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Environmental Health

Foundry/Corporate Office

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March 12, 2009

Mr. Jerry Wickham
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Fuel Leak Case No. RO0000092 and Geotracker Global ID T0600100065 Work Plan for Enhanced Aerobic Biodegradation Pilot Study – Former Three 10,000-Gallon USTs Area, AB&I Foundry, 7825 San Leandro Street, Oakland California 94621

Dear Mr. Wickham:

AB&I respectfully submits the attached Work Plan for Enhanced Aerobic Biodegradation Pilot Study – Former Three 10,000-Gallon USTs Area for the AB&I Foundry Site located at 7825 San Leandro Street, Oakland, California.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document are true and correct to the best of my knowledge.

Sincerely,

Dave Robinson
Engineering Manager

Attachment: Work Plan for Enhanced Aerobic Biodegradation Pilot Study – Former Three 10,000-Gallon USTs Area, AB&I Foundry, 7825 San Leandro Street, Oakland, California

Work Plan for Enhanced Aerobic Biodegradation Pilot Study – Former Three 10,000-Gallon USTs Area

AB&I Foundry
7825 San Leandro Street
Oakland, California

01-ABI.001

Prepared For:

AB& I Foundry
7825 San Leandro Street
Oakland, California

Prepared By:

SGI environmental THE SOURCE GROUP, INC.

3451-C Vincent Road
Pleasant Hill, California 94523

March 12, 2009

Prepared By:

Nathan Colton
Senior Staff Scientist

Reviewed By:

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Senior Hydrogeologist

PROFESSIONAL GEOLOGIST
JON R. PHILIPP
No. 7945
STATE OF CALIFORNIA

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CERTIFICATION

All hydrogeologic and geologic information in this document regarding the AB&I Foundry Site have been prepared under the supervision of and reviewed by the certified professional whose signature appears below.

Jon Philipp, P.G., C.HG.
Senior Hydrogeologist
The Source Group, Inc.

1.0 INTRODUCTION

This document presents an Enhanced Aerobic Biodegradation Pilot Study Work Plan (Work Plan) for the AB&I Foundry located at 7825 San Leandro Street in Oakland, California (Figure 1; Site). This Work Plan has been prepared by The Source Group, Inc. (SGI) on behalf AB&I Foundry (AB&I). This Work Plan was prepared in response to a request from the Alameda County Environmental Health Department (ACEH) for a Work Plan to conduct a pilot test study of remediation technologies to remediate petroleum hydrocarbons in the area of the former three, 10,000-gallon underground storage tanks (USTs, ACEH letter dated November 4, 2008 [ACEH 2008]). SGI prepared this Work Plan on behalf of AB&I for submittal to the ACEH.

2.0 BACKGROUND

2.1 Site Description and History

The Site is located at 7825 San Leandro Street, east of the intersection with 77th Avenue, in a light industrial area of Oakland (Figures 1 and 2). The Site is bounded by commercial/industrial properties to the north, south, east, and west. Union Pacific Railroad is located immediately adjacent to and west of the Site. Oakland Truck Stop is located immediately adjacent to and east of the Site. Elmhurst Creek is located along the southeast corner of the property (Figure 2). San Leandro Bay is located approximately one mile west of the Site.

AB&I has been operating at its present location since at least 1930 (BSK Associates [BSK], 1993). Business activities include the manufacture of cast pipe and fittings. The facility accepts scrap iron and steel, which it stockpiles on-site, and uses during manufacturing activities. The Site encompasses an area of approximately 11.8 acres. The Site contains various warehouses, manufacturing and office buildings. The entire Site is covered with buildings and asphalt and concrete pavement. Seven underground storage tanks (USTs) were previously located on the Site. The USTs included one 8,000-gallon UST used for storing unleaded gasoline, one 8,000-gallon UST used for the storage of mineral spirits and later 1,1,1-trichloroethane (1,1,1-TCA), one 550-gallon UST used for storing regular leaded gasoline, one 10,000-gallon UST used for storing diesel, and three 10,000-gallon USTs used for storing gasoline. All UST have been removed from the Site. UST removal activities were initiated in 1982 and completed in the early 1990s.

Following the removal of the seven USTs, various investigations were conducted at the Site to characterize the presence and extent of contaminated soil and groundwater associated with the former USTs. In July 2006, a soil and groundwater assessment was conducted as part of a property transfer. According to BSK, groundwater samples were collected from each of the existing monitoring wells (MW-1, MW-3, and MW-4) and submitted for chemical analysis for polycyclic aromatic hydrocarbons (PAHs) using U.S. Environmental Protection Agency (EPA) Method 8270C, total petroleum hydrocarbons as gasoline (TPHg) and total petroleum hydrocarbons as diesel (TPHd) using EPA Method 8015M as well as benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020. All samples were also analyzed for volatile organic compounds (VOCs) including fuel oxygenates, using EPA Method 8260B. Well MW-2 was found to be damaged beyond repair, and therefore was not sampled. On August 13, 2006 monitoring well MW-2, was abandoned (BSK, 2007).

