RECEIVED

9:54 am, Aug 08, 2008

Alameda County
Environmental Health

GRIBI
ASSOCIATES

August 6, 2008

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

Attention: Barbara Jakub

Subject: Revised Workplan to Conduct Ozone Injection Pilot Test
Former St. Francis Pie Shop UST Site
1125 67th Street Oakland, Ca
ACDEH Site No. RO2602

Ladies and Gentlemen:

Gribi Associates is pleased to submit this revised workplan on behalf of St. Francis Pie Shop for the underground storage tank (UST) site located at 1125 67th Street in Oakland, California. This workplan, which proposes to conduct an ozone injection pilot test at the site, is a revision of a workplan contained in *Remedial Investigation Report and Workplan To Conduct Ozone Injection Pilot Test*, (Gribi Associates, May 10, 2007).

SITE BACKGROUND

General Site Description

The project site is located on the south side of 67th Street, just west of San Pablo Avenue, in Oakland, California (see Figure 1 and Figure 2). The site is occupied by a rectangular concrete block warehouse building that measures approximately 150 feet by 90 feet and covers almost the entire site. A small yard area and detached building are present on the northeast side of the site. The project site is bounded on the east by a McDonald's Restaurant and parking lot, on the south by Fratallanza Club parking lot, on the west by single family residences, and on the north by 67th Street, followed by a large storage warehouse. Groundwater is present beneath the site at approximately seven feet below surface grade and would be expected to flow in a west-southwesterly direction towards San Francisco Bay.

Site History

Sanborn Fire Insurance Maps for the site area show the project site parcel as vacant on the 1903 and 1911 maps. The 1950 and 1952 maps show the project site parcel, as well as the adjacent east parcel, to include a large building labeled as "Sealy Mattress Factory". The 1967 map shows the project site building, labeled as "Industrial Gas Vaporizor Factory". On the 1967 map, the east adjacent parcel, at 6645 San Pablo Avenue, is labeled as "Gas & Oil", signifying a gas station, and contains a shop building adjacent to the project site yard area and a canopy further east adjacent to San Pablo Avenue.

Based on information on the Sanborn Maps, it appears that the project site parcel and the east adjacent parcel (6699 San Pablo Avenue) were occupied by a mattress factory in the early 1950s. Historical city directories list the 6699 San Pablo Avenue address as Charles Braun Mattress Company in 1933 and as Sealy Mattress Company in directories from 1938 to 1950. These results indicate that the project site building was occupied by a mattress company from at least 1933 to 1952.

The 1125 67th Street project site address is listed in city directories as Ransome Torch & Burner Company from at least 1962 to 1970, and as St. Francis Pie Shop from at least 1980 to 2000.

In the 1967 city directory only, Enco Service Station is listed at 6645 San Pablo Avenue, immediately east from the project site. In the 1970 and subsequent directories, McDonald's Hamburgers is listed at 6625 San Pablo Avenue, immediately southeast from the project site.

McDonald's Restaurant Environmental Conditions

The adjacent east property is occupied by a McDonald's Restaurant, with parking immediately east from the site and the restaurant building southeast from the project site. A gas station occupied the current parking lot area, directly east from the project site yard, in the mid to late 1960s.

According to information contained in ACDEH files, a geotechnical investigation was conducted on the east adjacent McDonald's parking lot parcel in September 1996 by Kleinfelder. This investigation included the drilling and sampling of four soil borings. In February 1997, five additional borings were drilled and sampled on the McDonald's parcel by Kleinfelder. Soil and grab groundwater samples from these borings showed gasoline and diesel range hydrocarbon impacts in soil and groundwater over the entire site, with the highest concentrations in borings on the west side of the McDonald's parcel, immediately adjacent to the project site.

In July 1998, Baseline Environmental Consulting conducted a passive soil gas survey of the adjacent McDonald's parking lot parcel. The investigation included the installation of 31 shallow samplers in a grid pattern over the site. Results from this investigation showed elevated gasoline-range soil gas concentrations on the center of the adjacent McDonald's parking lot parcel

In January 1999, Baseline Environmental Consulting installed three shallow groundwater monitoring wells, MW-1A, MW-2A, and MW-3A, and two deeper well, MW-1B and MW-3B. Groundwater samples from the shallow wells MW-1A and MW-2A showed relatively high levels of gasoline range hydrocarbons east and southeast, respectively, from the project site. Groundwater gradient beneath the adjacent McDonald's parcel seems to be to the southwest.

Project Site Environmental Conditions

In December 2003, TEC Accutite removed one 10,000-gallon gasoline underground storage tank (UST) and associated piping from the northeast site yard area. The UST was constructed of fiberglass. Soil samples collected following removal activities showed no significant levels of Total Petroleum Hydrocarbons as Gasoline (TPH-G) or Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) constituents, but did show detectable concentrations of Methyl-tert-butyl Ether (MTBE).

Based on the UST removal results, the UST excavation cavity was overexcavated and groundwater was removed from the excavation cavity between February and May 2004. Approximately 5,000 gallons of hydrocarbon-impacted groundwater was removed from the excavation cavity, and approximately 417 tons of soil from the UST excavation and 86 tons of soil from the former fuel dispenser island and piping trench were removed for offsite disposal. Confirmatory soil samples collected following soil and groundwater removal activities showed MTBE concentrations ranging from approximately 2 milligrams per kilogram (mg/kg) to 10 mg/kg in the former UST overexcavation cavity sidewalls, as well as below the former piping trench and the former fuel dispenser area.

In October 2005, TEC Accutite drilled and sampled seven direct-push soil borings, B1 through B7 at the site (see Figure 2 and Figure 3). Results of this investigation were reported in *Preliminary Site Assessment Report* (November 14, 2005). Soil borings were drilled to approximately 30 feet in depth, and selected soil and grab groundwater samples were analyzed for TPH-G, BTEX, and Fuel Additives (MTBE, ETBE, TAME, DIPE, TBA, 1,2-DCA, 1,2-EDB, and Ethanol). Soils in the seven borings generally consisted of clays and silty clays, with relatively thin and discontinuous silts and silty sands below 20 feet in depth. According to the TEC Accutite boring logs, groundwater was generally first encountered in the borings in the deeper sand layers, and then rose in the borings to approximately seven feet in depth. Results from this investigation seem to show a relatively small, concentrated MTBE groundwater plume extending west, and possibly southeast, from the former project site UST system.

Between December 2006 and March 2007, Gribi Associates conducted a Remedial Investigation (RI) for the site, reported in *Remedial Investigation Report and Workplan To Conduct Ozone Injection Pilot Test*, (Gribi Associates, May 10, 2007). On December 18 and 19, 2006, twelve soil borings, B-8 through B-19, were drilled and sampled at the project site. Cross sections depicting subsurface lithologies encountered in these borings are summarized on Figure 4 and Figure 5. Based on the results of the soil boring investigation, five shallow groundwater monitoring wells, MW-1 through MW-5, were installed at the project site on February 26, 2007. Soil and groundwater laboratory analytical results from the 12 soil borings and five groundwater monitoring wells are summarized on Figures 6, 7, and 8. Results of the RI investigation, together with previous results, indicated the following relative to hydrocarbon impacts on the project site:

- Soil hydrocarbon impacts appear to be: (1) Limited vertically to shallow soils, between approximately seven feet and 11 feet in depth; and (2) Limited laterally to the former UST area and adjacent east McDonald's parking lot parcel. The highest TPH-G concentration in soil on the project site was 620 mg/kg in a soil sample collected at 5.0 feet in depth in previous TEC/Accutite boring B-3, located near the south end of the former project site UST. This sample, as well as almost all other samples, showed no detectable concentrations of benzene.

