.5 to 18.0)			7,13,15 N=28	0.0ppm
18-20		ML	18-20 - Silt and Clay, trace sand, moist, stiff Light olive-brn.			6,8,11,12 N=19	0.0ppm
20 / 20-21.5			20-21.5 - Silt, little clay and sand, trace organics stiff, wet, Lt. olive-brown			4,8,10 N=18	0.0ppm
21.5-23			21.5-23 Silt, some clay, trace sand and organics stiff, wet, Lt. olive-brown			5,6,8 N=14	0.0ppm
23-25			23-25 Same as above			5,5,8,12 N=13	0.0ppm
25 / 25-26.5			25-26.5 Silt, some clay, stiff, wet, Lt. olive-brn			7,7,11 N=18	0.0ppm
26.5-28			26.5-28 silt and Clay, stiff, wet, trace gravel Lt. olive-brn			10,4,6,8 N=10	0.0ppm
30							
			End of Boring 28 ft bgs				

Boring/Well No.: NW-1

Date drilled: 12/19/05

Drilling company: BC2

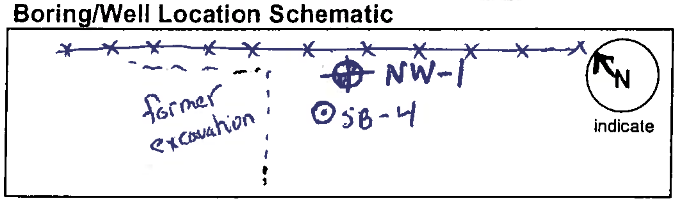
LFR Staff: Lee McIlvaine

Drilling method: 12" O.D. HSA

Sampling Method: SS

Hammer weight and size: 140/30"

Boring/Well Location Schematic



Reviewed by:________ Signed:________ Date:________

Lithology and Sample Data

LFR LEVINE•FRICKE

Project Number: 003-09155-00

Project Name: Aspire Charter School site

Date: 12/20/05

Depth, feet	Time of Sample	Graphic Log	Description	Penetration Rate (blows/ft.)	PID/FID (ppm)
0		Asphalt/base; FILL	Hand auger 0-5' 0-2' - Fill, sand, gravel, silt, moist loose, yellowish-brown		2.3
		ML	2-5' - Silt, some clay, little sand and gravel moist, stiff d. olive-gray		
5; 5-6.5	8:35		5-6.5 - 18/18 - Silt, little clay, sand, gravel Stiff, moist, d. olive gray - petroleum odor	8, 10, 15 N=25	23.5
6.5-8			6.5-8 - 6.5-7 Silt to f. sand, little gravel moist 7-8 Silt, little clay trace sand & gravel - petroleum odor moist, loose top/stiff bottom	8, 8, 10 N=18	210
8-10			8-10 - Silt, little clay, f. sand, trace gravel & organics moist stiff, olive-gray and Lt. olive-brown	6, 8, 9, 11 N=17	214
10; 10-11.5			10-11.5 - 17/18 - Silt, little clay at top to Silt, little sand and gravel, moist petroleum odor, Lt. olive-brn	4, 6, 7 N=13	476
11.5-13			11.5-13 Silt, little sand and gravel, trace clay moist, stiff, petroleum odor, olive-gray	4, 5, 6 N=11 6, 7, 9, 11 =A18	103: 71: 878
13-15; 15		SM	13-15 - 12/24 - Silt to Sand, little gravel, moist to wet sheen on outside of core	5, 7, 8 N=15	88.
		ML	15-16.5 - 18/18 Silt, little clay, trace organics & gravel moist, olive-gray to Lt. olive-brn no to little petroleum odor	4, 5, 7, 9 N=12	24. 12.
20			16.5-18 Silt to Silty, little sand and gravel, trace clay, moist, stiff, Lt. olive-brown	3, 4, 6 N=10	11.
		SM	18-20 - Silt, to Sand little gravel, moist/wet Lt. olive-brown	6, 7, 8 N=15	14.
25			20-21.5' - Sand, some silt, little gravel wet, Lt. olive-brown	6, 8, 8, 11 N=16	5.
		SW-SM	21.5-23 - SAND, little silt, trace gravel wet, Lt. olive-brown	4, 6, 8 N=14 25-26.5	3.
			23-25 - Sand, some to little silt, moist/wet Lt. olive-gray & Lt. olive-brown		
30		ML	25-26.5 - Sand at top, 3" olive-gray Clay layer, Sand and gravel 25.5 to 26.5 wet		
		SM	26.5-28 - m-c Sand, little f. sand, trace gravel olive-gray wet, loose		

Boring/Well No.: NW-2

Date drilled: 12/20/05

Drilling company: BC2

LFR Staff: Lee McIlvaine

Drilling method: 12" O.D. HSA

Sampling Method: SS (18") & (24")

Hammer weight and size: 140lb/30"

Boring/Well Location Schematic

N indicate

Reviewed by: ______ Signed: ______ Date: ______

Lithology and Sample Data

LFR LEVINE•FRICKE

Project Number: 003-09155-00

Project Name: Aspire Charter School Site

Date: 12/20/05

WELL CONSTRUCTION Depth, feet	Time of Sample	Graphic Log	LITHOLOGY Description	SAMPLE DATA Sample Number	Interval	Penetration Rate (blows/ft.)	PID/FID (ppm)
30 30-31.5		SM	30-31.5 16/18 Sand and gravel, ~~[illegible]~~ wet, olive-gray, loose - bottom 8" Silt little sand and clay, trace gravel, olive-brown			4, 6, 13 N = 19	1.2 ppm
		ML	31.5 - 33 17/18 Silt, little clay, trace gravel stiff, wet,				
			End of Boring - Augers 31.5' SS - 33'				

Boring/Well No.: NW-2

Date drilled:

Drilling company:

LFR Staff:

Drilling method:

Sampling Method:

Hammer weight and size:

Boring/Well Location Schematic

N indicate

Reviewed by: Signed: Date:

Lithology and Sample Data

LFR LEVINE•FRICKE

Project Number: 003-09155-00 | Page 1 of 1

Project Name: Proposed Aspire Charter High School Site | Date: 12/19/2005

WELL CONSTRUCTION | LITHOLOGY | SAMPLE DATA

3:25 — Hand auger 0-5'

Depth, feet	Time of Sample	Graphic Log	Description	Sample Number	Interval	Penetration Rate (blows/ft.)	PID/FID (ppm)
0		asphalt / Fill	asphalt, Fill 0-2.5ft seepage at 1.5ft – tree branch 1-2" diameter at 2.5ft Fill, Sand, gravel, silt, wet/moist yellowish-brown				NA
5		SM Sand Silt Gravel	5-6.5 17/18 SAND, some silt, little gravel (angular) wet/moist Light olive-brown			9,13,17 N=30	0.0ppm
			6.5-8 - 15/18 - same as above			12,14,16 N=30	0.0ppm
			8-10 - 8-9' as above, 9-10 Clay, some silt, trace sand and gravel, moist, stiff lt. olive-brn			8,10,15,20 N=25	0.0ppm
10		CL Clay Silt	10-11.5 16/18 - Clay, some silt, trace sand moist, stiff light olive-brown w/ little olive-gray			8,11,13 N=24	0.0ppm
		CL	11.5-13 17/18 - Clay, some silt, trace sand and gravel wet, stiff olive-gray			6,9,11 N=20	0.0ppm
		ML	13-15 18/18 - SILT, some clay, tr. Sand & Gravel wet, stiff, olive gray			10,13,15,15 N=28	0.0ppm
15			15-16.5 SILT, some clay, trace sand and gravel wet, stiff, olive-gray			9,11,11 N=22	0.0ppm
			16.5-18 - same as above 17/18			10,12,14 N=26	0.0ppm
			18-20 20/24 - Silt and Clay, trace sand and gravel wet, stiff olive-gray and Light olive-brown			7,10,10,13 N=20	0.0ppm
20		CL	20-21.5 - 17/18 Clay, little silt, trace organics (roots) wet, stiff, light olive-brown			10,11,13 N=24	0.0ppm
			21.5-23 - 16/18 Clay, little silt, wet, stiff Lt. olive-brn			8,8,10 N=18	0.0ppm
			23-25 - 17/18 Clay, as above			7,10,10,14 N=20	0.0ppm
25			25-26.5 17/18 Clay as above			8,11,12 N=23	0.0ppm
			26.5-28 17/18 Clay, little silt, stiff, wet olive-gray			9,10,12 N=22	0.0ppm
			End of Boring 28 ft bgs				

