

# Atlantic Richfield Company

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**RECEIVED**

*By Alameda County Environmental Health at 8:48 am, May 29, 2013*

May 28, 2013

Re: Revised Work Plan for Monitoring Well Installation and Vapor Intrusion Assessment  
Atlantic Richfield Company Station #402  
1450 Fruitvale Ave, Oakland, California  
ACEH Case #RO00000307

"I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached document are true and correct.

Submitted by,



Shannon Couch  
Operations Project Manager

Attachment



**REVISED WORK PLAN FOR  
MONITORING WELL INSTALLATION  
AND  
VAPOR INTRUSION ASSESSMENT  
Former Richfield Oil Company Station #402  
1450 Fruitvale Avenue  
Oakland, Alameda County, California  
ACEH Case #RO0000307**

**Prepared for:**

Ms. Shannon Couch  
Atlantic Richfield Company  
P.O. Box 1257  
San Ramon, CA 94583

**Prepared by:**

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May 28, 2013

Project No. 08-88-602



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**CREATING SOLUTIONS. BUILDING TRUST.**

May 28, 2013

Project #08-88-602

Atlantic Richfield Company  
P.O. Box 1257  
San Ramon, CA 94583  
Submitted via ENFOS

Attn.: Ms. Shannon Couch

Re: Revised Work Plan for Monitoring Well Installation and Vapor Intrusion Assessment  
Former Richfield Oil Company Station #402, 1450 Fruitvale Ave., Oakland, Alameda County  
ACEH Case #RO0000307

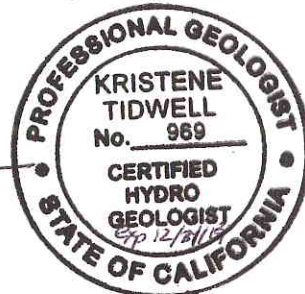
Dear Ms. Couch:

Broadbent & Associates, Inc. (Broadbent) is pleased to submit this *Revised Work Plan for Monitoring Well Installation and Vapor Intrusion Assessment (Work Plan)* on behalf of Atlantic Richfield Company (a BP affiliated company), for Former Richfield Oil Company Station #402 located at 1450 Fruitvale Avenue, Oakland, Alameda County, California (Site). This Work Plan presents a description of proposed activities to install monitoring wells and perform a vapor intrusion assessment in order to evaluate residual onsite petroleum hydrocarbon contamination. This Work Plan supersedes the previously submitted *Monitoring Well Installation Work Plan* (Broadbent, June 19, 2012).

Please do not hesitate to contact me at (707) 455-7290.

Sincerely,  
BROADBENT & ASSOCIATES, INC.

Kristene Tidwell, P.G., C. Hg.  
Senior Geologist



cc: Ms. Dilan Roe, P.E., Alameda County Environmental Health (submitted via ACEH ftp site)  
Mr. Bill Phua, Fruitvale-Farnum Associates, LLC, 638 Webster St., #300, Oakland, CA 94607  
Mr. Hugh K. Phares, III, Attorney at Law, 911 Paru St., Alameda, CA 94501-4033  
Electronic copy uploaded to GeoTracker

**REVISED WORK PLAN FOR MONITORING WELL INSTALLATION  
AND VAPOR INTRUSION ASSESSMENT**

Former Richfield Oil Company Station #402  
1450 Fruitvale Avenue, Oakland, Alameda County, California

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**DRAWINGS**

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# REVISED WORK PLAN FOR MONITORING WELL INSTALLATION AND VAPOR INTRUSION ASSESSMENT

Former Richfield Oil Company Station #402  
1450 Fruitvale Avenue  
Oakland, Alameda County, California

## 1.0 INTRODUCTION

Broadbent & Associates, Inc. (Broadbent) has prepared this *Work Plan for Monitoring Well Installation and Vapor Intrusion Assessment* (Work Plan) on behalf of the Atlantic Richfield Company (ARC) – a BP affiliated company, for Former Richfield Oil Company Station #402 located at 1450 Fruitvale Avenue in Oakland, Alameda County, California (Site). A Site Location Map is presented as Drawing 1.

In a letter dated October 16, 2008 Alameda County Environmental Health (ACEH) requested the completion of a soil and groundwater investigation. The *Work Plan – Monitoring Well Installation, 1450 Fruitvale Avenue, Oakland, California* (AEI Consultants, 2005), originally prepared for Fruitvale-Farnam Associates, LLC, was previously approved by the ACEH in a letter dated June 22, 2006. That work plan had proposed installing four additional groundwater monitoring wells on and off the Site, replacing the three onsite monitoring wells that had been lost or destroyed as a result of property redevelopment activities. ARC had repeatedly attempted without success to collectively implement the approved scope of work with the other co-Responsible Parties (RPs) listed in the ACEH letters. ARC was finally able to negotiate a property access agreement with Mr. Phua / Fruitvale-Farnam Associates, LLC, on April 11, 2012.

This revised Work Plan proposes installing four new onsite groundwater monitoring wells to assess current groundwater conditions. In addition, a soil vapor assessment is proposed to evaluate risks to potential current building occupants and offsite, potentially downgradient residences. A Site description, background, proposed activities, and proposed schedule are presented in the following Sections. This Work Plan supersedes the *Monitoring Well Installation Work Plan*, submitted by Broadbent on June 19, 2012.

## 2.0 SITE DESCRIPTION AND BACKGROUND

The Site is currently occupied by the Fruitvale Commercial Center office building located on the northeast corner of Farnam Street and Fruitvale Avenue in Oakland, Alameda County, California (Drawing 2). The building has a slab-on-grade foundation with no basement and has a vapor barrier beneath the slab (AEI, 2002). A restaurant and large Laundromat occupy the first floor of this three-story building. A health & dental clinic occupy the second floor, and a tax preparation service and real estate mortgage company occupy the third floor of the building. Open space areas west and east of the three-story building are concrete covered parking lots with narrow landscape planter strips along the western and southern edges of the property.

The Site was reportedly was developed and operated as a gas station between 1950 by Richfield Oil Company at least until 1983, although some evidence has been located that the USTs were operated by Curtis & Joyce Thomas from 1976 to 1983. Four underground storage tanks (USTs) were formerly located at the Site. The fuel dispenser island was located on the northwestern portion of the west parking lot. AEI Consultants (AEI) conducted research at the City of Oakland Fire and Building Departments for records relating to the location of the USTs and associated piping. Although formal

UST removal records were not located, available records indicated that USTs were formerly located along Farnam Street, as indicated on Drawing 2 (AEI, 1999).

In May 1999 AEI conducted three excavations in order to determine the presence of USTs remaining onsite. The approximate locations of these excavations are depicted on Drawing 2. No tanks were encountered and soils removed from the larger excavation (Excavation A) appeared to be consistent with imported fill material commonly used to backfill former tank basins. A total of six soil samples and one grab-groundwater sample (labeled AEI GW 8') were collected from the former UST pit (Excavation A). The analytical results indicated minimal concentrations of petroleum hydrocarbons. Historic soil and groundwater laboratory analytical results from this investigation are summarized in Appendices A and B, respectively (AEI, 1999).

Between July 1998 and June 2002, a total of 22 soil borings (GP-1 through GP-8 and AEI-9 through AEI-22) were advanced and three monitoring wells (MW-1 through MW-3) were installed at the Site. A Site Map with historic boring and monitor well locations is presented as Drawing 2. Historic soil analytical data are presented in Appendix A; historic groundwater analytical data are presented in Appendix B, and historic soil boring/well construction logs and a geologic cross-section are provided in Appendix C. GRO and Benzene isoconcentration contour maps are presented as Drawings 3 and 4, respectively.

On September 26, 2002, AEI advanced an additional three shallow soil borings (AEI-23 through AEI-25) with a hand auger in the vicinities of the former dispenser (AEI-23), product piping (AEI-24), and beneath the proposed building (AEI-25). The purpose of these borings was to confirm the absence of hydrocarbon impacts within the shallow soil (vadose zone) and to collect a soil samples for grain size analysis. Residual petroleum hydrocarbon concentrations were not present in the vadose zone (AEI, 2002a).

In 2002, AEI prepared a *Site Summary and Risk Evaluation Report* (AEI, 2002b), which included an analysis of groundwater, soil, and vapor exposure pathways at the Site and presented the results of a preferential pathway study. A comparative analysis of Site groundwater and soil analytical data with Regional Water Quality Control Board risk-based screening levels and City of Oakland screening levels was included in this report. Based on the results of this evaluation, AEI recommended formal case closure. The ACEH did not grant closure and requested that additional groundwater investigation activities be conducted following redevelopment of the property.

On March 7, 2005, AEI submitted a *Work Plan – Monitoring Well Installation*, which proposed installing four additional monitoring wells to further assess the extent of the hydrocarbon contaminant plume. However, the work activities proposed within that Work Plan were not conducted.

A total of eight groundwater monitoring/sampling events were conducted at the Site between October 2000 and September 2002 using the three original onsite wells MW-1, MW-2, and MW-3. These three wells appear to have been paved over with concrete or otherwise abandoned, although a record of proper destruction/decommissioning has not been filed with the ACPWA.

Analytical data collected previous to wells being abandoned/lost indicates that the highest concentrations of GRO and benzene were reported near the former UST pit and dispensers (former well MW-3 and boring AEI-22). Concentrations of GRO were generally limited to onsite, with concentrations less than near cleanup levels of 100 µg/L in former borings AEI-20, AEI-16, and AEI-14. The GRO plume

was defined to the south and southwest on Farnam Street by former borings AEI-13 and AEI-18, where none was detected. Benzene was historically defined to below 0.5 µg/L in all directions with the exception of to the north, where one minor detection (0.81 µg/L) was detected in former boring AE-16. Isoconcentration Maps for GRO and benzene from the most recent sampling event (2002) are presented as Drawings 3 and 4, respectively.

### **3.0 GEOLOGY AND HYDROGEOLOGY**

#### **3.1 Regional Setting**

According to the *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report* (California Regional Water Quality Control Board – San Francisco Bay Region/SFRWQCB, June 1999), the Site is located within the Oakland Sub-Area of the East Bay Plain of the San Francisco Basin. The Oakland Sub-Area contains a sequence of alluvial fan deposits. The alluvial fill thickness ranges from 300 to 700 feet deep and there are no well-defined aquitards such as estuarine muds. The largest and deepest wells in this sub-area have historically pumped one to two million gallons per day at depths greater than 200 feet. Overall, sustainable yields are low due in part to low recharge potential. The Merritt sand in West Oakland was an important part of the early water supply for the City of Oakland. It is shallow (up to 60 feet), but before the turn of the last century, septic systems contaminated the water supply wells.

Throughout most of the Alameda County portion of the East Bay Plain, from Hayward north to Albany, water level contours show that the general direction of groundwater flow is from east to west or from the Hayward Fault to the San Francisco Bay. Groundwater flow direction generally correlates to topography. Flow direction and velocity are also influenced by buried stream channels that typically are oriented in an east to west direction.

#### **3.2 Site-Specific Conditions**

Based on the eight monitoring events between October 2000 and September 2002, depth-to-water (DTW) measurements have ranged from approximately 8 to 18 feet below ground surface (bgs). The groundwater gradient direction associated with the Site has varied, but the predominant direction was to the southeast. However, the historic well network was small with wells being located close together, so the accuracy of these former groundwater gradient calculations is unclear. Historic groundwater monitoring data including gradient magnitude and direction is provided in Appendix B.

Based on review of geologic boring logs, soil beneath the Site generally consists of mixed silty, sandy, and gravely clays, which have been encountered to the maximum boring depth of 35 feet bgs. Soils observed between 10 and 12 feet bgs are predominantly clay while sand and gravel content increase with depth. Lenses of sand have been observed ranging from several inches to several feet thick in several borings within the 10 to 15 feet bgs range.

A review of previous boring/well logs indicates that first-encountered groundwater is generally intermittently present in clays from approximately 0 to 30 feet bgs (see boring/well logs, Appendix C), and present in gravel in select borings/wells in a discontinuous sand/gravel layer at approximately 20 to 30 feet bgs. The three former monitoring wells were installed in the sand/gravel. Former wells installed at the Site were completed to depths of approximately 30 feet bgs, but static groundwater levels were noted as high as 8 feet bgs. It is unclear as to whether this groundwater rise is due to confined conditions in the gravel layer present at approximately 20 to 30 feet bgs in these wells, or if

groundwater is present in the clays above in sufficient amounts for well installation. First-encountered groundwater was noted in previous soil borings where not gravels were present, indicating that the clays themselves may represent first-encountered groundwater.

#### **4.0 PROPOSED MONITORING WELL INSTALLATION ACTIVITIES**

The purpose of this proposed investigation is to collect data in order to evaluate current subsurface Site conditions including the presence and extent of residual hydrocarbon impacts in soil and groundwater. The objectives are to collect high quality and representative data to achieve this purpose.

As previously noted, historic onsite wells are assumed to have been paved over during previous Site redevelopment. In order to evaluate current groundwater conditions, four new monitoring wells (MW-4 through MW-7) are being proposed. Well MW-4 is planned near the former source area, which wells MW-5 through MW-7 planned to assess the upgradient and downgradient extent of the plume, and also to provide a sufficient well network for accurate groundwater direction and gradient calculations. The proposed new well locations are presented in Drawing 5. Table 1 presents the purposes for each of the proposed monitoring wells. These well locations are tentative and are subject to change due to access and utility clearance.

#### **4.1 Preliminary Activities, Local Permitting, and Notification**

Prior to initiating field activities, Broadbent will obtain the necessary well permits from ACPWA, prepare a site-specific Health and Safety Plan (HASP) for the proposed work, and clear the proposed boring locations of conflicts with subsurface utilities. The utility clearance will include notifying Underground Service Alert (USA) of the pending work a minimum of 48 hours prior to initiating the field investigation, utilizing a private utility locator to additionally clear boring locations of underground utilities. Boreholes will be physically cleared to 6.5 feet bgs using hand auger or air knife methods consistent with BP's and Broadbent's Defined Practice for Ground Disturbance.

Concurrent with utility locating activities, attempts will be made to locate formerly lost/paved over wells MW-1 through MW-3. This attempt will be made by using available geophysical methods in locations where the lost wells were historically located based on maps and available survey data. If found, these well locations will be marked for future reference. Results of the inspection will be included in the report following this phase of work.

