GRIBI ASSOCIATES

December 31, 2008

Alameda County Department of
Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502

Attention: Steven Plunkett

Subject: Revised Workplan to Conduct Ozone Injection Pilot Test
1075 40th Street, Oakland, CA 94608
ACDEH Site No. RO000186

Ladies and Gentlemen:

Gribi Associates is pleased to submit this revised workplan on behalf of Fidelity Roof Company for the underground storage tank (UST) site located at 1075 40th Street in Oakland, California (see Figure 1 and Figure 2). This workplan, which proposes to conduct an ozone injection pilot test at the site, is a revision of an ozone injection pilot test workplan contained in *Workplan to Conduct Site Remediation Activities*, (Gribi Associates, April 3, 2007) and the *Workplan Addendum*, (Gribi Associates, June 7, 2007).

SITE BACKGROUND

Significant remediation and investigation activities were conducted at this site in the past. These activities are summarized in the following sections. Selected results from these activities are summarized on Figures 3, 4, and 5.

UST Removal and Overexcavation Activities

On December 19, 1995, Tank Protect Engineering, Inc. removed one 1,000-gallon diesel UST and one 500-gallon gasoline UST from a single excavation cavity on the southeast corner of the property. Soil sample analytical results indicated minimal soil hydrocarbon impacts beneath the 1,000-gallon UST. On September 12, 1996, All Environmental, Inc. (AEI) drilled and sampled four soil borings, SB-1 through SB-4, near the former UST excavation. Analytical results from the subsurface investigation revealed significant soil hydrocarbon impacts east and west of the UST excavation cavity.

On October 25, 1996, AEI extended the excavation cavity laterally seven feet to the south and 12 feet to the west. Soil was removed to a depth of nine feet below ground surface. The dispenser island and associated piping were also removed. Analyses of the soil samples collected from the excavation sidewalls indicated up to 150 milligrams per kilogram (mg/kg) of TPH-G, 16 mg/kg of benzene, and 300 mg/kg of TPH-D remained within the western excavation sidewall.

Site Investigation Activities

On March 6, 1997, AEI installed three groundwater monitoring wells, MW-1, MW-2, and MW-3. Significant groundwater hydrocarbon impacts were encountered in well MW-3, located approximately ten feet west-northwest from the former fuel dispenser island. Low to nondetectable groundwater hydrocarbon impacts were detected in groundwater samples from wells MW-1 and MW-2, located south and north, respectively, from the former UST excavation cavity.

On November 4, 1998, AEI drilled and sampled six additional soil borings, SB-1 through SB-6, south and west from the former excavation cavity. An elevated concentration of diesel-range hydrocarbons was noted in a grab groundwater sample from a southerly boring; groundwater analytical results from west borings showed no significant hydrocarbon impacts.

On May 6, 2004, AEI installed one vapor extraction well, VE-1, and two air sparge wells, AS-1 and AS-1, at the site. In addition, six shallow drive point small diameter monitoring wells, DP-1 through DP-6, were installed on May 13, 2004 using direct push technology. On May 19 and 20, 2004, AEI conducted a soil vapor extraction/air sparge pilot test using newly-installed wells. The results of this pilot test and recommendations for remediation are summarized in AEI's *Soil Vapor Extraction and Air Sparge Pilot Test Report*, dated August 6, 2004.

Between March 8 and March 13, 2006. AEI conducted a five-day high vacuum dual-phase (SVE and groundwater extraction) extraction (HVDPE) event at the site. On March 8, 2006, extraction began on well MW-3. Total influent hydrocarbon concentrations ranged from approximately 156 part per million by volume (ppmv) to 355 ppmv. The total system flow rate ranged from 32 to 50 standard cubic feet per minute (scfm). Extraction well VE-1 and monitoring well MW-2 were connected to the system on March 10, 2006. Total influent hydrocarbon concentrations ranged from approximately 427 to 612 ppmv. The total system flow rate ranged from 108 to 124 scfm. Hydrocarbon concentrations stabilized in the 450 to 500 ppmv range until the end of the day on March 12, 2006 when the concentrations fell to about 340 ppmv. By the last day of the event, concentrations stabilized in the 150 to 200 ppmv range. Mass removal estimates using field data indicated a total of approximately 58.4 pounds of hydrocarbons were recovered. With a 97% system uptime, this equals approximately 12.65 pounds per day (lb/day) of vapor phase hydrocarbons recovered. AEI estimated the approximate total mass of hydrocarbons in the smear zone (from approximately 5.5 to 12 feet bgs) to be 1,821 pounds, or 299 gallons.

AEI installed two additional groundwater monitoring wells, MW-5 and MW-6, on December 14, 2006. Soil and groundwater analytical results from these wells showed low to nondetectable hydrocarbon impacts.

Recent Site Remediation Activities

Review of previous site data showed soil and groundwater hydrocarbon impacts extending downgradient (west-northwest) from the former fuel dispenser area. Due to the low permeability soils beneath the site, these impacts were fairly small and concentrated. The soil and groundwater impacts included gasoline-range hydrocarbons above regulatory screening levels, and free phase hydrocarbons (free product) in a single well, MW-3. Remediation of the free product would be required prior to obtaining regulatory site closure.

To address free-product and associated soil and groundwater impacts in the vicinity of MW-3, Gribi Associates submitted the *Workplan to Conduct Site Remediation Activities* and the *Addendum to Workplan to Conduct Site Remediation Activities* to the Alameda County Department of Environmental Health (ACDEH) on April 3, 2007 and June 7, 2007, respectively. The workplan and workplan addendum were approved by the ACDEH on May 23, 2007 and August 8, 2007, respectively.

Seven site groundwater monitoring and remediation wells were decommissioned on November 23, 2007. The decommissioned wells consisted of one 2-inch diameter monitoring well (MW-3), four 3/4-inch diameter monitoring wells (DP-3 through DP-6), and two 2-inch diameter remediation wells (AS-1 and AS-2).