On August 12, 13, and 18, 2006, six new groundwater monitoring wells (MW-2R, and MW-5 through MW-9) were installed. Between August 17 and August 23, 2006, water levels were measured and groundwater samples were collected from the three existing and six new monitoring wells. One groundwater sample from each of the previously existing wells (MW-1, MW-3, and MW-4) was analyzed for PAHs. Groundwater samples from the six newly installed wells (MW-2R, MW-5, MW-6, MW-7, MW-8 and MW-9) were submitted for chemical analysis for TPHg TPHd, BTEX, VOCs including fuel oxygenates, and PAHs. In addition, soil samples were collected at various depth intervals during the installation of monitoring wells MW-5, MW-6, MW-7, and MW-8 and were analyzed for metals and VOCs using EPA Methods 6020 and EPA Method 8260B, respectively.

Results of the July/August 2006 sampling event indicated that five of the nine wells had concentrations of at least one compound that exceeded their respective EPA maximum contaminant level (MCL) or California Regional Water Quality Control Board – San Francisco Bay Region (CRWQCB-SF) Environmental Screening Levels (ESLs) for groundwater that is a current or potential source of drinking water (BSK, 2007).

In 2007 and 2008, SGI conducted soil and groundwater investigations on the Site. These investigations included the investigation of both shallow groundwater (less than 30 feet below ground surface [bgs]) and deep groundwater (greater than 30 feet bgs), and the collection of soil vapor samples. The results of these investigations indicated that shallow groundwater in the vicinity of the Parking Lot Area (located in the vicinity and northwest of well MW-8; Figure 3) is impacted with chlorinated VOCs, including 1,1,1-TCA, 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), chloroethane, cis and trans 1,2-dichloroethene (1,2-DCE), and vinyl chloride. Shallow groundwater in the vicinity of the Former Three 10,000 Gallon USTs Area (located in the vicinity of well MW-9 and downgradient of the three former 10,000 gallon USTs) is impacted with petroleum fuels (TPH) including BTEX, TPHg, and TPHd. Of the compounds detected, only vinyl chloride exceeded its respective ESL for vapor intrusion from groundwater into indoor air under the commercial land use scenario. Results of the soil vapor analysis indicated that two of soil gas samples had ESL exceedences for indoor air vapor intrusion for vinyl chloride and PCE under the commercial land use scenario. In addition, two soil gas samples had ESL exceedences for indoor air vapor intrusion for benzene and ethylbenzene (one location) under the commercial land use scenario. Further details can be found in SGI's reports titled, "Site Investigation Report" and "Additional Site Investigation Report" (SGI 2008a; SGI 2008b).

On November 4, 2008, ACEH submitted a letter to AB&I stating that "the mass of residual fuel hydrocarbons present below the water table constitutes on ongoing source of groundwater contamination" in the area of the former three 10,000-gallon USTs. Therefore, ACEH requested that AB&I "implement cleanup to reduce the mass of residual fuel hydrocarbons in the source area." In addition, ACEH expressed concern regarding the apparent recalcitrance of chlorinated VOCs in groundwater, associated with releases from the former 8,000-gallon mineral spirits/1,1,1-TCA UST, to further breakdown, which could promote the accumulation of vinyl chloride. To address these issues, ACEH requested that AB&I submit Work Plans to conduct pilot test studies of remediation technologies to remediate chlorinated VOCs associated with releases from the former 8,000-gallon mineral spirits/1,1,1-TCA UST and petroleum hydrocarbons in the area of the former three 10,000-gallon USTs (ACEH 2008).

2.2 Hydrogeological Setting

The Site is located near the San Francisco Bay within an area identified as the East Bay Plain. The East Bay Plain is situated on the east side of the San Francisco Bay depression. The alluvial sediments of the East Bay Plain consist of a mixture of gravel, sand and clay deposited by coalescing alluvial fans. In the vicinity of the Site, fluvial and near shore deposits have been mapped (Helley et. al., 1979). The fluvial deposits are described as unconsolidated, moderately sorted, fine sand and silt, with clayey silt and occasional thin beds of coarse sand (Muir, 1993). The near-shore deposits are described as a well-sorted, fine to medium grained sand and silt, with lenses of sandy clay and clay. Regional groundwater flow in the vicinity of the Site is interpreted to be towards the west - southwest toward San Leandro Bay.

The Site is underlain by a mixture of sandy/silty clay to a depth of at least 20-feet below ground surface (bgs). Groundwater has been encountered in borings and excavations at depths ranging from 8 to 12-feet bgs at the Site. Based on groundwater monitoring data from on-site monitoring wells for the December 2008 sampling event, groundwater flows to the northwest at a gradient of 0.006 feet per foot (ft/ft; SGI 2009).

Based on the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) (RWQCB, 1995), groundwater beneath the Site is part of the East Bay Plain basin, which has beneficial uses for municipal and domestic drinking water supply, industrial process and service water supply, and agricultural water supply. That said, East Bay Municipal Utility District (EBMUD) provides water for these uses to the Site and vicinity from Sierra-fed surface-water sources. Development of the shallow water-bearing zones beneath the Site for beneficial uses is remote due to uneconomically low, sustainable well yields, and the presence of regional contamination (e.g., coliform from leaking sanitary sewer lines, unrelated chemical plumes), and presence of more productive water-bearing zones at depth (RWQCB, 1999). In addition, State regulations require sealing of at least the upper 50 feet of subsurface for public/industrial water supply wells (Department of Water Resources, 1991).