The Site-specific HASP will be prepared for use by field personnel implementing this Work Plan. The HASP will address hazards associated with drilling activities and potential exposure pathways and media which project personnel may encounter during proposed replacement well installation. A copy of the HASP will be available on-site during work. The subcontractor(s) performing field activities will be provided with a copy of the HASP prior to initiating work, and daily safety tailgate meetings will also be conducted to review hazards and drilling safety associated with execution of the work.

#### **4.2 Soil Borings**

Proposed borings will be completed under the direct supervision of Broadbent field personnel. A California C-57 licensed drilling company will provide a hollow-stem auger rig for well installation. The borings will be advanced to an approximate total depth of 25 to 35 ft bgs, based on the presence of water (described below). Each boring will be continuously cored and inspected for lithology, presence



of first-encountered groundwater and identification of potential contamination. Select soil samples collected up to 20 feet bgs (two feet below the lowest groundwater level based on historical data) will be submitted for laboratory analytical testing. Deeper sampling is not warranted because saturated soil samples are more representative of groundwater conditions than soil. Sampling across the entire range of historic groundwater levels is being proposed to accommodate for free-product smearing that may have historically occurred at the Site, at a time when free product may have been present. Soil cores will be classified according to the Unified Soil Classification System (USCS), and will be additionally logged using visual and manual methods for parameters including odor, staining, color, grain size, and moisture content. Field screening for hydrocarbons will include use of a photo-ionization detector (PID) measurements.

Collected soil sample cores will be sealed with Teflon sheets, capped, and placed in a chilled cooler. Samples will be then be submitted to TestAmerica Laboratory (TestAmerica) of Irvine, California, a state-certified analytical laboratory, under standard chain-of-custody protocol. Soil samples will be analyzed for Gasoline-Range Organics (GRO, C6-C12) by EPA Method 8015M and for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), Naphthalene, and Methyl Tertiary Butyl Ether (MTBE) by EPA Method 8260B.

Investigation-derived residuals (IDR) will be temporarily stored on-site in 55-gallon drums, pending characterization for proper disposal. Broadbent will coordinate the transportation and disposal of all IDR to the appropriate California-regulated facilities.

#### **4.3 Groundwater Monitoring Well Construction**

New onsite monitoring wells MW-4 through MW-7 will be constructed of two-inch diameter, Schedule 40 poly-vinyl chloride (PVC) threaded casing, with 0.010-inch machine-cut slots. As discussed in Section 3.2 above, first-encountered groundwater is generally intermittently present in clays from approximately 0 to 30 feet bgs (see boring/well logs, Appendix C), and present in gravel in select borings/wells in a discontinuous sand/gravel layer at approximately 20 to 30 feet bgs. The three former monitoring wells were installed in the sand/gravel. Former wells installed at the Site were completed to depths of approximately 30 feet bgs, but static groundwater levels were noted as high as 8 feet bgs. It is unclear as to whether this groundwater rise is due to confined conditions in the gravel layer present at approximately 20 to 30 feet bgs in these wells, or if groundwater is present in the clays above in sufficient amounts for well installation. First-encountered groundwater was noted in previous soil borings where not gravels were present, indicating that the clays themselves may represent first-encountered groundwater. If groundwater is not encountered in these clays, temporary casing will be installed in the well to approximately 15 feet bgs and left overnight to determine if water accumulates. Wells will be screened across first encountered groundwater, approximately 5 feet above and 5 feet below, for a total screen interval of 10 feet. If water is not encountered until the gravel layer at approximately 20 to 30 feet bgs, then screens will likely be submerged due to confined conditions.

A filter pack consisting of No.2/12 sand will be installed in the annular space from total depth drilled to one foot above the casing screen interval. A one-foot Bentonite clay seal will be placed above the filter pack with neat cement grout completing the seal. The well will be completed with a traffic-rated locking vault which will be set in cement concrete to protect the well head.

#### **4.4 Groundwater Monitoring Well Development, Surveying, and Sampling**

The wells will be developed no sooner than 48 hours after installation. Wells will be developed by surging and bailing each well to remove fine-grained sediments from the well and sand filter pack. A minimum of three and a maximum of ten wetted casing volumes of groundwater will be removed until water quality parameters have stabilized. Periodic measurements of the water quality parameters pH, temperature, and conductivity will be recorded during the development to establish baseline values for groundwater. Purge water generated during development activities will be temporarily stored on-site in 55-gallon drums, pending characterization for proper disposal. Broadbent will coordinate the transportation and disposal of purge water to the appropriate California-regulated facilities.

After installation, the monitoring wells will be surveyed in accordance with State Water Resource Control Board's standards for the GeoTracker database. Consistent with California Department of Water Resources (DWR) and ACPWA requirements, the licensed C-57 well driller will prepare a Well Completion Report (DWR Form 188) for each new monitoring well. The completed well reports shall be submitted to the DWR, ACPWA, and the ACEH.

The wells will be sampled utilizing low flow purging technique no sooner than 48 hours after well development. Groundwater samples will be submitted to a TestAmerica under standard chain-of-custody protocol. Groundwater samples will be analyzed for GRO by EPA Method 8015M and for BTEX, Naphthalene and MTBE by EPA Method 8260B.

#### **5.0 PROPOSED VAPOR INTRUSION ASSESSMENT ACTIVITIES**

The purpose of this proposed investigation is to collect data in order to evaluate current subsurface Site conditions including the presence and extent of residual hydrocarbon impacts in soil vapor. The objectives are to collect high quality and representative data to achieve this purpose.

Additional Assessment is proposed to determine whether there is a vapor intrusion risk associated with the historic release. In order to evaluate this potential risk, three soil vapor sampling locations are proposed (Drawing 5; Table 1). The locations of the proposed investigation have been specifically selected to evaluate to risk to potential on- and offsite receptors. Potential onsite receptors include current building workers; potential offsite receptors include offsite, potentially downgradient residences. All soil vapor sampling activities will be performed in accordance with The California Department of Toxic Substances Control's (DTCS's) *Advisory – Active Soil Gas Investigations* (DTSC, 2012).

#### **5.1 Preliminary Activities, Local Permitting, and Notification**

Broadbent carry out preliminary field activities that will include obtaining the necessary permits for soil vapor probes from ACPWA, the proposed work in the site-specific HASP, and clearing the proposed installation locations of conflicts with subsurface utilities. The utility clearance will include notifying Underground Service Alert (USA) of the pending work a minimum of 48 hours prior to initiating the field investigation, and procuring the services of a private utility locating company to confirm the absence of underground utilities at each soil vapor probe location. Soil vapor probe locations will be physically cleared using a hand auger consistent with BP's and Broadbent's Defined Practice for Ground Disturbance.

Concurrent with preliminary activities, a survey of the Site building will be performed in order to determine any vapor intrusion risk associated with potential residual hydrocarbons in soil vapor. The survey will include reviewing available building plans, foundation characteristics, floor integrity, and building ventilation characteristics. This data gathered will be included in the assessment of potential vapor intrusion risks to onsite workers.

## **5.2 Soil Vapor Probe Borings**

Two soil vapor probes will be installed at each location: An "A" soil vapor probe will be constructed with the probe installed at 3.5 ft bgs, and a "B" soil vapor probe will be constructed with the probe installed at 5.5 ft bgs. The two depth intervals are being proposed in order to assess the potential bioattenuation of residual hydrocarbons in soil vapor. Specific bioattenuation indicator parameters (oxygen, argon, methane, and carbon dioxide; see Section 5.4 below) will be measured in each interval to determine the presence and length of any zone of bioattenuation.

In lieu of nested multi-level wells, each soil vapor boring will be constructed to a specific depth within its own boring, thus minimizing the potential for short-circuiting. Therefore there will be a SG-1A and SG-1B in front of the building in order to quantify risks to potential future building occupants. Soil vapor probes SG-2A/B is proposed on the northeast corner of the property; SG-3A/B is proposed in the southeast corner of the property. These locations are intended to evaluate risks the residences to the east of the property. Each probe will be horizontally separated by at least three feet at each location. Proposed soil vapor probe boring locations are shown in Drawing 3.

## **5.3 Soil Vapor Probe Construction**

Soil vapor probes will be constructed by attaching a 6-inch long soil vapor probe tip to a 0.125-inch diameter nylon tubing (i.e. NylaFlow) extending approximately two feet above the surface. The soil vapor probe tips will be constructed of double-woven stainless steel wire screen with a 0.057-inch pore diameter, equipped with stainless-steel end fittings. Each soil vapor probe will be embedded within the middle of a one-foot thick sand filter pack of #2/12 sorted sand, topped with one-half foot of dry powdered Bentonite clay below a minimum of one-half foot of hydrated powdered Bentonite clay, and completed with a traffic-rated well vault at the surface set with neat cement concrete surface seal to match the existing grade. Care will be taken to prevent the tubing and Swagelok fittings at their ends from being damaged or kinked when coiled back into the well vaults.

## **5.4 Soil Vapor Probe Sampling**

Sampling will occur at least one month after installation of the soil vapor probes to allow them time for the concrete to cure and the disturbed subsurface conditions to equilibrate. In addition, soil vapor sampling shall not be performed during or immediately after a rainfall event of 0.5 inches or more. If a rainfall event of this magnitude occurs within 24 hours of the scheduled soil vapor sampling activities, the field work shall be rescheduled.

After setting up a secure and barricaded work area, the soil vapor sampling train will be assembled. The Swagelok fitting at the end of the implant's tubing will be connected to an inline vacuum gauge with a tee then to a 100-cubic centimeter (cc) calibrated syringe with three-way valve at the tip. Coming off the tee for the sample will be a one-liter Summa canister, supplied by the laboratory under high vacuum

(-30 inches Mercury, in.Hg), leak checked and batch-certified to be free of contaminants. With the valve of the soil vapor probe closed and the valve to the Summa canister closed, the sampling train will be checked for leaks during a "shut-in" leak test by applying with the calibrated syringe a vacuum of -15 in.Hg for a period of five minutes (-15 in.Hg is fifty percent above the standard threshold of -10 in.Hg considered representative of "No Flow" conditions). When the applied vacuum does not drop during the shut-in test, the sampling train assembly will be considered leak-tested tight.

After the shut-in leak test, the closed valve of the soil vapor probe will be opened and the sampling train slowly purged of one calculated interior volume using the calibrated syringe. The calculated interior volume shall include the aboveground tubing and appurtenances and below-ground tubing and probe tip, but not the pore space within the filter pack. The main purpose in waiting to sample for at least one month after installation is to allow the soil vapor in the fine sand filter pack to equilibrate to the soil vapor in the undisturbed soil surrounding the implant location. In the tight permeability soils anticipated to be encountered at this Site, the first soil vapor drawn in from outside the implant tubing will be most representative and likely contain higher concentrations than would be encountered through excessive purging.

Following the completion of purging, a clear-plastic shroud will be setup over the sampling train to contain the chemical tracer/leak-check compound (i.e. Helium gas) that will be released within. The shroud will be placed to completely cover the soil vapor sampling implant wellhead, its aboveground tubing, and the tubing, fittings, and sample Summa canister that will make up the sampling train. Once setup, Helium gas will be released via tubing under the shroud. A Radiodetection Model MGD-2002 Helium detector (or equivalent) will be used to monitor the concentration within the shroud by placing its sensor probe within. Prior to and during sampling, a positive-pressure concentration of approximately 20 percent Helium will be maintained within the shroud using the compressed gas cylinder's flow regulator. Helium concentrations within the shroud will be recorded in the field notes at one-minute intervals.

Once a positive-pressure Helium atmosphere is created under the shroud, the valve to the Summa canister will be opened and the sample collected. The sampling rates into the Summa canisters will be fixed by laboratory-supplied critical orifice assemblies (i.e. mini flow regulators) with a 0.0060 inch orifice allowing approximately 200 standard cc per minute (cc/min). Samples will be collected into the Summa canisters until the vacuum has dropped from the initial laboratory-supplied vacuum of -30 in.Hg to -5 in.Hg. Sample start times, end times, starting vacuums, ending vacuums, and Helium concentrations during sampling will be recorded in the field notes.

## **5.5 Laboratory Analysis of Soil vapor Samples**

Collected samples will be submitted to a state-certified analytical laboratory under standard chain-of-custody protocol. At the laboratory, soil vapor samples will be analyzed for GRO by EPA Method TO-3 and for BTEX, Naphthalene and MTBE by EPA Method TO-15. Soil vapor samples will also be analyzed for Oxygen (O<sub>2</sub>) and Argon, Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), and Helium (tracer/leak-check compound) by Modified ASTM D-1946. Laboratory analyses for soil vapor samples will be performed in accordance with EPA standard holding times for Summa canisters.

## 6.0 INVESTIGATION REPORTING

Upon completion of field activities described above and compilation of field data, reports will be prepared and submitted to ACEH and the State GeoTracker database (including the required individual GeoTracker upload files). A *Monitoring Well Installation and Quarterly Groundwater Monitoring Event Report* will be prepared summarizing the monitoring well installation and sampling activities. Separately, a *Vapor Intrusion Assessment Report* will be prepared summarizing installation and sampling of the soil vapor probes. Each report will document fieldwork and analytical data and will include the following information:

- Scope of Work
- Lithologic boring/well construction logs (GEO\_BORE files)
- Site map showing monitoring well and soil vapor probe locations (GEO\_MAP file)
- Location survey data for the wells and soil vapor probes (GEO\_XY and GEO\_Z files)
- Text and tabulated investigation results (GEO\_WELL files)
- Laboratory reports and chain of custody records (EDFs)
- Significance of detected petroleum hydrocarbons
- Recommendations for future activities, if warranted

Recommendations for the next phase of work, if applicable, will be included in this report, as noted above. These recommendations may include, but are not limited to, a preferential pathway study, further downgradient groundwater assessment, vertical assessment of petroleum hydrocarbons in groundwater, and additional soil vapor sampling. These recommendations, and any others, will be carefully considered upon completion of the scope of work proposed herein.

## 7.0 PROPOSED SCHEDULE

The proposed schedule for the work described above shall proceed as follows:

- Monitoring Well Installation – Monitoring well installation activities will begin immediately and are anticipated to be completed within 75 calendar days following approval of this Work Plan.
- Monitoring Well Installation and Initial Quarterly Sampling Event Report – A summary report of well installation activities combined with the first round of quarterly sampling results is proposed to be submitted within 45 calendar days following completion of the well installation activities, above (i.e. within 120 calendar days of Work Plan approval).
- Vapor Intrusion Assessment – Soil vapor probe installation and sampling activities will begin immediately and are anticipated to be completed within 75 calendar days following approval of this Work Plan.
- Vapor Intrusion Assessment Report – A summary report of soil vapor probe installation and sampling activities is proposed to be submitted within 45 calendar days following completion of the soil vapor probe installation activities, above (i.e., within 120 calendar days of Work Plan approval).