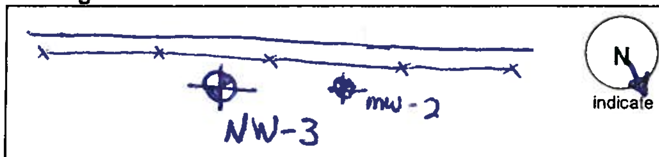
Boring/Well No.: NW-3 | Drilling method: 12" O.D. HSA

Date drilled: 12/19/05 | Sampling Method: Split Spoon

Drilling company: BC² | Hammer weight and size: 140/30"

LFR Staff: Lee McIlvaine

Boring/Well Location Schematic



Reviewed by: ________ Signed: ________ Date: ________

LOG OF BORING / WELL AS - 1D

PROJECT NAME: Aspire
CLIENT: LFR
PROJECT LOCATION: Oakland
PROJECT NUMBER: 003-09155-01
LOCATION: 1009 66th Ave
OVA EQUIPMENT:
GROUND ELEVATION:
HOLE DIAMETER: 8"
TOP OF CASING ELEVATION:
HOLE DEPTH: 30'
FIRST ENCOUNTERED WATER: 20'
STABILIZED WATER: 6.3' (4.84) after grout set
LOGGED BY: M. Sullivan
DATE: 10/23/08

DRILLING CONTRACTOR: Gregg
DRILLING METHOD: Hollow Stem
STAMP (IF APPLICABLE) AND/OR NOTES

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							Hand Auger 5'		Flush Mount	
				SP		0-2	Fill Gravely sand (3/3 10YR) Dark Brown	0.4		
							sand fine-coarse, Moist, Loose			
				ML			gravels fine, Auslar, moist	0.9		
						2-5	(ML) clayey silt, (4/1 10G) Dark greenish grey	38.5		
5							Low plastic, Moist, stiff, odor at 4'	347		5
				(ML)			coarsens w/ Depth add sand	381.7		
	2.5/5	X		CL		5-7	(ML) Gravely Sandy Silt (4/1 10G)	817.0		
							gravels fine, sub Angular-subrounded, Moist, strong odor			
10				ML			sands fine-Coarse, subrounded Moist, Med dense, Friable	2230		10
							silts+clay Low-non plastic, Moist medium stiff, Friable strong odor	864		
	4/5	X		ML				1143		
				ML		7.0-7.5	(CL) silty clay (3/4 2.5Y) Olive Brown	973		
15							Some stains 10-12' (olive brown)			15
						10-14	(ML) clayey Sandy Silt	56.5		
	5/5	X					sand fine, Medium dense, Moist			
				ML			clay+silt Low plastic, Moist, strong odor			
							12-13' gravels, Angular, fine			
20	▽							352		20

(Continued Next Page)

APPROVED BY: [signature]   DATE: 10/23/08

LFR

PROJECT NAME Aspire
CLIENT LFR

LOG OF BORING / WELL AS-1D

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
				SP			15-20' (ML) sandy silt olive Brown (3/4 2.5Y)	0.4	Bentonite	
							sand fine, med dense, moist			
	4.5/5						silt, low-nonplastic, moist, med stiff			
				SM						
25	▽						20-21' (S.P.) Gravely Sand w/ Trace silt olive Brown (3/4 2.5Y)	1.4	Sand	25
				SP			Gravel fine, Angular-Sub Angular			
	3.5/5						silt Non plastic, ~~moist~~ wet, med stiff Friable, No odor	4.0	slough	
	*						sand fine-coarse, wet, med loose		slough	
30										30
							21-24.5 (SM) silty sand (3/4 2.5Y) olive brown (3/4 2.5Y)			
							silt low plastic, moist, med-stiff			
							sand fine-Medium grains, moist, Medium dense			
35										35
							25-27.5 (SP) Gravely Sand (3/4 2.5Y) olive Brown			
							gravels max 1", Angular, ~~loose~~			
							sand fine-coarse, wet, sub. Angular, very hard			
40										40
							* soft pressure on drill rig in un recovered section			
							Boring to 30'			

(Continued Next Page)

MATERIALS USED

Sand Monterey # 2/12 2.5 bags
Bentonite 3/4 Hole Plug 1/2 bag

APPROVED BY: [signature] DATE: 10/23/08

LFR

SVE-1

LOG OF BORING / WELL ~~A~~

PAGE 1 OF 1

PROJECT NAME: Aspire

CLIENT: LFR

PROJECT LOCATION: Oakland

PROJECT NUMBER: 003-09155-01

LOCATION: 1009 66th Ave

OVA EQUIPMENT:

GROUND ELEVATION: HOLE DIAMETER: 8"

TOP OF CASING ELEVATION: HOLE DEPTH: 8'

FIRST ENCOUNTERED WATER: — (Dry) TD ~~7~~ 8.90

STABILIZED WATER: —

LOGGED BY: McSullivan DATE: 10/24/08

DRILLING CONTRACTOR: Gregg

DRILLING METHOD: Hollow Stem

STAMP (IF APPLICABLE) AND/OR NOTES

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							Hand Auger first 5'		Flush Mount	
				SP			Logged from soil cuttings		~~Grout~~ ~~Bentonite~~ Bentonite	
						0.0-2	(3/3 10YR) Fill, Dark Brown gravely sand w/ some silts fine-medium grains, loose, moist	0.4		
				ML		2-	(ML) Clayey silt Dark greenish grey (4/1 10G) low plastic, Moist, odor medium stiff	1.4	sand	
5										5
							Boring to 8'			
							Auger →	(107.6)		
								51		
10							Screen 8-3'			10
							Sand 8-2.5'			
							Bentonite 2.5-1.5'			
							Grout 1.5-0			
							Sand Monterey #2/12 (1.5 bags)			
15							Bentonite 3/4 coarse Hole plug 1/2			15
20										20

(Continued Next Page)

APPROVED BY: [signature] DATE: 10/24/08

LFR

PROJECT NAME Aspire
CLIENT LFR

LOG OF BORING / WELL AS-1I

PROJECT LOCATION Oakland
PROJECT NUMBER 003-09155-01
LOCATION 1009 66th Ave
OVA EQUIPMENT
GROUND ELEVATION
HOLE DIAMETER 8"
TOP OF CASING ELEVATION
HOLE DEPTH 18'
FIRST ENCOUNTERED WATER — (5.24) after Box set
STABILIZED WATER —
LOGGED BY M. Sullivan
DATE 10/24/08

DRILLING CONTRACTOR Gregg
DRILLING METHOD Hollow Stem
STAMP (IF APPLICABLE) AND/OR NOTES

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							(Hand Auger 5', Logged from soil cuttings)		Flush mount	
				SP		0-2'	Fill gravely Sand (3/3 10YR) ~~sand + gravels~~ Dark Brown	0.0		
				ML		2-5	~~Clayey~~ Silt (ML) Dark greenish gray (4/1 10G) Low plastic, Moist, med Stiff			
5						5-8	same as above			5
						8-13	(5/3 2.5Y) color change Light olive brown, Strong oder, (same as above (ML))			
				ML		~13-?	(same as above but..) Nonplastic, Strong oder Trace gravels	130		
10										10
								210		
							Screen 18-16'			
							Sand 18-15.5'			
				ML			Bentonite 15.5-13.5		Bentonite	
15							Grout 13.5-0			15
							Sand Monterey 2/12 1 bag		Sand	
							Bentonite Hole Plug 3/4 Coarse 1/2 bag	88		
							Boring to 18'			
20										20