3.0 PURPOSE AND OBJECTIVES

Shallow groundwater in the vicinity of the Former Three 10,000 Gallon USTs Area is impacted with petroleum hydrocarbons, including TPHg, TPHd, and BTEX. ACEH concluded that, "the mass of residual fuel hydrocarbons present below the water table constitutes on ongoing source of groundwater contamination" in the area of the former three 10,000-gallon USTs. Therefore, ACEH requested that AB&I "implement cleanup to reduce the mass of residual fuel hydrocarbons in the source area (ACEH 2008). "

The overall goal of cleanup (remediation) is to reduce concentrations of chemicals of potential concern (COPCs) to levels that do not pose an unacceptable risk to human health and the environment. Proposed cleanup levels for the Former Three 10,000 Gallon USTs Area are presented in the following sections.

4.0 PROPOSED SHORT-TERM CLEANUP GOALS

As indicated in section 3.0, the overall goal of cleanup (remediation) is to reduce concentrations of chemicals of potential concern (COPCs) to levels that do not pose an unacceptable risk to human health and the environment. Proposed cleanup levels for the Former Three 10,000 Gallon USTs Area are presented in the following subsections.

Short-term (i.e., cessation of active remediation) site-specific cleanup goals were developed using the following criteria:

- Overall Protection of Human Health and the Environment, and;
- Regional Risk-Based Benchmarks (CRWQCB ESLs).

The following sections discuss the criteria for development of short-term site-specific cleanup goals for groundwater located downgradient of the Former Three 10,000 Gallon USTs Area.

4.1 Overall Protection of Human Health and the Environment

The site-specific cleanup goals were developed to promote the overall protection of human health and environment. A conservative screening level risk evaluation was conducted for the Site to evaluate possible chemical exposures associated with current and likely future uses of the Site (SGI 2008a). The objective of the SLRE was to quantify possible exposures in order to identify the need for, and possible extent of, remediation activities to adequately protect human and ecological health.

Under current and expected future conditions, no complete or significant exposure pathways were identified for ecological receptors at the Site. Under current and expected future uses, the SLRE identified areas of concern (AOCs) in groundwater that exceed ESLs. The site-specific cleanup goals were developed to address these AOCs as discussed below.

The only complete and significant exposure pathway for the indoor commercial/industrial worker is the inhalation of vapors in indoor air volatilizing from the subsurface. No COPCs were identified for the hypothetical indoor commercial/industrial worker receptor in any of the former UST areas with the exception of the Parking Lot Area and the Former Three 10,000 Gallon USTs Area. For the Former Three 10,000 Gallon USTs Area, only benzene was identified as a COPC in soil gas (sample SG-7) for the hypothetical indoor commercial/industrial worker receptor. One groundwater monitoring well (MW-9) is located downgradient of the Former Three 10,000 Gallon USTs Area. Soil gas sample location SG-7 is located outdoors and in the immediate vicinity of the former three 10,000 gallon USTs. Therefore, vapor intrusion into indoor air is not expected to constitute a significant risk to the hypothetical indoor commercial/industrial worker receptor under the current exposure scenario. However vapor intrusion into indoor air may constitute a risk to the hypothetical indoor commercial/industrial worker receptor under the future exposure scenario.

4.2 Regional Risk-Based Benchmarks

The CRWQCB (San Francisco Bay Region) has developed regional risk-based benchmarks, which are referred to as ESLs (CRWQCB, 2008). The ESLs were intended to be conservative for use at a vast majority of impacted sites in developed areas. Chemical concentrations below their corresponding ESLs are assumed not to pose a significant long-term (chronic) threat to human health and the environment (CRWQCB, 2008). For potential carcinogens (i.e., benzene and ethylbenzene), the CRWQCB ESLs are based on a target excess cancer risk of 10^{-6} which represents the upper end (most stringent) of the potentially acceptable range of 10^{-4} to 10^{-6} recommended by the USEPA (1989). For noncarcinogens (i.e., toluene and xylene), the CRWQCB ESLs are based on a target hazard quotient of 0.2 versus 1 used by USEPA. Therefore, the use of CRWQCB ESLs as proposed final short-term (i.e., cessation of active remediation) site-specific cleanup goal is conservative and will ensure that any potential human health risks are well below acceptable levels.

Groundwater ESLs for vapor intrusion concerns under the commercial land use scenario are proposed as final site-specific cleanup goals for the COPCs detected in groundwater. As discussed above, benzene exceeded its respective ESL in the sample collected from soil gas sample SG-7 (Figure 3). The SLRE identified inhalation of vapors in indoor air volatilizing from groundwater as the only complete and significant exposure pathway. In support of the SLRE and to further investigate potential indoor air impacts, two soil gas sampling events were conducted in 2007 and 2008. Only benzene, toluene, ethylbenzene, and xylene were detected in soil gas in the Former Three 10,000 Gallon USTs Area. Therefore, the CRWQCB groundwater ESLs (vapor intrusion concerns - commercial land use) for benzene, toluene, ethylbenzene, and xylene are proposed as final short-term (i.e., cessation of active remediation) site-specific cleanup goals for active remediation.

Compound	Benzene	Toluene	Ethylbenzene
Commercial ESL (µg/L)	1,800	530,000	170,000

5.0 EVALUATION OF REMEDIAL TECHNOLOGIES

Based on a review of Site characterization data, a summary of potential remedial technologies was developed for shallow soil and groundwater. The development, evaluation, and screening of potential remedial technologies consisted of the following key components:

- An evaluation of Site characterization data to assess the nature and extent of contamination;
- Preliminary identification of potential remedial technologies;
- Identification of regulatory requirements and appropriate remedial objectives;
- Screening of remedial alternatives including:
  - Overall protection of human health and the environment;
  - Long-term effectiveness and permanence;
  - Reduction of toxicity, mobility, and volume;
  - Short-term effectiveness;
  - Implementability;
  - Cost;
  - Regulatory acceptance; and
  - Community acceptance.
- Development of an overall remedial strategy that considers client and regulatory objectives, requirements, and costs; and
- Identification of the most feasible remedial approaches and technologies, and what additional data collection and pilot testing is recommended for future detailed evaluation.