## **8.0 LIMITATIONS**

Broadbent will do its best to alert the client of matters which, in the opinion of Broadbent, require immediate attention to protect public health, safety, and the environment. Broadbent will make every effort to advise the client of matters which should be reported to government regulatory agencies. However, the client is solely responsible for reporting such matters, and Broadbent shall not be held liable in the event that the proper agency is not notified. Our services will be performed in accordance with generally accepted practice at the time work commences. Results and recommendations will be based on review of available documentation and written or verbal correspondence with appropriate regulatory agencies, laboratory results, observations of field personnel, and the points investigated. No warranty is expressed or implied.

## 9.0 REFERENCES

- ACEH, June 22, 2006. *Fuel Leak Case No. RO0000307, ARCO #402/Parking Lot, 1450 Fruitvale Avenue, Oakland, CA*. Letter from Mr. Steven Plunkett (ACEH) to Mr. Bill Puha (Fruitvale-Farnam Associates, LLC), Mr. Ken Phares (Jay Phares Corporation), and Mr. Paul Supple (BP West Coast Products, LLC).
- ACEH, December 20, 2006. *Fuel Leak Case No. RO0000307, ARCO #402/Parking Lot, 1450 Fruitvale Avenue, Oakland, CA – Work Plan Approval*. Letter from Mr. Steven Plunkett (ACEH) to Mr. Bill Puha (Fruitvale-Farnam Associates, LLC), Mr. Ken Phares (Jay Phares Corporation).
- ACEH, October 16, 2008. *Fuel Leak Case No. RO0000307 and Geotracker Global ID T06019734265, ARCO #0402, 1450 Fruitvale Avenue, Oakland, CA 94601*. Letter from Mr. Paresh Khatri (ACEH) to Bill Puha (Fruitvale-Farnam Associates, LLC), Curtis & Joyce Thomas, Ken Phares (c/o Jay Phares Corporation), and Paul Supple (Atlantic Richfield Company).
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- Glenfos, Inc., July 27, 1998. *Limited Phase I and Phase II Environmental Site Assessment, 1450 Fruitvale Avenue, Oakland, California*. Prepared for Glendale Federal Bank.



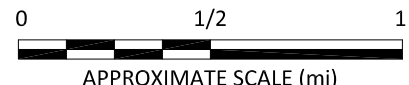
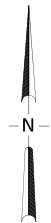
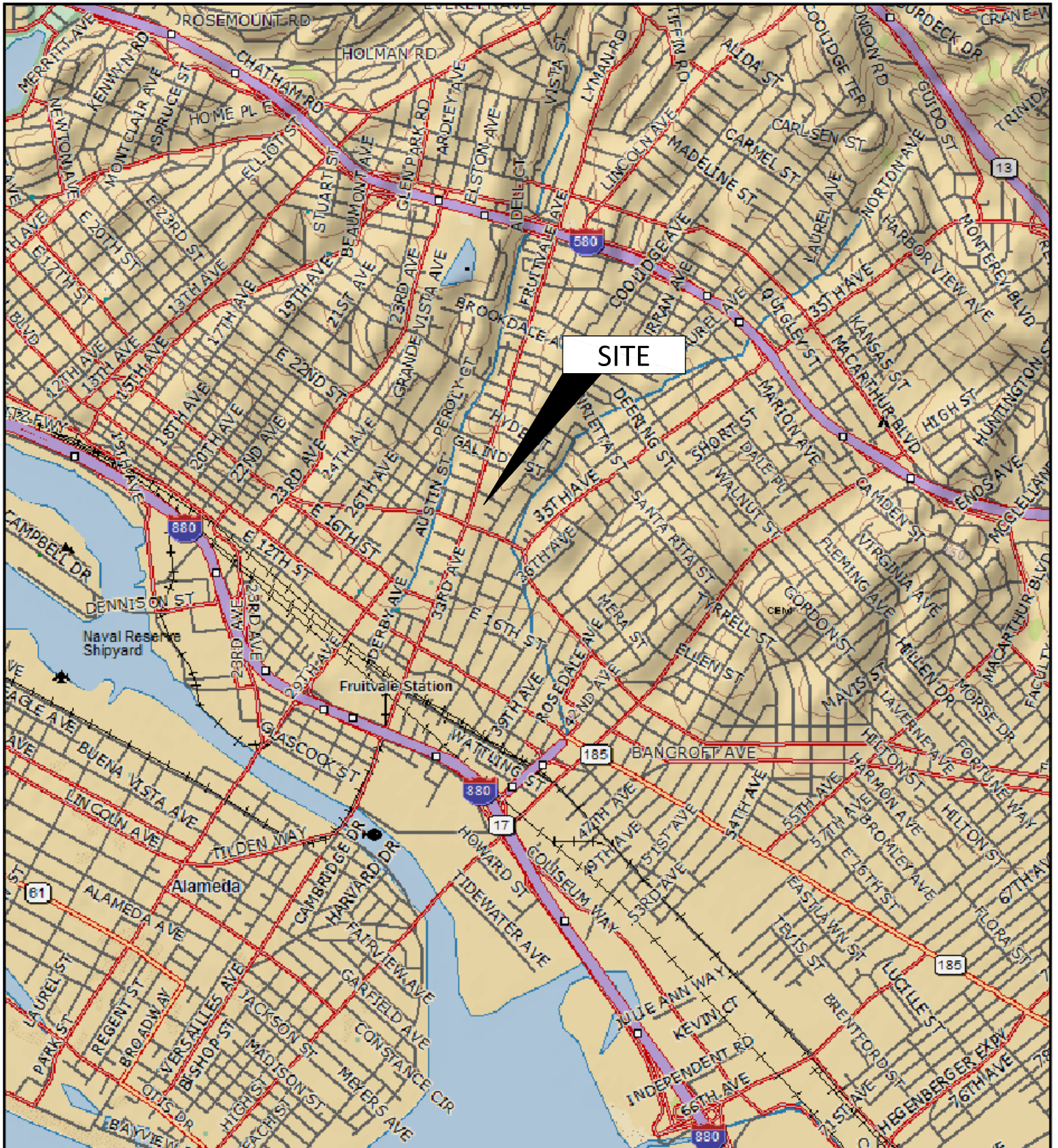


IMAGE SOURCE: DeLorme Topo USA 7.0

**BROADBENT**  
 875 Cotting Lane, Suite G  
 Vacaville, California 95688  
 Project No.: 08-88-602 Date: 3/8/2013

Former BP Station #402  
 1450 Fruitvale Avenue  
 Oakland, California

Site Location Map

Drawing

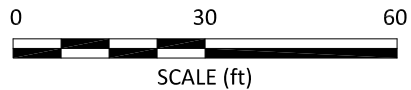
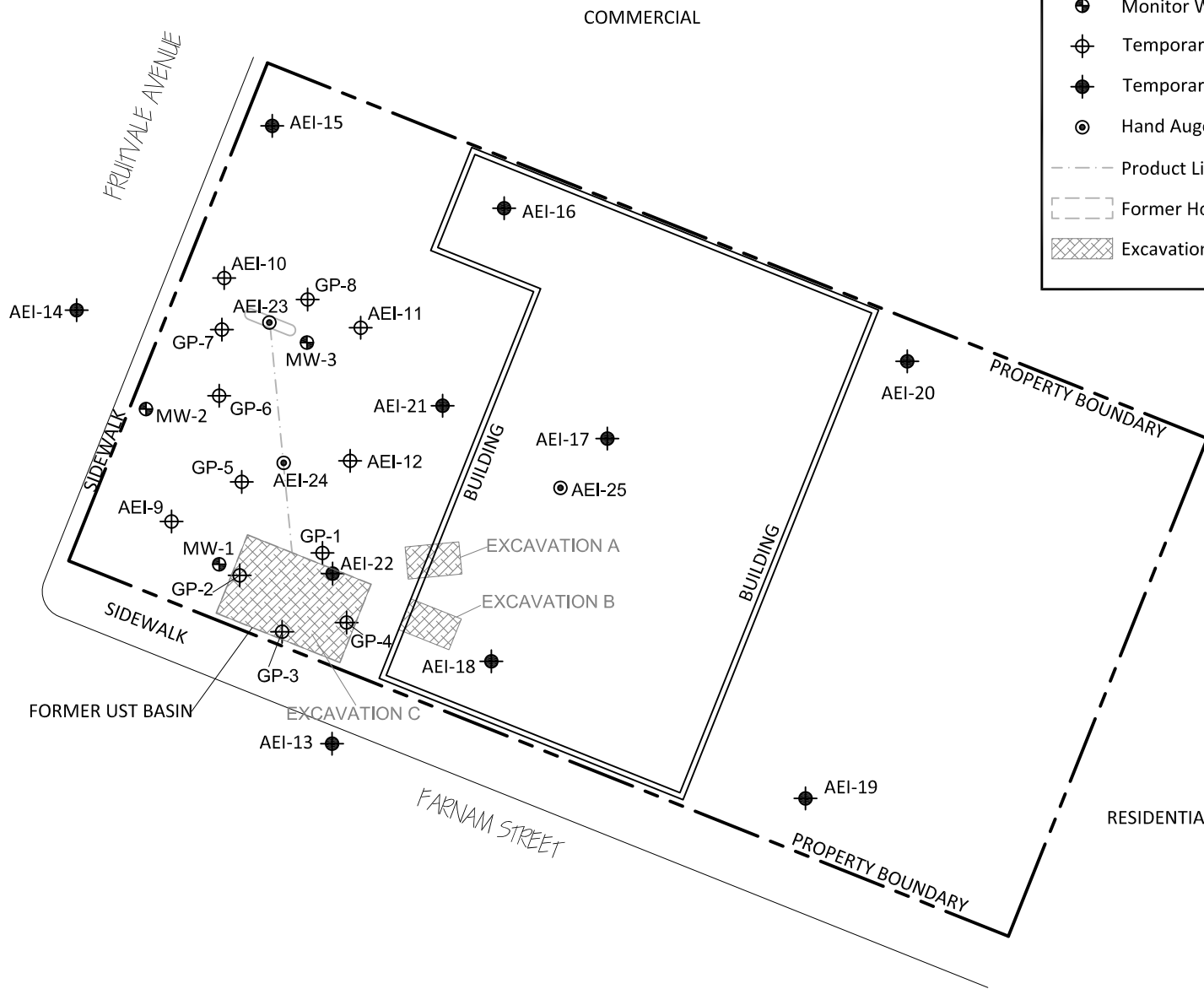
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**LEGEND**

- ⊕ Monitor Well Location
- ⊕ Temporary Boring Location: 1998 - 1999
- ⊕ Temporary Boring Location: June 2002
- ⊙ Hand Auger Boring Location: September 2002
- Product Lines
- ⊔ Former Hold Tank
- ▨ Excavation

NOTE: SITE MAP ADAPTED FROM AEI CONSULTANTS FIGURES  
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.



**BROADBENT**  
875 Cotting Lane, Suite G  
Vacaville, California 95688  
Project No.: 08-88-602 Date: 3/7/2013






Former BP Station #402  
1450 Fruitvale Avenue  
Oakland, California

Site Map with Historic Boring and  
Monitoring Well Locations

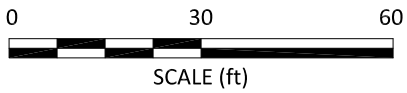
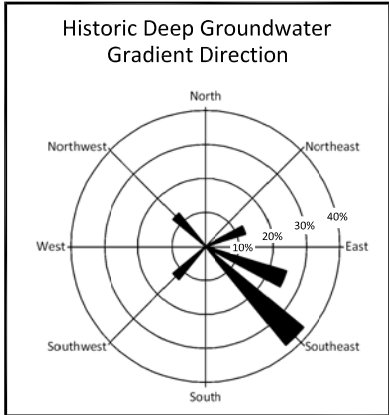
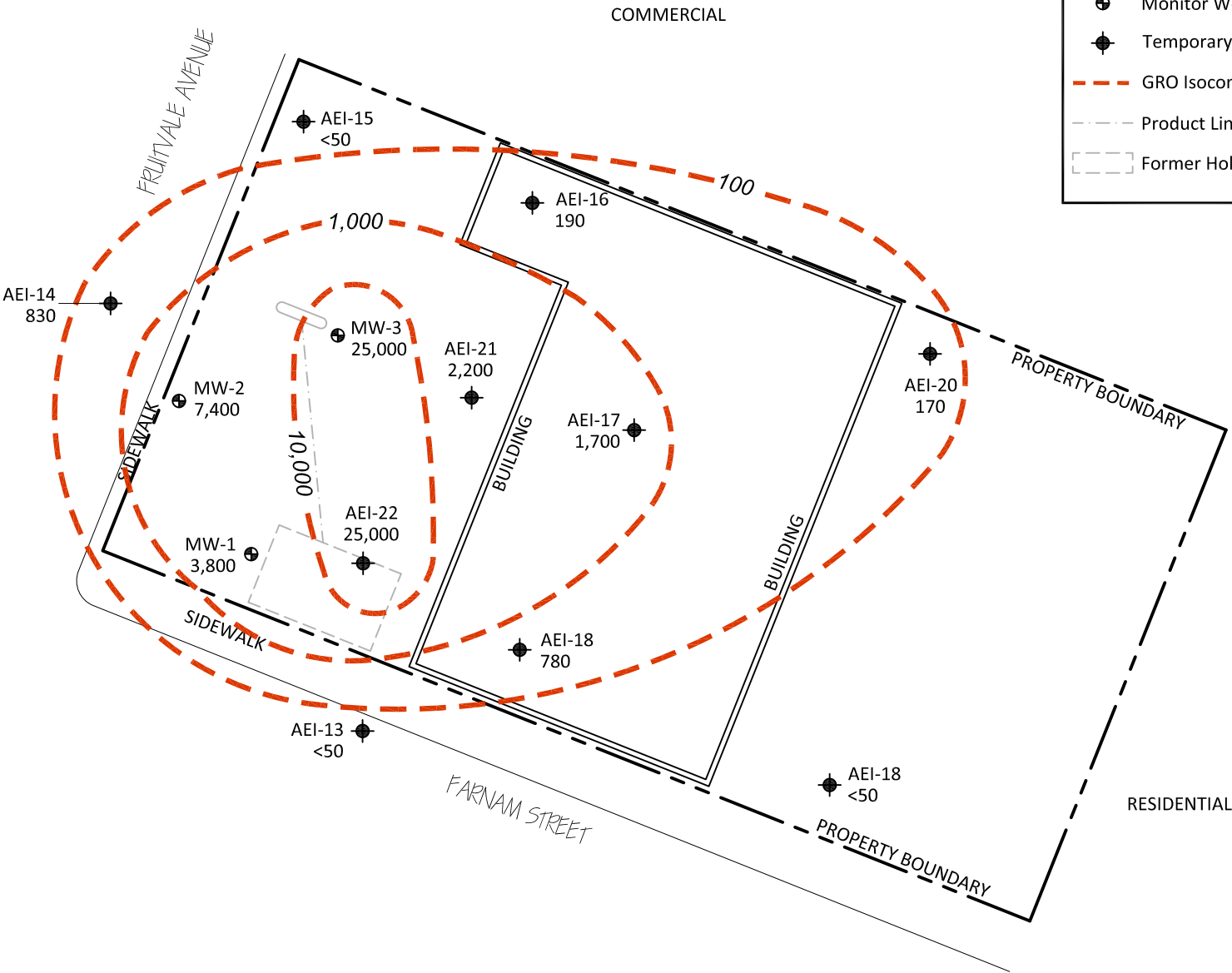
Drawing

2

**LEGEND**

-  Monitor Well Location
-  Temporary Boring Location: June 2002
-  GRO Isoconcentration (µg/L)
-  Product Lines
-  Former Hold Tank

NOTE: SITE MAP ADAPTED FROM AEI CONSULTANTS FIGURES  
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.