(Continued Next Page)

APPROVED BY: [signature] **DATE:** 10/24/08

LFR

LOG OF BORING / WELL ASMW-2I

PAGE 1 OF 2

PROJECT NAME 003-09155-01
CLIENT LFR
PROJECT LOCATION Oakland
PROJECT NUMBER 003-09155-01
LOCATION 1009 66th Ave Oakland
OVA EQUIPMENT
GROUND ELEVATION
HOLE DIAMETER 8"
TOP OF CASING ELEVATION
HOLE DEPTH 20
FIRST ENCOUNTERED WATER —
STABILIZED WATER 19.04 (5.35) after well set
LOGGED BY M. Sullivan
DATE 10/23/08

DRILLING CONTRACTOR Gregg
DRILLING METHOD Hollow Stem
STAMP (IF APPLICABLE) AND/OR NOTES

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							Hand Auger 5'		Flush mount	
						0-2'	Fill (SP)(3/3 10YR) Dark Brown			
				SP			sand w/ some gravels	3.2		
							Sand fine-coarse, loose, moist			
				CL			Trace silt	11.3		
						2-5	(CL) ~~sandy~~ silty clay w/			
5							Trace sand (4/10G)	10.7	Grout	5
							Dark Greenish Grey			
				SP			(10G 4/1) Dark greenish grey	1277.2		
	3.5/5					5-7	(SP) Gravelly silty sand			
				CL			Gravel fine grained, Angular		Bentonite	
							Moist	1656		
							Silt Non plastic, med-dense			
							Friable, odor			
10							Sand fine-coarse - Angular	290		10
				ML			moist, medium Hard			
						7-8.5	(CL) Sandy clay olive Brown		(4/3 2.5Y)	
							Sand fine, Moist, medium		Sand	
	5/5			ML			Hard	52.0		
							clay, Plastic, Moist, med			
				ML			dense	45.2		
15						10-12	(ML) clayey sandy silt	37.0		15
				ML			olive Brown (4/3 2.5Y)			
							Sand fine, Moist, med. Hard			
				SM			Silt & Clay, low plastic - Plastic, Moist	11.1	Sand	
							med stiff		Bentonite	
						12-14	(ML) sandy silt same as			
20							above, non-plastic			20

(Continued Next Page)

APPROVED BY: [signature] DATE: 10/25/08

LFR

PROJECT NAME Aspire
CLIENT LFR

LOG OF BORING / WELL ASMW-21

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							14-15 (ML) Clayey Sandy silt same as 10-12'			
							15-17 (ML) Sandy silt same as 12'-14'			
25							17-18 Clay silty Sand w/ little gravels (SM) olive Brown (4/3 2.5Y)			25
							Silt + clay Low plastic, very stiff Moist, No oder, Moist			
							Gravels fine gravel, Moist, Angular-Sub angular.			
30							Sand fine-course, Moist, Sub angular			30
							Well set @ 17 feet Bentonite to 17.5 Sand to add Bridging Screen 17.5-17.			
35							Bentonite 20-17.5' Screen 10-17' Sand 17.5-9 Bentonite 9-7' Grout 7-0			35
40							Boring to 20'			40

(Continued Next Page)

MATERIALS USED Sand Monterey #2/12 2 Bags
Bentonite 3/4 Hole Plug 1/2 Bag

APPROVED BY: [signature] DATE: 10/23/08

LFR

PROJECT NAME Aspire
CLIENT LFR

LOG OF BORING / WELL ASMW-2D

PROJECT LOCATION Oakland
PROJECT NUMBER 003-09155-01
LOCATION 1009 66th Ave Oakland
OVA EQUIPMENT
GROUND ELEVATION
HOLE DIAMETER 8"
TOP OF CASING ELEVATION
HOLE DEPTH 30'
FIRST ENCOUNTERED WATER 19'
STABILIZED WATER 9.5' (4.65) after well set
LOGGED BY M. Sullivan
DATE 10/23/08

DRILLING CONTRACTOR Gregg
DRILLING METHOD Hollow Stem -
STAMP (IF APPLICABLE) AND/OR NOTES

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							Hand Auger First 5'		Flush Mount	
				SP		0-2'	Fill - (3/3 10YR) Dark Brown Sand, loose, fine-coarse, trace gravel + silt, Moist			
				CL		2-5	(CL) Clay (4/1 10G) Dark greenish grey Stiff, plastic, Moist, Strong oder and Staining	2.6		
5								58.5		5
	4/5			ML		5-8	(ML) Sandy Silt (4/1 10G) Dark Greenish Grey Sand - fine, Med loose, Moist Silt - Non Plastic, Med Soft Friable, Moist, very strong oder	270.2		
10				CL		8-19'	(CL) Silty Clay (5/4 10YR) Yellowish Brown Stiff, Medium-Plastic Moist, Strong oder	330.5		10
	4.5/5			CL				4.9	Grout	
15						19-22.5	(SM) Gravely Silty Sand (5/4 2.5Y) Light olive Brown Gravel, ~.1-0.5" Angular, Silt low plastic, med-soft wet, Feint oder Sand fine-Coarse grained Medium loose, wet,		Bent	15
	7							13.6	Sand	
20				SM						20

(Continued Next Page)

APPROVED BY: [signature] **DATE:** 10/23/08

LFR

PROJECT NAME Aspire

CLIENT LFR

LOG OF BORING / WELL ASMW-2D

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							21.5-23.0 (ML) (5/4 2.5Y)	0.5		
							Sandy silt Light olive Brown			
				SP			sand fine, Medium ~~Soft~~ loose, Moist			
	21.5/5			ML				6.0		
				SP			silt Low plastic, Medium soft	0.4		
							Moist			
							23.0-25? (SP) Sand (3/4 2.5Y)			
25	▽			SP			sand Light olive Brown	0.7		25
							fine-Coarse, Loose, sub round			
							Moist			
				SP			Trace silts, non plastic, soft,	0.2		
							Moist		Sloughed in	
							25-27 (SP) Same as 19-22.5			
30							Gravely silty sand			30
							27 = inc Clay Gravely Sand			
							slough 30-27			
							screen 27-19'			
35							Sand 27-18'			35
							Bentonite 18 - ~~17~~ 16.5			
							Grout ~~17~~ 16.5 - 0			
40										40
							Boring to 30'			

(Continued Next Page)

MATERIALS USED

Used water to keep hole open when setting well

Sand Monterey # 2/12 11 1/2 2.5 Bags

Bentonite 3/4 coarse Hole Plug 1/2 Bag

APPROVED BY: [signature] DATE: 10/23/08

LFR

PROJECT NAME	Aspire	**LOG OF BORING / WELL** SU MW-2
CLIENT	LFR	PAGE 1 OF 1

PROJECT LOCATION	Oakland	DRILLING CONTRACTOR	Gregg
PROJECT NUMBER	003-09155-01	DRILLING METHOD	Hollow Stem
LOCATION	1009 66th Ave	STAMP (IF APPLICABLE) AND/OR NOTES	
OVA EQUIPMENT			
GROUND ELEVATION	HOLE DIAMETER 8"		
TOP OF CASING ELEVATION	HOLE DEPTH		
FIRST ENCOUNTERED WATER	— (Dry) TD = 7.86		
STABILIZED WATER			
LOGGED BY	M. Sullivan DATE 10/24/08		