- Shallow groundwater (above 20 feet in depth) in the former project site UST area is impacted primarily with MTBE only. Although groundwater flow direction beneath the site is to the west-southwest, the presence of shallow sands extending eastward and southward from the east side of the project site appears to have resulted in some preferential eastward and southward migration of MTBE onto the east adjacent McDonald's site. However, overall, the shallow groundwater MTBE impacts are concentrated in the former project site UST area, and do not extend a significant distance east, south, or west from the former project site UST. The highest groundwater MTBE impact was encountered in well MW-1, located within the former UST excavation cavity, which showed 2,000 ug/l of MTBE and 1,400 ug/l of TBA (an MTBE breakdown product).

- Elevated TPH-G, TPH-D, ethylbenzene, and xylenes encountered in the shallow groundwater sample from McDonald's property boring B-19 appear to have originated from the former gas station on the McDonald's property. The groundwater sample from B-19, which is located approximately 70 feet southeast from the former project site UST, showed TPH-G and TPH-D concentrations of 29,000 ug/l and 3,500 ug/l, respectively. On the other hand, the groundwater sample from boring B-16, located only 20 feet southeast from the former project site UST, showed TPH-G and TPH-D concentrations of only 2,100 ug/l and 960 ug/l, respectively. Also, the groundwater sample from boring B-18, located only 30 feet east-southeast from the former project site UST, showed TPH-G and TPH-D concentrations of only 4,100 ug/l and 330 ug/l, respectively.

- Based on results from the previous TEC/Accutite investigation, it appears that deeper (below 24 feet in depth) soil and groundwater hydrocarbon and MTBE impacts are relatively low, indicating minimal downward MTBE migration. The highest deeper groundwater MTBE impacts were in TEC/Accutite borings B-5 and B-7, which showed MTBE concentrations of 460 ug/l and 340 ug/l, respectively.

In summary, investigative results indicate that: (1) MTBE is the primary contaminant of concern relative to the project site UST; (2) MTBE is limited primarily to shallow groundwater in the immediate source area (adjacent to the former UST), with minimal downgradient (west-southwest) and crossgradient (east and south) migration; and (3) Some TPH-G and TPH-D hydrocarbon impacts are present on the adjacent east McDonald's parcel which are not related to the project site UST system. In order to move this site towards regulatory closure, we recommend remediating shallow groundwater MTBE impacts in the immediate UST source area, while allowing diffuse, low level downgradient and crossgradient MTBE groundwater impacts to naturally attenuate over time.

Options for remediation of source area groundwater MTBE impacts could include: (1) No action, relying on natural attenuation of MTBE over time; (2) Dual-phase (groundwater and soil vapor) extraction (DPE); or (3) Chemical oxidation (ozone or hydrogen peroxide injection). The first option (no action, or natural attenuation), while relatively low cost, could take several years to obtain regulatory closure. The second option (dual-phase extraction), while more aggressive (quicker time to closure) than no action, would be more costly and difficult to implement than chemical oxidation. For the third option (chemical oxidation), we would recommend ozone injection, rather than peroxide injection. Ozone injection is relatively low cost and has been shown to be very effective in remediating MTBE groundwater impacts. The primary potential difficulty with ozone injection would be due to low permeability soils, which could require high injection pressures and result in small radii of influence around the injection wells.

In order to assess the effectiveness of ozone injection at the project site, we recommend conducting an ozone injection pilot test at the site. Ozone injection is a preferred technology to DPE, particularly for dissolved hydrocarbon groundwater impacts, because: (1) Installation and operating costs (energy consumption, O&M, and permitting) are relatively low; and (2) Ozone injection destroys hydrocarbon contaminants in-place, thus eliminating the additional permitting, treatment, and disposal costs associated with DPE remediation.

WORKPLAN TO CONDUCT OZONE INJECTION PILOT TEST

The ozone injection pilot test will involve (1) The installation of approximately three small-diameter injection wells to about 25 feet in depth, screened with specially-manufactured injection screen; (2) The installation of approximately three shallow vapor monitoring wells to assess health and safety concerns; (3) The installation of above/below ground small-diameter delivery tubing; (4) The operation of a mobile ozone generation unit on the site for approximately three months; and (5) 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, however, 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):

$$C_6H_6O + 7.5O_2 \rightarrow CO_2 + 3H_2O$$

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 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) to allow for adequate widening of the dissolved ozone cone as it slowly rises in groundwater.

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 the previous investigations for the project site, Gribi Associates conducted a underground utilities survey using Foresite, a private utility locator. The only identified buried utilities in close proximity to the proposed ozone injection area are along 67th Street to the north and along the west side of the site yard, adjacent to the site building. Proposed injection well locations were chosen to allow for at least 25 feet setback distance between injection wells and utilities. In addition, field ozone vapor monitoring will be conducted in 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.

[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.

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 approximately three 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 all 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 three shallow vapor 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 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 injection wells, IW-1, IW-2, and IW-3 and three shallow vapor monitoring wells, VW-1, VW-2, and VW-3, are shown on Figure 9. 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 wells MW-1 and MW-2. The three shallow vapor monitoring wells, VW-1, VW-2, and

VW-3, will be sited adjacent to the site building, along the perimeter of the injection area to insure that possible fugitive ozone and/or VOCs are not migrating towards adjacent buildings or buried utilities.

Drilling and Sampling of Well Borings

Injection wells will be installed using a combination direct-push and hollow stem auger equipment. 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 23 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 three shallow vapor monitoring wells, VW-1, VW-2, and VW-3, will be installed using direct-push coring equipment and 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 five feet in depth using 3-1/2-inch diameter coring pipe; (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.

Installation of Delivery Piping

To minimize site impacts and project costs, where possible, the ozone injection delivery tubing, consisting of 3/8-inch synthetic flexible tubing, will be installed above ground, within one inch diameter Schedule 40 PVC pipe. If necessary, the additional protective measures for the piping/tubing, such as barriers or temporary fencing, will be installed to insure tubing integrity.

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. The unit includes 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 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
St. Francis Pie Shop 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, existing site hydrocarbon plume wells MW-1 and MW-2, will be monitored monthly during and immediately following the three-month duration of the pilot test. In addition, we will attempt to gain approval from McDonald's to monitor nearby upgradient shallow wells MW-1A and MW-2A. 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.