**BROADBENT**  
875 Cotting Lane, Suite G  
Vacaville, California 95688  
Project No.: 08-88-602 Date: 3/7/2013

Former BP Station #402  
1450 Fruitvale Avenue  
Oakland, California

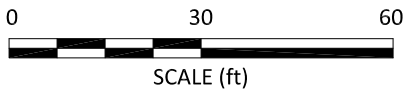
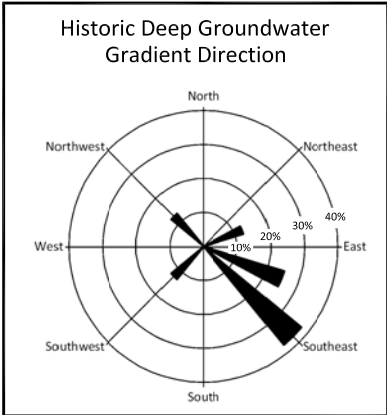
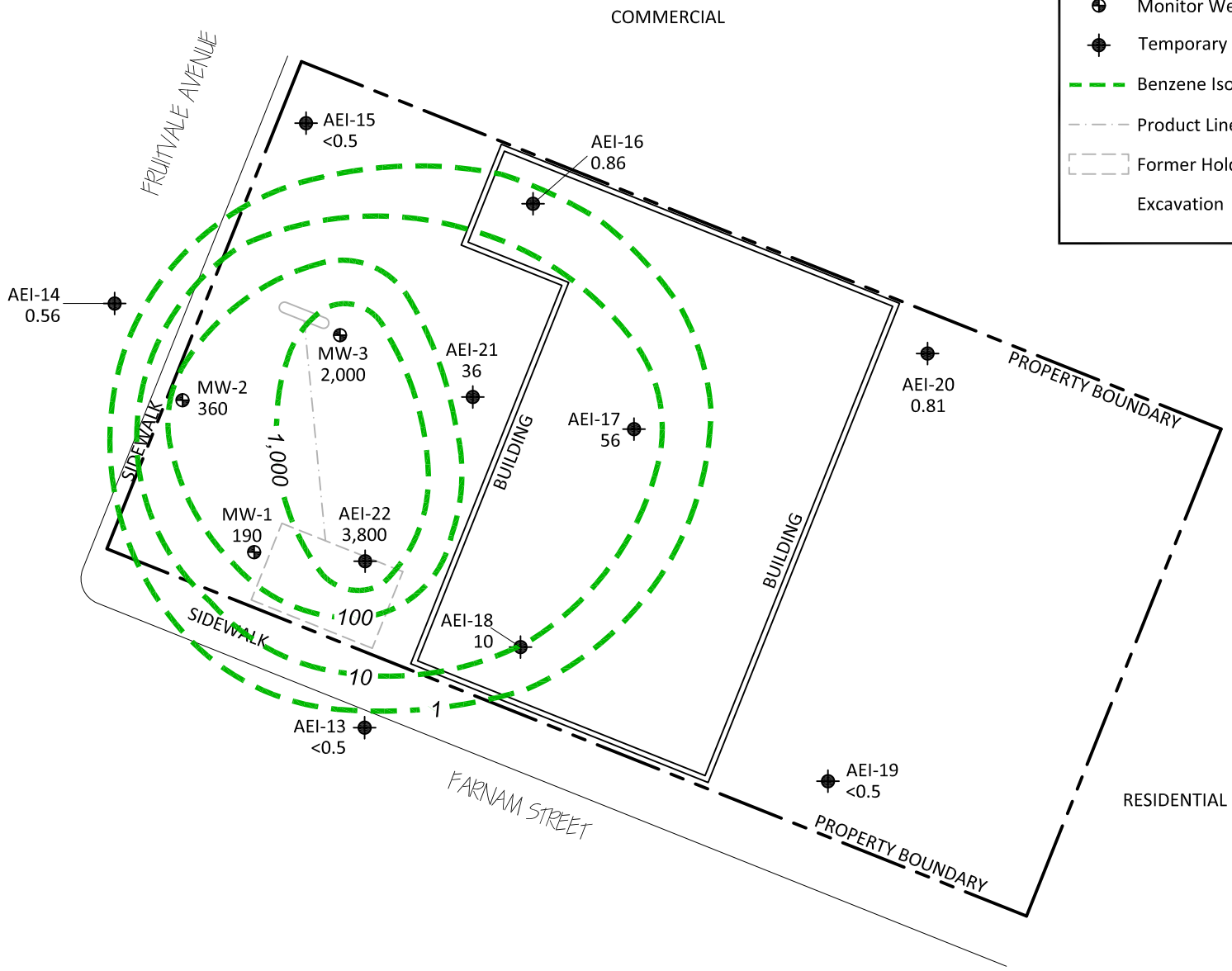
GRO Isoconcentration Contour Map  
September 19, 2002

Drawing  
**3**

**LEGEND**

-  Monitor Well Location
-  Temporary Boring Location: June 2002
-  Benzene Isoconcentration (µg/L)
-  Product Lines
-  Former Hold Tank
-  Excavation

NOTE: SITE MAP ADAPTED FROM AEI CONSULTANTS FIGURES  
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.



**BROADBENT**  
875 Cotting Lane, Suite G  
Vacaville, California 95688  
Project No.: 08-88-602 Date: 3/7/2013

Former BP Station #402  
1450 Fruitvale Avenue  
Oakland, California

Benzene Isoconcentration Contour Map  
September 19, 2002

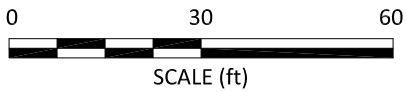
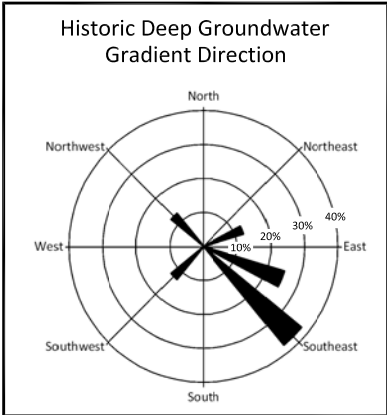
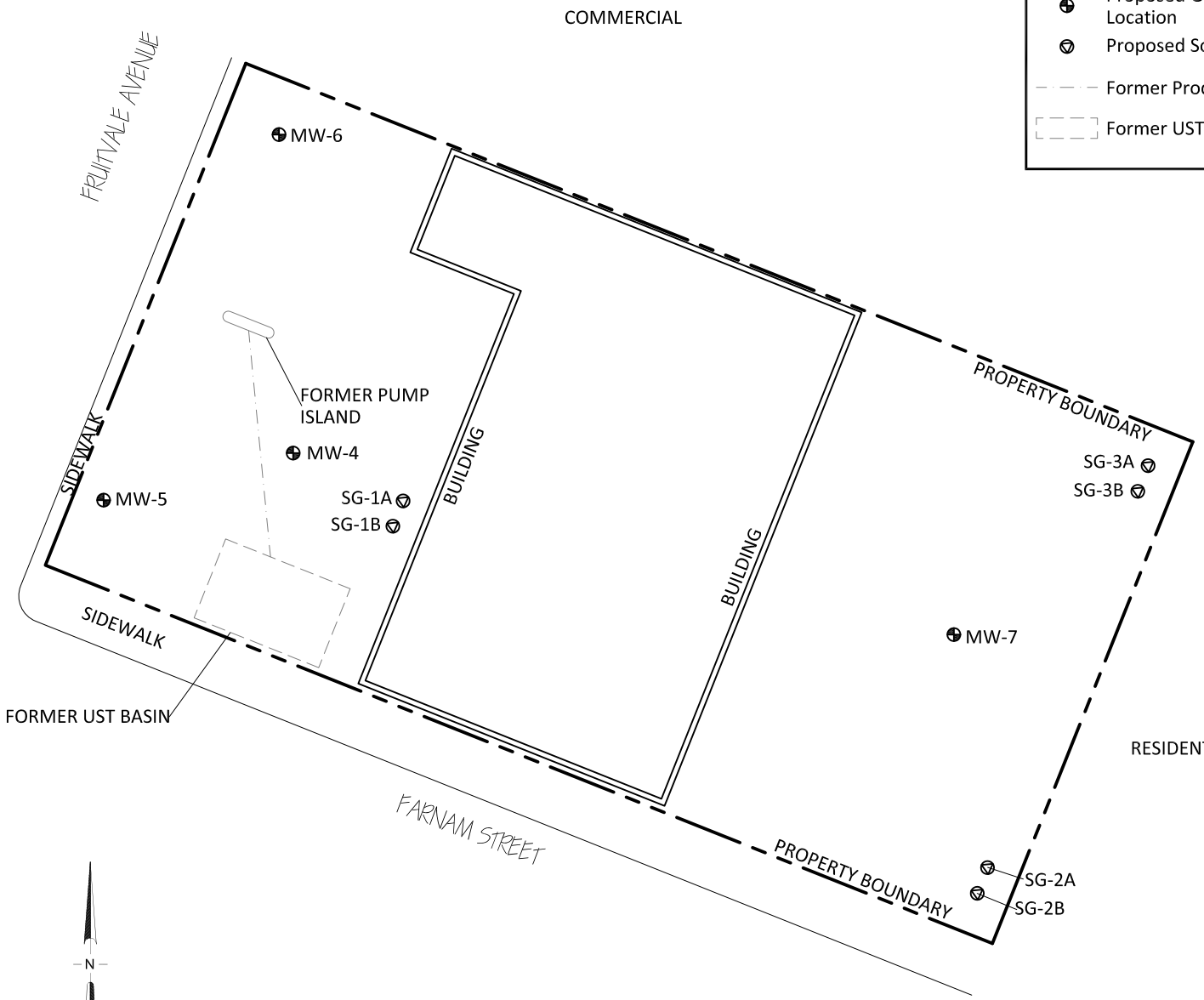
Drawing

4

**LEGEND**

- ⊕ Proposed Groudwater Monitoring Well Location
- ⊗ Proposed Soil Gas Vapor Probe Location
- - - Former Product Lines
- ⌞ Former UST Basin

NOTE: SITE MAP ADAPTED FROM AEI CONSULTANTS FIGURES  
SITE DIMESIONS AND FACILITY LOCATIONS NOT VERIFIED.



**BROADBENT**  
875 Cotting Lane, Suite G  
Vacaville, California 95688  
Project No.: 08-88-602 Date: 3/29/2013

Former BP Station #402  
1450 Fruitvale Avenue  
Oakland, California

Site Map with Proposed  
Sampling Locations

Drawing

5

Table 1  
Proposed Groundwater and Soil Vapor Monitoring Well Purposes  
Former BP Station No. 402  
1450 Fruitvale Avenue, Oakland, California

Groundwater Monitoring Wells			
Proposed Well Identification	Groundwater Zone	Anticipated Screen Interval (ft-bgs)	Intended Purpose
MW-4	First-Encountered	7-17*; 20-30**	Source Area, Groundwater Gradient
MW-5	First-Encountered	7-17*; 20-30**	Upgradient Assessment, Groundwater Gradient
MW-6	First-Encountered	7-17*; 20-30**	Upgradient Assessment, Groundwater Gradient
MW-7	First-Encountered	7-17*; 20-30**	Downgradient Assessment, Groundwater Gradient
Soil Vapor Monitoring Wells			
Proposed Soil Vapor Probe Identification	Anticipated Screen Interval (ft-bgs)		Intended Purpose
SG-1A	3 to 3.5		Evaluate Risks to Site Workers
SG-1B	5 to 5.5		
SG-2A	3 to 3.5		Evaluate Risks to Offsite Residents
SG-2B	5 to 5.5		
SG-3A	3 to 3.5		Evaluate Risks to Offsite Residents
SG-3B	5 to 5.5		

**Notes:**

ft-bgs = feet below ground surface

\* If first-encountered groundwater is encountered in clays from 8 to 17 ft-bgs

\*\* If first-encountered groundwater is encountered in sand at approximately 20 to 30 ft-bgs