DEPTH (feet)	SAMPLE TYPE NUMBER	SAMPLE RECOVERY	BLOW COUNTS (per 6 inches)	U.S.C.S.	GRAPHIC LOG	DEPTHS	LITHOLOGIC DESCRIPTION	PID or OVA (ppm)	WELL DIAGRAM	DEPTH (feet)
							Hand Auger first 5'		Flushmount	
				SP			logged from soil cuttings		Grout	
						0-2	Fill Dark Brown (3/3 10YR) gravely sand	1.8	Bentonite	
				ML		2-8	(ML) clayey silt (4/1 10G) Dark greenish grey low plastic, moist, med stiff oder..	9.7	Sand	
5										5
							less clay w/ depth	Down auger (108)		
								504		
							Boring to 8'			
10							Screen 8-3'			10
							Sand 8-2.5'			
							Bentonite 2.5-1.5'			
							Grout 1.5-0			
15							Sand Monterey #12/12 1/2 Bag			15
							Bentonite Holeplug 3/4 coarse 1/2 bag			
20										20

BORING+WELL 2006 FIELD BLANK LFR TEST PROJ AUG2006.GPJ LFR SEPT 2006.GDT 8/29/06

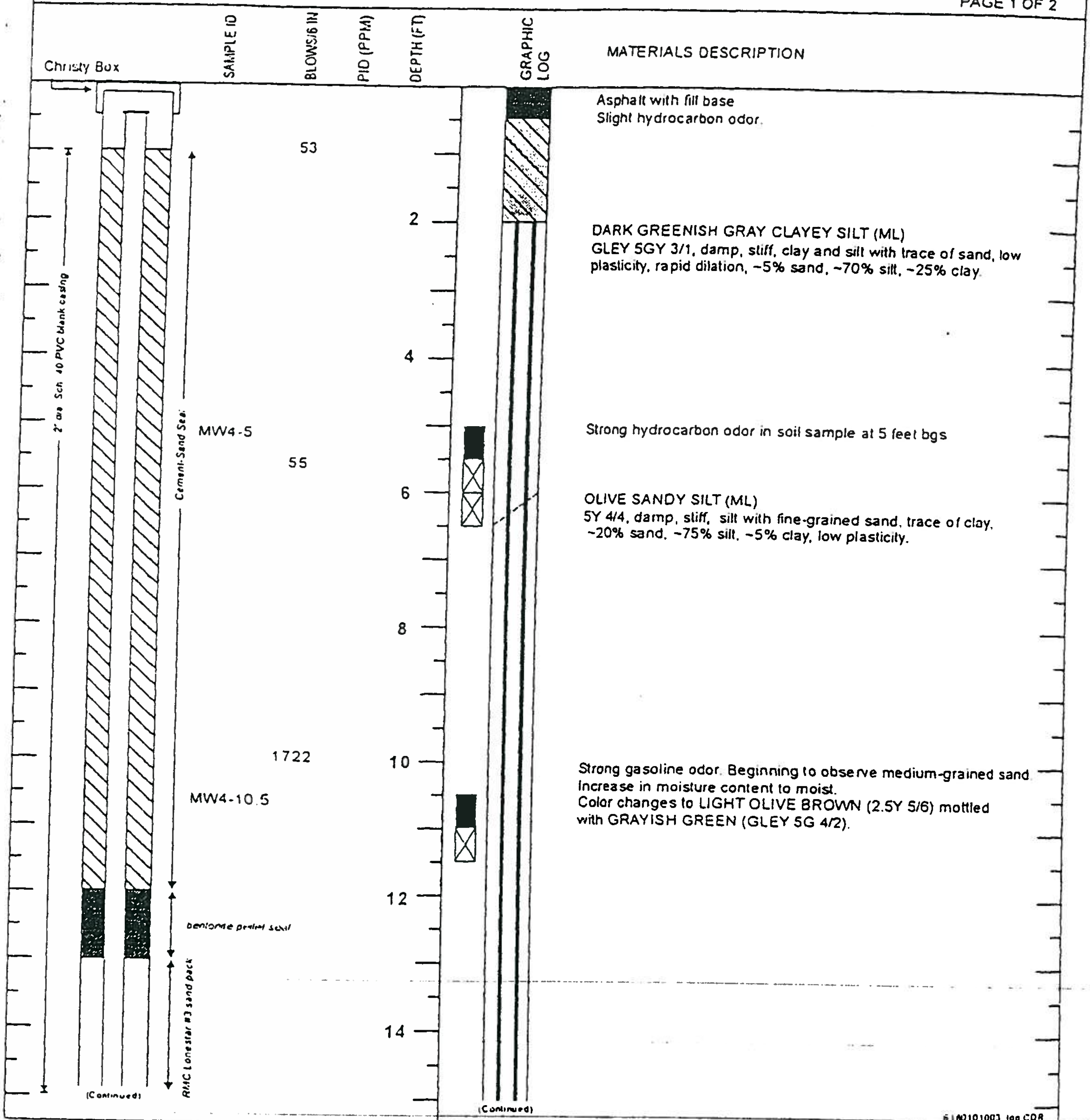
APPROVED BY: [signature] DATE: 10/24/08

(Continued Next Page)

LFR

PES Environmental, Inc.
Engineering & Environmental Services

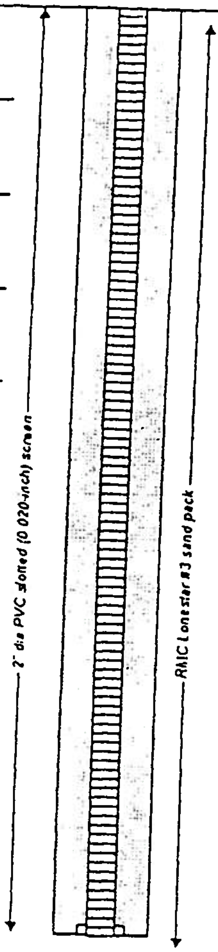
LOG OF MONITORING WELL MW-4



PROJECT	Pacific Electric Motor Company, 1009 66th Avenue	DIAMETER OF HOLE	8 inches	PLATE
LOCATION	Oakland, CA	TOTAL DEPTH OF HOLE	25 feet	A-4
JOB NUMBER	618.0101.003	TOP OF CASING ELEVATION	100.32 ft.	
GEOLOGIST/ENGINEER	Jenny Han	DATE STARTED	9/14/98	
DRILL RIG/SAMPLING METHOD	Rhino LAR	DATE COMPLETED	9/14/98	

PES Environmental, Inc.
Engineering & Environmental Services

LOG OF MONITORING WELL MW-4



SAMPLE ID	BLOWS/6 IN	PID (PPM)	DEPTH (FT)	MATERIALS DESCRIPTION
MW4-15.5		44		Increase in clay content to ~10%. Increase in plasticity to low to medium. Hydrocarbon odor not as strong.
			17	
			19	
			21	
			23	
			25	*Bottom of borehole @ 25.0 feet below ground surface.*
			27	
			29	

6180101003_log.CDR

PROJECT	Pacific Electric Motor Company, 1009 66th Avenue	DIAMETER OF HOLE	8 inches
LOCATION	Oakland, CA	TOTAL DEPTH OF HOLE	25 feet
JOB NUMBER	618.0101.003	TOP OF CASING ELEVATION	100.32 ft.
GEOLOGIST/ENGINEER	Jenny Han	DATE STARTED	9/14/98
DRILL RIG/SAMPLING METHOD	Rhino LAR	DATE COMPLETED	9/14/98

PLATE

A-4

APPENDIX C

Alameda County Public Works Agency -
Water Resources Well Permit

Alameda County Public Works Agency - Water Resources Well Permit

399 Elmhurst Street
Hayward, CA 94544-1395
Telephone: (510)670-6633 Fax:(510)782-1939

Application Approved on: 10/22/2008 By jamesy

Permit Numbers: W2008-0803
Permits Valid from 10/23/2008 to 10/24/2008

Application Id: 1224274972642
City of Project Site: Oakland
Site Location: 1009 66th Avenue
Oakland, California
Project Start Date: 10/23/2008
Completion Date: 10/24/2008
Requested Inspection: 10/23/2008
Scheduled Inspection: 10/23/2008 at 11:00 AM (Contact your inspector, Vicky Hamlin at (510) 670-5443, to confirm.)