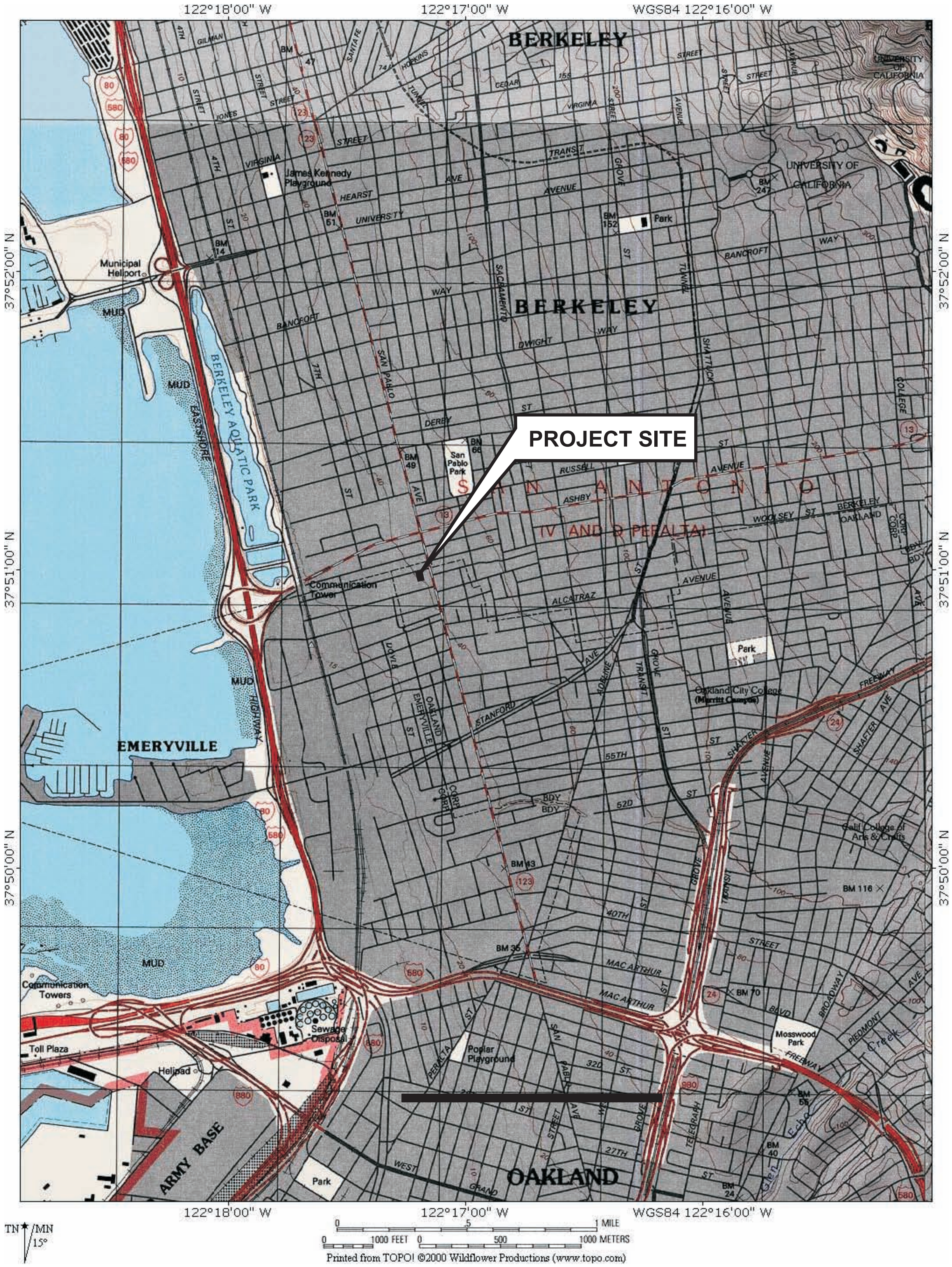
Very truly yours,

James E. Gribi
Professional Geologist
California No. 5843

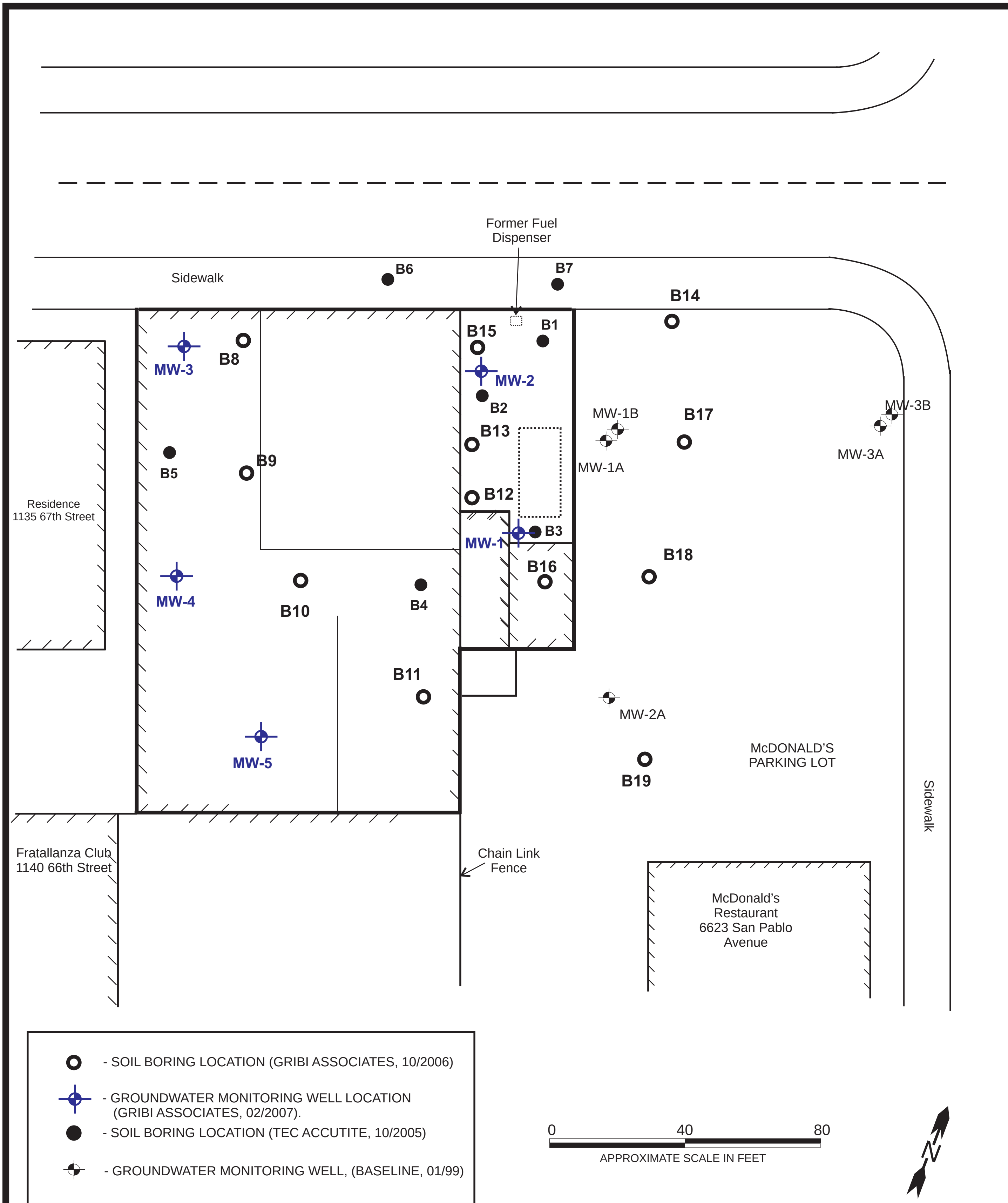
REGISTERED GEOLOGIST
JAMES E. GRIBI
No. 5843
STATE OF CALIFORNIA

