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FIDELITY ROOF COMPANY

June 7, 2007

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

Attention: Barney Chan

Subject: Workplan Addendum to **05/10/07** Workplan to Conduct Site Remediation Activities 1075 40th Street, Oakland, CA 94608
ACDEH Site No. RO000186

Ladies and Gentlemen:

Attached please find a copy of the *Addendum to Workplan to Conduct Site Remediation Activities, 1075 40th Street, Oakland, CA 94608,* prepared by Gribi Associates. I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.

Very truly yours,

Monte M. Upshaw
Chairman
Fidelity Roof Company

June 7, 2007

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

Attention: Barney Chan

Subject: Workplan Addendum
1075 40th Street, Oakland, CA 94608
ACDEH Site No. RO000186

Ladies and Gentlemen:

Gribi Associates is pleased to submit this workplan addendum on behalf of Fidelity Roof Company for the underground storage tank (UST) site located at 1070 40th Street in Oakland, California (see Figure 1 and Figure 2). This letter provides additional explanation and information requested in the letter from Alameda County Department of Environmental Health (ACDEH) dated May 23, 2007.

On April 2, 2007, Gribi Associates submitted the *Workplan to Conduct Site Remediation Activities* to ACDEH proposing: (1) Excavation of hydrocarbon-impacted soil and groundwater in the vicinity of the former fuel dispenser and well MW-3; and (2) Implementation of an ozone injection pilot test in the vicinity of well MW-2. On May 23, 2007, ACDEH issued a letter approving the workplan approach, but requesting additional explanation and information before implementing the workplan. Specific additional explanation and information requested include: (1) A site plan showing residual soil hydrocarbon concentrations and proposing additional soil boring locations to fill in data gaps; and (2) Explanation of ozone remediation questions related to injection well depths, spatial distribution of injection wells, possible hydrocarbon vapor off gasing, and completeness of the chemical oxidation process. This requested information is provided in the following sections.

Proposed Limits of Excavation

Soil TPH-G and benzene concentrations for all identified soil sample analyses except for those collected during UST removal activities (for which we do not have copies of reports) are shown on Figures 3 and 4, respectively. We have not included MTBE soil results, since almost all MTBE soil analysis were run using USEPA Method 8015M, which often produces false positive results.

The primary purpose of the proposed excavation activities, as stated in the previously-submitted workplan, is to remove hydrocarbon-impacted soil and groundwater adjacent to the former dispenser area that has acted as a source for free product in well MW-3. The goal of the excavation activities is not to remove all hydrocarbon-impacted soil, since this could result in a large disruption to the site and a large cost.

In reference to the technical comments stated in the May 23, 2007 ACDEH letter regarding the proposed soil excavation activities, we would point out the following key points:

- While the previous consultant, AEI, did not generally provide vertical hydrocarbon delineation in soil borings and excavations, there are a few more recent borings (DP-4, DP-5, DP-6, and AS-2) where multiple soil samples were analyzed. These analysis, and particularly those from DP-4 and DP-5, seem to confirm a hydrocarbon smear zone from 8 feet to 12 feet in depth, whereby soil samples below12 feet in depth are not hydrocarbon-impacted, and soil samples that are not in the immediate UST source area and are shallower that about 8 feet in depth are also not hydrocarbon-impacted.

- Given this typical hydrocarbon smear zone in soils away from the UST source areas, soil samples collected at about 10 feet in depth in these non-source area borings are clearly representative of hydrocarbon soil impacts in the hydrocarbon smear zone. Thus, while soil hydrocarbon impacts are not defined vertically in the former excavation areas, they are reasonably well defined in downgradient unexcavated areas.

- Relative to the previous 1995 and 1996 excavation events, the AEI report for the 1996 excavation event states that the excavation cavity, which was approximately 9 feet in depth, was backfilled with first-removed clean stockpiled soil and imported soil, compacted in 1 foot lifts. The UST cavity would also have been backfilled with imported fill, to replace the volume of the tanks. Thus, while there may be hydrocarbon-impacted soil from 8 feet to 12 feet in the former UST and 9 to 12 feet in the overexcavated area, this possible hydrocarbon-impacted soil is overlain by 7 to 9 feet of compacted, presumably clean, fill soil. Thus, while characterization of the hydrocarbon smear zone from 8 feet to 12 feet may be warranted, we would think it unlikely that removal of this soil, after re-excavation of backfill, would be warranted.