Applicant: LFR, Inc.. - Ron Goloubow
1900 Powell Street Suite 1200, Emeryville, CA 94608
Phone: 510-596-9550
Property Owner: Charles Robitallie Aspire Public Schools
1001 22nd Avenue; Suite 100, Oakland, CA 94606
Phone: 925-698-1118
Client: ** same as Property Owner **
Contact: Michael Sullivan
Phone: 510-596-9689
Cell: 510-409-2451

Total Due: $230.00
Receipt Number: WR2008-0377 **Total Amount Paid:** $230.00
Payer Name : LFR Inc. Paid By: CHECK **PAID IN FULL**

Works Requesting Permits:

Remediation Well Construction-Injection - 6 Wells
Driller: Gregg Drilling - Lic #: 485165 - Method: hstem **Work Total: $230.00**

Specifications

Permit #	Issued Date	Expire Date	Owner Well Id	Hole Diam.	Casing Diam.	Seal Depth	Max. Depth
W2008-0803	10/22/2008	01/21/2009	AS-1D	8.00 in.	2.00 in.	25.00 ft	32.00 ft
W2008-0803	10/22/2008	01/21/2009	AS-1I	8.00 in.	2.00 in.	9.00 ft	16.00 ft
W2008-0803	10/22/2008	01/21/2009	ASMW2D	8.00 in.	2.00 in.	25.00 ft	32.00 ft
W2008-0803	10/22/2008	01/21/2009	ASMW2I	8.00 in.	2.00 in.	9.00 ft	16.00 ft
W2008-0803	10/22/2008	01/21/2009	SVE1	8.00 in.	2.00 in.	2.00 ft	5.00 ft
W2008-0803	10/22/2008	01/21/2009	SVMW2	8.00 in.	2.00 in.	2.00 ft	5.00 ft

Specific Work Permit Conditions

1. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.

2. Permitte, permittee's contractors, consultants or agents shall be responsible to assure that all material or waters generated during drilling, boring destruction, and/or other activities associated with this Permit will be safely handled, properly managed, and disposed of according to all applicable federal, state, and local statutes regulating such. In no case shall these materials and/or waters be allowed to enter, or potentially enter, on or off-site storm sewers, dry wells, or waterways or be allowed to move off the property where work is being completed.

3. Compliance with the well-sealing specifications shall not exempt the well-sealing contractor from complying with appropriate State reporting-requirements related to well construction or destruction (Sections 13750 through 13755 (Division 7, Chapter 10, Article 3) of the California Water Code). Contractor must complete State DWR Form 188 and mail original to the Alameda County Public Works Agency, Water Resources Section, within 60 days. Including permit number and site map.

4. Applicant shall submit the copies of the approved encroachment permit to this office within 60 days.

5. Applicant shall contact Vicky Hamlin for an inspection time at 510-670-5443 or email to vickyh@acpwa.org at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.

6. Minimum seal depth (Neat Cement Seal) is 2 feet below ground surface (BGS).

7. Minimum surface seal thickness is two inches of cement grout placed by tremie

8. Copy of approved drilling permit must be on site at all times. Failure to present or show proof of the approved permit application on site shall result in a fine of $500.00.

9. Prior to any drilling activities onto any public right-of-ways, it shall be the applicants responsibilities to contact and coordinate a Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits required for that City or to the County and follow all City or County Ordinances. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County a Traffic Safety Plan for any lane closures or detours planned. No work shall begin until all the permits and requirements have been approved or obtained.

APPENDIX D

Well Development and Sampling Field Logs

GREGG

MONITORING WELL DEVELOPMENT LOG

All measurements taken from: ☑ Top of Casing ☐ Protective Casing ☐ Ground Level

Sample ID ____

Qty. of Drilling Fluid Lost: Ø

Well Number: AS-1I

Date: 10-27-08

Time Start: 9:15 End: 11:15

Client: L.F.R

Project: ASPIRE SCHOOL SITE

Job Number: —

Installation Date: 10-24-08

Well Diameter: 2"

Borehole Diameter: 8"

Screen Length: 2'

Measured Depth (pre-development): 18.03

Measured Depth (post-development): 18.03

Static Water Level (ft.): 5.03

Standing Water Column (ft.): 13.0

One Well Volume (gal.): 2.21

One Annulus Vol. (gal.) ____

Minimum Gal. to be Purged: 14 Gallons

Development Method: SURGE, BAIL & PUMP.

Purging Equipment: 2" SS BAILER

Water Level Equipment: SOLINST

pH/EC Meter: HORIBA U-10

Turbidity Meter: " "

Other ____

Field Parameters Measured

Time	Amount Purged (gal.)	pH	EC	Turbidity	D.O.	D.O. Temp.	SAL.	GPM / W.L.	Comments	Field Tech.
9:15	START SURGING 2" WELL USING A 2" SURGE BLOCK.								HARD BOTTOM	
9:30	—	BAILING —							SURGE WELL FOR 15 MINUTES	
9:40	2/2	4.91	3.52	999	—	21.6	—	—	COLOR - BROWN	
9:55	—	START PUMPING —						.18gpm		
10:06	2/4	5.24	3.73	759	—	21.4		WL=15.65	- WELL GETTING DRY,	
10:15	2/6	5.39	3.34	188	—	21.7	—	WL=15.75	PUMPING VERY SLOW.	
10:28	2/8	5.42	3.59	200	—	21.8	—	" =16.01		
10:44	2/10	5.48	3.58	36	—	22.1	—	WL=16.01		
10:54	2/12	5.56	3.52	33	—	21.9	—	" "		
11:06	2/14	5.54	3.53	5	—	22.0	—	" "		
11:15					FINAL WL =			11.99		

FINAL FIELD PARAMETER MEASUREMENTS

GREGG

MONITORING WELL DEVELOPMENT LOG

All measurements taken from: ☑ Top of Casing ☐ Protective Casing ☐ Ground Level

Sample ID ______

Qty. of Drilling Fluid Lost: 0

Well Number: ASMW21
Date: 10-27-08
Time Start: 8:00 End: 1:00
Client: L.F.R
Project: ASPIRE SCHOOL SITE
Job Number: —
Installation Date: 10-23-08
Well Diameter: 2"

Borehole Diameter: 8"
Screen Length: 8'
Measured Depth (pre-development): 16.90
Measured Depth (post-development): 16.90
Static Water Level (ft.): 5.28
Standing Water Column (ft.): 11.62
One Well Volume (gal.): 1.97
One Annulus Vol. (gal.): ______

Minimum Gal. to be Purged: 16 Gallons
Development Method: SURGE, BAIL & PUMP
Purging Equipment: 2" SS BAILER
Water Level Equipment: SOLINST / HORIBA U-10
pH/EC Meter: " "
Turbidity Meter: " "
Other: ______

Time	Amount Purged (gal.)	pH	EC	Turbidity	D.O.	D.O. Temp.	SAL.	GPM / W.L.	Comments	Field Tech.
8:20	START SURGING 2" WELL, USING A 2" SURGE BLOCK								HARD BOTTOM	
8:45	—	BAILING —							SURGE FOR 20 MIN	
8:59	2/2	4.11	7.52	999	—	20.2	—	—	COLOR - BROWN	
11:30	—	START PUMPING —						0.33 gpm		
11:40	2/4	5.73	7.33	999	—	24.5	—	WL = 12.8		
11:50	2/4	5.56	7.26	999	—	23.7	—	WL = 14.25		
11:56	2/6	5.46	6.98	999	—	23.5	—	WL = N/A		
12:04	2/8	5.48	6.91	999	—	23.1	—	WL = N/A	WATER LEVEL BELOW TOP OF PUMP	
12:10	2/10	5.47	6.82	235	—	23.5	—	"	"	
12:17	2/12	5.44	6.73	85	—	23.5	—	"	"	
12:25	2/14	5.43	6.70	30	—	23.7	—	"	"	
12:34	2/16	5.44	6.69	18	FINAL FIELD PARAMETER MEASUREMENTS	23.6		"	"	