Enclosure
cc: Mr. John Buschini

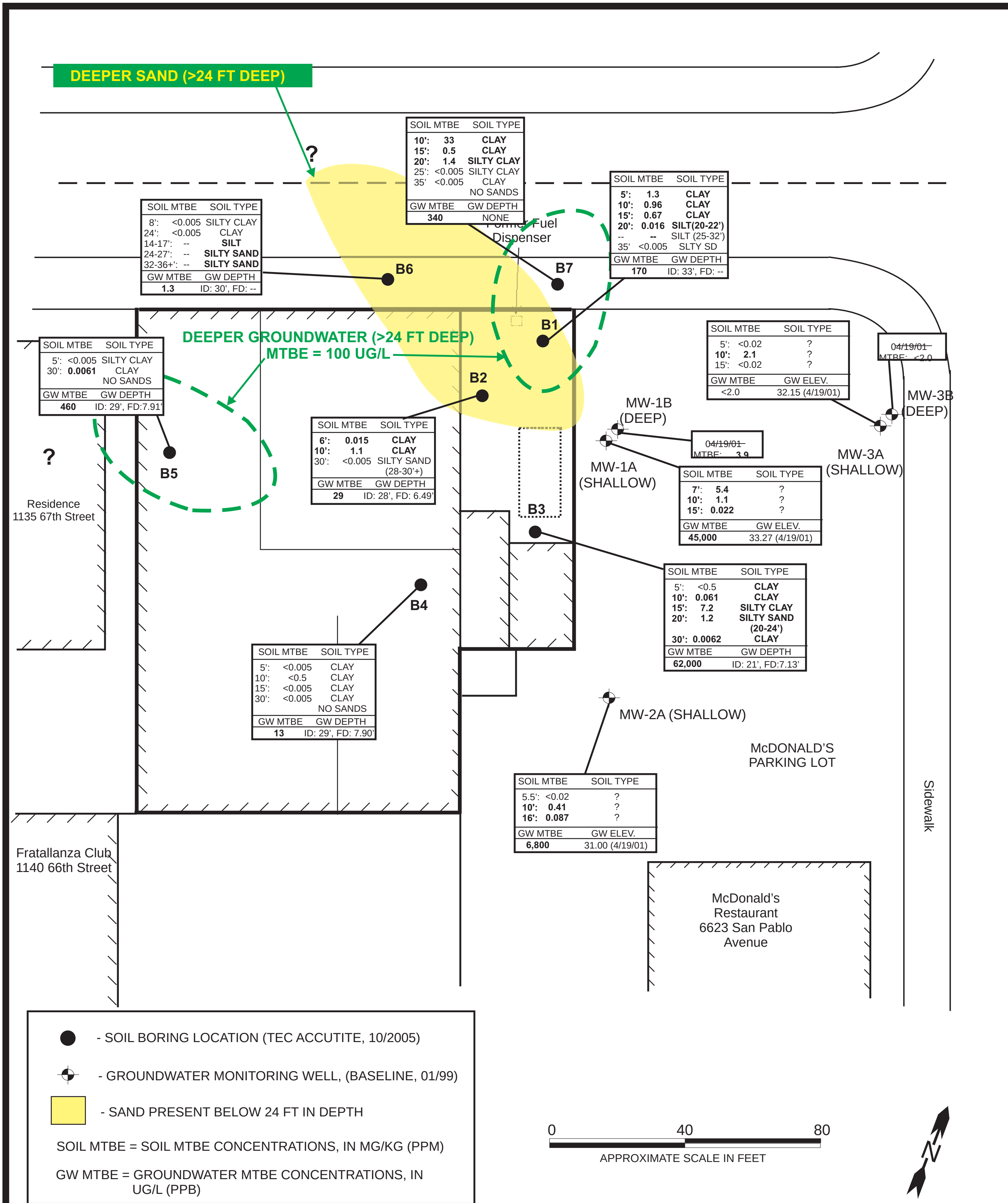
FIGURES



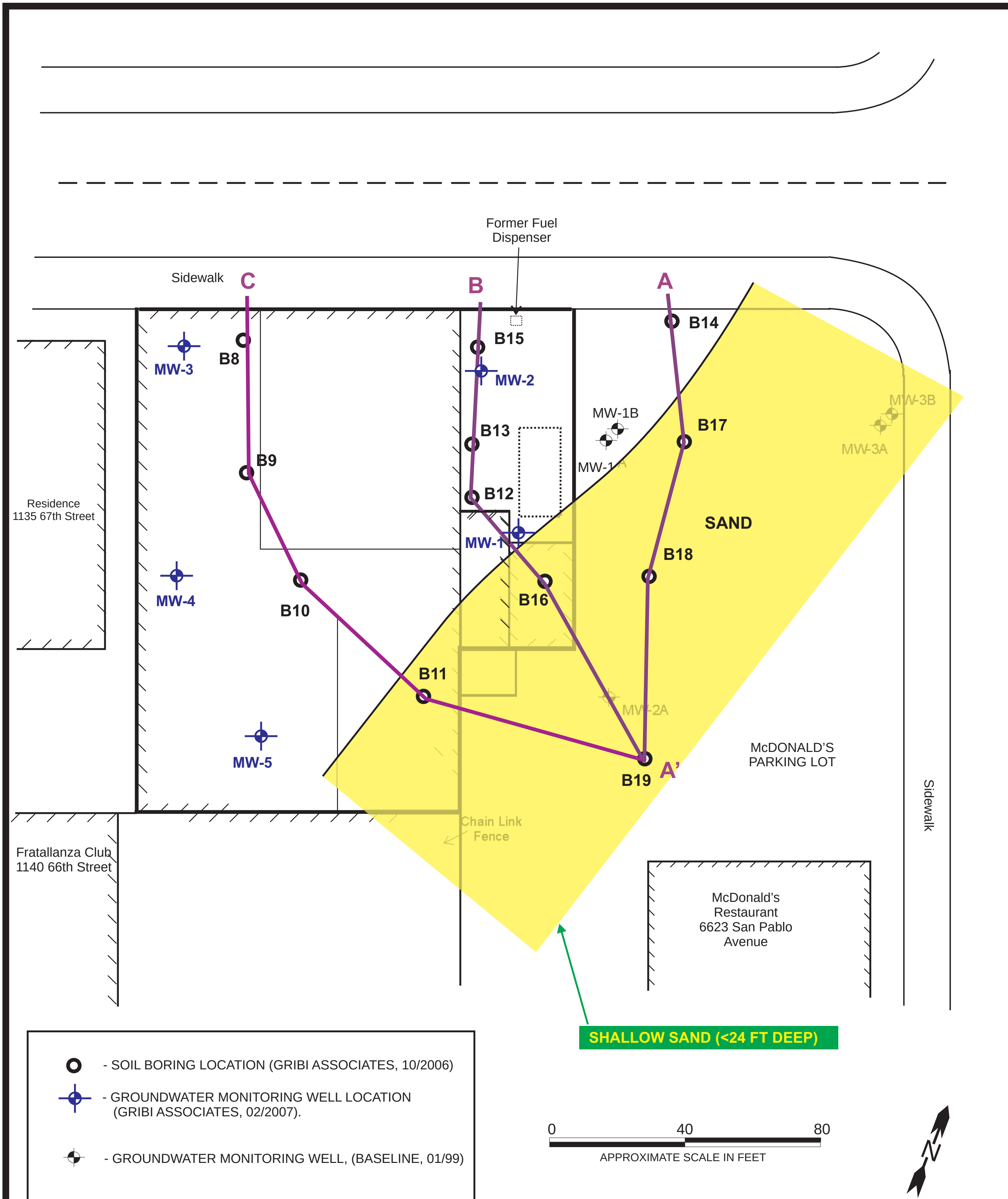
DESIGNED BY:	CHECKED BY:	**SITE VICINITY MAP**	DATE: 08/20/07	FIGURE: **1**
DRAWN BY: JG	SCALE:	ST. FRANCIS PIE SHOP 1125 67th STREET OAKLAND, CALIFORNIA	GRIBI	
PROJECT NO: 320-01-01				