In order provide additional site characterization, Figure 5 shows proposed locations for 4 soil borings. The 4 borings will be drilled to at least 25 feet in depth. Soil samples will be collected at five-foot intervals and at obvious lithologic changes or evidence of hydrocarbon impacts. Two grab groundwater samples will be collected from each boring, the first at first encountered groundwater and the second by hydropunching below 20 feet in depth. Soil and groundwater sampling activities will be conducted in accordance with standard sampling guidelines and protocols. Soil and groundwater samples will be analyzed for TPH-G/BTEX and Oxygenates.

Excavation Sampling

Assuming that the proposed excavation area (1,250 square feet) does not change, we will collect five excavation pit bottom samples for laboratory analysis. Also, in accordance with *Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste* (SFBRWQCB, Draft, October 20, 2006), approximately 16 soil samples (1 sample per 25 cubic yards of soil) will be analyzed for gasoline-range hydrocarbons in accordance with the SFBRWQCB guidance document.

Ozone Injection

The following explanations correspond to specific questions contained in the May 23, 2007 letter from ACDEH. Location of the proposed injection wells are shown on Figure 6.

How was the (ozone) injection depth selected?

In choosing ozone injection depths, one tries to place the injection point deep enough below the water table to create an effective radius of influence, while not going so deep that ozone either can't reach the water table or takes too long to filter upward to the water table, where groundwater hydrocarbon impacts are greatest. Some information from vendors has suggested a radius of influence of approximately 1.5 to 2.0 times the injection depth below the water table. While we have found this approximation to be, in almost every case, true, we have also found that it is important, in choosing injection depths, to review site boring logs and to try to place the injection points in relatively high-permeability soils. This allows ozone to be relatively easily injected and to be broadcast farther laterally away from the injection point before moving upward.

For the project site, after determining that we would need to place the injection points below 20 feet in depth (i.e. ten feet below the water table), we noted the presence of an apparently persistent sand in deeper well boring logs AS-1 and AS-2, and determined that placing the injection point in this sand interval would be advantageous.

Obviously, the injection depth can, and often will, be altered slightly in the field based on boring lithology. In this case, after reaching a depth of 20 feet, we will sample continuously to 25 feet in depth using a split spoon sampler, and will place the injection point in the first high permeability zone below 20 feet.

While injection depth is important, it is our experience that proper construction and sealing of the injection wells are far more important. It can be very difficult to sand and seal wells below the water table, since sand and bentonite tend to fall very slowly through the typically thick, muddy water inside the augers. Thus, well construction activities below the water table must be conducted slowly and methodically to insure proper well construction.

Is there a need for injection at multiple depths?

Factors that would warrant multiple injection depths would include: (1) Well defined multiple aquifers with contaminant impacts in multiple layers, where injection in a deeper aquifer may not reach an upper aquifer; or (2) A preponderance of very low-permeability, dense clays, where ozone injection may not prove viable and where pilot testing at varying injection depths is warranted to prove the technology. These conditions do not, we believe, exist at the project site.

How do you determine the completeness of chemical oxidation?

Ozone is one of the strongest known oxidants and is highly reactive in the subsurface environment.[1] In fact, because ozone gas degrades so quickly to oxygen, it is important to place the ozone generation equipment in close proximity to the injection wells, so that the ozone delivery distance, and hence delivery time, is minimized. Thus, there is little likelihood that unreacted/undegraded ozone gas will ever reach the surface.

Relative to the completeness of contaminant oxidation, we would expect the ozone injection to result in complete contaminant oxidation. The primary contaminant of concern relative to the ozone injection pilot test is MTBE. The complete oxidation reaction for MTBE is as follows (EPA, May 2004):

$$C_5H_{12}O + 7.5O_2 \rightarrow 5CO_2 + 6H_2O$$

However, studies have shown that incomplete oxidation occurs if oxygen demand is not met, possibly resulting in the formation of intermediate byproducts acetone, tertiary butyl alcohol (TBA), tertiary butyl formate (TBF), and bromate. Acetone, TBA, and TBF are organic compounds which, with continued ozone injection, will degrade further to CO_2 and H_2O.

Bromate is a known carcinogen which forms, in the presence of bromide, during traditional advanced oxidation water treatment systems[2]. 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. 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.

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

[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.

Our direct experience with ozone injection on both MTBE-impacted sites and elevated gasoline-impacted sites has shown no measurable increases in possible hydrocarbon or oxygenate intermediate products. We have also been required to analyze groundwater samples for metals, (including hexavalent chromium) and bromate, and have never detected significant concentrations of these constituents.