On November 27, 2007, four investigative soil borings, B-1 through B-4, were drilled by Gregg Drilling to depths ranging from approximately 16 feet to 30 feet in depth using direct-push hydraulically-driven soil coring equipment. Soils encountered in boring B-1 through B-4 were generally similar, consisting primarily of silty gravel fill material to a depth of approximately 8 feet below surface, followed by silty clays to total boring depths. Groundwater was encountered in all borings at depths of approximately 8 feet below surface grade. Moderate hydrocarbon staining and odors were noted in soils in all four borings at the fill/native interface, from about 8 feet to 10 feet below surface grade. Soils below 10 feet in depth in the four borings did not exhibit significant staining or odors. Soil and groundwater laboratory analytical results for these four borings are summarized on Figure 3. Results of the soil boring investigation showed relatively low soil and groundwater hydrocarbon impacts in native soils at the base of the former UST overexcavation cavity. The highest soil and groundwater hydrocarbon impacts were encountered in boring B-2, located beneath the former UST itself, in the northeast corner of the former overexcavation cavity. The soil sample collected at 8 feet in depth in B-2 showed 170 mg/kg of TPH-G, 0.087 mg/kg of benzene, and 1.4 mg/kg of MTBE. Soil samples collected at 12 feet and 16 feet in depth showed low concentrations of TPH-G, but did show respective benzene concentrations of 1.1 mg/kg and 1.1 mg/kg, and respective MTBE concentrations of 6.5 mg/kg and 3.8 mg/kg. The grab groundwater sample from boring B-2 showed 320 ug/l of TPH-G, 4.6 ug/l of benzene, and 180 ug/l of MTBE. These concentrations are all above the RWQCB's drinking water ESLs for TPH-G, benzene, and MTBE; however, they are generally below nondrinking water ESLs. Groundwater below the site is not currently a drinking water source, and there is little expectation that groundwater below the site would be used for drinking water purposes in the future.

Soil excavation and disposal activities and confirmation soil sampling activities were conducted between March 10, 2008 and March 12, 2008. Groundwater removal and excavation backfill and resurfacing activities were conducted between March 18, 2008 and March 25, 2008. Source removal activities included: (1) The permitted decommissioning of seven site wells; (2) The excavation and offsite disposal of approximately 282 tons of hydrocarbon-impacted soil; (3) The removal of approximately 2,500 gallons of hydrocarbon-impacted groundwater from the excavation cavity; (4) The collection and laboratory analysis of excavation cavity verification soil samples and soil and water disposal samples; and (5) The backfilling of the excavation cavity with both reused clean excavated soil and clean imported fill material The goals of these activities were to sufficiently remediate the site and move the site towards regulatory closure.

Source removal activities appear to have been effective in removing a significant volume of hydrocarbon-impacted soils and groundwater immediately west and northwest from the former UST excavation cavity. Approximately 282 tons of hydrocarbon impacted soil was excavated and disposed of at the West Contra Costa County Landfill in Richmond, California, and approximately 2,500 gallons of hydrocarbon impacted groundwater was removed and disposed of at the Instrat facility in Rio Vista California. Confirmation soil sample laboratory analytical results are summarized on Figure 4. Excavation pit sidewall soil samples, collected in the groundwater hydrocarbon “smear zone” at about 10 feet in depth, showed low to nondetectable concentrations of hydrocarbon constituents, with the highest TPH-G and benzene concentrations being 73 mg/kg and 0.033 mg/kg, respectively. Excavation pit bottom soil samples, collected at 12 feet in depth, showed low to nondetectable concentrations of hydrocarbon constituents, with the highest TPH-G and benzene concentrations being 170 mg/kg and 0.012 mg/kg, respectively. While the highest TPH-G soil concentration (170 mg/kg) is above the San Francisco Bay Regional Water Quality Control Board’s (RWQCB’s) drinking water soil environmental screening level (ESL) of 100 mg/kg, this appears to be a laterally isolated occurrence at 12 feet in depth. In addition, the highest benzene soil concentration (0.033 mg/kg) is below the drinking water soil ESL of 0.044 mg/kg. Thus, residual soil hydrocarbon impacts in the excavation area appear to be minimal and do not pose a significant environmental or human health risk.

The grab groundwater sample from the water holding tank showed 240 ug/L of TPH-G, 440 ug/L of TPH-D, and no detectable benzene. While the TPH-G and TPH-D concentrations are above the drinking water ESL for TPH-G and TPH-D of 83 ug/L, the lack of detectable benzene in this sample would tend to reduce the risk posed by this groundwater. Also, groundwater below the site is not currently a drinking water source, and there is little expectation that groundwater below the site would be used for drinking water purposes in the future.

Results of source removal activities were reported in *Report of Source Removal Activities*, (Gribi Associates, April 22, 2008). Based on source removal activities, this report recommended no additional investigation or remediation in this area of the site.

Quarterly groundwater monitoring has been conducted for site wells since 2001. Results of this and previous monitoring events seem to indicate: (1) A general west-northwesterly groundwater flow gradient beneath the site; and (2) A relatively small groundwater hydrocarbon plume extending 30 to 40 feet northwest from the former UST area. Groundwater laboratory analytical results from the most recent groundwater monitoring event are summarized on Figure 5.

WORKPLAN TO CONDUCT OZONE INJECTION PILOT TEST

The April 3, 2007 ozone injection pilot test workplan proposed the installation of five ozone injection wells, followed by four months of ozone injection in the wells. On May 23, 2007, ACDEH issued a letter approving the workplan approach, but requesting additional explanation and information before implementing the workplan. Specific additional pilot test-related explanation was requested relative to injection well depths, spatial distribution of injection wells, possible hydrocarbon vapor off gasing, and completeness of the chemical oxidation process. On June 6, 2007, Gribi Associates submitted a workplan addendum that provided the requested additional explanation. This workplan addendum was approved by ACDEH in a letter dated August 8, 2007. However, in a subsequent phone conversation, Ms. Donna Drogos of ACDEH stated that she would not approve the workplan because: (1) Five injection wells were too many for a pilot test; (2) Four months of ozone injection was too long for a pilot test; and (3) The existing monitoring well network was insufficient to monitor remediation effectiveness. This revised workplan seeks to address these ACDEH concerns.

General Description of Pilot Test and Remediation Method

The ozone injection pilot test will involve (1) The installation of three small-diameter injection wells, IW-1, IW-2, and IW-3, to about 25 feet in depth, screened with specially-manufactured injection screen; (2) The installation of two shallow vapor monitoring wells, VW-1 and VW-2, to assess health and safety concerns; (3) The installation of five additional groundwater monitoring wells, MW-7 through MW-11, to provide additional groundwater data during and after the pilot test; (4) The installation of above/below ground small-diameter delivery tubing; (5) The operation of a mobile ozone generation unit on the site for approximately three months; and (6) Periodic monitoring of a wide range of parameters to measure remediation effectiveness and health and safety concerns.