Technologies Evaluated during the Screening Process

- Excavation;
- High-vacuum dual-phase extraction;
- Dual-phase extraction/Groundwater pumping; and
- In-situ reductive dechlorination via enhanced anaerobic biodegradation (EAB).

Technologies Screened out of Consideration

Site characterization data, particularly geologic, hydrogeologic, and contaminant distribution data, were the major drivers for feasibility screening for the Site. In summary, groundwater VOC concentrations are elevated in the vicinity of well MW-8 and within approximately 150 feet downgradient; however, a sharp concentration gradient exists where concentrations decrease dramatically to non-detect. Data indicates that the majority of the mass of VOCs is present in and around the shallow groundwater zone, which extends from approximately 5 to 20 feet below ground surface (ft-bgs).

Given the Site conditions, many common remedial technologies screen out of consideration. The silts and tight clay soils do not allow efficient extraction of soil vapor or groundwater using traditional vertical well extraction methods. In addition, the presence of surface and subsurface features, such as equipment and foundations, limits direct access to the subsurface contamination via excavation. Of the listed technologies, only in-situ reductive dechlorination via EAB was selected for additional evaluation.

6.0 SELECTED REMEDIAL TECHNOLOGY FOR ADDITIONAL EVALUATION

Data indicates that natural attenuation is occurring at the Site, but the speed and completeness of the degradation process could be increased. Since the majority of the contaminant mass is limited to the shallow groundwater zone, the introduction of an oxygen-releasing compound (ORC), such as Oxygen Release Compound® (ORC®) or calcium peroxide, within this zone throughout the heavily impacted areas could accelerate and complete the remediation process.

Enhanced Aerobic Biodegradation

Enhanced aerobic biodegradation (EAB) is the stimulation of naturally occurring bacteria by circulating water-based solutions through contaminated media to enhance in-situ biological degradation of organic contaminants or immobilization. Nutrients, oxygen, or other amendments may be used to enhance biodegradation and contaminant desorbtion from subsurface materials.

Data collected during previous site investigations along with data from the quarterly monitoring program indicates that natural aerobic biodegradation processes are likely playing a significant role in the initial degradation of petroleum compounds located in the vicinity of the Former Three 10,000 Gallon USTs Area. Since the installation and initiation of monitoring activities for well MW-9 (located downgradient of the former three 10,000-gallon USTs) in August 2006, concentrations of TPHg, TPHg, and BTEX have generally declined. The greatest decline has been observed in TPHd concentrations, which have declined from 440 ug/L (August 2006) to 86 ug/L (December 2008). Other declines include benzene and TPHg, which have dropped from a high concentration of 250 and 7,400 ug/L, respectively (August 2006) to 120 and 2,300 ug/L, respectively (December 2008). During the last sampling event (December 2008), dissolved oxygen (DO) concentrations in well MW-9 were around 1.28 milligrams per liter (mg/L). Current literature suggests that optimal aerobic degradation of petroleum products occurs at DO concentrations above 2 mg/L. Therefore, the in-situ addition of an oxygen-releasing compound (e.g., calcium peroxide, magnesium peroxide) to affected groundwater may increase DO concentrations and help to accelerate the breakdown of petroleum hydrocarbons in affected media.

Advantages

- Generation of relatively small amounts of remediation wastes compared to ex-situ technologies.
- Reduced potential for cross-media transfer of contaminants commonly associated with ex-situ treatment.
- Reduced risk of human exposure to contaminated media, compared to ex-situ treatment technologies.
- Relatively lower cost or treatment compared to excavation and disposal, ex-situ treatment, and conventional pump-and-treat systems.
- Potential to remediate a site faster than with use of conventional technologies.

Limitations

- Specific contaminants at a site may not be amenable to biodegradation.
- Enhancement technologies, when needed, may be costly or their implementation may be technologically challenging.

7.0 PLANNED ENHANCED AEROBIC BIODEGRADATION ACTIVITIES

The primary purpose of the pilot study is to evaluate the ability to reduce the mass of petroleum hydrocarbons in the Former Three 10,000 Gallon USTs Area through EAB. EAB will be promoted through the in-situ addition of ORC. Design and application of the injection locations will be based on the nature and extent of petroleum-impacted groundwater at the Site as identified during previous sampling events. Specific objectives of the planned remediation activities include:

- ORC injection application specifications including volume and flow rates;
- Injection procedures and execution including schedule and personnel; and
- Groundwater monitoring and data analyses of injection effectiveness.

7.1 Prefield Activities

Prior to field activities, a number of pre-field activities will be completed. Prior to initiating fieldwork a soil boring permit will be obtained from Alameda County Public Works Department. USA will also be notified at least 48 hours prior to the commencement of field activities.

The existing Site-specific Health and Safety Plan (HASP) will be updated to incorporate the EAB activities prior to all fieldwork. The plan will provide for guidance to meet safety requirements of the Occupational Safety and Health Administration (OSHA) and will comply with AB&I health and safety requirements. Details will be provided on chemical safety and any other expected field activities. All contractors will be required to comply and sign off on the HASP as well as providing their own policies.