How will you ensure that petroleum vapors are not migrating?

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 monitoring wells immediately after uncapping; (3) At all piping connections; and (4) At the ozone generator. Using a field photoionization detector (PID), we will also monitor for VOC vapors at the well boxes and inside monitoring wells immediately after uncapping.

Factors which would tend to minimize the possibility, or mitigate the effects, of VOC vapor generation include: (1) Ozone (5% ozone/air mixture) injection is conducted at low flow rates (approximately 2 scfm); (2) Ozone injection is not conducted continuously in the wells, but is conducted intermittently in one hour cycles, with each cycle providing about 10 to 15 minutes of injection followed by 45 to 50 minutes of “rest” for each well; (3) The ground surface overlying the injection area is completely asphalt paved, thus acting as a vapor barrier; (4) There are no buildings overlying the injection area to trap possible relict VOCs; and (5) The primary contaminant of concern, dissolved-phase MTBE, has relatively low volatility[3].

How will you verify the radius of influence of the ozone?

The two indicators which will be used to monitor ozone injection radius of influence are: (1) Field monitoring of dissolved oxygen in surrounding wells MW-1, MW-2, MW-5, MW-6, VE-1, DP-1, and DP-2; and (2) MTBE and hydrocarbon concentrations in surrounding wells. We have found that dissolved oxygen is a very useful field indicator of ozone influence. Given the variable distances of surrounding monitoring wells from injection wells, these field monitoring results will provide a useful indication of effective radius of influence. Ultimately, decreases in MTBE and hydrocarbon concentrations in groundwater in surrounding wells will provide a clear indication of ozone radius of influence.

[3]According to *MTBE Fact Sheet #2, Remediation of MTBE Contaminated Soil And Groundwater*, “When moving from dissolved phase (in water) to the vapor phase, MTBE is about ten times less volatile than benzene (i.e., its Henry’s law constant is 1/10th benzene).” (USEPA Office of Underground Storage Tanks, EPA 510-F-97-015, January 1998).

We appreciate the opportunity to present this workplan addendum or your review. Please call if you have questions or require additional information.

Very truly yours,

James E. Gribi
Registered Geologist
California No. 5843

JEG/ct
Enclosure

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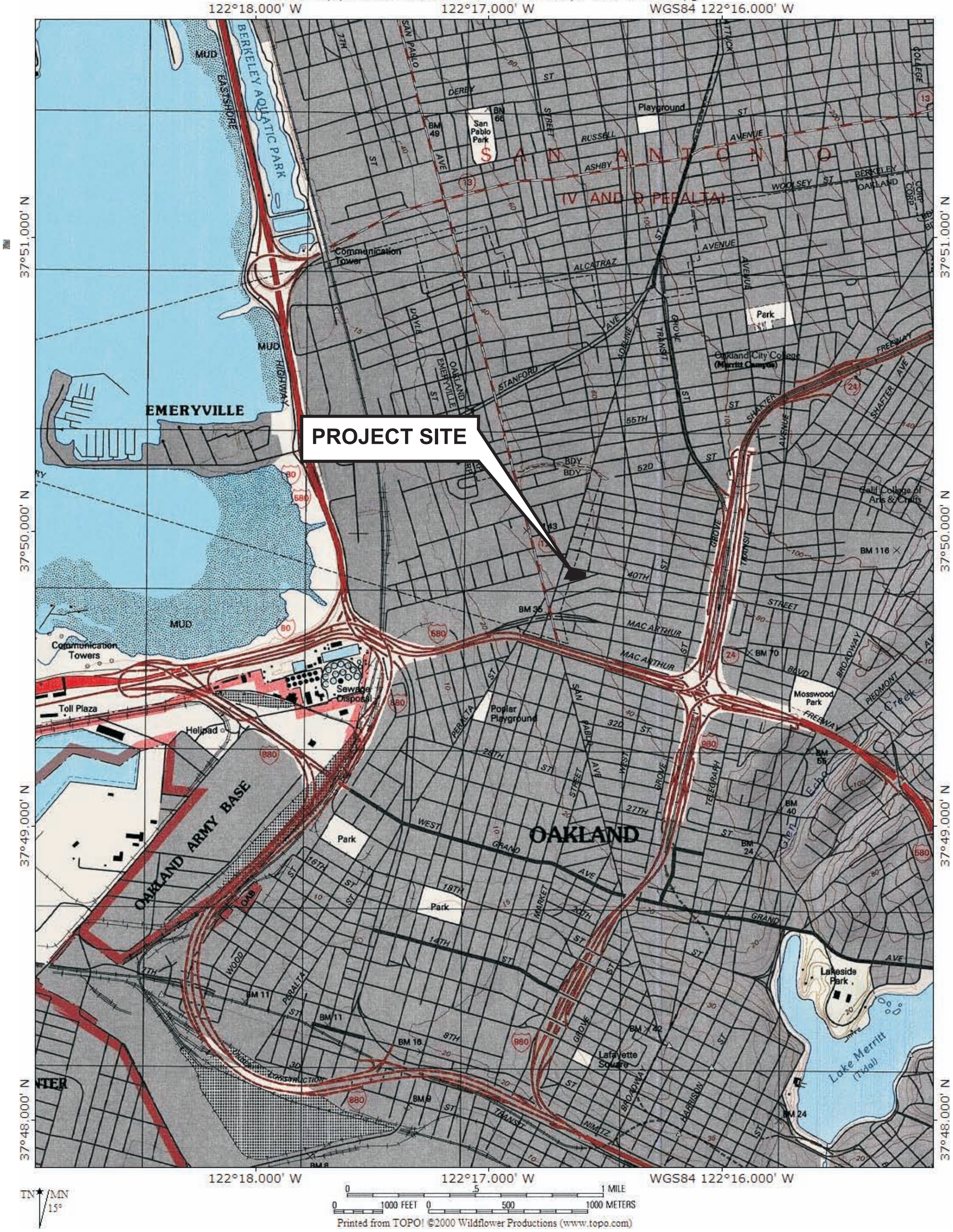
FIGURES