The advantages of this remediation include (1) The ozone generation equipment is small (contained within a 4' by 8' trailer), such that, once installed, the system would have minimal impact on site uses, (2) The system operates on 110 volts, and uses minimal amounts of electricity, (3) Ozone breaks down the gasoline-range hydrocarbons in soil and groundwater, thus requiring no SVE in vadose zone soils and no air discharge permitting, and (4) Ozone injection is generally more rapid in remediating groundwater hydrocarbon impacts than groundwater pump and treat.

Ozone (O_3) is a strong oxidant that can be used to destroy petroleum contamination *in-situ*. Because it is a highly reactive gas and decomposes fairly rapidly, it is typically generated in close proximity to the treatment area and delivered to the subsurface through closely-spaced injection points/wells. Delivery concentrations and rates vary because of the high reactivity of ozone and associated free radicals. In typical applications, air containing up to five percent ozone is injected into the groundwater, where it dissolves in the water and reacts with subsurface organics, and ultimately decomposes to oxygen. Ozone can oxidize site contaminants directly or through formation of hydroxyl radicals (OH), strong nonspecific oxidants with an oxidation potential that is about 1.4 times that of ozone.

Once introduced into subsurface groundwater, ozone reacts with natural organic materials, natural inorganic materials (primarily oxidizable metals), and residual hydrocarbons. That portion of the ozone which reacts with natural organic and inorganic materials is unavailable for hydrocarbon oxidation. Given the inherent variability in subsurface regimes, the hydrocarbon chemical oxygen demand can vary significantly, and can be affected by such factors as groundwater pH, metals and organic content, and porosity/permeability. The complete oxidation reaction for benzene is as follows (EPA, May 2004):

$$C_6H_6O + 7.5O_2 \text{ -> } CO_2 + 3H_2O$$

In theory, the amount of oxygen required per gram of contaminant for benzene and most other gasoline constituents is 3.0 to 3.5 grams. For example, for 4,000 grams of benzene, approximately 12,000 grams of ozone would be required for full oxidation; for 30,000 grams of gasoline, approximately 90,000 grams of ozone would be required for full oxidation.

Because ozone decomposes into oxygen, ozone is also effective in delivering dissolved oxygen to enhance subsurface bioremediation of petroleum-impacted areas. Ozone is ten times more soluble in water than is pure oxygen. Consequently groundwater becomes increasingly saturated with dissolved oxygen as the unstable ozone molecules decomposes into oxygen molecules. About one-half of dissolved ozone introduced into subsurface degrades to oxygen within approximately 20 minutes. The dissolved oxygen can then be used by indigenous aerobic hydrocarbon-degrading bacteria[1].

[1] United State Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*", EPA 510-R-04-002, May 2004.

Ozone Injection System Design Considerations

The ozone injection pilot test will be designed to assess not only remediation effectiveness, but also injection radius of influence, optimum ozone injection concentration and flow rate, and optimum system operation to minimize potential health and safety concerns.

The three ozone injection wells, IW-1, IW-2, and IW-3, will be sited at varying distances from existing and newly-installed groundwater monitoring wells in order to assess ozone radius of influence. Also, the injection diffusers will be installed at sufficient depth below the groundwater table (10 to 15 feet below the water table) to allow for adequate widening of the dissolved ozone cone as it slowly rises in groundwater.

The ozone injection pilot test will be run for three months. It is our experience that ozone injection over several months is necessary to adequately test this technology. From a theoretical standpoint, this relatively long duration would be expected, given the large relative amount of ozone required for hydrocarbon oxidation and the possible interferences from other ozone reactants.

Ozone Injection Health and Safety Considerations

Ozone is one of the strongest known oxidants and is highly reactive in the subsurface environment (EPA, 2004). Possible undesired effects of ozone injection can include: (1) Degradation of underground metal objects (such as nearby metal utilities or tanks); (2) Oxidation of naturally occurring chromium (primarily chromate) to form hexavalent chromium, a known carcinogen; (3) Oxidation of naturally occurring bromide to form bromate, a known carcinogen; (4) Volatilization and upward migration of VOCs (i.e. air sparging); and (5) "Short circuiting" of ozone to the surface.

There are no known USTs systems within the site vicinity. During previous investigations for the site, Gribi Associates conducted an underground utilities survey using Foresite, a private utility locator. The only identified buried utility in close proximity to the proposed ozone injection area is a sewer line buried at about three feet in depth and running east-west, just north of well MW-2. Proposed injection well locations were chosen to allow for at least 25 feet distance between injection wells diffusers (at 25 feet in depth) and the buried sewer line (at three feet in depth). In addition, field ozone vapor monitoring will be conducted in existing and newly-installed shallow vapor monitoring wells to investigate this concern.

Both hexavalent chromium and bromate can be oxidized in the presence of chromate and bromide, respectively. Bromate forms in a sequence of reactions whereby bromide ions react with dissolved ozone to form the intermediate product hypobromide, which then reacts with ozone to form bromate [2]. Limiting dissolved ozone by periodic injections (as is the case with the proposed injection pilot test), rather than continuous injections, can limit bromate formation by limiting the formation of hypobromide and subsequent oxidation. Groundwater samples will be analyzed for bromate and hexavalent chromium as part of the pilot test monitoring requirements.

Factors which would tend to minimize the possibility, or mitigate the effects, of VOC vapor generation include: (1) Injecting an ozone/air mixture with a relatively high ozone concentration (low air concentration); (2) Conducting ozone injection at relatively low flow rates (less than 2 scfm); (3) Conducting ozone injection intermittently for short durations, rather than continuously; (4) The ground surface overlying the pilot test area is completely concrete and asphalt paved, thus acting as a vapor barrier; and (5) There are no buildings overlying the injection area to trap possible relict VOCs. To monitor for possible VOC vapor generation, we will: (1) Install one shallow vapor sampling wells (VW-1, VW-2, and VW-3); and (2) Conduct field monitoring of well boxes and inside all monitoring well casings (both groundwater monitoring wells and vapor monitoring wells) immediately after uncapping for all nearby wells using a field organic vapor monitor (OVM).