12:48 FINAL — WL = 12.84

GREGG

MONITORING WELL DEVELOPMENT LOG

All measurements taken from: ☑ Top of Casing ☐ Protective Casing ☐ Ground Level

Sample ID ______

Well Number: AS-1D
Date: 10-27-08
Time Start: 3:20 End: 4:45
Client: L.F.R
Project: ASPIRE SCHOOL SITE
Job Number: —
Installation Date: 10-23-08
Well Diameter: 2"

Borehole Diameter: 8"
Screen Length: ______
Measured Depth (pre-development): 25.43
Measured Depth (post-development): 26.0
Static Water Level (ft.): 4.88
Standing Water Column (ft.): 20.55
One Well Volume (gal.): 3.49
One Annulus Vol. (gal.): ______

Qty. of Drilling Fluid Lost: Ø
Minimum Gal. to be Purged: 35 Gallons
Development Method: SURGE, BAIL & PUMP.
Purging Equipment: 2" SS BAILER
Water Level Equipment: SOLINST
pH/EC Meter: HORIBA U-10
Turbidity Meter: " "
Other: ______

Field Parameters Measured

Time	Amount Purged (gal.)	pH	EC	Turbidity	D.O.	D.O. Temp.	SAL.	GPM / W.L.	Comments	Field Tech.
3:25	START SURGING 2" WELL USING A 2" SURGE BLOCK								SOFT BOTTOM	
3:45	—	BAILING	—						SURGE WELL FOR 20 MIN	
3:50	4/4	5.98	1.34	999	—	21.7	—		GOOD FLOWRATE	
4:00	—	START		PUMPING						
4:05	6/10	5.57	1.21	999	—	20.9	—	2.5 gpm/	WL: 19.7	
4:07	5/15	5.49	1.16	569	—	21.0	—	"	"	
4:09	5/20	5.46	1.18	324	—	21.8	—	"	"	
4:11	5/25	5.42	1.13	204	—	21.6	—	"	"	
4:13	5/30	5.32	1.20	158	—	20.8	—	"	"	
4:15	5/35	5.30	1.19	181	—	21.2	—	"	"	
4:40					FINAL		WL -	5.16		

FINAL FIELD PARAMETER MEASUREMENTS

GREGG

MONITORING WELL DEVELOPMENT LOG

All measurements taken from: ☑ Top of Casing ☐ Protective Casing ☐ Ground Level

Sample ID ______

Qty. of Drilling Fluid Lost Ø

Well Number ASMW2D

Date 10-27-08

Time Start: 1:00 End: 3:15

Client L.F.R

Project ASPIRE SCHOOL SITE

Job Number —

Installation Date 10-23-08

Well Diameter 2"

Borehole Diameter 8"

Screen Length 10'

Measured Depth (pre-development) 25.90

Measured Depth (post-development) 26.73

Static Water Level (ft.) 4.64

Standing Water Column (ft.) 21.26

One Well Volume (gal.) 3.61

One Annulus Vol. (gal.) ______

Minimum Gal. to be Purged 36 Gallons

Development Method SURGE, BAIL & PUMP.

Purging Equipment 2" SS BAILER

Water Level Equipment SOLINST

pH/EC Meter HORIBA U-10

Turbidity Meter " "

Other ______

Time	Amount Purged (gal.)	pH	EC	Turbidity	D.O.	D.O. Temp.	SAL.	GPM / W.L.	Comments	Field Tech.
1:00	START SURGING 2" WELL, USING A 2" SURGE BLOCK								SOFT BOTTOM	
1:45	— BAILING —								SURGE WELL FOR 45 MINUTES.	
1:55	3/3	5.60	3.26	999	—	21.9	—	—		
2:00	— START PUMPING							1gpm /	WL = 13.35	
2:10	4/7	5.45	3.03	999	—	21.2	—	"	" "	
2:14	4/11	5.46	3.00	999	—	20.7	—	"	" 13.45	
2:18	4/15	5.47	2.86	999	—	21.0	—	"	" "	
2:23	4/19	5.45	2.89	999	—	20.7	—	"	" "	
2:27	4/23	5.44	2.48	999	—	21.1	—	"	" "	
2:31	4/27	5.43	2.77	582	—	21.6	—	"	" 13.28	
2:35	4/31	5.43	2.48	631	—	21.2	—	"	" "	

FINAL FIELD PARAMETER MEASUREMENTS

GREGG

MONITORING WELL DEVELOPMENT LOG

All measurements taken from: ☑ Top of Casing ☐ Protective Casing ☐ Ground Level

Well Number: ASMW2D
Date: 10-27-08
Time Start: 1:00 End: 3:15
Client: LFR
Project: ASPIRE SCHOOL SITE
Job Number: —
Installation Date: 10-23-08
Well Diameter: 2"

Borehole Diameter: 8"
Screen Length: 10'
Measured Depth (pre-development): 25.90
Measured Depth (post-development): 26.73
Static Water Level (ft.): 4.64
Standing Water Column (ft.): 21.26
One Well Volume (gal.): 3.61
One Annulus Vol. (gal.):

Sample ID:
Qty. of Drilling Fluid Lost: 0
Minimum Gal. to be Purged: 36 Gallons
Development Method: SURGE, BAIL ē PUMP
Purging Equipment: 2" SS BAILER
Water Level Equipment: SOLINST
pH/EC Meter: HORIBA U-10
Turbidity Meter: " "
Other:

Time	Amount Purged (gal.)	pH	EC	Turbidity	D.O.	D.O. Temp.	SAL.	GPM / W.L.	Comments	Field Tech.
		Field Parameters Measured								
2:39	4/35	5.44	2.73	428	—	21.1	—	1 gpm/	WL = 13.15	
2:43	4/39	5.44	2.74	300	—	21.1	—	"	" "	
3:13					FINAL		WL = 5.39			

FINAL FIELD PARAMETER MEASUREMENTS

APPENDIX E

Laboratory Analytical Reports

Curtis & Tompkins, Ltd.

Total Volatile Hydrocarbons

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8015B
Matrix:	Water	Sampled:	10/27/08
Units:	ug/L	Received:	10/27/08
Batch#:	144171		

Field ID:	AS-1I	Diln Fac:	20.00
Type:	SAMPLE	Analyzed:	10/29/08
Lab ID:	207211-001		

Analyte	Result	RL
Gasoline C7-C12	50,000	1,000

Surrogate	%REC	Limits
Trifluorotoluene (FID)	131	61-149
Bromofluorobenzene (FID)	139	65-146

Field ID:	ASMW-2I	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	10/28/08
Lab ID:	207211-002		

Analyte	Result	RL
Gasoline C7-C12	6,700	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	122	61-149
Bromofluorobenzene (FID)	106	65-146

Field ID:	AS-1D	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	10/28/08
Lab ID:	207211-003		

Analyte	Result	RL
Gasoline C7-C12	530	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	115	61-149
Bromofluorobenzene (FID)	104	65-146

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Total Volatile Hydrocarbons

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8015B
Matrix:	Water	Sampled:	10/27/08
Units:	ug/L	Received:	10/27/08
Batch#:	144171		

Field ID:	ASMW-2D	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	10/28/08
Lab ID:	207211-004		

Analyte	Result	RL
Gasoline C7-C12	140	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	106	61-149
Bromofluorobenzene (FID)	103	65-146

Field ID:	TRIP BLANK	Diln Fac:	1.000
Type:	SAMPLE	Analyzed:	10/28/08
Lab ID:	207211-005		

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	103	61-149
Bromofluorobenzene (FID)	101	65-146

Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC467450	Analyzed:	10/28/08

Analyte	Result	RL
Gasoline C7-C12	ND	50

Surrogate	%REC	Limits
Trifluorotoluene (FID)	106	61-149
Bromofluorobenzene (FID)	104	65-146

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Total Volatile Hydrocarbons

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC467451	Batch#:	144171
Matrix:	Water	Analyzed:	10/28/08
Units:	ug/L		

Analyte	Spiked	Result	%REC	Limits
Gasoline C7-C12	1,000	1,060	106	78-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	119	61-149
Bromofluorobenzene (FID)	103	65-146

Curtis & Tompkins, Ltd.