7.2 Injection Methodology

Injections will be completed using temporary direct-push points that will release the ORC approximately 5 and 20-feet below ground surface (bgs). Injections will be advanced within the area located upgradient of well MW-9. In addition, several points will be advanced within the area directly adjacent to well MW-9. A total of 15 points will be employed on 15-foot centers (Figure 3). A licensed drilling contractor will perform the injections. Each point will consist of a two-inch diameter stainless steel casing driven into the subsurface via a direct-push-type rig operated by qualified and experienced personnel. Hollow sections of steel casing will be added and advanced until the designed injection depth(s) are reached. Injections will be conducted using a ‘bottom-up’ injection approach starting at a depth of 20 feet and ending at a depth of five feet. Injections will be conducted at a rate so that an appropriate amount of ORC is injected per foot for each location. The quanitity and concentration of ORC will be decided based on the nature of the selected ORC, manufacturer recommendations, and site conditions. After the hollow steel rods are pushed or driven to the desired injection depth, the points will be connected to the ORC pumping and injection equipment. Upon completion of the injection event, the points will be removed.

In order to allow for easier injection, the ORC will be placed in a hopper equipped with a mixer. From the hopper a high pressure hose will be used to pump the solution into each injection point as the probe is extracted. The application will be repeated for each point, with the intention of creating a consistent concentration of substance throughout the injection interval (i.e., 5 to 20 feet bgs).

7.3 Effectiveness Monitoring

The effectiveness of the treatment will be monitored by analyzing groundwater samples for reductions in TPH and VOCs concentrations. Prior to the injection event, a baseline sample will be collected from well MW-9. Groundwater monitoring well MW-9 is located directly downgradient of the injection points and will be used to provide the indications of contaminant reduction. Groundwater samples will be collected and analyzed on a monthly basis for three months, reducing to semi-annual after initial effectiveness can be determined. Baseline and post-injection groundwater samples will be analyzed for TPHg, TPHd, and VOCs using EPA Methods 8015M and 8260B, respectively. Field measurements will be taken for DO, water temperature, pH, conductivity, and oxidation/reduction potential. Groundwater monitoring wells will be sampled in accordance with the procedures and methodologies outlined in SGI's work plan titled, "Revised Site Investigation Work Plan", dated September 17, 2007 (SGI 2007).

7.4 Equipment Decontamination

Disposable soil sampling equipment, such as small tools and disposable gloves, will be decontaminated or disposed of after each use. The decontamination procedure consisted of:

- Wash in a phosphate-free soap and water mixture;
- Rinse thoroughly in distilled water following washing; and
- Final rinse using distilled water.

Decontamination of larger drilling equipment will be conducted using a steam cleaner supplied by subcontractor selected for injection work.

7.5 Waste Management

Soil cuttings and decon water generated during the injection activities will be stored on Site in properly labeled containers pending proper disposal.

8.0 EVALUATION OF PILOT STUDY TEST

Following the EAB injection event, a three-month program of testing and monitoring will be implemented to monitor the performance of the EAB injections and provide data for final design of a full-scale EAB program. The performance objectives for the EAB program will be as follows:

- Ensure that EAB is compatible with site-specific conditions.
- Evaluate effectiveness of EAB injections.
- Evaluate longevity of EAB Injections.

Ensure that EAB is Compatible with Site-Specific Conditions

This objective seeks to ensure the sufficient quantities of ORC are injected based on site lithology. During the field activities, detailed notes will be taken regarding how much ORC can be injected at various depths within the target areas. Modifications to field activities may be made to better accommodate site-specific conditions.

Evaluate Effectiveness of EAB injections

Upon completion of EAB injection activities, groundwater samples will be collected from MW-9 to confirm that DO concentrations are elevated and that the mass of petroleum hydrocarbons in the test area have been reduced relative to the baseline sample.

Evaluate Longevity of EAB Injections

This objective seeks to ensure that the selected ORC has sufficient longevity to treat the required contamination within the target area. Specifically, DO concentrations in groundwater samples collected from well MW-9 will be monitored to determine how long DO concentrations remain elevated (greater than 2 milligrams per liter).

9.0 REPORTING AND SCHEDULE

9.1 Reporting

Upon completion of the three-month field program, a report will be prepared by SGI outlining the procedures and methodologies used during the EAB pilot study. Results of the pilot study will be presented and any recommendations will be discussed. Analytical data will be presented in tabular format and annotated on the appropriate figures. Figures will include a Site location map, Site map showing the sample locations, and a Site map showing annotated contaminant concentrations. The report will contain all pertinent documentation such as permits, boring logs, laboratory reports, survey data, and COC forms. The final report will be reviewed in its entirety and signed by a California State-licensed professional geologist or engineer.

Electronic copies of the report and other data will be submitted to ACEH's ftp site and the State Water Resources Control Board's (SWRCB's) Geotracker web site.

9.2 Schedule

The work proposed in this Work Plan will be conducted according to the following tentative schedule:

Date	Activities
March 12, 2009	Submit Work Plan to ACEH
March 27, 2009	ACEH Review and Approval of Work Plan
March 30 through April 3, 2009	Pre-field Activities/Access Permits/Baseline Sampling
April 6 through April 10, 2009	Field Work (Injections)
April 13 through July 3, 2009	EAB Effectiveness Monitoring
July 6 through August 7, 2009	Data Analysis and Report Preparation
August 7, 2009	Report Submittal to ACEH

10.0 REFERENCES

Alameda County Department of Environmental Health (ACEH). 2008. Letter regarding, "Fuel Leak Case No. RO0000092, American Brass & Iron Foundry, 7825 San Leandro Street, Oakland, California", November 4.