Factors which would tend to minimize the possibility, or mitigate the effects, of ozone “short circuiting” include: (1) Proper well installation to insure tight well seal; (2) Conducting ozone injection at relatively low flow rates (less than 2 scfm); (3) Conducting ozone injection intermittently for short durations, rather than continuously; (4) The ground surface overlying the pilot test area is completely concrete and asphalt paved, thus acting as a vapor barrier; (5) There are no buildings overlying the injection area to trap possible relict ozone vapors; and (6) Ozone is relatively unstable in air, and would tend to alter to oxygen in a relatively short time period. To monitor for ozone leakage or short circuiting, we will utilize a field ozone detector, and will check: (1) Inside the injection well and monitoring well boxes; (2) Inside adjacent groundwater and vapor monitoring wells immediately after uncapping; (3) At all piping connections; and (4) At the ozone generator.

Description of Field Activities

Prefield Activities

Prior to beginning field activities, well permits for the three ozone injection wells and five groundwater monitoring wells will be obtained from Alameda County Public Works Agency. In addition, proposed well locations will be marked with white paint, and Underground Services Alert (USA) will be notified at least 48 hours prior to drilling. Also, a private underground

[2] Bowman, Reid H., Ph.D., *HiPOx Ozone-Peroxide Advanced Oxidation System for Treatment of Trichloroethlene and Perchloroethylene Without Forming Bromate*, International Ozone Association Converence “2003 IOA World Conference”, Las Vegas, Nevada, July 2003.

utility locator will clear proposed well locations. Prior to drilling, a Site Safety Plan will be prepared, and a tailgate safety meeting will be conducted with all site workers.

Location of Injection and Monitoring Wells

Proposed locations for the three ozone injection wells, IW-1, IW-2, and IW-3, the two shallow vapor monitoring wells, VW-1 and VW-2, and five groundwater monitoring wells, MW-7 through MW-11, are shown on Figure 6. In order to assess ozone injection varying radii of influence and overall effectiveness, the three injection wells will be spaced in a semi-grid pattern within the groundwater hydrocarbon plume area, in between existing and proposed new monitoring wells. The two shallow vapor monitoring wells, VW-1 and VW-2, will be sited adjacent to the site building and adjacent to the buried sewer line, to insure that possible fugitive ozone and/or VOCs are not migrating towards adjacent buildings or buried utilities. Proposed monitoring well MW-7 will be sited along the MTBE/TBA groundwater plume median, between existing wells MW-2 and MW-6; proposed monitoring wells MW-8 through MW-11 will be arrayed along the expected downgradient and transgradient perimeter of the MTBE/TBA groundwater plume.

Drilling and Sampling of Well Borings

Injection wells will be installed using a combination of direct-push and hollow stem auger equipment. Groundwater and vapor monitoring wells will be installed using direct-push coring equipment only. For each well boring, direct-push equipment will be utilized to obtain continuos soil cores to total depth in each boring in a clear plastic acetate tube, nested inside a stainless steel core barrel. After each four-foot core barrel is brought to the surface and exposed, the core will be examined, logged, and field screened for hydrocarbons by a qualified geologist using sight, smell, and an organic vapor monitor (OVM). Soil cuttings generated during this investigation will be stored onsite in sealed DOT-approved containers.

Subsurface soils will be sampled at approximately five-foot intervals starting at five feet in depth, and including intervals with obvious hydrocarbon impacts. After the sample and core barrel are raised to the surface, each sample will be collected as follows: (1) The filled acetate tube will be exposed for visual examination; (2) The selected sample interval will be collected by cutting the sample and acetate plastic tubing to the desired length (typically about six inches); (3) The ends of the selected sample will be quickly wrapped with Teflon sheets or aluminum foil, capped with plastic end caps, labeled and wrapped tightly with tape; and (4) The sealed soil sample will be labeled and immediately placed in cold storage for transport to the analytical laboratory under formal chain-of-custody. All coring and sampling equipment will be thoroughly cleaned and decontaminated between each sample collection by triple rinsing first with water, then with dilute tri-sodium phosphate solution, and finally with distilled water. Cleaning rinseate will be contained onsite in a sealed drum pending laboratory results. At least one soil sample from each well boring will be analyzed for TPH-G, BTEX, and Oxygenates by a State-certified analytical laboratory.

Installation of Injection and Monitoring Wells

The three injection wells, IW-1, IW-2, and IW-3, will be installed using hollow stem auger equipment and will be constructed using 3/4-inch diameter Schedule 80 threaded PVC casing according to the following general specifications: (1) The well boring will be drilled to the desired depth (approximately 25 feet below surface); (2) A 12-inch long microporous silica-bonded diffuser will be placed at the base of the well boring (generally 24 to 25 feet in depth, but may vary) followed by blank 3/4-inch diameter well casing to surface; (3) As the hollow stem augers are removed slowly, filter sand will be placed around the well casing to approximately one foot above the diffuser (approximately 23 feet in depth); (4) A two-foot bentonite seal will be placed above the filter sand using time release bentonite pellets; and (5) The remaining annulus will be grouted using a cement/sand slurry (bentonite less than 5 percent) to approximate surface grade. The top of the well will be enclosed in a traffic-rated locking box set in concrete slightly above grade. In order to attempt to assure a tight surface seal to discourage “short circuiting” of ozone to the surface during injection, the blank casing above the diffuser will be abraded slightly prior to placement using coarse sandpaper.

The two shallow vapor monitoring wells, VW-1 and VW-2, will be installed using hand auger equipment. These wells will be constructed using 3/4 inch diameter Schedule 40 threaded PVC casing according to the following general specifications: (1) Soil will be cored to approximately five feet in depth using 3-1/2-inch diameter hand augering equipment; (2) 0.020-inch slotted well casing will be placed from five feet to three feet in depth, followed by blank well casing to surface; (3) As the outer core barrel is removed slowly, filter sand will be placed around the well casing to approximately 2.5 feet in depth; (4) A one foot bentonite seal will be placed above the filter sand; and (5) The remaining annulus will be grouted using a cement/sand slurry (bentonite less than 5 percent) to approximate surface grade. The top of the well will be enclosed in a traffic-rated locking box set in concrete slightly above grade.