TOPO! map printed on 04/03/07 from "California.tpo" and "Untitled.tpg"



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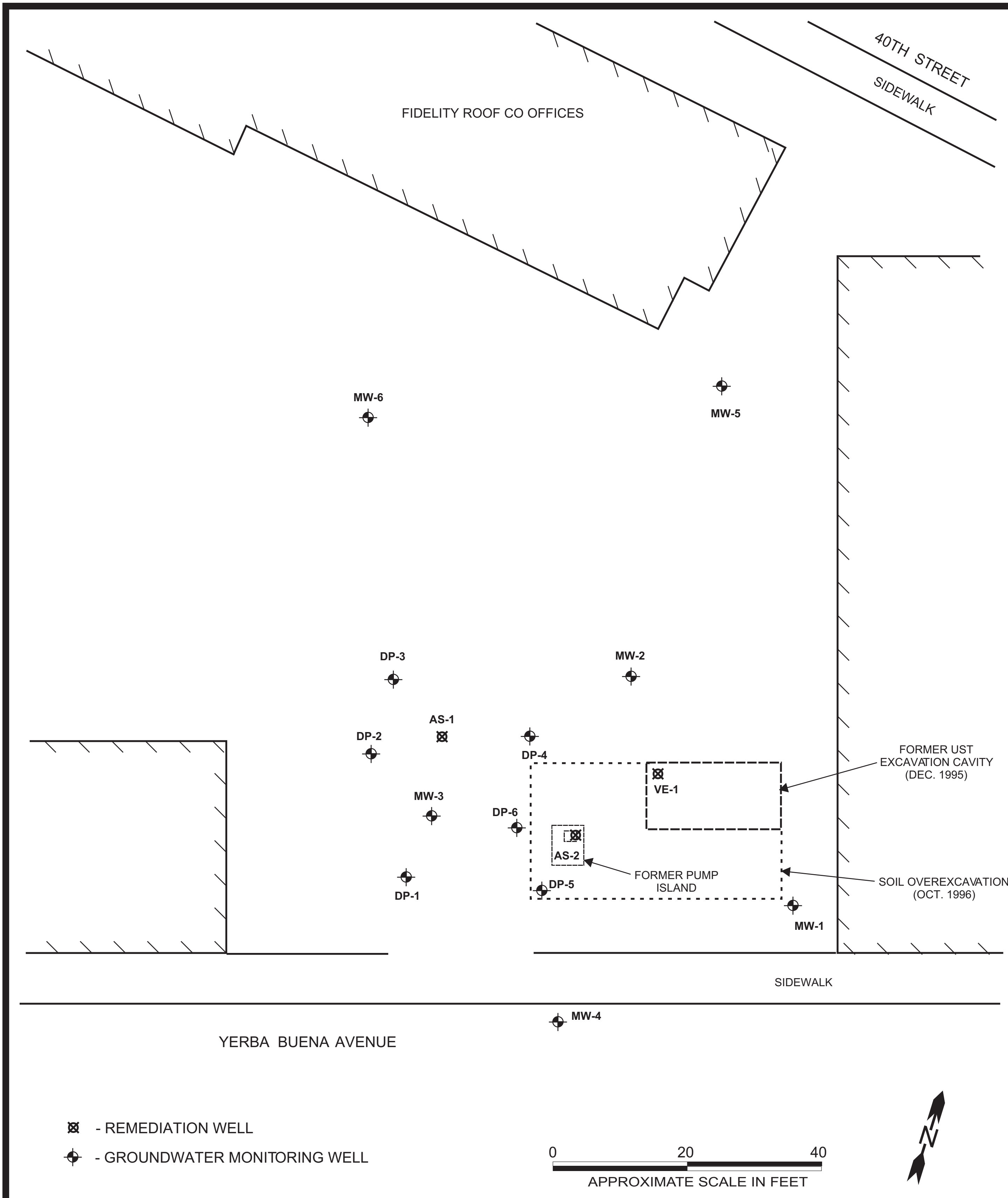
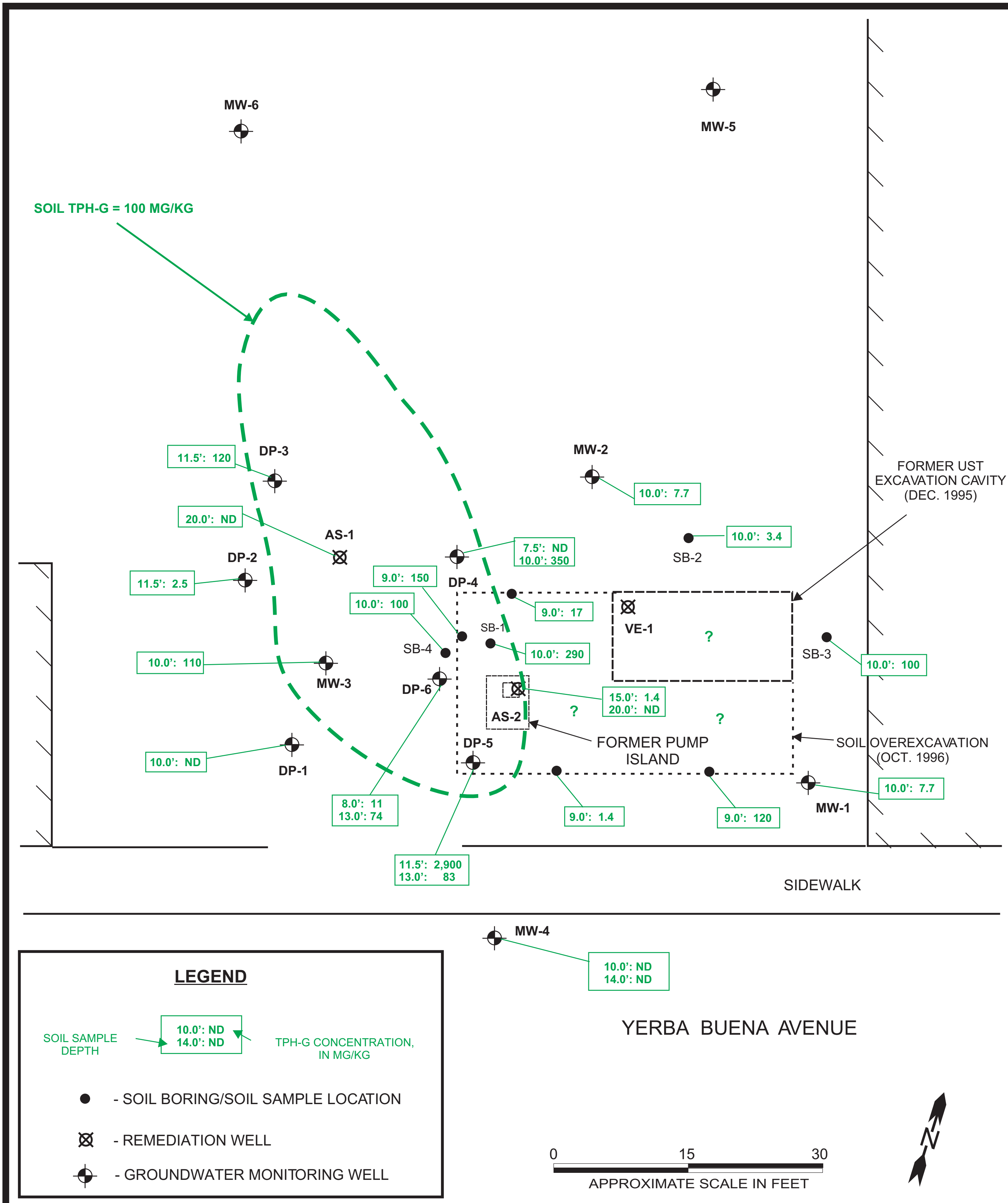
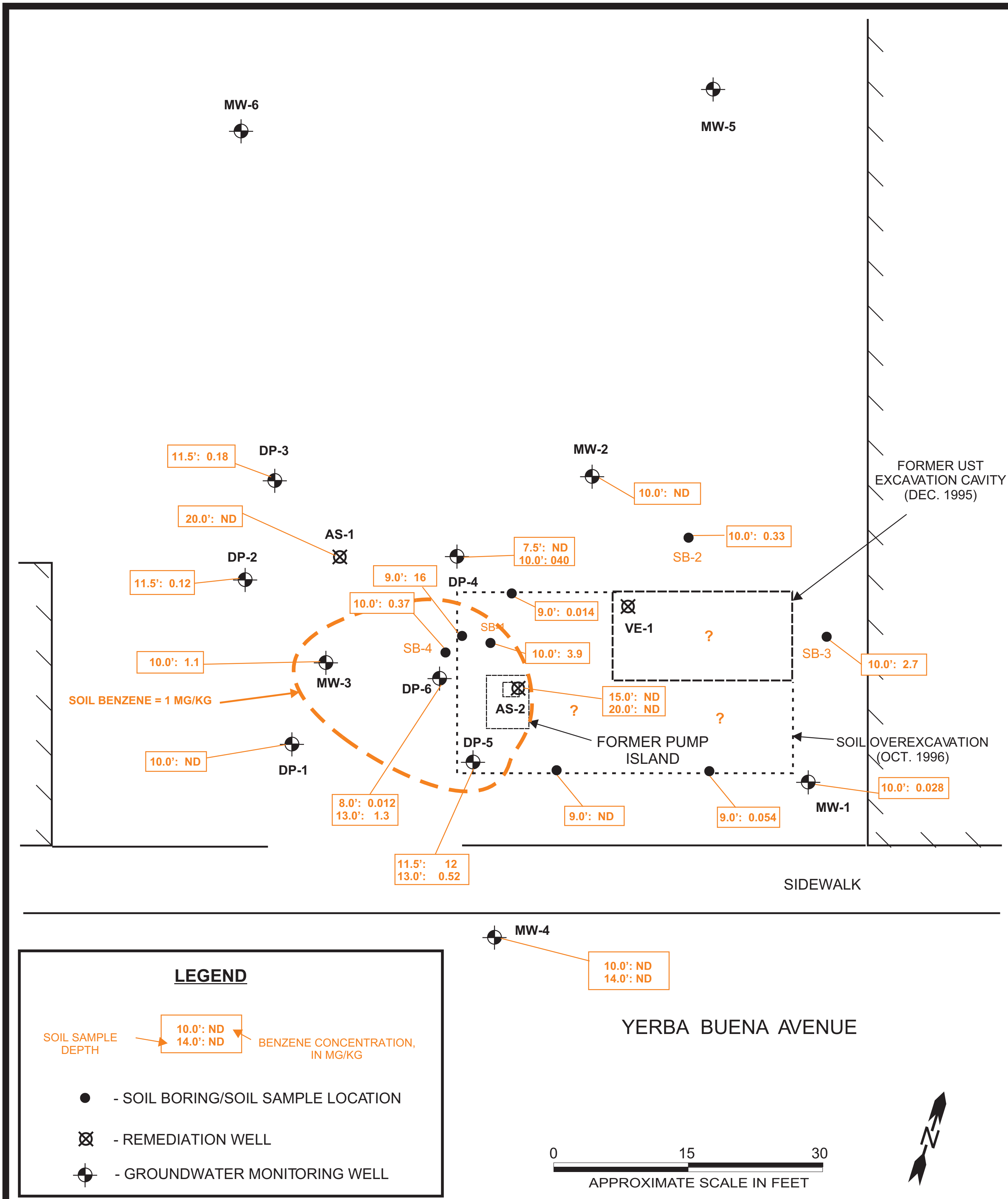
DESIGNED BY:	CHECKED BY:	SITE VICINITY MAP	DATE: 06/06/2007	FIGURE: 1
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