BSK Associates, Inc. (BSK). 1993. "Report Shallow Soil and Groundwater Investigation American Brass & Iron Foundry", April 30.

BSK Associates, Inc. (BSK). 2007. "Preliminary Groundwater Investigation Report AB&I Foundry", June 11.

California Department of Water Resources, 1991. California Well Standards. Bulletin 74-90. June.

California Regional Water Quality Control Board (CRWQCB). 2007. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final. November.

Helley, E.J., K.R. Lajoie, W.E. Spangle, and M.L. Blair. 1979. Flatland Deposits of the San Francisco Bay Region, California, Their Geology and Engineering Properties, and Their Importance to Comprehensive Planning. U.S. Geological Survey Professional Paper 943. Washington D.C.

Muir, K.S., 1993. Geologic Framework of the East Bay Plain Groundwater Basin, Alameda County, California.

The Source Group, Inc. (SGI 2007). "Revised Site Investigation Work Plan", AB&I Foundry, 7825 San Leandro Street, Oakland, California, September 17.

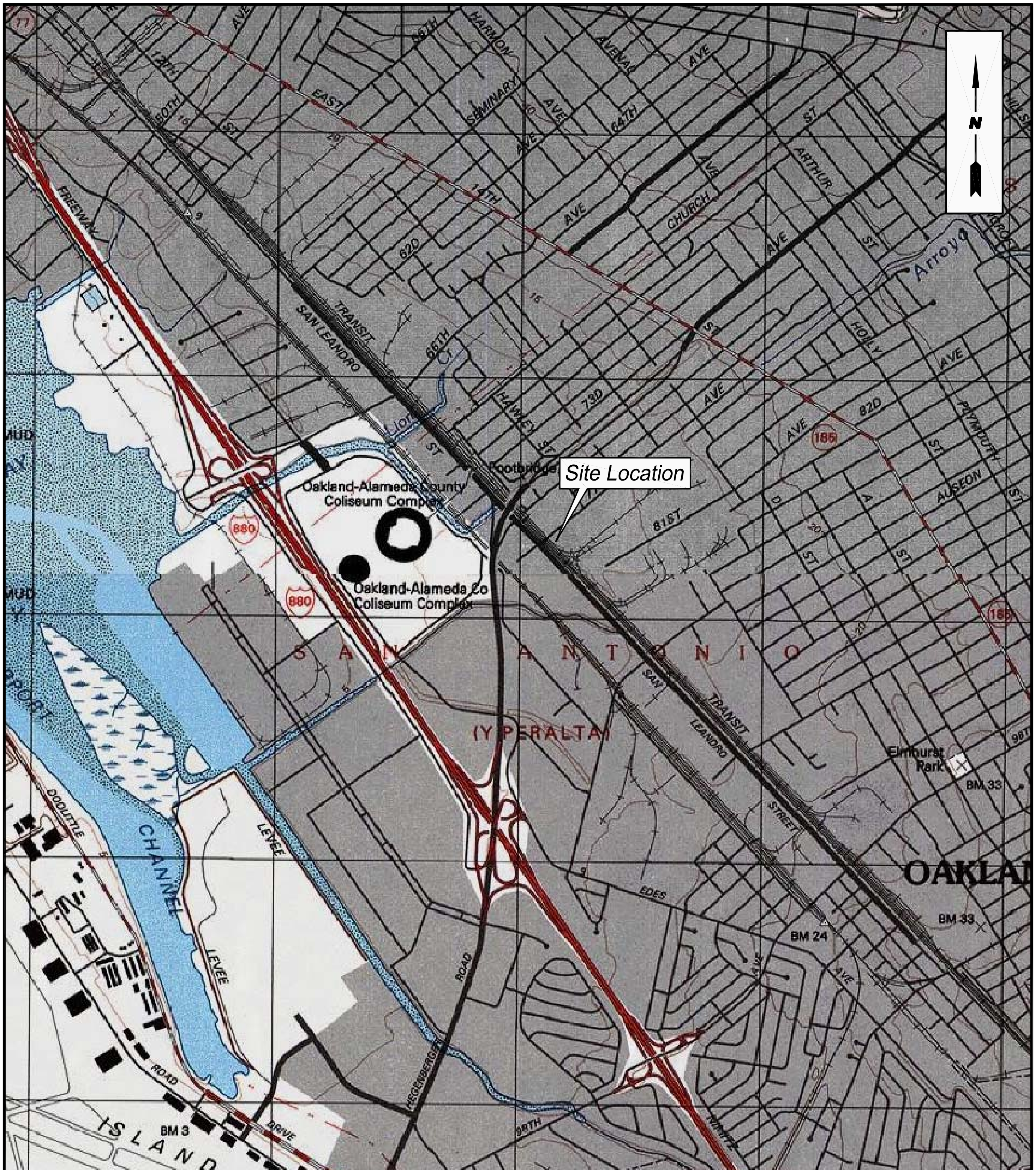
The Source Group, Inc. (SGI 2008a). "Site Investigation Report", AB&I Foundry, 7825 San Leandro Street, Oakland, California, February 14.