The five groundwater monitoring wells, MW-7 through MW-11, will be installed using direct-push coring equipment. These wells will be constructed using 3/4 inch diameter Schedule 40 threaded PVC casing according to the following general specifications: (1) A disposable metal tip will be pushed to approximately 20 feet in depth using 3-1/2-inch diameter coring pipe; (2) 0.020-inch slotted well casing will be placed from 20 feet to five feet in depth, followed by blank well casing to surface; (3) As the outer core barrel is removed slowly, filter sand will be placed around the well casing to approximately four feet in depth; (4) A one foot bentonite seal will be placed above the filter sand; and (5) The remaining annulus will be grouted using a cement/sand slurry (bentonite less than 5 percent) to approximate surface grade. The top of the wells will be enclosed in a traffic-rated locking boxes set in concrete slightly above grade.

Installation of Delivery Piping

The ozone injection delivery tubing, consisting of 3/8-inch synthetic flexible tubing, will be installed in approximately six-inch wide trenching at a depth of six inches to one foot below surface grade. The trenches will be backfilled with sand and will be resurfaced to match existing surface grade.

Installation of Injection Equipment

The ozone generation equipment will consist of a 110-volt ozone injection unit assembled by Piper Environmental Group located in Castroville, California. This unit will be capable of producing approximately 16 grams (one pound) of ozone per day, and will include an oxygen concentrator, ozone generator, compressors, programmable logic controller (PLC), and valves . This unit will be contained in a trailer and located near the existing remediation compound. This unit will supply an ozone/air mixture of under pressure to the three individual injection wells according to a set timed sequence. This unit will include an ozone detector with automatic shut down in the event of an ozone leak. Emergency phone numbers will be posted prominently in the remediation area.

Operation of Remediation System

The ozone injection remediation system will be operated continuously for approximately three months. During operation, the remediation system will be maintained and monitored regularly, beginning with bi-weekly visits for the first month, followed by weekly and semi-weekly visits as needed for the additional two-month duration. The remediation pilot test monitoring and maintenance schedule is included in Table 1. During monitoring, possible VOC generation and ozone leakage will be monitored to maintain appropriate health and safety during the pilot test. Any ozone or VOC detections will result in immediate system shut down and notification of ACDEH staff, followed by problem assessment and careful "recalibration" to insure cessation of the particular detection.

Table 1
REMEDIATION PILOT TEST MAINTENANCE AND MONITORING SCHEDULE
Fidelity Roof Company UST Site

Time Period	Frequency	Required Monitoring	Required Maintenance
Pre-Startup	■ Once	■ Groundwater TPH-G/BTEX/Oxygenates/Hex Chromium/Bromate monitoring in surrounding wells ■ Field monitor for ozone, dissolved oxygen, and VOCs in surrounding groundwater/extraction wells	■ Check system operation ■ Check for ozone leaks at injection well heads and manifold.
Initial System Startup	■ Every 3-4 days for first 2-4 weeks	■ Record system parameters ■ Field monitor for ozone, dissolved oxygen, and VOCs in surrounding groundwater/extraction wells	■ Check system operation ■ Check for ozone leaks at injection well heads and manifold.
Thereafter	■ Weekly	■ Field monitoring as above ■ Monthly groundwater TPH-G/BTEX/Oxygenates/Hex Chromium/Bromate monitoring in surrounding wells	■ As above

Remediation Effectiveness and Compliance Monitoring

In order to assess remediation effectiveness, new and existing hydrocarbon plume wells MW-2, MW-6, and MW-7, as well as new and existing perimeter wells MW-5, MW-8, MW-9, MW-10, and MW-11, will be monitored monthly during and immediately following the three-month duration of the pilot test. Groundwater monitoring will be conducted in accordance with applicable sampling protocols, and will include recording groundwater depths, purging at least three well volumes, and sampling of groundwater for Dissolved Oxygen (field parameter), TPH-G, BTEX, and Oxygenates analysis. In addition, groundwater samples from the first post-startup monthly monitoring will be analyzed for hexavalent chromium and bromate.

Report Preparation

Reports to be submitted to the ACDEH will include: (1) A report documenting well installation activities and ozone injection system installation and startup, to be completed approximately one month after beginning the ozone injection pilot test; and (2) A report documenting the completed ozone injection pilot test and including a workplan for additional activities, to be submitted within one month following completion of the pilot test. These reports will describe and document all activities and results, and will include laboratory analytical reports.

Project Schedule

Subject to ACDEH and State UST Cleanup Fund approval, the remediation pilot test system installation and startup activities can be completed in approximately six to eight weeks.

We appreciate this opportunity to provide this report for your review. Please contact us if there are questions or if additional information is required.