Batch QC Report

Total Volatile Hydrocarbons

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8015B
Field ID:	ZZZZZZZZZZ	Batch#:	144171
MSS Lab ID:	207197-003	Sampled:	10/22/08
Matrix:	Water	Received:	10/24/08
Units:	ug/L	Analyzed:	10/28/08
Diln Fac:	1.000		

Type: MS   Lab ID: QC467452

Analyte	MSS Result	Spiked	Result	%REC	Limits
Gasoline C7-C12	24.65	2,000	1,917	95	65-120

Surrogate	%REC	Limits
Trifluorotoluene (FID)	132	61-149
Bromofluorobenzene (FID)	107	65-146

Type: MSD   Lab ID: QC467453

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Gasoline C7-C12	2,000	1,921	95	65-120	0	20

Surrogate	%REC	Limits
Trifluorotoluene (FID)	129	61-149
Bromofluorobenzene (FID)	105	65-146

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Field ID:	AS-1I	Batch#:	144209
Lab ID:	207211-001	Sampled:	10/27/08
Matrix:	Water	Received:	10/27/08
Units:	ug/L	Analyzed:	10/30/08
Diln Fac:	125.0		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	41,000	1,300
MTBE	11,000	63
Isopropyl Ether (DIPE)	ND	63
Ethyl tert-Butyl Ether (ETBE)	ND	63
1,2-Dichloroethane	ND	63
Benzene	9,900	63
Methyl tert-Amyl Ether (TAME)	ND	63
Toluene	930	63
1,2-Dibromoethane	ND	63
Ethylbenzene	1,600	63
m,p-Xylenes	2,200	63
o-Xylene	830	63

Surrogate	%REC	Limits
Dibromofluoromethane	106	80-125
1,2-Dichloroethane-d4	108	80-137
Toluene-d8	102	80-120
Bromofluorobenzene	100	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Field ID:	ASMW-2I	Batch#:	144209
Lab ID:	207211-002	Sampled:	10/27/08
Matrix:	Water	Received:	10/27/08
Units:	ug/L	Analyzed:	10/30/08
Diln Fac:	33.33		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	22,000	330
MTBE	ND	17
Isopropyl Ether (DIPE)	ND	17
Ethyl tert-Butyl Ether (ETBE)	ND	17
1,2-Dichloroethane	ND	17
Benzene	430	17
Methyl tert-Amyl Ether (TAME)	ND	17
Toluene	960	17
1,2-Dibromoethane	ND	17
Ethylbenzene	180	17
m,p-Xylenes	750	17
o-Xylene	270	17

Surrogate	%REC	Limits
Dibromofluoromethane	109	80-125
1,2-Dichloroethane-d4	109	80-137
Toluene-d8	101	80-120
Bromofluorobenzene	104	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Field ID:	AS-1D	Batch#:	144209
Lab ID:	207211-003	Sampled:	10/27/08
Matrix:	Water	Received:	10/27/08
Units:	ug/L	Analyzed:	10/30/08
Diln Fac:	3.333		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	570	33
MTBE	240	1.7
Isopropyl Ether (DIPE)	ND	1.7
Ethyl tert-Butyl Ether (ETBE)	ND	1.7
1,2-Dichloroethane	ND	1.7
Benzene	25	1.7
Methyl tert-Amyl Ether (TAME)	ND	1.7
Toluene	19	1.7
1,2-Dibromoethane	ND	1.7
Ethylbenzene	12	1.7
m,p-Xylenes	53	1.7
o-Xylene	17	1.7

Surrogate	%REC	Limits
Dibromofluoromethane	107	80-125
1,2-Dichloroethane-d4	116	80-137
Toluene-d8	102	80-120
Bromofluorobenzene	105	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Field ID:	ASMW-2D	Batch#:	144259
Lab ID:	207211-004	Sampled:	10/27/08
Matrix:	Water	Received:	10/27/08
Units:	ug/L	Analyzed:	10/31/08
Diln Fac:	25.00		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	470	250
MTBE	1,800	13
Isopropyl Ether (DIPE)	ND	13
Ethyl tert-Butyl Ether (ETBE)	ND	13
1,2-Dichloroethane	ND	13
Benzene	ND	13
Methyl tert-Amyl Ether (TAME)	ND	13
Toluene	ND	13
1,2-Dibromoethane	ND	13
Ethylbenzene	ND	13
m,p-Xylenes	ND	13
o-Xylene	ND	13

Surrogate	%REC	Limits
Dibromofluoromethane	108	80-125
1,2-Dichloroethane-d4	124	80-137
Toluene-d8	107	80-120
Bromofluorobenzene	107	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	144209
Units:	ug/L	Analyzed:	10/29/08
Diln Fac:	1.000		

Type: BS Lab ID: QC467612

Analyte	Spiked	Result	%REC	Limits
tert-Butyl Alcohol (TBA)	100.0	96.96	97	59-152
MTBE	20.00	19.22	96	70-125
Isopropyl Ether (DIPE)	20.00	21.47	107	67-126
Ethyl tert-Butyl Ether (ETBE)	20.00	24.00	120	69-127
1,2-Dichloroethane	20.00	22.81	114	78-132
Benzene	20.00	21.68	108	80-120
Methyl tert-Amyl Ether (TAME)	20.00	24.21	121	80-122
Toluene	20.00	22.07	110	80-120
1,2-Dibromoethane	20.00	20.42	102	80-120
Ethylbenzene	20.00	22.39	112	80-122
m,p-Xylenes	40.00	44.11	110	80-126
o-Xylene	20.00	20.43	102	80-120

Surrogate	%REC	Limits
Dibromofluoromethane	106	80-125
1,2-Dichloroethane-d4	112	80-137
Toluene-d8	104	80-120
Bromofluorobenzene	95	80-122

Type: BSD Lab ID: QC467613

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
tert-Butyl Alcohol (TBA)	100.0	88.71	89	59-152	9	20
MTBE	20.00	18.90	94	70-125	2	20
Isopropyl Ether (DIPE)	20.00	21.28	106	67-126	1	20
Ethyl tert-Butyl Ether (ETBE)	20.00	23.68	118	69-127	1	20
1,2-Dichloroethane	20.00	22.63	113	78-132	1	20
Benzene	20.00	22.16	111	80-120	2	20
Methyl tert-Amyl Ether (TAME)	20.00	24.10	121	80-122	0	20
Toluene	20.00	22.32	112	80-120	1	20
1,2-Dibromoethane	20.00	20.20	101	80-120	1	20
Ethylbenzene	20.00	23.01	115	80-122	3	20
m,p-Xylenes	40.00	44.04	110	80-126	0	20
o-Xylene	20.00	20.84	104	80-120	2	20

Surrogate	%REC	Limits
Dibromofluoromethane	105	80-125
1,2-Dichloroethane-d4	110	80-137
Toluene-d8	107	80-120
Bromofluorobenzene	101	80-122