The Source Group, Inc. (SGI 2008b). "Report for Additional Site Investigation", AB&I Foundry, 7825 San Leandro Street, Oakland, California, September 25.

The Source Group, Inc. (SGI 2009). "Quarterly Groundwater Monitoring and Sampling Report Third and Fourth Quarter 2008", AB&I Foundry, 7825 San Leandro Street, Oakland, California, January 13.

USEPA, 1989. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. Interim Final. Solid Waste and Emergency Response. December.

FIGURES



THE SOURCE GROUP, INC.

3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

SOURCE: U.S.G.S. 7.5' QUAD SHEET
OAKLAND EAST, CALIFORNIA
PHOTOREVISED 1997

SCALE: 0 FEET 2000 SCALE

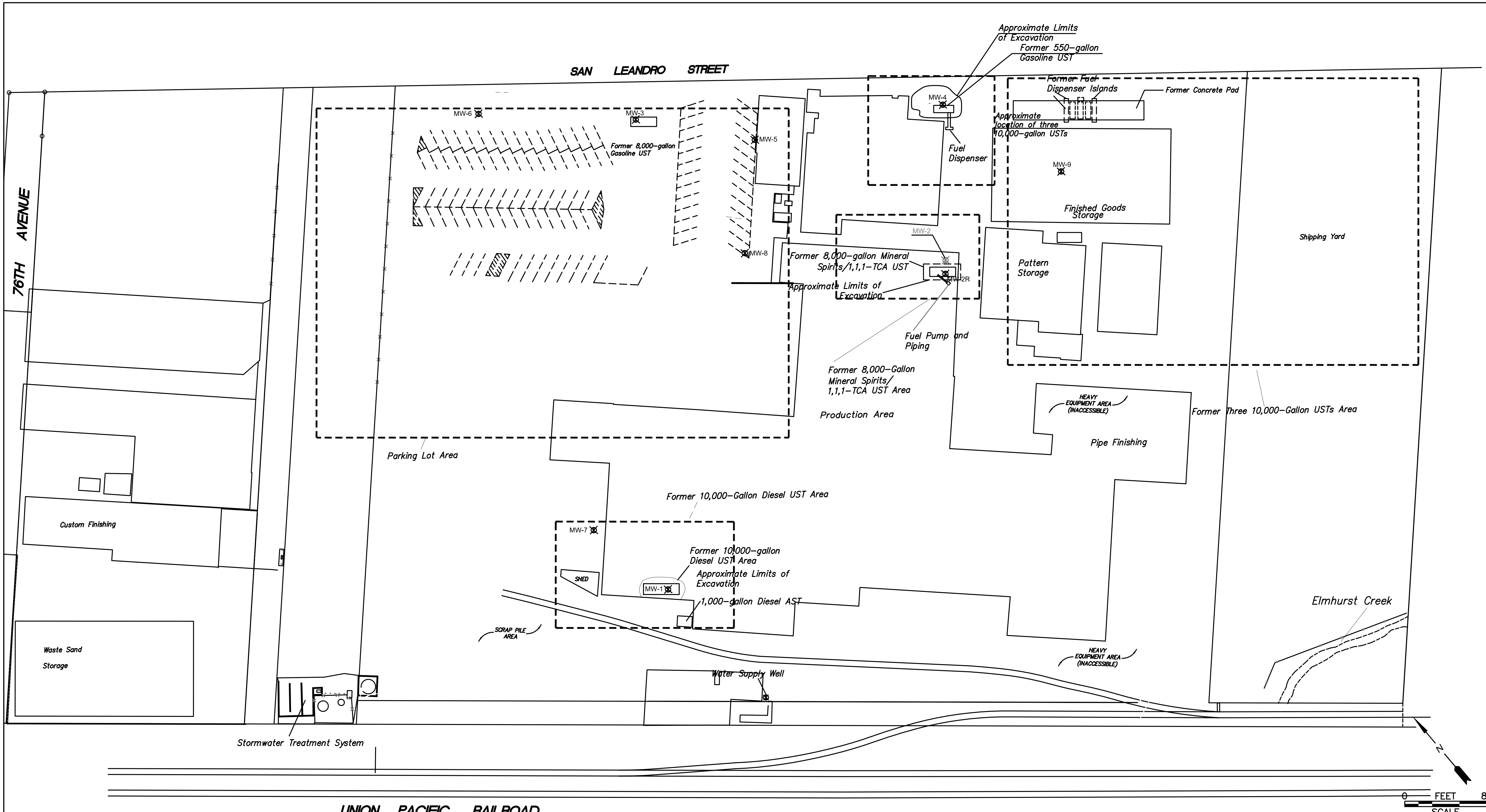
SITE LOCATION MAP

CLIENT: AB&I FOUNDRY

DATE: 6/27/07

LOCATION: 7825 San Leandro Street
Oakland, California

FIGURE: 1



Legend

MW-1	Existing Monitoring Well Location (BSK, 1993, 2006)
MW-1	Abandoned Monitoring Well (BSK, 2006)
UST	Underground Storage Tank
1,1,1-TCA	1,1,1-trichloroethane