Very truly yours,

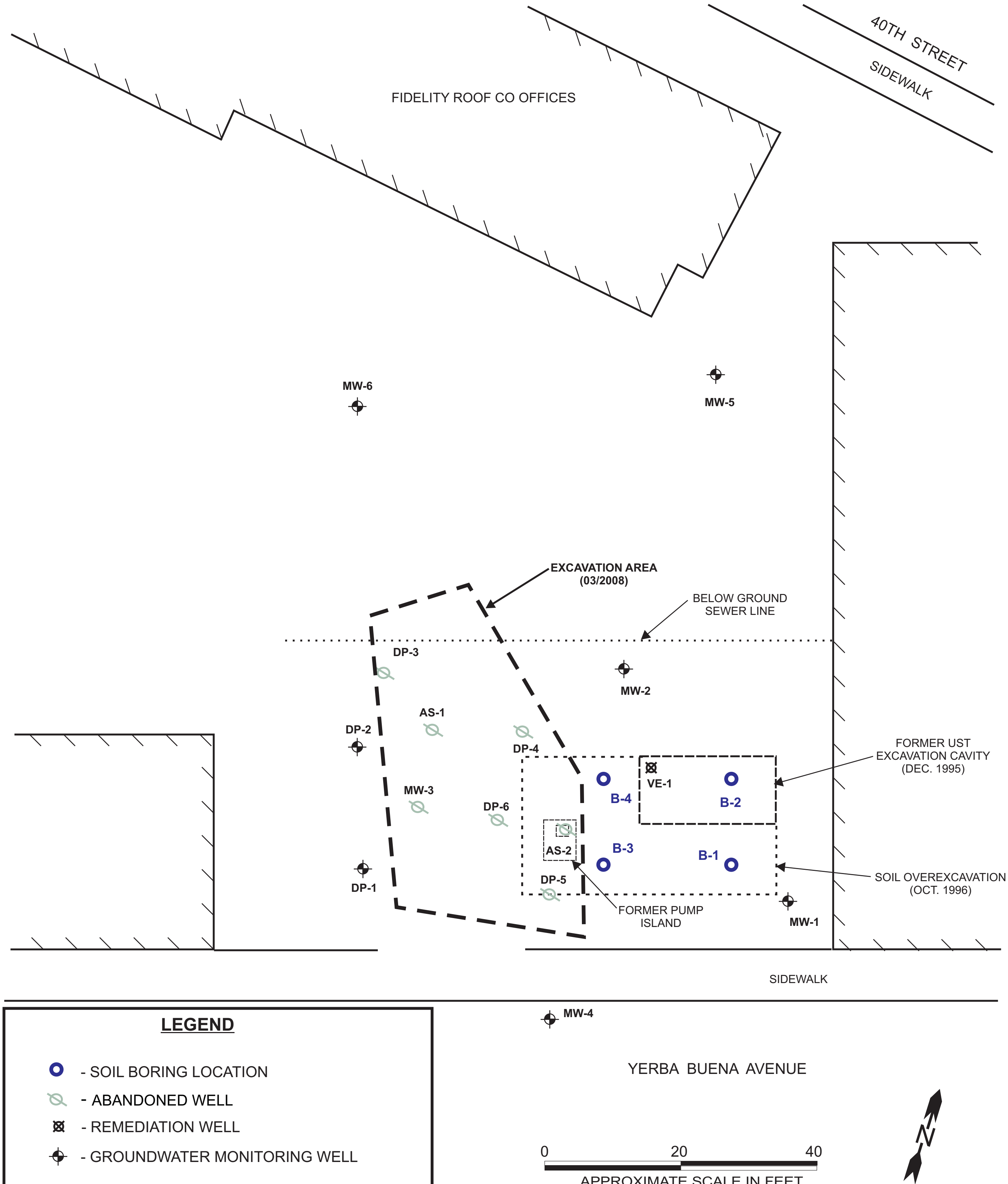
James E. Gribi
Professional Geologist
California No. 5843

Enclosure

cc: Mr. Monte Upshaw, Chairman, Fidelity Roof Company
Mr. Kenneth White, President, Fidelity Roof Company

FIGURES

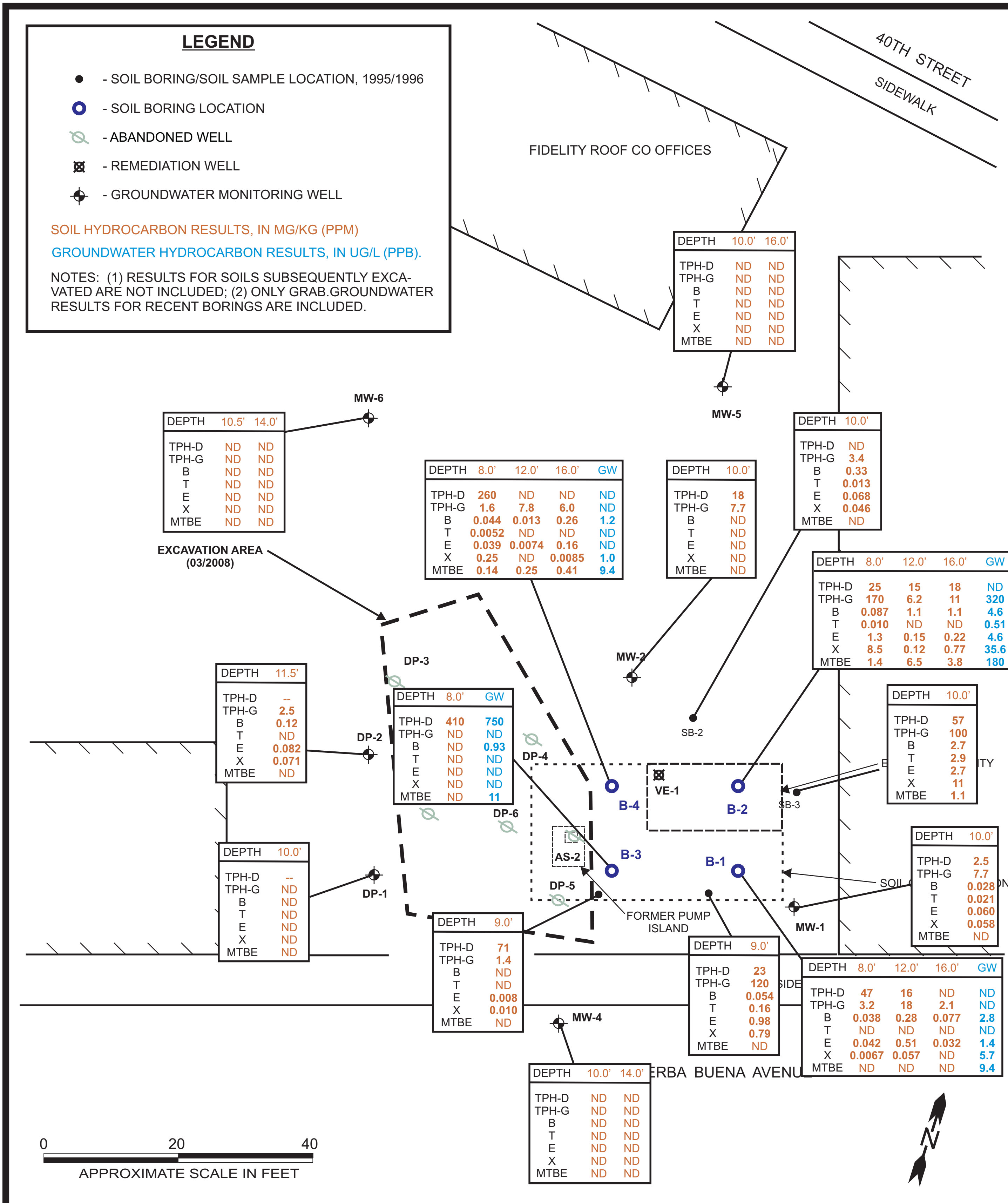
DESIGNED BY:	CHECKED BY:	SITE VICINITY MAP	DATE: 12/30/2008	FIGURE: 1
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