## **APPENDIX A**

### Historic Soil Analytical Data

**Table 1 - Soil Sample Analytical Data**  
**1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Sample ID	Consultant	Sample Date	TPH-g mg/kg	MTBE mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	Total Lead mg/kg
GP-1 10'	Glenfos	7/9/1998	10	-	<0.005	0.022	0.015	<0.01	-
GP-2 10'	Glenfos	7/9/1998	1.5	-	0.017	<0.005	<0.005	<0.01	-
GP-2 15'	Glenfos	7/9/1998	27	-	0.017	0.056	0.052	0.51	-
GP-2 30'	Glenfos	7/9/1998	2.5	-	<0.005	<0.005	<0.005	<0.01	-
GP-3 10'	Glenfos	7/9/1998	95	-	0.59	0.42	1.1	1.5	7.3
GP-3 15'	Glenfos	7/9/1998	2.5	-	0.055	0.018	0.055	0.26	-
GP-3 20'	Glenfos	7/9/1998	1.6	-	0.02	<0.005	0.02	0.032	-
GP-3 25'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-4 10'	Glenfos	7/9/1998	2.5	-	0.017	<0.005	0.003	0.021	4.1
GP-5 10'	Glenfos	7/9/1998	6.5	-	<0.005	0.022	0.018	0.041	-
GP-5 15'	Glenfos	7/9/1998	19	-	0.077	0.016	0.43	0.49	-
GP-5 20'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-6 5'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-6 10'	Glenfos	7/9/1998	7.7	-	0.008	0.015	0.012	0.047	6.2
GP-6 15'	Glenfos	7/9/1998	190	-	0.34	0.53	2.3	4.7	-
GP-6 20'	Glenfos	7/9/1998	28	-	0.083	0.081	0.052	0.19	-
GP-7 10'	Glenfos	7/9/1998	86	-	<0.005	0.088	0.09	0.5	-
GP-7 15'	Glenfos	7/9/1998	2.7	-	0.008	0.012	<0.005	0.031	-
GP-8 10'	Glenfos	7/9/1998	24	-	0.022	0.061	0.071	0.45	-
GP-8 15'	Glenfos	7/9/1998	5.8	-	0.021	0.014	0.022	0.06	-
GP-8 20'	Glenfos	8/23/1999	<1	-	<0.005	<0.005	<0.005	<0.01	-
AEI-9 10'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-9 20'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-10 10'	AEI	8/23/1999	77	<0.05	<0.005	<0.005	0.078	<0.005	-
AEI-10 15'	AEI	8/23/1999	69	0.071	0.1	0.21	0.23	<0.005	-
AEI-11 10'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-11 15'	AEI	8/23/1999	210	<0.40	<0.020	1.1	1.2	2.4	-
AEI-12 10'	AEI	8/23/1999	24	<0.05	<0.005	0.12	<0.005	<0.005	-
AEI-12 15'	AEI	8/23/1999	120	<0.40	<0.020	<0.020	1.6	1.6	-
MW-1 6.5'	AEI	9/25-26/00	<1.0	<.05	<.005	<.005	<.005	<.005	-
MW-1 11.5'	AEI	9/25-26/00	15.0	<.05	<.005	0.31	<.005	0.011	-
MW-2 6.5'	AEI	9/25-26/00	<1.0	<.05	<.005	<.005	<.005	<.005	-
MW-2 11'	AEI	9/25-26/00	73.0	<.05	<.005	0.044	0.0080	0.040	-
MW-3 6.5'	AEI	9/25-26/00	<1.0	<.05	<.005	<.005	<.005	<.005	-
MW-3 16'	AEI	9/25-26/00	360.0	<1.0	0.42	2.1	6.5	11.0	-
MDL			1.0	0.05	0.005	0.005	0.005	0.005	

MDL = Method Detection Limit

mg/kg = milligrams per kilogram (ppm)

- Sample not analyzed for this chemical

TPH-g = Total petroleum hydrocarbons as gasoline

**Table 1 - Soil Sample Analytical Data: Continued**  
**1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Sample ID	Date	TPH-g mg/kg	MTBE mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg
AEI-13 10'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-14 10'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-15 10'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-16 10'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-16 19'	610-12/02	41	<0.2	<0.02	<0.02	0.038	0.079
AEI-17 10'	610-12/02	<1	<0.5	<0.005	<0.005	<0.005	<0.005
AEI-17 20'	610-12/02	290	<0.05	0.84	1.3	1.8	2.8
AEI-18 4'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-18 14'	610-12/02	290	<0.02*	<0.2	0.91	2.3	2.9
AEI-19 15'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-20 10'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-20 20'	610-12/02	42	<0.5	<0.05	0.20	0.12	0.15
AEI-21 5'	610-12/02	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-21 13'	610-12/02	12	<0.05	<0.005	0.090	0.028	<0.005
AEI-22 10'	610-12/02	74	<0.1	0.0086	0.58	0.11	0.26
AEI-22 20'	610-12/02	5	<0.05	0.30	0.016	0.26	0.42
AEI-23 2.5'	9/27/2002	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-24 2.5'	9/27/2002	<1	<0.05	<0.005	<0.005	<0.005	<0.005
AEI-25 2.5'	9/27/2002	<1	<0.05	<0.005	<0.005	<0.005	<0.005
MDL		1.0	0.05	0.005	0.005	0.005	0.005

MDL = Method Detection Limit

mg/kg = milligrams per kilogram (ppm)

- Sample not analyzed for this chemical

TPH-g = Total petroleum hydrocarbons as gasoline

\* MTBE by EPA method 8260, all others by 602/8020

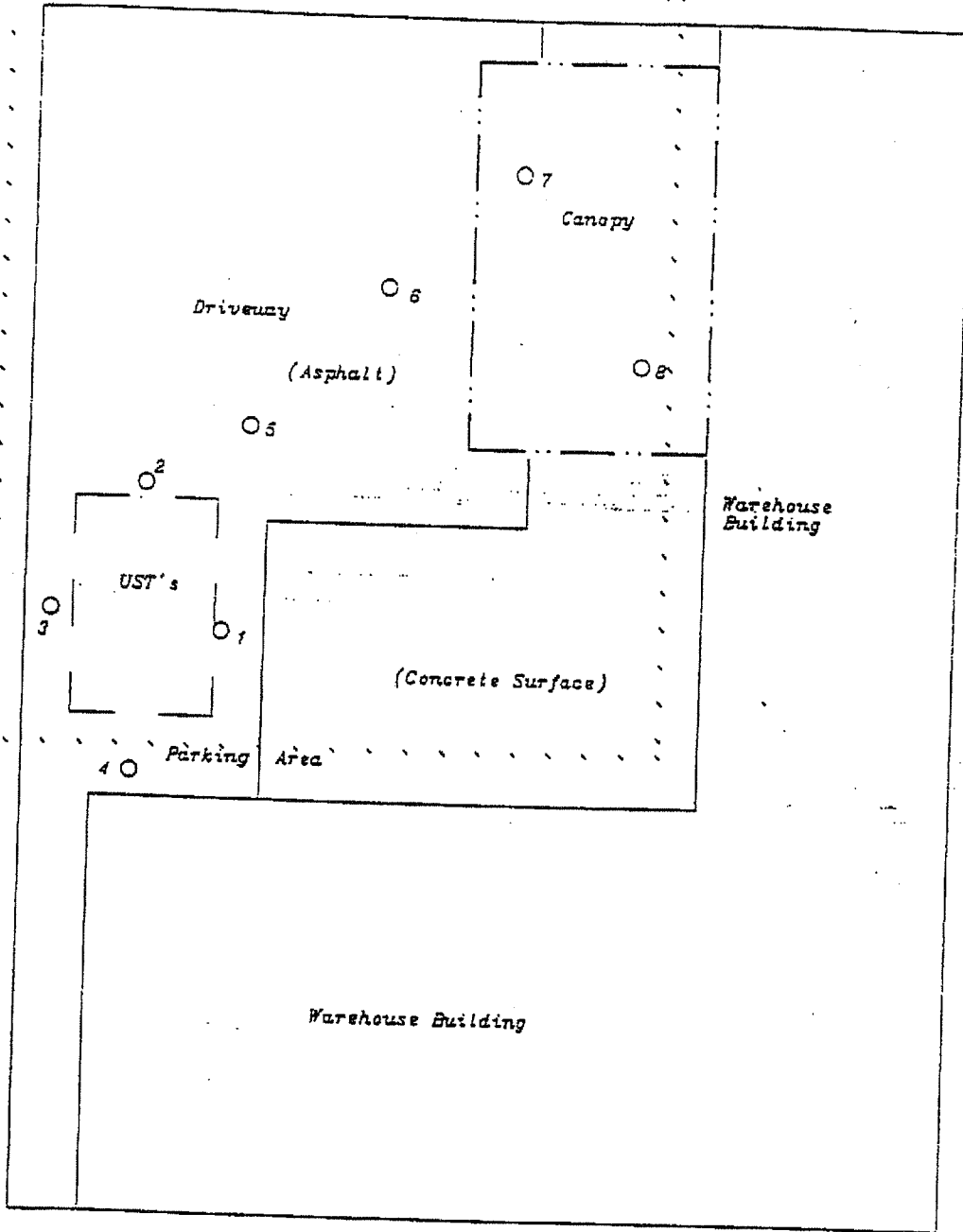


**Table 5 - Sample Analytical Data: Exploratory Excavation Project  
1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Sample ID	Location	TPH-g mg/kg	TPH-d mg/kg	TOG mg/kg	MTBE mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	Total Lead mg/kg
AEI EBA 6'	Exc. A - Bottom	<1.0	<1.0	<50.0	<0.05	<0.005	<0.005	<0.005	<0.005	6.9
AEI EBB 6'	Exc. B - Bottom	<1.0	<1.0	<50.0	<0.05	<0.005	<0.005	<0.005	<0.005	9.1
AEI EBW 8'	Exc. C - West	<1.0	<1.0	-	<0.05	<0.005	<0.005	<0.005	<0.005	9.4
AEI EBE 8'	Exc. C - East	11	<1.0	-	<0.05	<0.005	0.059	0.028	0.042	32
AEI EBN 8'	Exc. C - North	<1.0	<1.0	-	<0.05	<0.005	<0.005	<0.005	<0.005	8.7
AEI EBS 8'	Exc. C - South	<1.0	<1.0	-	<0.05	<0.005	<0.005	<0.005	<0.005	80

FRUITVALE AVENUE

FAYHAM STREET



150 Fruitvale Avenue  
Sacramento, CA 94601  
94601-081798

**LENFOS, Inc.**  
20 TOPANGA CANYON PLACE SUITE F  
DARTMOUTH, CA 91311

FACILITY  
LAYOUT  
MAP



NOT TO SCALE

FIGURE  
2

## **APPENDIX B**

### Historic Groundwater Analytical Data

**Table 2 - Groundwater Sample Analytical Data: Temporary Borings  
1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Sample ID	Consultant	Date	TPH-g µg/L	MTBE µg/L	Benzene µg/L	Toluene µg/L	Ethyl- Benzene µg/L	Xylenes µg/L
GP 1	Glenfos	7/9/1998	170	-	0.53	<0.5	1.2	2.0
GP 4	Glenfos	7/9/1998	210	-	<0.5	<0.5	0.58	<1
GP 5	Glenfos	7/9/1998	17,000	-	42	24	820	110
GP 8	Glenfos	7/9/1998	20,000	<10	1,000	19	420	290
AEI GW 8'	AEI	5/27/1999	<50	<5.0	<0.5	<0.5	<0.5	<0.5
AEI-9W	AEI	8/23/1999	690	3.8	72	0.79	29	24
AEI-13 W	AEI	610-12/02	<50	<5.0	<0.5	<0.5	<0.5	<0.5
AEI-14 W	AEI	610-12/02	830	<5.0	0.56	2.7	1.2	2.9
AEI-15 W	AEI	610-12/02	<50	14*	<0.5	<0.5	<0.5	<0.5
AEI-16 W	AEI	610-12/02	190	<5.0	0.86	1.0	0.75	1.3
AEI-17 W	AEI	610-12/02	1,700	<0.5*	56	2.5	89	69
AEI-18 W	AEI	610-12/02	780	<5.0	10	1.1	41	20
AEI-19 W	AEI	610-12/02	<50	<5.0	<0.5	<0.5	<0.5	<0.5
AEI-20 W	AEI	610-12/02	170	<5.0	0.81	0.55	7.7	3.1
AEI-21 W	AEI	610-12/02	2,200	2.8*	36	<5.0	110	58
AEI-22 W	AEI	610-12/02	25000	<12*	3800	290	1100	1900

MDL = Method Detection Limit

ND = Not detected above the Method Detection Limit (unless otherwise noted)

µg/L = micrograms per liter (ppb)

- Sample not analyzed for this chemical

TPH-g = Total petroleum hydrocarbons as gasoline

\* MTBE by EPA method 8260, all others by 602/8020

**Table 3 - Groundwater Elevation Data**  
**1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Well ID (Screen - ft bgs)	Date	Well Elevation (ft msl)	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-1 (15-30)	10/16/00	42.13	17.72	24.41
	1/19/01	42.13	9.15	32.98
	4/26/01	42.13	9.40	32.73
	8/3/01	42.13	12.38	29.75
	11/5/01	42.13	16.22	25.91
	3/29/02	42.13	7.96	34.17
	6/11/02	42.13	12.18	29.95
	9/16/02	42.13	11.35	30.78
MW-2 (15-30)	10/16/00	42.08	14.98	27.10
	1/19/01	42.08	9.00	33.08
	4/26/01	42.08	8.34	33.74
	8/3/01	42.08	11.70	30.38
	11/5/01	42.08	15.08	27.00
	3/29/02	42.08	8.96	33.12
	6/11/02	42.08	12.49	29.59
	9/16/02	42.08	10.52	31.56
MW-3 (15-30)	10/16/00	42.55	17.98	24.57
	1/19/01	42.55	10.90	31.65
	4/26/01	42.55	9.21	33.34
	8/3/01	42.55	12.67	29.88
	11/5/01	42.55	15.90	26.65
	3/29/02	42.55	9.20	33.35
	6/11/02	42.55	11.83	30.72
	9/16/02	42.55	11.42	31.13

Episode #	Date	Average Water Table (ft msl)	Change from Previous Episode	Flow direction (gradient)
1	10/16/00	25.36	-	E/SE (0.116)
2	1/19/01	32.57	+7.21	E/NĒ (0.041)
3	4/26/01	33.27	+0.70	SE (0.034)
4	8/3/01	30.00	-3.27	ESE (0.024)
5	11/5/01	26.52	-3.48	SE (0.033)
6	3/29/02	33.55	+7.03	NW (0.032)
7	6/11/02	30.09	-3.46	SW (0.040)
8	9/16/02	31.16	+1.07	SE (0.028)

Notes:

All well elevations are measured from the top of the casings  
ft msl = feet above mean sea level