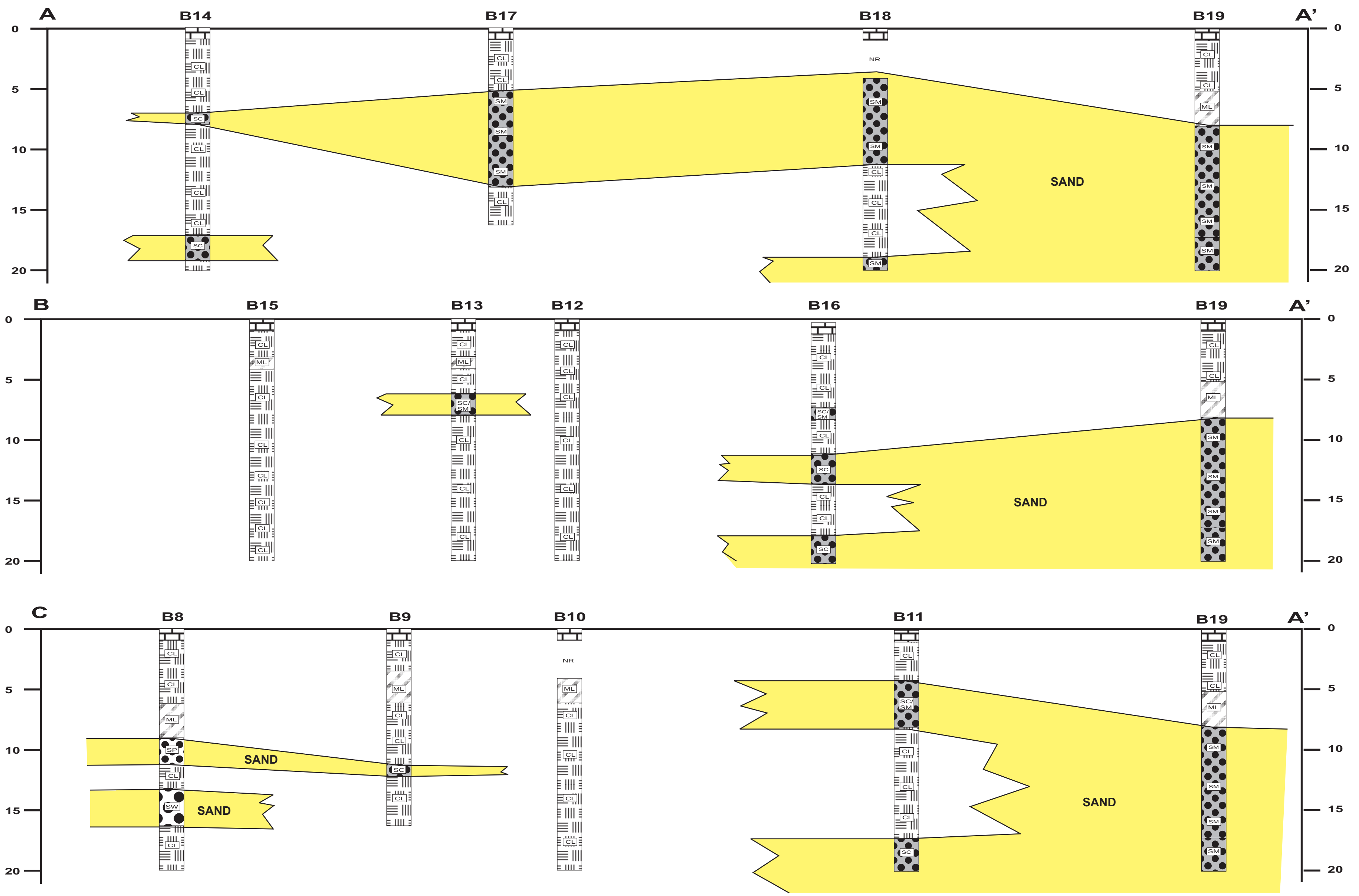
DESIGNED BY:	CHECKED BY: JEG	**SITE PLAN**	DATE: 08/06/2008	FIGURE: **2**
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01		ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA		