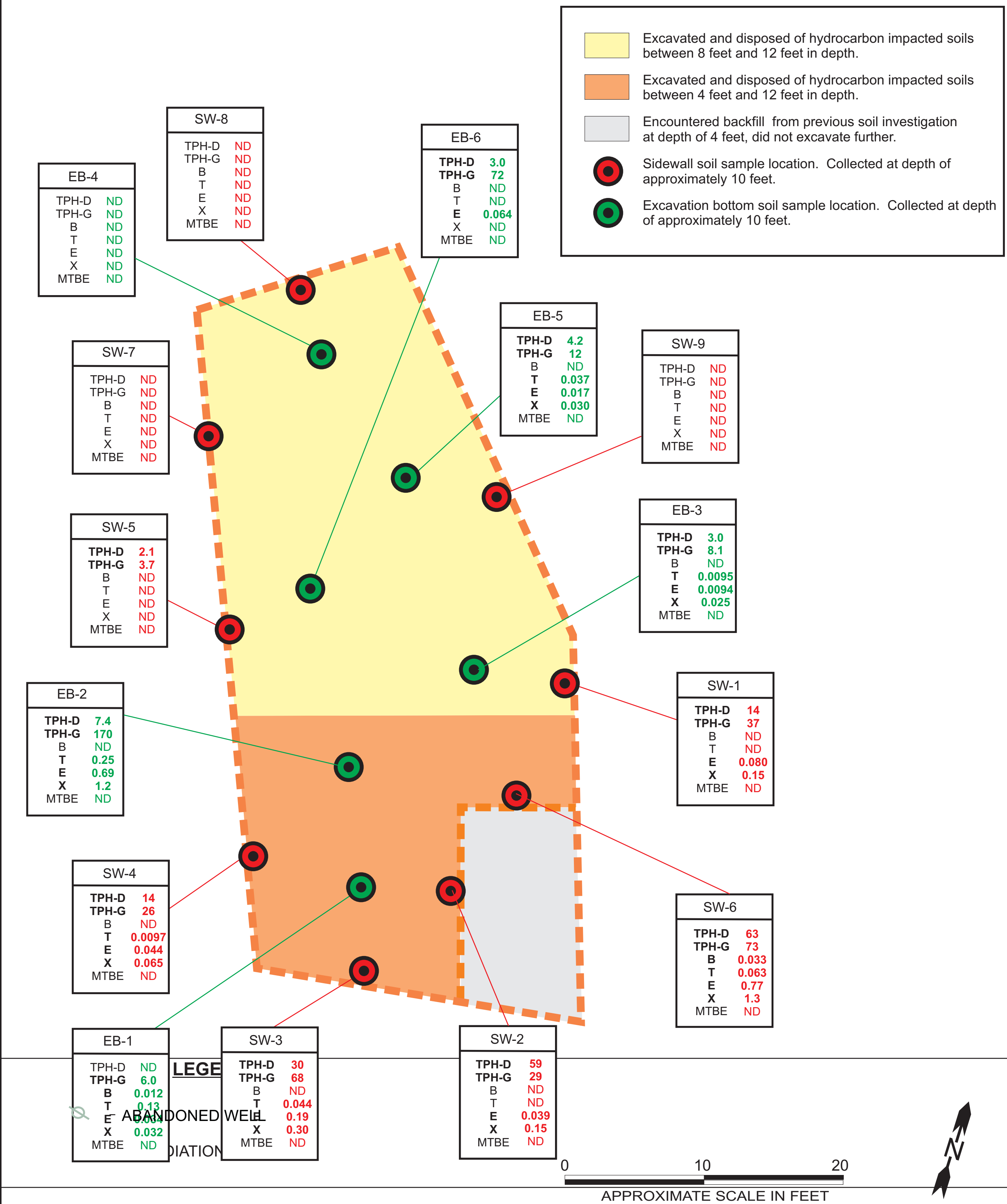
LEGEND

- SOIL BORING LOCATION
- ABANDONED WELL
- REMEDIATION WELL
- GROUNDWATER MONITORING WELL

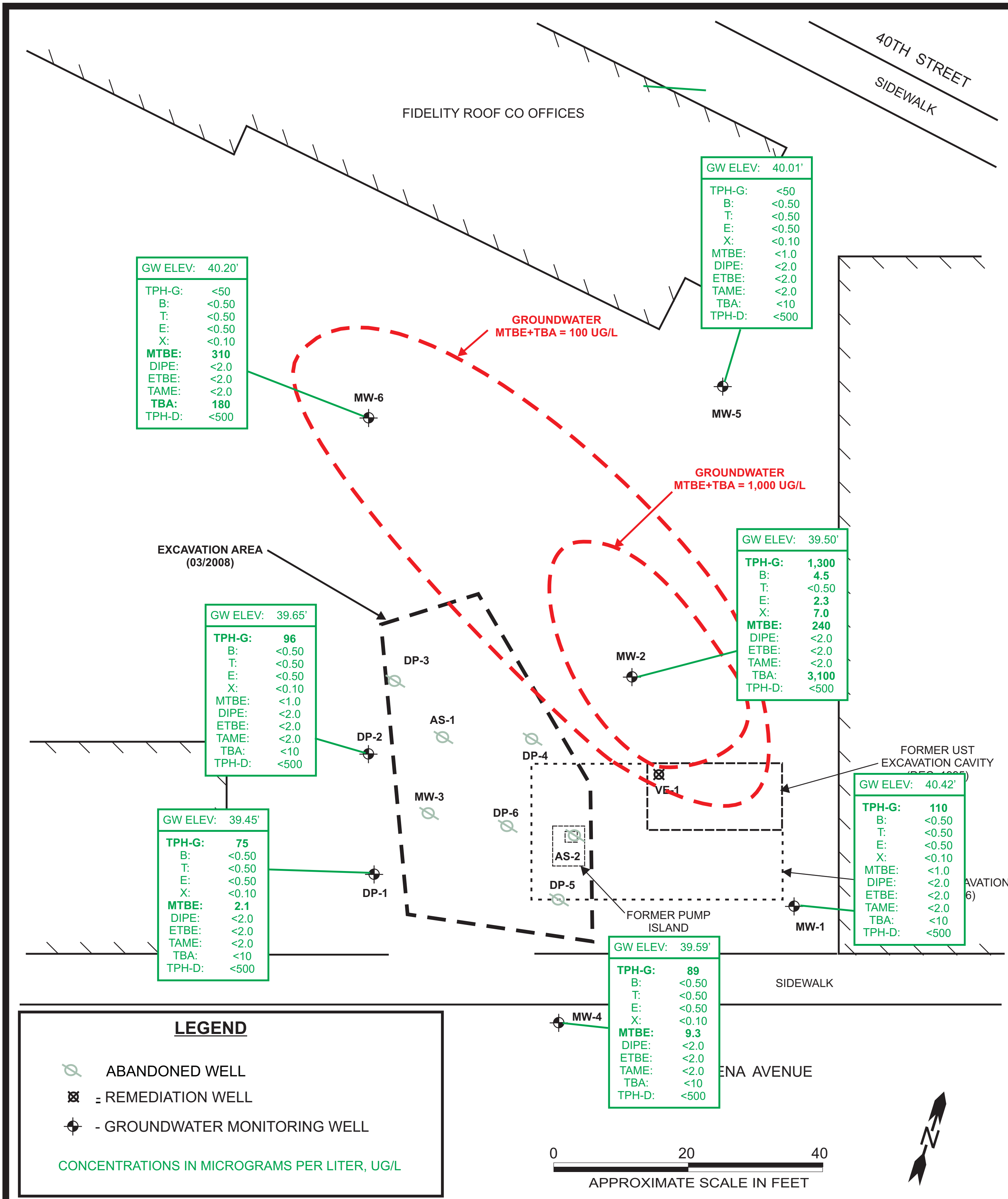
DESIGNED BY:	CHECKED BY:	SITE PLAN	DATE: 12/30/2008	FIGURE: 2
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