**Table 4 - Groundwater Monitoring Well Analytical Data  
1450 Fruitvale Avenue, Oakland, CA - AEI Project # 10460**

Well/Sample ID	Date Collected	Consultant/Lab	TPHg	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes
			µg/L EPA 8015	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	10/16/00	AEI/MAI	4,500	<20	560	14	53	62
	01/19/01	AEI/MAI	13,000	<100	790	46	1,100	210
	04/26/01	AEI/MAI	7,500	<30	470	23	720	120
	08/03/01	AEI/MAI	4,500	<10	440	11	55	6.6
	11/05/01	AEI/MAI	1,700	<10	100	6.0	4.6	2.1
	03/29/02	AEI/MAI	9,500	ND<100	880	32	400	59
	06/11/02	AEI/MAI	3,400	<50	620	9.7	75	11
	09/16/02	AEI/MAI	3,800	<10	190	15.0	14	7.7
MW-2	10/16/00	AEI/MAI	4,600	<300	380	3.8	95	33
	01/19/01	AEI/MAI	4,200	<10	450	4.7	120	50
	04/26/01	AEI/MAI	5,600	<20	810	12	210	65
	08/03/01	AEI/MAI	2,900	<20	360	3	97	46
	11/05/01	AEI/MAI	2,400	<85	280	3.2	76	25
	03/29/02	AEI/MAI	7,100	ND<100	930	11	220	39
	06/11/02	AEI/MAI	4,400	<150	680	8.1	160	38
	09/16/02	AEI/MAI	7,400	<250	360	8.4	150	38
MW-3	10/16/00	AEI/MAI	12,000	<10	570	32	680	1,200
	01/19/01	AEI/MAI	27,000	<200	3,400	110	2,200	2,700
	04/26/01	AEI/MAI	33,000	<200	3,300	190	2,800	3,400
	08/03/01	AEI/MAI	23,000	<50	2,300	52	1,800	1,400
	11/05/01	AEI/MAI	30,000	<200	1,900	58	2,000	1,600
	03/29/02	AEI/MAI	29,000	ND<100	2,100	57	2,500	1,700
	06/11/02	AEI/MAI	22,000	<50	2,100	44	2,300	1,600
	09/16/02	AEI/MAI	25,000	<220	2,000	47	2,200	1,100
MRL			50.0	5.0	0.5	0.5	0.5	0.5

*Fuel Oxygenates*

Well/Sample ID	Date Collected	DIPE	ETBE	MTBE	TAME	TBA	EDB	1,2-DCA
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	06/11/02	-	-	2.4	-	-	-	-
	09/16/02	0.56	<0.5	<3.0	<0.5	<0.5	<0.5	<0.5
MW-2	06/11/02	-	-	23	-	-	-	-
	09/16/02	7.30	<1.2	92	<1.2	<1.2	<1.2	<1.2
MW-3	06/11/02	-	-	<2.5	-	-	-	-
	09/16/02	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
MRL		0.5	0.5	0.5	0.5	5.0	0.5	0.5

MRL = Method Reporting Limit, unless otherwise shown

µg/L = micrograms per liter

AEI = AEI Consultants

MAI = McCampbell Analytical, Inc.

TPHg = total petroleum hydrocarbons as gasoline


MTBE = methyl tertiary butyl ether

## **APPENDIX C**

Soil Boring/Well Construction Logs and Geologic Cross-Section

## SOIL BORING LOG

Drilling Company: <b>Gregg Drilling</b>	Station Name:	Boring Number: <b>GP-1</b>
Drillers:	Address: <b>1450 Fruitvale</b>	Date Drilled: <b>July 9, 1998</b>
Rig Type: <b>Geoprobe GII-40</b>	City: <b>Oakland</b>	Depth Drilled: <b>12 feet</b>
Rig Number:	State, Zip: <b>CA, 94601</b>	Boring Diameter: <b>2 inches</b>
Sampling Tech: <b>Hydraulic Push</b>	Nearest X-Street: <b>Fruitvale</b>	Casing Diameter: <b>NA</b>
Logged By: <b>BB Mitchell</b>		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	GVA READING (ppm)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
0					GC	1-inch asphalt, no base
5	X	0				Fill-Clayey Gravel, some fine to coarse sand, light brown, moist, no odors
10	X	0				Same, no odor
15						Same, soil saturated, no Hydrocarbon odor
20						
25						
30						
35						
40						
45						
50						
55						

TD = 12 feet

Note: Collected groundwater sample GP-1. Groundwater appears clean, and perched in the UST tank pit.

CLIENT NAME: <b>Glendale Federal Bank</b>	<b>GLENFOS, INC.</b>
PROJECT NAME: <b>1450 Fruitvale</b>	Global Environmental Focus
PROJECT NUMBER: <b>P1/P2-94601-081798</b>	9620 Topanga Canyon Place
	Chatsworth, CA 91311



# SOIL BORING LOG

Drilling Company: <u>Greer Drilling</u>	Station Name:	Boring Number: <u>GP-1</u>
Drillers:	Address: <u>1450 Fruitvale Avenue</u>	Date Drilled: <u>July 9, 1998</u>
Rig Type: <u>Geosrobe GJH-40</u>	City: <u>Oakland</u>	Depth Drilled: <u>30 feet</u>
Rig Number:	State, Zip: <u>CA 94601</u>	Boring Diameter: <u>1 inches</u>
Sampling Tech: <u>Hydraulic Push</u>	Nearest X-Street: <u>Fruitvale Street</u>	Casing Diameter: <u>NA</u>
Logged By: <u>Bill Mitchell</u>		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	OVA READING (psi)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
0					ML	1-inch asphalt, no base.
5	X	0				Clayey silt, greyish brown, moist, no Hydrocarbon odor
10	X	0				Same as above, moist, no Hydrocarbon odor
15	X					Same, except streaks of dark grey, and a slight odor.
20					CL	Silty clay, dark brown to grey, moist, slight to moderate Hydrocarbon odor
25						
30	X	0			TD = 30 feet	Same - no Hydrocarbon odor
35						
40						
45						
50						
55						

Notes: Groundwater not encountered.

CLIENT NAME: <u>Glendale Federal Bank</u>	<u>GLENFOS, INC.</u>
PROJECT NAME: <u>1450 Fruitvale</u>	<u>Global Environmental Focus</u>
PROJECT NUMBER: <u>P1/P2-94601-061798</u>	<u>9620 Topanga Canyon Place</u>
	<u>Chatsworth, CA 91311</u>

## SOIL BORING LOG

Drilling Company: Greig Drilling	Station Name:	Boring Number: GP-1
Drillers:	Address: 1450 Fruitvale	Date Drilled: July 9, 1998
Rig Type: Geogrober GH-60	City: Oakland	Depth Drilled: 18 feet
Rig Number	State, Zip: CA 94601	Boring Diameter: 1 inches
Sampling Tech: Hydraulic Push	Nearest X-Street: Carnegie Avenue	Casing Diameter: NA
Logged By: Bill Mitchell		


DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	OVA READING (ppm)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
0						1-inch asphalt no base
5	X	0			ML	Clayey silt, greenish brown, moist, no Hydrocarbon odor
10	X	210				Same, moist no Hydrocarbon odor.
15	X	2				Same, moist, slight to moderate Hydrocarbon odor
20	X	39				Same, moderate Hydrocarbon odor
25	X	1			GP TD = 28 feet	Sandy Gravel, some clay, light brown, moist, no Hydrocarbon odor.
30						
35						
40						
45						
50						
55						

Note: Groundwater not encountered

CLIENT NAME: Glendale Federal Bank	GLENFOS, INC.
PROJECT NAME: 1450 Fruitvale	Global Environmental Focus
PROJECT NUMBER: P1/P2-94601-061798	9620 Topanga Canyon Place Chatsworth, CA 91311

## SOIL BORING LOG

Drilling Company: <u>Gregg Drilling</u>	Station Name: _____	Boring Number: <u>GP-4</u>
Drillers: _____	Address: <u>1450 Fruitvale Avenue</u>	Date Drilled: <u>July 9, 1998</u>
Rig Type: <u>Geoprobe GJH-40</u>	City: <u>Oakland</u>	Depth Drilled: <u>28 feet</u>
Rig Number: _____	State, Zip: <u>CA, 94601</u>	Boring Diameter: <u>2 inches</u>
Sampling Tech: <u>Hydraulic Pist</u>	Nearest X-Sheet: <u>Ferrous</u>	Casing Diameter: <u>NA</u>
Logged By: <u>Bill Mitchell</u>		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	DVA READING (inches)	BLOW COUNTS	GRAIN LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
5	X	0			GC	1- inch asphalt, no base. Fill- Clayey Gravel, some fine to coarse sand, light brown, moist, no Hydrocarbon odor
10	X	468			ML TD = 12 feet	Sandy Silt, some gravel, light brown with streaks of greenish grey, strong Hydrocarbon odor
15						
20						
25						
30						
35						
40						
45						
50						
55						

Note: Groundwater collected at a depth of 10 feet. Obtained sample GP-4 Groundwater had no Hydrocarbon odor and appears to have been perched UST pit.

CLIENT NAME: <u>Glendale Federal Bank</u>	GLENFOS, INC.
PROJECT NAME: <u>1450 Fruitvale</u>	Global Environmental Focus
PROJECT NUMBER: <u>P1/P2-94601-061798</u>	9620 Topanga Canyon Place Chatsworth, CA 91311

## SOIL BORING LOG

Drilling Company: Grege Drilllog	Station Name:	Boring Number: CP-3
Drillers:	Address: 1450 Fruitvale	Date Drilled: July 9, 1998
Rig Type: Geoprobe GII-40	City: Oakland	Depth Drilled: 11 feet
Rig Number	State, Zip: CA 94601	Boring Diameter: 2 inches
Sampling Tech.: Hydraulic Puck	Nearest X-Sect: Farasm	Casing Diameter: NA
Logged By: Bill Mitchell		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	GVA READING (psf)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
						1-inch asphalt, no base Clayey silt, greyish brown, moist, no Hydrocarbon odor
5	X				ML	Same, moist, no Hydrocarbon odor.
10	X					
15	X				CL	Clayey silt, greyish brown to grey, with black streaks, moist moderate Hydrocarbon odor.
20	X				ML	Silty clay, dark brown to grey, moist moderate Hydrocarbon odor.
					TD = 22 feet	Clayey silt, some fine gravel, greyish brown with black streaks, moist slight Hydrocarbon odor.
25						
30						
35						
40						
45						
50						
55						

CLIENT NAME: Glendale Federal Bank	GLENFOS, INC.
PROJECT NAME: 1450 Fruitvale	Global Environmental Focus
PROJECT NUMBER: P1/P2-94601	9620 Topanga Canyon Place Chatsworth, CA 91311

## SOIL BORING LOG

Drilling Company: <b>Gregg Drilling</b>	Station Name:	Boring Number: <b>CP-4</b>
Drillers:	Address: <b>1450 Fruitvale</b>	Date Drilled: <b>July 9, 1994</b>
Rig Type: <b>Geoprobe CH-40</b>	City: <b>Oakland</b>	Depth Drilled: <b>22 feet</b>
Rig Number:	State, Zip: <b>CA 94601</b>	Boring Diameter: <b>1.625 inches</b>
Sampling Tool: <b>Hydraulic Probe</b>	Nearest X-Street: <b>Fruitvale</b>	Casing Diameter: <b>NA</b>
Logged By: <b>Bill Mitchell</b>		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	OYA READING (ft)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
0						1-inch asphalt, no base
5	X	0			ML	Clayey silt, greyish brown, moist, no Hydrocarbon odor
10	X	15				Same, moist, no Hydrocarbon odor
15	X	14			CL	Clayey silt, greyish brown with black streaks, moist, moderate Hydrocarbon
20	X	1			GP	Silty Clay, dark brown to grey, moist, moderate Hydrocarbon odor
25						Clayey silt, some fine gravel, greyish brown with black streaks, moist, slight Hydrocarbon odor
30						
35						
40						
45						
50						
55						

TD = 22 feet

Notes: Groundwater encountered at 20 feet, rose to 9 feet in 10 minutes. Collected sample GP-4. Strong Hydrocarbon odor, and a petroleum sheen observed.

CLIENT NAME: <b>Glendale Federal Bank</b>	GLENFOS, INC.
PROJECT NAME: <b>1450 Fruitvale</b>	Global Environmental Focus
PROJECT NUMBER: <b>P1/P2-94601-061798</b>	9620 Topanga Canyon Place
	Chatsworth, CA 91311

## SOIL BORING LOG

Drilling Company: <u>Gregg Drilling</u>	Station Name: _____	Boring Number: <u>GP-7</u>
Drillers: _____	Address: <u>1458 Fruitvale</u>	Date Drilled: <u>July 9, 1998</u>
Rig Type: <u>Geoprobe CH-40</u>	City: <u>Oakland</u>	Depth Drilled: <u>21 feet</u>
Rig Number: _____	State, Zip: <u>CA 94601</u>	Boring Diameter: <u>3 inches</u>
Sampling Tech: <u>Hydraulic Pasa</u>	Nearest X-Sect: <u>Fairfax</u>	Casing Diameter: <u>NA</u>
Logged By: <u>Bill Mitchell</u>		

DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	OVA READING (psi)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
5	X	100			ML	1-inch asphalt, no base Clayey silt, greyish brown, moist, no Hydrocarbon odor
10	X	323			ML	Same, moist, strong Hydrocarbon odor  Sandy silt, some gravel, light brown with streaks of greenish grey, moist, strong Hydrocarbon odor
15	X	25			ML	Silty Clay, dark brown to grey, moist, moderate Hydrocarbon odor
20		136			TD = 16 feet	Sandy gravel, some clay, light brown, moist, moderate Hydrocarbon odor
25						
30						
35						
40						
45						
50						
55						

note: Groundwater not encountered

CLIENT NAME: <u>Glendale Federal Bank</u>	GLENFOS, INC.
PROJECT NAME: <u>1458 Fruitvale</u>	Global Environmental Focus
PROJECT NUMBER: <u>P1/P2-94601-081798</u>	9520 Topanga Canyon Place Chatsworth, CA 91311

## SOIL BORING LOG

Drilling Company: <b>Gregg Drilling</b>	Station Name:	Boring Number: <b>GP-5</b>
Driller:	Address: <b>1450 Fruitvale</b>	Date Drilled: <b>July 9, 1998</b>
Rig Type: <b>Geoprobe CH-40</b>	City: <b>Oakland</b>	Depth Drilled: <b>16 feet</b>
Rig Number:	State, Zip: <b>CA 94601</b>	Boring Diameter: <b>2 inches</b>
Sampling Tech.: <b>Hydraulic Push</b>	Nearest X-Sect: <b>Fernam</b>	Casing Diameter: <b>NA</b>
Logged By: <b>Bill Mitchell</b>		