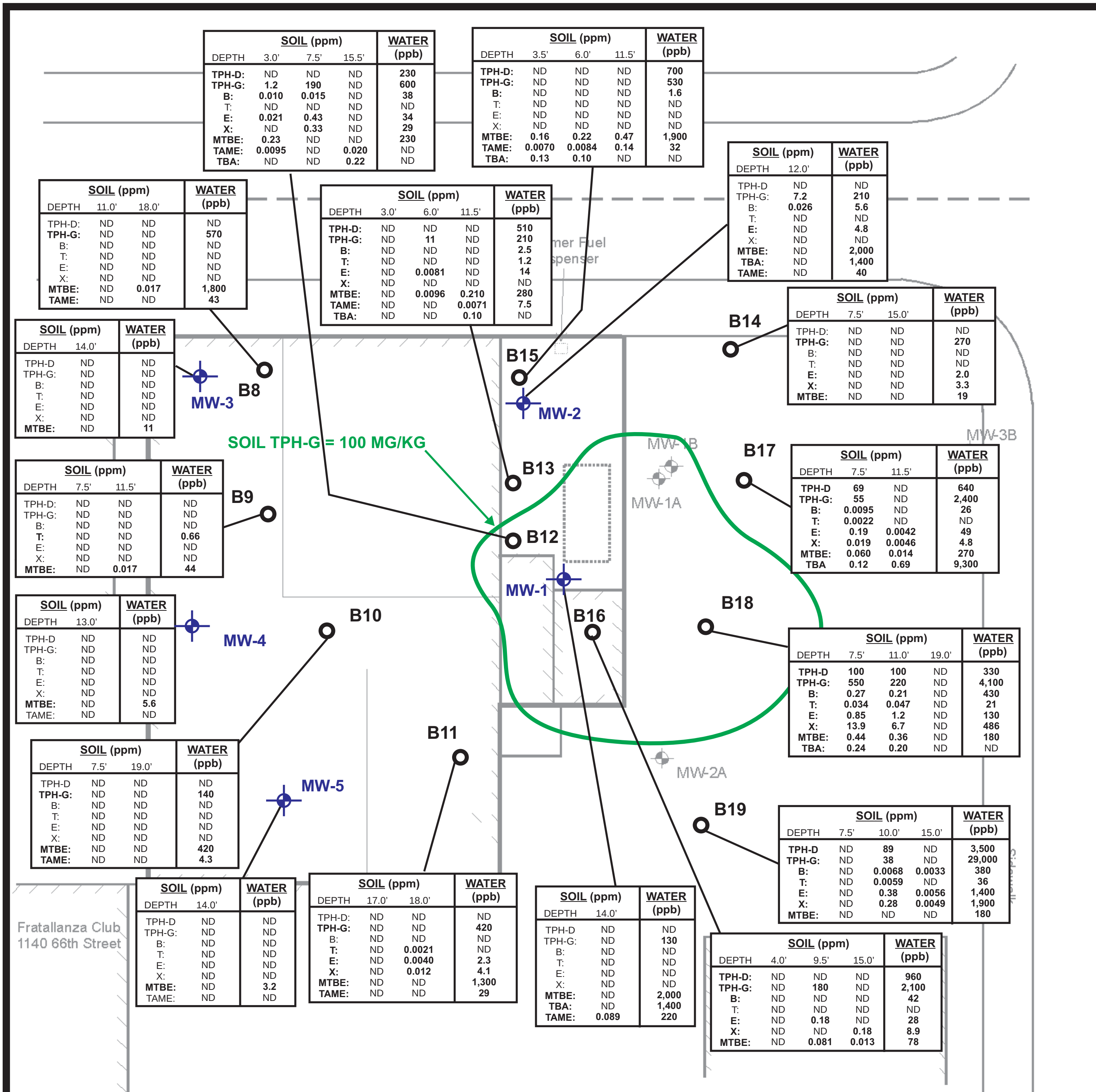
DESIGNED BY:	CHECKED BY: JEG	**TEC/ACCUTITE SOIL & GROUNDWATER HYDROCARBON RESULTS** ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	DATE: 08/06/2008	FIGURE: **3**
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01				



DESIGNED BY:	CHECKED BY: JEG	**CROSS SECTION LOCATION MAP** ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	DATE: 08/06/2008	FIGURE: **4**
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01				



DESIGNED BY:	CHECKED BY:	**CROSS SECTIONS**	DATE: 08/06/08	FIGURE: 5
DRAWN BY: JEG	SCALE:	ST. FRANCIS PIE SHOP UST SITE OAKLAND, CALIFORNIA	GRIBI	
PROJECT NUMBER: 320-01-01				



DEPTH	SOIL (ppm) 3.0'	7.5'	15.5'	WATER (ppb)
TPH-D:	ND	ND	ND	230
TPH-G:	1.2	190	ND	600
B:	0.010	0.015	ND	38
T:	ND	ND	ND	ND
E:	0.021	0.43	ND	34
X:	ND	0.33	ND	29
MTBE:	0.23	ND	ND	230
TAME:	0.0095	ND	0.020	ND
TBA:	ND	ND	0.22	ND

DEPTH	SOIL (ppm) 3.5'	6.0'	11.5'	WATER (ppb)
TPH-D:	ND	ND	ND	700
TPH-G:	ND	ND	ND	530
B:	ND	ND	ND	1.6
T:	ND	ND	ND	ND
E:	ND	ND	ND	ND
X:	ND	ND	ND	ND
MTBE:	0.16	0.22	0.47	1,900
TAME:	0.0070	0.0084	0.14	32
TBA:	0.13	0.10	ND	ND

DEPTH	SOIL (ppm) 12.0'	WATER (ppb)
TPH-D	ND	ND
TPH-G:	7.2	210
B:	0.026	5.6
T:	ND	ND
E:	ND	4.8
X:	ND	ND
MTBE:	ND	2,000
TBA:	ND	1,400
TAME:	ND	40

DEPTH	SOIL (ppm) 11.0'	18.0'	WATER (ppb)
TPH-D:	ND	ND	ND
TPH-G:	ND	ND	570
B:	ND	ND	ND
T:	ND	ND	ND
E:	ND	ND	ND
X:	ND	ND	ND
MTBE:	ND	0.017	1,800
TAME:	ND	ND	43

DEPTH	SOIL (ppm) 3.0'	6.0'	11.5'	WATER (ppb)
TPH-D:	ND	ND	ND	510
TPH-G:	ND	11	ND	210
B:	ND	ND	ND	2.5
T:	ND	ND	ND	1.2
E:	ND	0.0081	ND	14
X:	ND	ND	ND	ND
MTBE:	ND	0.0096	0.210	280
TAME:	ND	ND	0.0071	7.5
TBA:	ND	ND	0.10	ND

DEPTH	SOIL (ppm) 7.5'	15.0'	WATER (ppb)
TPH-D:	ND	ND	ND
TPH-G:	ND	ND	270
B:	ND	ND	ND
T:	ND	ND	ND
E:	ND	ND	2.0
X:	ND	ND	3.3
MTBE:	ND	ND	19

DEPTH	SOIL (ppm) 14.0'	WATER (ppb)
TPH-D	ND	ND
TPH-G:	ND	ND
B:	ND	ND
T:	ND	ND
E:	ND	ND
X:	ND	ND
MTBE:	ND	11

DEPTH	SOIL (ppm) 7.5'	11.5'	WATER (ppb)
TPH-D:	ND	ND	ND
TPH-G:	ND	ND	ND
B:	ND	ND	ND
T:	ND	ND	0.66
E:	ND	ND	ND
X:	ND	ND	ND
MTBE:	ND	0.017	44

DEPTH	SOIL (ppm) 7.5'	11.5'	WATER (ppb)
TPH-D:	69	ND	640
TPH-G:	55	ND	2,400
B:	0.0095	ND	26
T:	0.0022	ND	ND
E:	0.19	0.0042	49
X:	0.019	0.0046	4.8
MTBE:	0.060	0.014	270
TBA	0.12	0.69	9,300

DEPTH	SOIL (ppm) 13.0'	WATER (ppb)
TPH-D	ND	ND
TPH-G:	ND	ND
B:	ND	ND
T:	ND	ND
E:	ND	ND
X:	ND	ND
MTBE:	ND	5.6
TAME:	ND	ND

DEPTH	SOIL (ppm) 7.5'	11.0'	19.0'	WATER (ppb)
TPH-D	100	100	ND	330
TPH-G:	550	220	ND	4,100
B:	0.27	0.21	ND	430
T:	0.034	0.047	ND	21
E:	0.85	1.2	ND	130
X:	13.9	6.7	ND	486
MTBE:	0.44	0.36	ND	180
TBA:	0.24	0.20	ND	ND