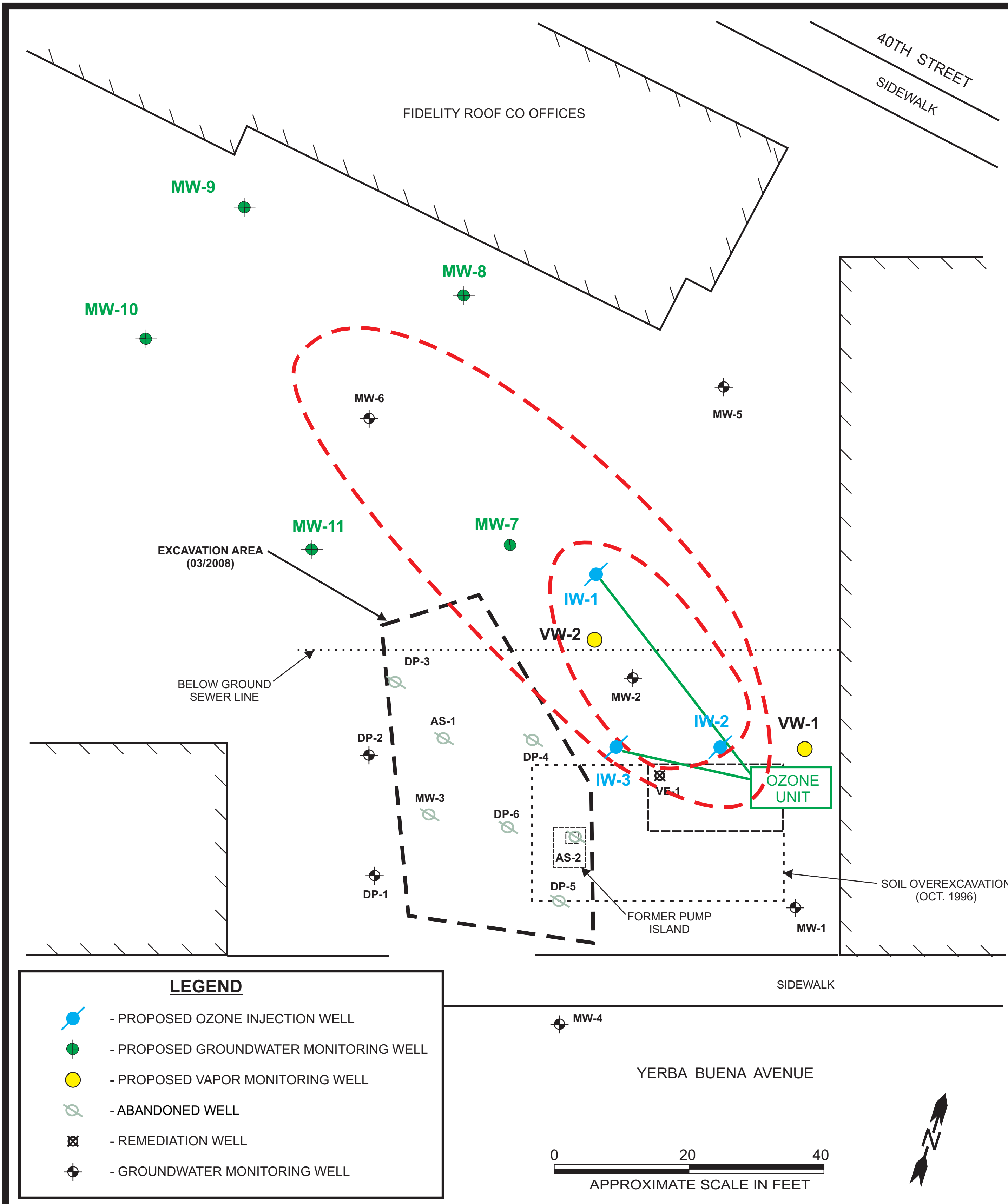
DESIGNED BY:	CHECKED BY:	**SELECTED HISTORICAL SOIL HYDROCARBON RESULTS**	DATE: 12/30/2008	FIGURE: 3
DRAWN BY: JG	SCALE:	1075 40TH STREET OAKLAND, CALIFORNIA	GRIBI	
PROJECT NO: 330-01-01				



DESIGNED BY:	CHECKED BY:	**RESULTS OF EXCAVATION CONFIRMATION SOIL SAMPLING**	DATE: 12/30/2008	FIGURE: 4
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



DESIGNED BY:	CHECKED BY:	**GROUNDWATER ELEVATIONS & RESULTS, 09/10/2008**	DATE: 12/30/2008	FIGURE: 5
DRAWN BY: JG	SCALE:	1075 40TH STREET OAKLAND, CALIFORNIA	GRIBI	
PROJECT NO: 330-01-01				



DESIGNED BY:	CHECKED BY:	**PROPOSED WELL LOCATIONS**	DATE: 12/30/2008	FIGURE: **6**
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		