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC467727	Batch#:	144209
Matrix:	Water	Analyzed:	10/29/08
Units:	ug/L		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	ND	10
MTBE	ND	0.5
Isopropyl Ether (DIPE)	ND	0.5
Ethyl tert-Butyl Ether (ETBE)	ND	0.5
1,2-Dichloroethane	ND	0.5
Benzene	ND	0.5
Methyl tert-Amyl Ether (TAME)	ND	0.5
Toluene	ND	0.5
1,2-Dibromoethane	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5

Surrogate	%REC	Limits
Dibromofluoromethane	104	80-125
1,2-Dichloroethane-d4	108	80-137
Toluene-d8	103	80-120
Bromofluorobenzene	101	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Matrix:	Water	Batch#:	144259
Units:	ug/L	Analyzed:	10/30/08
Diln Fac:	1.000		

Type: BS Lab ID: QC467837

Analyte	Spiked	Result	%REC	Limits
tert-Butyl Alcohol (TBA)	100.0	90.88	91	59-152
MTBE	20.00	18.00	90	70-125
Isopropyl Ether (DIPE)	20.00	20.63	103	67-126
Ethyl tert-Butyl Ether (ETBE)	20.00	22.51	113	69-127
1,2-Dichloroethane	20.00	23.06	115	78-132
Benzene	20.00	21.72	109	80-120
Methyl tert-Amyl Ether (TAME)	20.00	23.28	116	80-122
Toluene	20.00	21.13	106	80-120
1,2-Dibromoethane	20.00	20.08	100	80-120
Ethylbenzene	20.00	21.50	108	80-122
m,p-Xylenes	40.00	44.43	111	80-126
o-Xylene	20.00	20.93	105	80-120

Surrogate	%REC	Limits
Dibromofluoromethane	104	80-125
1,2-Dichloroethane-d4	112	80-137
Toluene-d8	104	80-120
Bromofluorobenzene	100	80-122

Type: BSD Lab ID: QC467838

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
tert-Butyl Alcohol (TBA)	100.0	87.27	87	59-152	4	20
MTBE	20.00	18.38	92	70-125	2	20
Isopropyl Ether (DIPE)	20.00	20.38	102	67-126	1	20
Ethyl tert-Butyl Ether (ETBE)	20.00	22.98	115	69-127	2	20
1,2-Dichloroethane	20.00	23.53	118	78-132	2	20
Benzene	20.00	21.69	108	80-120	0	20
Methyl tert-Amyl Ether (TAME)	20.00	22.89	114	80-122	2	20
Toluene	20.00	22.13	111	80-120	5	20
1,2-Dibromoethane	20.00	20.55	103	80-120	2	20
Ethylbenzene	20.00	22.17	111	80-122	3	20
m,p-Xylenes	40.00	45.58	114	80-126	3	20
o-Xylene	20.00	21.79	109	80-120	4	20

Surrogate	%REC	Limits
Dibromofluoromethane	104	80-125
1,2-Dichloroethane-d4	108	80-137
Toluene-d8	103	80-120
Bromofluorobenzene	99	80-122

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

BTXE & Oxygenates

Lab #:	207211	Location:	Aspire School
Client:	LFR Levine Fricke	Prep:	EPA 5030B
Project#:	003-09155-00	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC467965	Batch#:	144259
Matrix:	Water	Analyzed:	10/30/08
Units:	ug/L		

Analyte	Result	RL
tert-Butyl Alcohol (TBA)	ND	10
MTBE	ND	0.5
Isopropyl Ether (DIPE)	ND	0.5
Ethyl tert-Butyl Ether (ETBE)	ND	0.5
1,2-Dichloroethane	ND	0.5
Benzene	ND	0.5
Methyl tert-Amyl Ether (TAME)	ND	0.5
Toluene	ND	0.5
1,2-Dibromoethane	ND	0.5
Ethylbenzene	ND	0.5
m,p-Xylenes	ND	0.5
o-Xylene	ND	0.5

Surrogate	%REC	Limits
Dibromofluoromethane	106	80-125
1,2-Dichloroethane-d4	117	80-137
Toluene-d8	103	80-120
Bromofluorobenzene	101	80-122

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.
Analytical Laboratory Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900 Phone
(510) 486-0532 Fax

CHAIN OF CUSTODY

C & T LOGIN #: 207211

Sampler: M. JONES

Project No.: 003-09155-00

Report To: LUCAS GOLDSTEIN

Project Name: ASPIRE SCHOOL

Company: LFR INC.

Project P.O.: -

Telephone: (510) 652-4500

Turnaround Time: STANDARD

~~Fax:~~ EMAIL: LUCAS.GOLDSTEIN@LFR.COM

Lab No.	Sample ID.	Sampling Date Time	Matrix: Soil	Matrix: Water	Matrix: Waste		# of Containers	Preservative: HCL	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: ICE		Analysis: TPH-GAS BY EPA 8015M	Analysis: ~~TPH-DIESEL ... BY 8015M~~	Analysis: ~~8260B FUEL ...~~	Analysis: BTEX + OXYS BY 8260B
1	AS-1I	10/27/08 1503		X			6	X			X		X			X
2	ASMW-2I	10/27/08 1530		X			6	~~X~~			X	U.P.	X			X
3	AS-1D	10/27/08 1624		X			6	X			X		X			X
4	AS-MW-2D	10/27/08 1445		X			6	X			X		X			X
5	TRIP BLANK	—		X			1	X					X			

Notes:
ASMW-2I IS UNPRESERVED.

SAMPLE RECEIPT
☐ Intact ☐ Cold
☒ On Ice ☐ Ambient

Preservative Correct?
☐ Yes ☐ No ☐ N/A

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
[signature]	10/27/08 1724	Patricia Gonzalez [signature]	10/27/08 5:25pm

SIGNATURE

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # 207211 Date Received 10/27/08 Number of coolers 1
Client LFR Project ASPIRE SCHOOL

Date Opened 10/27/08 By (print) M. VILLANUEVA (sign) [signature]
Date Logged in ✓ By (print) ✓ (sign)

1. Did cooler come with a shipping slip (airbill, etc)? .... YES **NO** (circled)
   Shipping info ______

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☐ **NO** (circled)
   How many ______ Name ______ Date ______

2B. Were custody seals intact upon arrival? .... YES NO **N/A** (circled)

3. Were custody papers dry and intact when received? .... **YES** (circled) NO

4. Were custody papers filled out properly (ink, signed, etc)? .... **YES** (circled) NO

5. Is the project identifiable from custody papers? (If so fill out top of form) .... **YES** (circled) NO

6. Indicate the packing in cooler: (if other, describe) ______

- ☑ Bubble Wrap
- ☑ Foam blocks
- ☑ Bags
- ☐ None
- ☐ Cloth material
- ☐ Cardboard
- ☐ Styrofoam
- ☐ Paper towels

7. Temperature documentation:

   Type of ice used: ☑ Wet ☐ Blue/Gel ☐ None Temp(°C) 8.0

   ☐ Samples Received on ice & cold without a temperature blank

   ☑ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? .... YES **NO** (circled)
   If YES, what time were they transferred to freezer? ______

9. Did all bottles arrive unbroken/unopened? .... **YES** (circled) NO

10. Are samples in the appropriate containers for indicated tests? .... **YES** (circled) NO

11. Are sample labels present, in good condition and complete? .... **YES** (circled) NO

12. Do the sample labels agree with custody papers? .... **YES** (circled) NO

13. Was sufficient amount of sample sent for tests requested? .... **YES** (circled) NO

14. Are the samples appropriately preserved? .... **YES** (circled) NO N/A

15. Are bubbles > 6mm absent in VOA samples? .... **YES** (circled) NO N/A

16. Was the client contacted concerning this sample delivery? .... YES NO
    If YES, Who was called? ______ By ______ Date: ______

COMMENTS