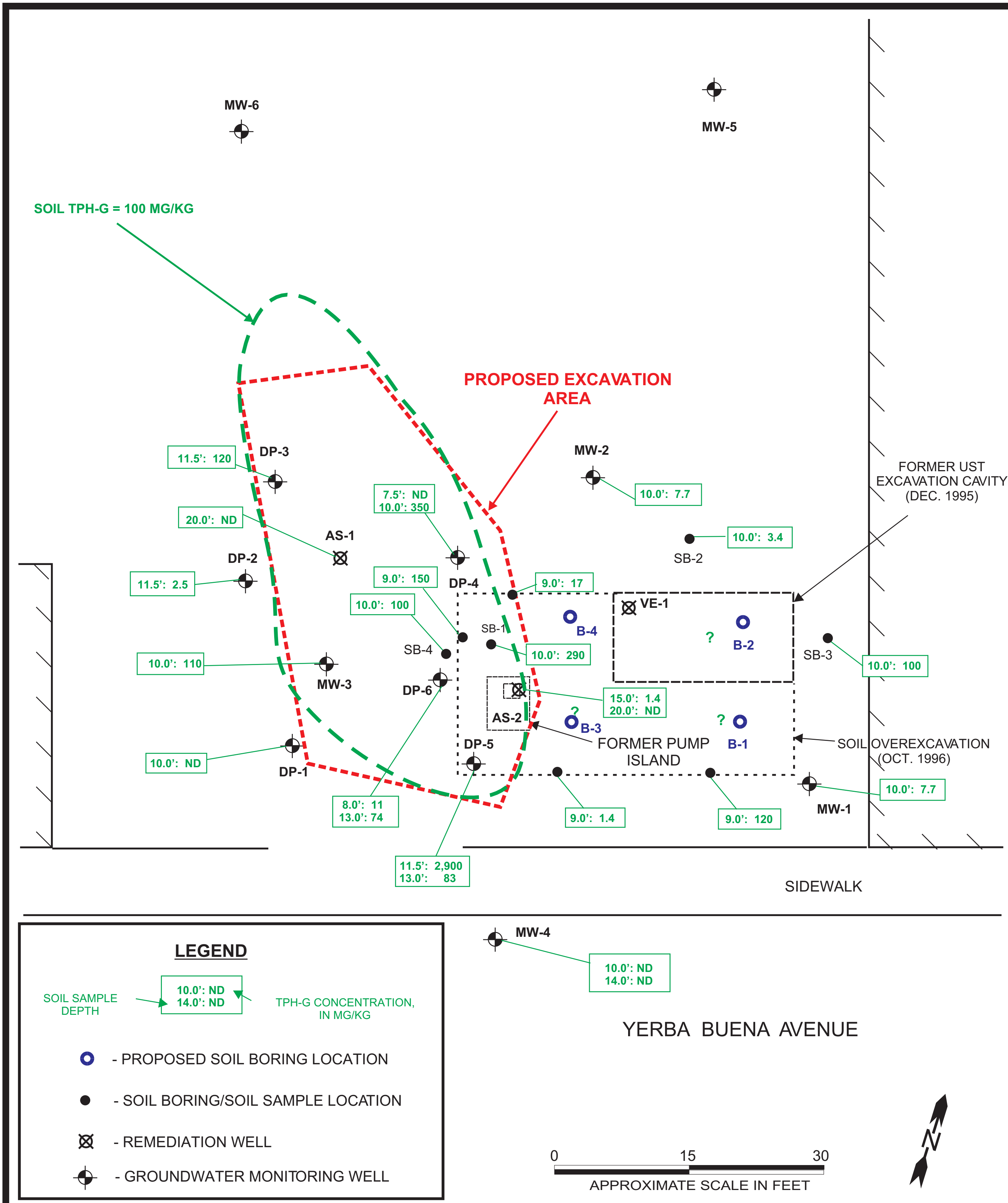
DESIGNED BY:	CHECKED BY:	SITE PLAN	DATE: 06/06/2007	FIGURE: 2
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