DEPTH	SOIL (ppm) 7.5'	19.0'	WATER (ppb)
TPH-D	ND	ND	ND
TPH-G:	ND	ND	140
B:	ND	ND	ND
T:	ND	ND	ND
E:	ND	ND	ND
X:	ND	ND	ND
MTBE:	ND	ND	420
TAME:	ND	ND	4.3

DEPTH	SOIL (ppm) 7.5'	10.0'	15.0'	WATER (ppb)
TPH-D	ND	89	ND	3,500
TPH-G:	ND	38	ND	29,000
B:	ND	0.0068	0.0033	380
T:	ND	0.0059	ND	36
E:	ND	0.38	0.0056	1,400
X:	ND	0.28	0.0049	1,900
MTBE:	ND	ND	ND	180

DEPTH	SOIL (ppm) 14.0'	WATER (ppb)
TPH-D	ND	ND
TPH-G:	ND	ND
B:	ND	ND
T:	ND	ND
E:	ND	ND
X:	ND	ND
MTBE:	ND	3.2
TAME:	ND	ND

DEPTH	SOIL (ppm) 17.0'	18.0'	WATER (ppb)
TPH-D:	ND	ND	ND
TPH-G:	ND	ND	420
B:	ND	ND	ND
T:	ND	0.0021	ND
E:	ND	0.0040	2.3
X:	ND	0.012	4.1
MTBE:	ND	ND	1,300
TAME:	ND	ND	29

DEPTH	SOIL (ppm) 14.0'	WATER (ppb)
TPH-D	ND	ND
TPH-G:	ND	130
B:	ND	ND
T:	ND	ND
E:	ND	ND
X:	ND	ND
MTBE:	ND	2,000
TBA:	ND	1,400
TAME:	0.089	220

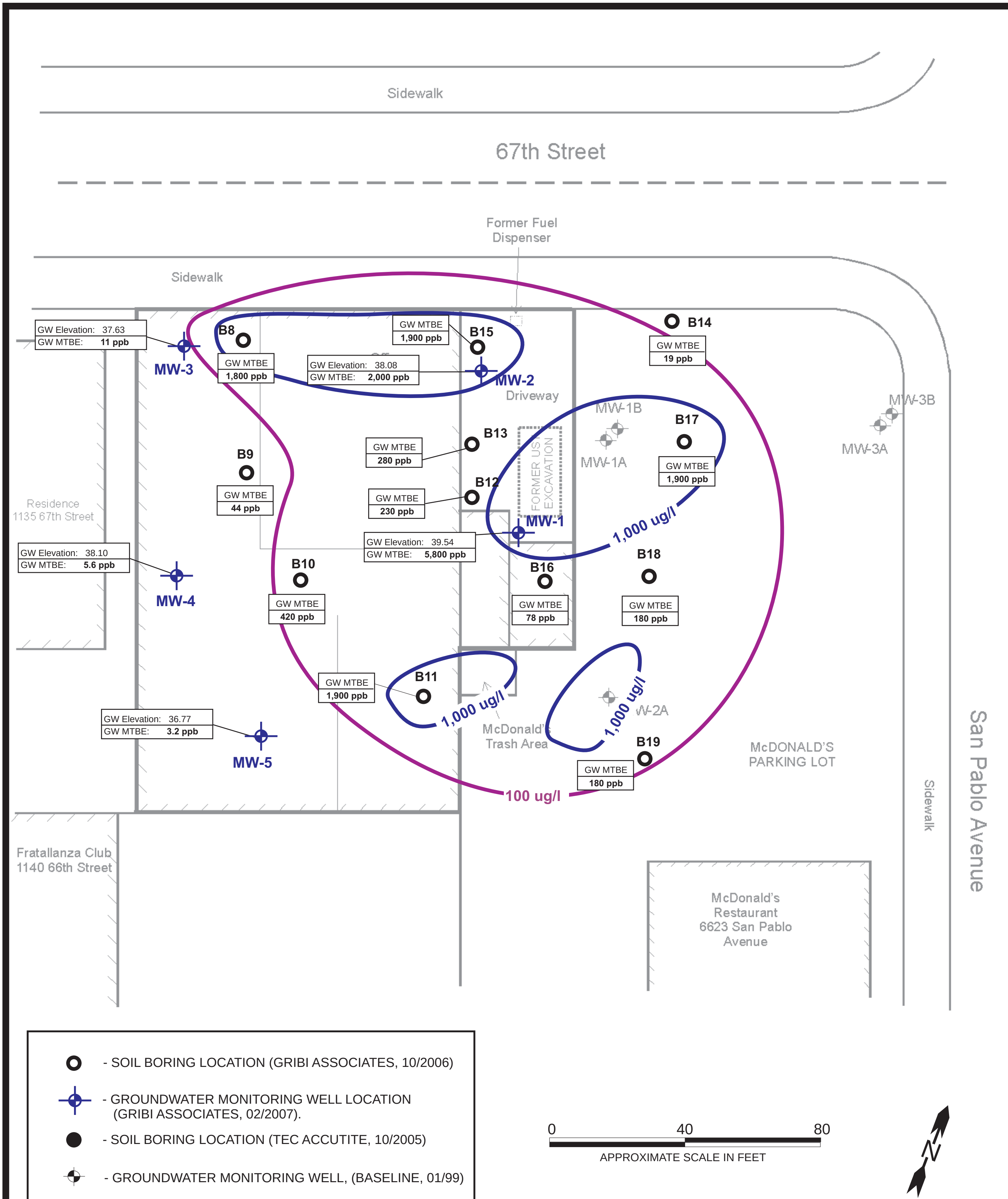
DEPTH	SOIL (ppm) 4.0'	9.5'	15.0'	WATER (ppb)
TPH-D:	ND	ND	ND	960
TPH-G:	ND	180	ND	2,100
B:	ND	ND	ND	42
T:	ND	ND	ND	ND
E:	ND	0.18	ND	28
X:	ND	ND	0.18	8.9
MTBE:	ND	0.081	0.013	78

- SOIL BORING LOCATION (GRIBI ASSOCIATES, 10/2006)
- GROUNDWATER MONITORING WELL LOCATION (GRIBI ASSOCIATES, 02/2007).
- SOIL BORING LOCATION (TEC ACCUTITE, 10/2005)
- GROUNDWATER MONITORING WELL, (BASELINE, 01/99)