DEPTH BELOW SURFACE (ft.)	SAMPLE INTERVAL	OYA READING (feet)	BLOW COUNTS	GRAPHIC LOG	SOIL CLASSIFICATION	SOIL DESCRIPTION <small>Color, Texture, Moisture</small>
0					ML	0.5 inch concrete, no base
5	X	5				Clayey silt, grayish brown, moist, no Hydrocarbon odor
10	X	85			ML	Same, moist, slight Hydrocarbon odor
15	X	38				Sandy silt, some gravel, light brown with streaks of grey, strong Hydrocarbon odor
20	X				GP	Same, moist, slight to moderate Hydrocarbon odor
25						
30						
35						
40						
45						
50						
55						

Note: Groundwater not encountered

CLIENT NAME: <b>Glendale Federal Bank</b>	GLENFOS, INC.
PROJECT NAME: <b>1450 Fruitvale Avenue</b>	Global Environmental Focus
PROJECT NUMBER: <b>P1/P2-94601-061798</b>	9620 Topanga Canyon Place Chatsworth, CA 91311

Project No: 3397





Sheet: 1 of 1

Project Name: FRUITVALE

**Log of Borehole: AEI-9**

Client: JAY-PHARES CORP

Location: WESTERN CORNER

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
1		<b>ASPHALT</b>						
2		<b>CLAY</b> Silty and sandy clay						
3								
4								
5			AEI-9 5'	SS		100	No hydrocarbon odor	
6								
7								
8								
9								
10		Sandy clay with gravel up to 2 cm	AEI-9 10'	SS		100	No hydrocarbon odor	
11								
12								
13								
14								
15		Stiff silty clay	AEI-9 15'	SS		45	Groundwater after 15 min. No hydrocarbon odor	
16								
17								
18								
19								
20			AEI-9 20'	SS		80	Strong hydrocarbon odor	
21								
22								
23								
24								
25		<b>GRAVEL</b> Coarse sandy gravel up to 3 cm, clast supported						
26								
27								
28								
29								
30								
31		<b>CLAY</b> Silty clay with gravel up to 2.5 cm	AEI-9 30'	SS		90	No hydrocarbon odor Groundwater initially observed	
32								
33		End of Borehole						
34								
35								
36								

Drill Date 9/28/99

Reviewed by: JPD

AEI Consultants  
901 Moraga Road, Suite C  
Lafayette, CA 94549  
(800) 801-3224

Drill Method: DIRECT PUSH

Logged by: PJM

Total Depth: 32 ft.

Depth to Water: 14 ft.



Project No: 3397

Sheet: 1 of 1

Project Name: FRUITVALE

**Log of Borehole: AEI-10**

Client: JAY-PHARES CORP

Location: SOUTHERN PORTION, NEAREST EXCAVATION

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
0		<b>CONCRETE</b>						
1		<b>CLAY</b>						
1		Silty clay, moderately plastic						
5			AEI-10 5'	SS		100	Moderate hydrocarbon odor	
10		Stiff silty clay with fine sand	AEI-10 10'	SS		100	Moderate hydrocarbon odor	
15			AEI-10 15'	SS		100	Mild hydrocarbon odor	
20		Sandy clay, damp	AEI-10 20'	SS		100	No hydrocarbon odor	
25			AEI-10 25'	SS		50	No hydrocarbon odor	
30		Stiff silty clay	AEI-10 30'	SS		100	No hydrocarbon odor	
33		End of Borehole					No groundwater generation	

Drill Date 9/28/99  
 Drill Method: DIRECT PUSH  
 Total Depth: 33 ft.  
 Depth to Water: NA

Reviewed by: JPD  
 Logged by: PJM

AEI Consultants  
 901 Moraga Road, Suite C  
 Lafayette, CA 94549  
 (800) 801-3224

Project No: 3397

Sheet: 1 of 1

Project Name: FRUITVALE

**Log of Borehole: AEI-11**

Client: JAY-PHARES CORP

Location: SOUTH EAST OF FORMER DISPENSERS

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
0	XXXX	ASPHALT						
1	XXXX	CLAY						
1	XXXX	Silty clay, moderately plastic						
4	XXXX	Gravel present at 5%	AEI-11 5'	SS		60	No hydrocarbon odor	
10	XXXX	Stiff silty clay	AEI-11 10'	SS		100	No hydrocarbon odor	
15	XXXX		AEI-11 15'	SS		100	Strong hydrocarbon odor	
20	XXXX		AEI-11 20'	SS		5	No sample recovery	
24	XXXX	Stiff sandy clay, locally damp						
30	XXXX		AEI-11 30'	SS		20	No hydrocarbon odor Not sufficient soil collected	
33		End of Borehole					No groundwater generation	

Drill Date 9/28/99

Reviewed by: JPD

AEI Consultants  
901 Moraga Road, Suite C  
Lafayette, CA 94549  
(800) 801-3224

Drill Method: DIRECT PUSH

Logged by: PJM

Total Depth: 33 ft.

Depth to Water: NA

Project No: 3397

Sheet: 1 of 1

Project Name: FRUITVALE

**Log of Borehole: AEI-12**

Client: JAY-PHARES CORP

Location: NORTH OF FORMER DISPENSERS

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
0	XXXXXX	CONCRETE						
1		CLAY						
2		Stiff clay with minor sand						
3								
4								
5			AEI-12 5'	SS		60	No hydrocarbon odor	
6								
7								
8								
9								
10		Sandy clay w/ coarse gravel up to 2.5 cm, unconsolidated	AEI-12 10'	SS		90	Mild hydrocarbon odor	
11								
12								
13								
14								
15		Stiff silty clay, dry	AEI-12 15'	SS		85	Moderate hydrocarbon odor	
16								
17								
18								
19								
20			AEI-12 20'	SS		15	No sample recovery	
21								
22		Silty clay						
23								
24								
25								
26								
27								
28								
29								
30							Groundwater sample exposed between 30 and 34 feet bgs.	
31							No groundwater generation	
32								
33								
34								
35		End of Borehole						
36								

Drill Date 9/28/99  
 Drill Method: DIRECT PUSH  
 Total Depth: 34 ft.  
 Depth to Water: NA

Reviewed by: JPD  
 Logged by: PJM

AEI Consultants  
 901 Moraga Road, Suite C  
 Lafayette, CA 94549  
 (800) 801-3224

Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-13**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<i>Hand Auger</i> Black, earthy soils						Slight HC odor
4									PID <1 ppm
6			<i>Clay</i> Sandy, grey color	AEI-13 5'	SS				
8									
10			<i>Clay</i> Firm clay, less sand, redish/grey mottled appearance	AEI-13 10'	SS				Slight HC odor
12									PID <1 ppm
14									
16			<i>Clay</i> Stiff, tan color, very few sands	AEI-13 15'	SS				
18									
20			<i>Clay</i> Gravelly, sandy						PID <1 ppm
22									
24			<i>Clay</i> Stiff, tan color, 10-20 % sands	AEI-13 20'	SS				PID <1 ppm
26									
28									
30			<i>Sand</i> Silty w/ lots of gravels	AEI-25'	SS				Slight HC odor
32			End of Borehole	AEI-13 30'	SS				
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 30  
 Depth to Water: 14.5

Reviewed by:  
 Logged by: AW

AEI Consultants  
 3210 Old Tunnel Road, Suite B  
 Lafayette, CA 94549  
 (925) 283-6000

Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-14**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<b>Hand Auger</b> Black, earthy soils						
4									
6			<b>Clay</b> Sandy, brown color						
8									
10			<b>Clay</b> Stiff, olive green color, some gravels	AEI-14 10'	SS				PID 2 ppm
12			<b>Clay</b> Firm, very sandy, green/brown mottled appearance						Slight HC odor
14									PID 1 ppm
16			<b>Clay</b> Stiff, olive green color	AEI-14 15'	SS				
18									
20			<b>Clay</b> Gravelly, 30% gravels, olive color	AEI-14 20'	SS				Slight HC odor PID 4 ppm
22									
24									No HC odor
26				AEI-14 25'	SS				
28			<b>Clay</b> Soft, very wet, tan color						
30				AEI-14 30'	SS				
32			<b>Sand</b> Clayey w/ some gravels, wet and dry layers						
34									

Drill Date 6/10/02

Reviewed by:

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Lafayette, CA 94549  
(925) 283-6000

Drill Method: Direct Push

Logged by: AW

Total Depth: 35

Depth to Water: 32

Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-15**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<b>Sand</b> Clayey, some gravels, black color						No HC odor
4									PID <1ppm
6			<b>Clay</b> Very sandy, some gravels, tan color	AEI-15 5'	SS				
8									
10				AEI-15 10'	SS				
12			<b>Clay</b> Gravelly, black color						
14									
16			<b>Sand</b> Black color, gravelly	AEI-15 15'	SS				PID <1 ppm
18									
20			<b>Clay</b> Dry, sandy, gravelly, brown color	AEI-15 18'	SS				No HC odor PID <1 ppm
22									
24					AEI-15 24'	SS			
26			<b>Gravel</b> Mixed with firm brown clays and some sands						
28									
30				AEI-15 30'	SS				
32			End of Borehole						
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 30  
 Depth to Water: 23

Reviewed by:  
 Logged by: AW

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Project No: 5183

Sheet 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-16**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks	
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery			
0			Ground Surface							
2	[Diagonal Hatching]		<b>Clay</b> Stiff, gravelly 10-20%, black						No HC odor	
4										
6	[Diagonal Hatching]		<b>Clay</b> Firm, gravel 50%, brown color	AEI-16 5'	SS				PID <1ppm	
8										
10				AEI-16 10'	SS					
12										
14	[Diagonal Hatching]		<b>Clay</b> Stiff, tan color	AEI-16 15'	SS				PID <1 ppm HC odor	
16										
18	[Diagonal Hatching]		<b>Clay</b> Stiff, olive green color, minor gravels	AEI-16 19'	SS				PID 309 ppm	
20										
22	[Diagonal Hatching]		<b>Clay</b> Stiff, sandy, brownish/green mottled color						PID 17 ppm	
24										
26	[Diagonal Hatching]		<b>Clay</b> Gravelly, sandy, wet	AEI-16 25'	SS					
28			<b>Clay</b> Mottled grey/green/bron appearance, gravelly, wet							
30			End of Borehole							
32										
34										

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 30  
 Depth to Water: 28

Reviewed by:  
 Logged by: AW

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Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-17**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<b>Soil</b> Firm, clayey, black color					No HC odor	
4			<b>Clay</b> Firm, green color, some gravels and sands 20-30%					No HC odor	
6								Strong HC odor	
8			<b>Sand</b> Brown, gravelly, some clay	AEI-17 10'	SS			Slight HC odor	
10									
12									
14			<b>Clay</b> Stiff, olive green color, minor gravels	AEI-17 15'	SS				
16									
18			<b>Clay</b> Stiff, green color	AEI-17 20'	SS				
20									
22			<b>Clay</b> Stiff, green color	AEI-17 25'	SS				
24									
26			<b>Clay</b> Stiff, green	AEI-17 30'	SS				
28									
30			<b>Clay</b> Tan, saturated						
32									
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 35  
 Depth to Water: 23.5

Reviewed by:  
 Logged by: AW

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Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-18**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<b>Soil</b> Firm, black color, 20% gravels						
4			<b>Clay</b> Stiff, brownish, 20% sand	AEI-18 4'	SS			PID 112 ppm	
6								Slight HC odor	
8			<b>Clay</b> Stiff, green color	AEI-18 10'	SS			Strong HC odor	
10								PID 112 ppm	
12			<b>Clay</b> Stiff, 40% sand and gravels, olive green/orange mottled appearance	AEI-18 14'	SS			PID 181 ppm	
14								Slight HC odor	
16			<b>Clay</b> Firm, brownish color, slightly wet	AEI-18 25'	SS			PID 46 ppm	
18								Strong HC odor	
20			<b>Clay</b> Stiff, green						
22									
24			<b>Silt</b> Isolated lens						
26									
28			<b>Clay</b> Stiff, brown, 40% gravels	AEI-18 30'	SS			PID <1 ppm	
30									
32									
34									

Drill Date 6/10/02

Reviewed by:

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Lafayette, CA 94549  
(925) 283-6000

Drill Method: Direct Push

Logged by: AW

Total Depth: 35

Depth to Water: 25.3

Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-19**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<i>Soil</i> Firm, black color, 20% gravels						
4									
6									
8			<i>Clay</i> Stiff, brownish, 20% gravels					No HC odor	
10				AEI-19 10'	SS			PID <1 ppm	
12									
14									
16				AEI-19 15'	SS			PID <1 ppm	
18			<i>Clay</i> Stiff, green color, fine grained					HC odor	
20				AEI-19 20'	SS			PID 9 ppm	
22									
24			<i>Clay</i> Firm, brown, 20% gravels					PID 3 ppm	
26			End of Borehole	AEI-19 25'	SS				
28									
30									
32									
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 25  
 Depth to Water: 20.5

Reviewed by:  
 Logged by: AW

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Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-20**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<i>Soil</i> Firm, black color, sandy						
4									
6				AEI-20 5'	SS			PID <1 ppm	
8									
10			<i>Clay</i> Soft, brown, 30% sand	AEI-20 10'	SS			PID 2 ppm	
12								Slight HC odor	
14									
16			<i>Clay</i> Stiff, green color	AEI-20 15'	SS			PID 4 ppm	
18			<i>Clay</i> Firm, brown, 30% sand					HC odor	
20			<i>Clay</i> Stiff, green color, 40% gravels	AEI-20 20'	SS			PID 12 ppm	
22								▼	
24								HC odor	
26				AEI-20 25'	SS			PID 13 ppm	
28			<i>Clay</i> Stiff, green/grey color w/ some orange sands						
30								PID 8 ppm	
32								Slight HC odor	
34			<i>Sand</i> Firm, wet, clayey	AEI-20 33'	SS				

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 35  
 Depth to Water: 22

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 Logged by: AW

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Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-21**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<b>Soil</b> Firm, black color, 30% sand					Slight HC odor	
4			<b>Clay</b> Firm, olive green color, 5% sand	AEI-21 5'	SS			HC odor	
6									
8									
10			<b>Clay</b> Stiff, olive green color, 20% gravels	AEI-21 9'	SS				
12									
14			<b>Clay</b> Stiff, olive green color, fine grained, 5% sands	AEI-21 13'	SS			Strong HC odor	
16				AEI-21 15'	SS			PID 239 ppm	
18									
20			<b>Gravels</b> Isolated layer	AEI-21 20'	SS			PID 38 ppm	
22									
24			<b>Sand</b> Firm, grey color, clayey	AEI-21 24'	SS			PID 124 ppm	
26			<b>Clay</b> Very sandy w/ gravels, brown color						
28			End of Borehole						
30									
32									
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 28  
 Depth to Water: 13

Reviewed by:  
 Logged by: AW

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Project No: 5183

Sheet: 1 of 1

Project Name: Fruitvale

**Log of Borehole: SB-22**

Client: PHUA

Location: Oakland, CA

Depth	USCS		Subsurface Description	Sample Data				Well Data	Remarks
	Symbol	Label		Sample Label	Type	Blow/ft	Recovery		
0			Ground Surface						
2			<i>Soil</i> Firm, sands and gravels present						
4			<i>Clay</i> Stiff w/ fine sands and silts, dk brown	AEI-22 5'	SS				
6									
8			<i>Clay</i> Stiff, olive green color, 10% gravels	AEI-22 10'	SS				HC odor
10									
12				AEI-22 15'	SS				
14			<i>Clay</i> Stiff, olive green color, gravel locally	AEI-22 20'	SS				Slight HC odor
16									
18			End of Borehole	AEI-22 25'	SS				
20									
22									
24									
26									
28									
30									
32									
34									

Drill Date 6/10/02  
 Drill Method: Direct Push  
 Total Depth: 25  
 Depth to Water: 19

Reviewed by:  
 Logged by: AW

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Project No: 3581






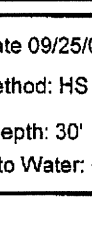

Sheet: 1 of 1

Project Name: Jay Phares Corp.