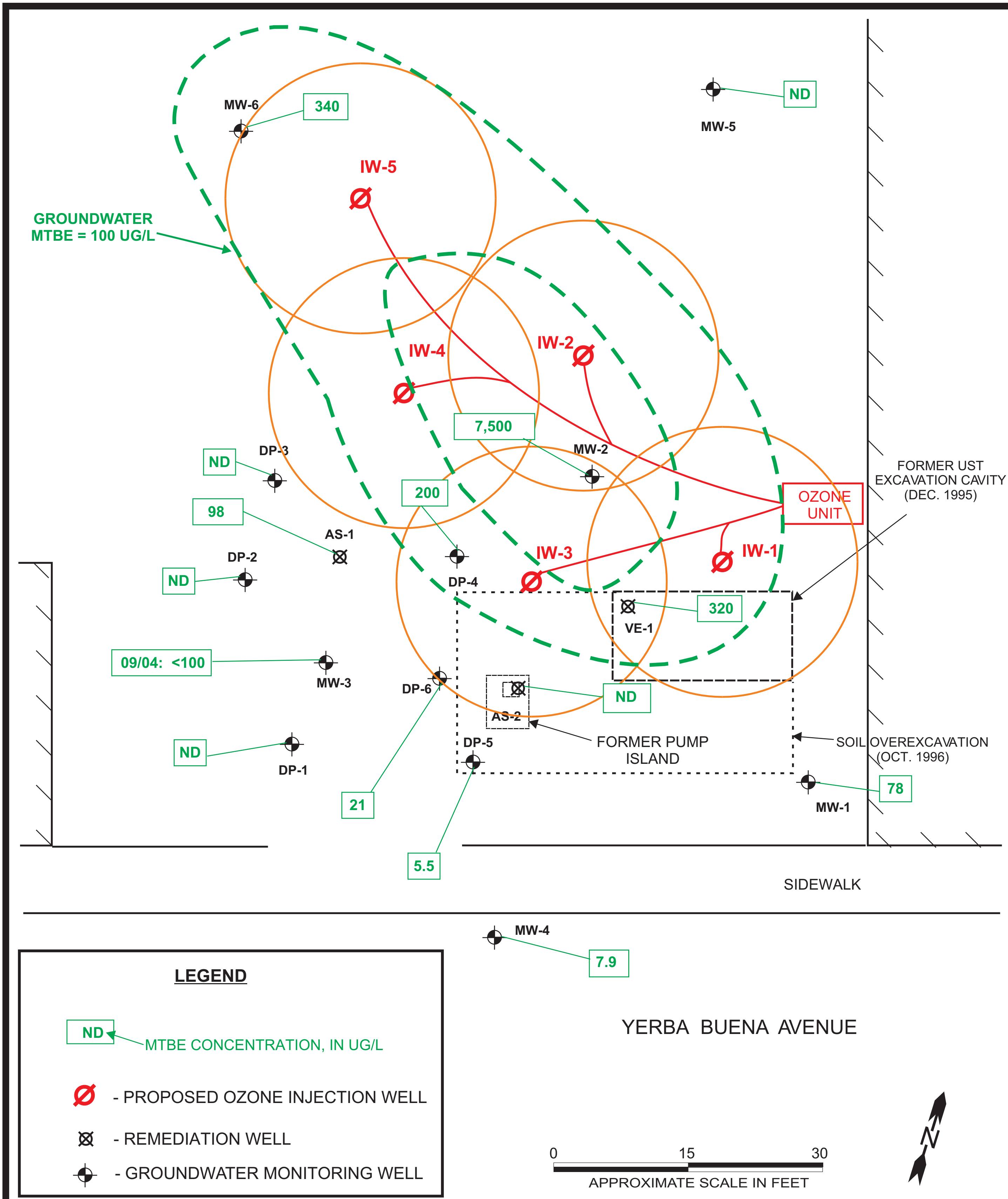
DESIGNED BY:	CHECKED BY:	**SOIL TPH-G RESULTS**	DATE: 06/06/2007	FIGURE: **3**
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



DESIGNED BY:	CHECKED BY:	SOIL BENZENE RESULTS	DATE: 06/06/2007	FIGURE: 4
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



DESIGNED BY:	CHECKED BY:	**PROPOSED BORING LOCATIONS**	DATE: 06/06/2007	FIGURE: **5**
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01		1075 40TH STREET OAKLAND, CALIFORNIA		



DESIGNED BY:	CHECKED BY:	**GROUNDWATER MTBE RESULTS & PROPOSED OZONE INJECTION PLAN** 1075 40TH STREET OAKLAND, CALIFORNIA	DATE: 06/06/2007	FIGURE: **6**
DRAWN BY: JG	SCALE:		GRIBI	
PROJECT NO: 330-01-01				