SITE PLAN

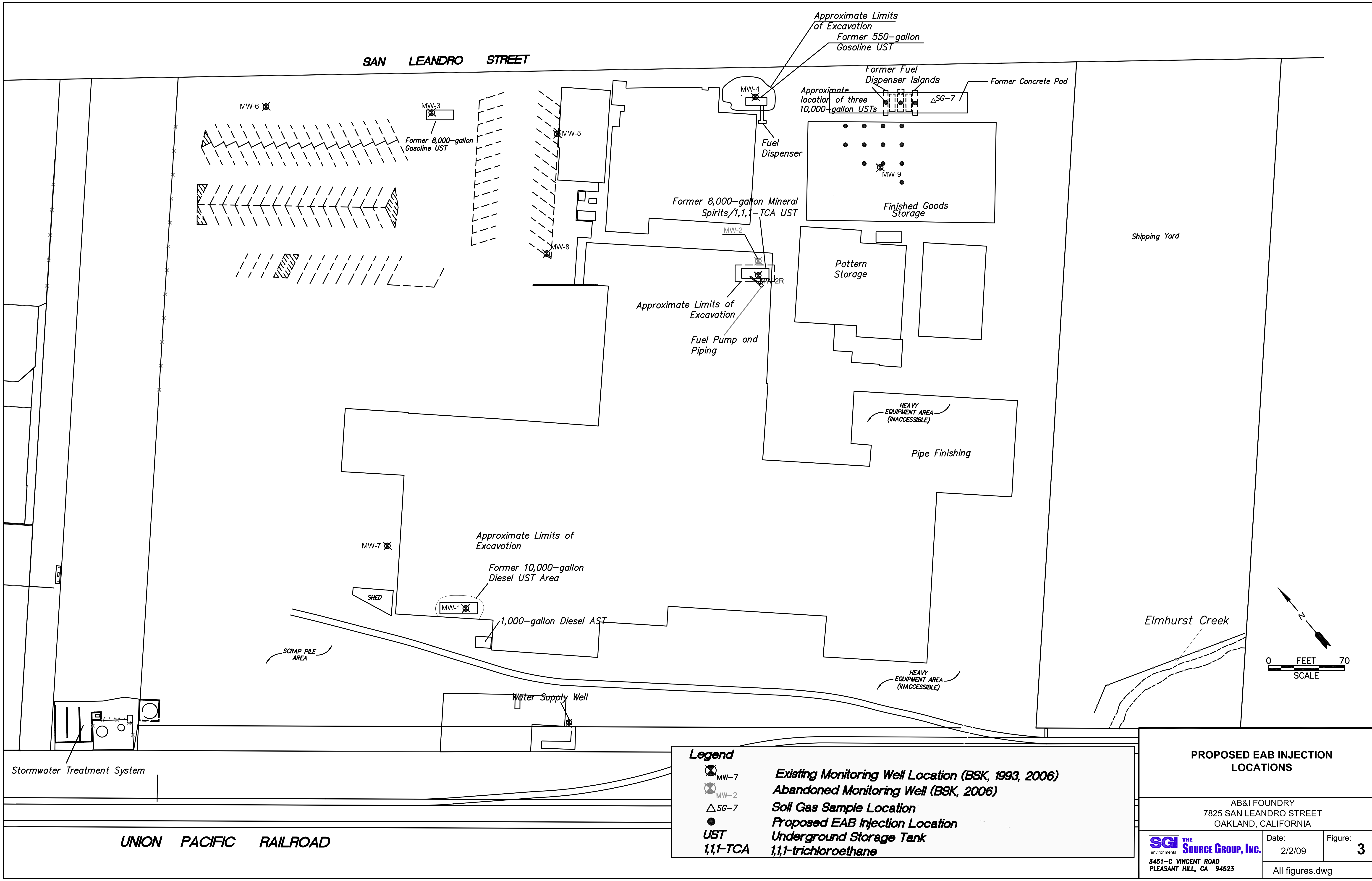
AB&I FOUNDRY
7825 SAN LEANDRO STREET
OAKLAND, CALIFORNIA

SGI environmental THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

Date: 1/19/08

Figure: 2

All figures.dwg


SAN LEANDRO STREET
Approximate Limits of Excavation
Former 550-gallon Gasoline UST
Former Fuel Dispenser Islands
Former Concrete Pad
Approximate location of three 10,000-gallon USTs
SG-7
MW-4
MW-6
MW-3
Former 8,000-gallon Gasoline UST
MW-5
Fuel Dispenser
MW-9
Finished Goods Storage
Former 8,000-gallon Mineral Spirits/1,1,1-TCA UST
MW-2
MW-2R
MW-8
Approximate Limits of Excavation
Fuel Pump and Piping
Pattern Storage
Shipping Yard
HEAVY EQUIPMENT AREA (INACCESSIBLE)
Pipe Finishing
Approximate Limits of Excavation
MW-7
Former 10,000-gallon Diesel UST Area
SHED
MW-1
1,000-gallon Diesel AST
SCRAP PILE AREA
HEAVY EQUIPMENT AREA (INACCESSIBLE)
Elmhurst Creek
N
0 FEET 70
SCALE
Water Supply Well
Stormwater Treatment System
UNION PACIFIC RAILROAD
Legend
MW-7 Existing Monitoring Well Location (BSK, 1993, 2006)
MW-2 Abandoned Monitoring Well (BSK, 2006)
SG-7 Soil Gas Sample Location
Proposed EAB Injection Location
UST Underground Storage Tank
1,1,1-TCA 1,1,1-trichloroethane
PROPOSED EAB INJECTION LOCATIONS
AB&I FOUNDRY
7825 SAN LEANDRO STREET
OAKLAND, CALIFORNIA
SGI environmental THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523
Date: 2/2/09
Figure: 3
All figures.dwg