**Log of Borehole: MW-1**

Client: Ken Phares

Location: 1450 Fruitvale Avenue

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
0-1		<b>CLAY</b>						
1-2		dark silty clay	MW-1	SS			PID= 3 ppm, no odor	
2-3		sandy clay w/coarse gravel	MW-1	SS			PID= 193 ppm, grey green staining, strong odor	
3-4								
4-5								
5-6								
6-7		<b>SAND</b> sandy gravel	MW-1	SS			PID= 29 ppm, wet grey	
7-8								
8-9								
9-10								
10-11								
11-12								
12-13								
13-14								
14-15								
15-16								
16-17								
17-18								
18-19								
19-20								
20-21								
21-22								
22-23								
23-24								
24-25								
25-26								
26-27								
27-28								
28-29								
29-30								
30-31								
31-32		End of Borehole						

Drill Date 09/25/00

Reviewed by: PM

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Drill Method: HS

Logged by: NW

Total Depth: 30'

Depth to Water: ~15'

Project No: 3581




Sheet: 1 of 1

Project Name: Jay Phares Corp.

**Log of Borehole: MW-2**

Client: Ken Phares

Location: 1450 Fruitvale Avenue

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
1		<b>CLAY</b> dark silty clay						
2								
3								
4								
5								
6								
7		sandy clay, coarse gravel	MW-2	SS			PID= 0 ppm, no odor	
8								
9								
10								
11		<b>SAND</b> gravelly sand	MW-2	SS			PID= 368 ppm, strong odor green staining, tree roots present	
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22			MW-2	SS			PID= 10 ppm, wet noticeable odor, green staining	
23								
24								
25								
26								
27								
28								
29								
30								
31		End of Borehole						
32								

Drill Date 09/25/00

Reviewed by: PM

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Drill Method: HS

Logged by: NW

Total Depth: 30'

Depth to Water: ~15'

Project No: 3581

Sheet: 1 of 1

Project Name: Jay Phares Corp.

**Log of Borehole: MW-3**

Client: Ken Phares

Location: 1450 Fruitvale Avenue

Depth ft m	Soil Symbol	Subsurface Description	Sample Data				Well Data	Remarks
			Sample Label	Type	Blow Counts/	Recovery		
0		Ground Surface						
1		<b>CLAY</b> brown silty clay w/ organic matter to 5'						
2								
3								
4								
5								
6								
7		silty clay, stiff	MW-3	SS			PID= 20 ppm, dark green staining, strong odor	
8								
9								
10								
11		silty gravelly clay intermixed w/coarse gravel	MW-3	SS			PID= 220 ppm, green staining strong odor	
12								
13								
14								
15								
16		stiff silty clay	MW-3	SS			PID= 522 ppm, light grey green staining, strong odor	
17								
18								
19								
20								
21								
22		gravelly sandy clay / light brown clayey sand	MW-3	SS			PID= 19 ppm, light odor	
23								
24								
25								
26								
27		gravelly sandy silt, light brown	MW-3	SS			no odor or staining	
28								
29								
30								
31		End of Borehole						
32								

Drill Date 09/25/00

Reviewed by: PM

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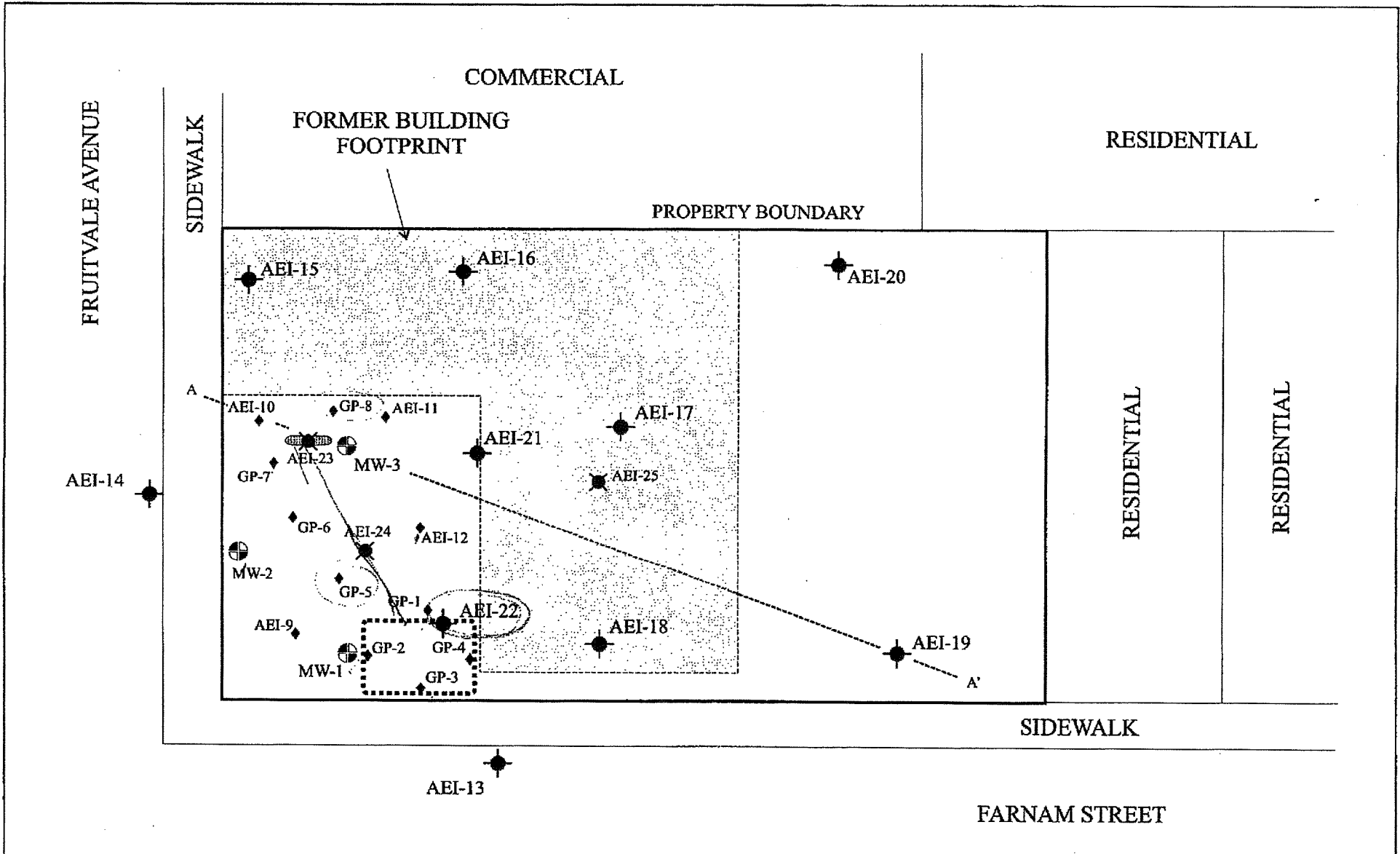
Drill Method: HS

Logged by: NW

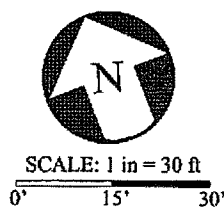
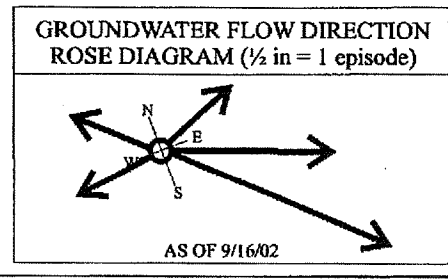
Total Depth: 30'

Depth to Water: ~15'

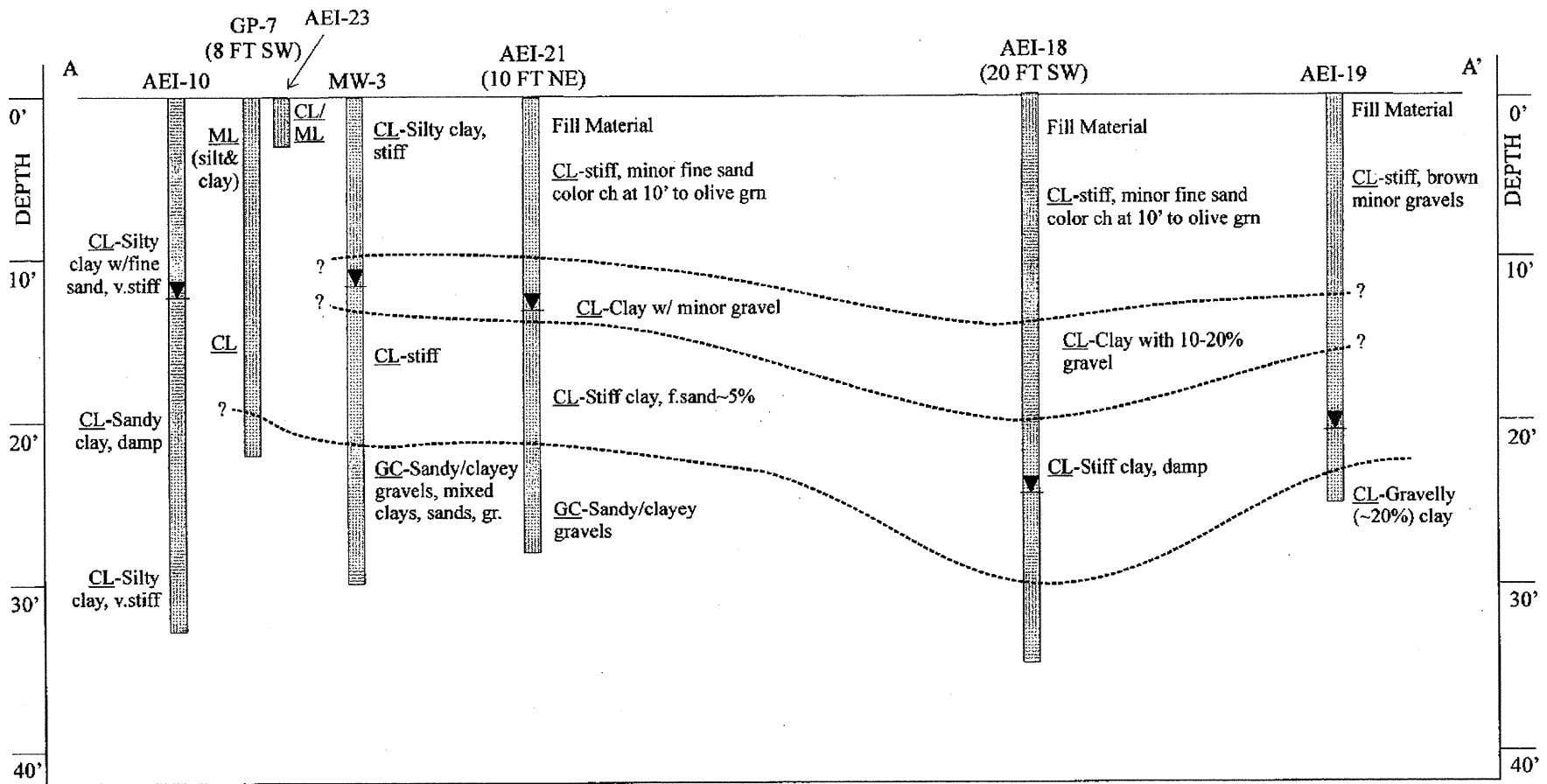




KEY	
	Existing 2" Monitoring Wells
	Temporary Borings: 1998-1999
	Temporary Borings: June 2002
	Hand Auger Borings: Sept. 2002



<b>AEI CONSULTANTS</b> 3210 OLD TUNNEL ROAD, SUITE B, LAFAYETTE, CA	
<b>BORING AND WELL LOCATIONS</b>	
1450 FRUITVALE AVENUE OAKLAND, CALIFORNIA	<b>FIGURE 4</b> AEI PROJECT NO 5624



--- APPROXIMATE SOIL TYPE BOUNDARY

▼ WATER LEVEL MEASURED IN WELLS OR TEMPORARY BORINGS

VERTICAL SCALE: 1 in = ~ 10 ft  
 HORIZONTAL SCALE: 1 in = ~20 ft

Abbreviations  
 ML = Silts  
 GC = Clayey Gravel  
 CL = Clay, silty, sandy,  
 or gravelly clay

**AEI CONSULTANTS**  
 2500 CAMINO DIABLO, SUITE 200, WALNUT CREEK, CA

**CROSS SECTION A-A'**

1450 FRUITVALE AVENUE  
 OAKLAND, CALIFORNIA

**FIGURE 6**  
 AEI PROJECT NO 10460