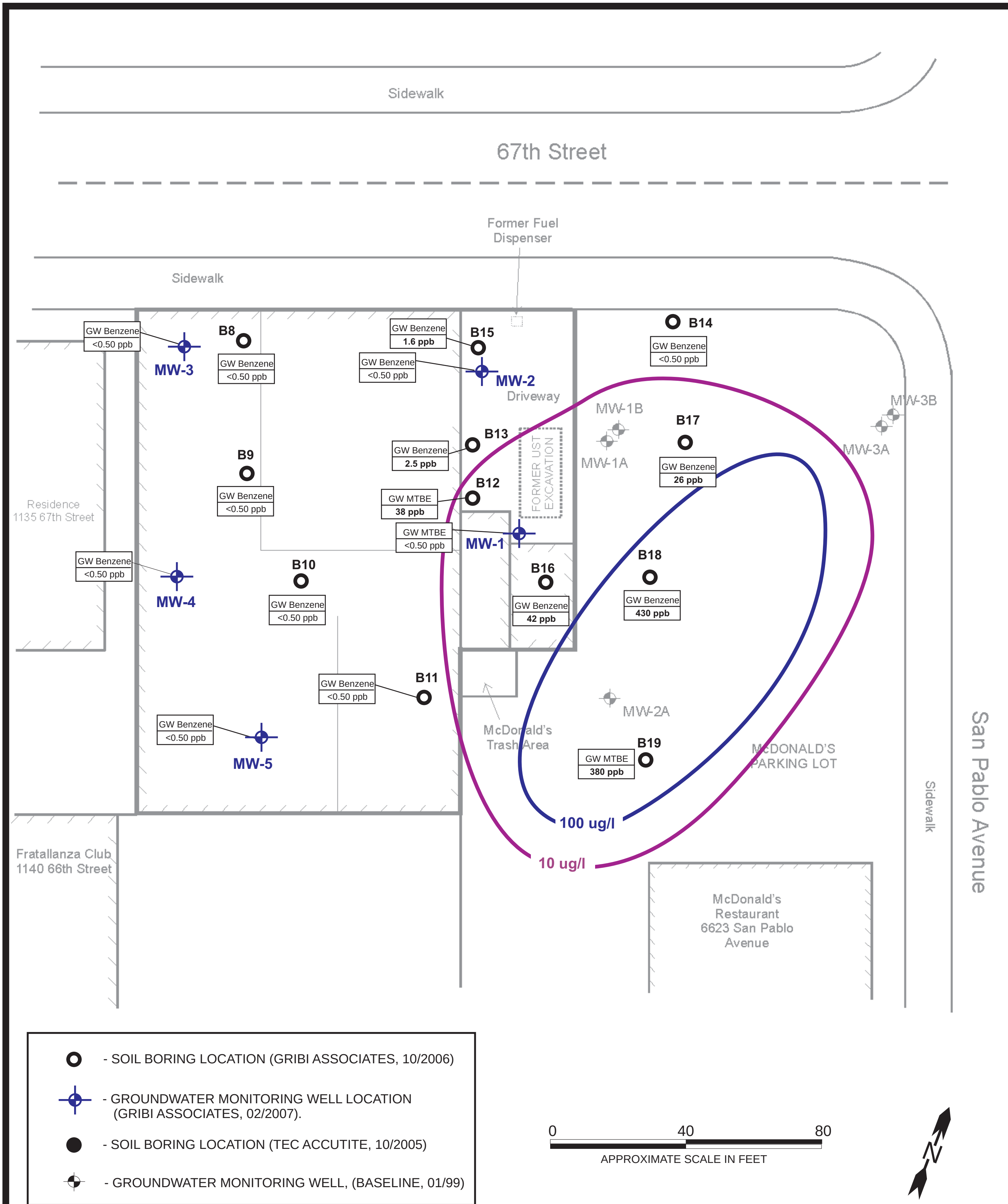
0 40 80
APPROXIMATE SCALE IN FEET

N

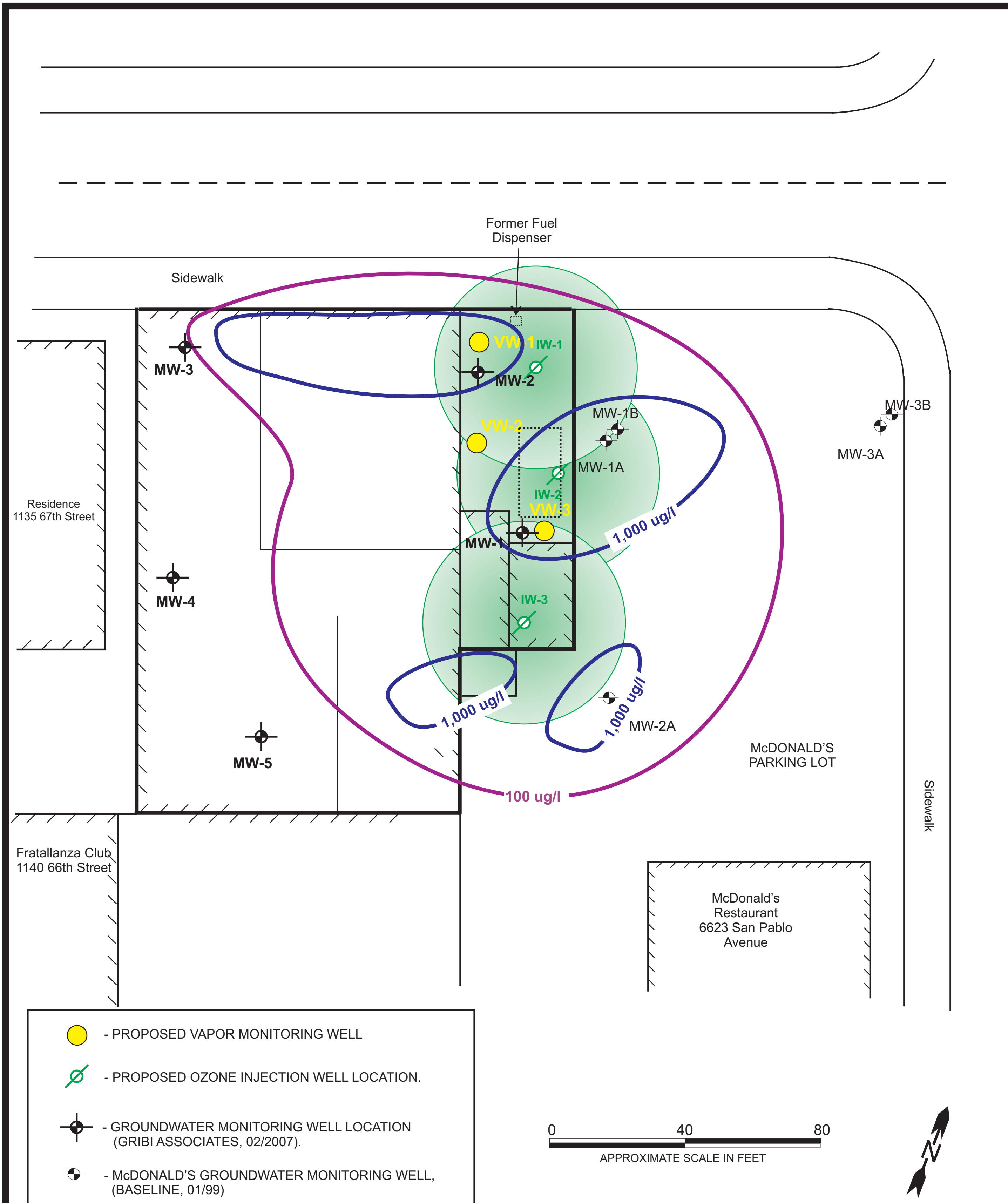
DESIGNED BY:	CHECKED BY: JEG	RI SHALLOW SOIL & GROUNDWATER HYDROCARBON RESULTS	DATE: 08/06/2008	FIGURE: 6
DRAWN BY: JEG	SCALE:	ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	GRIBI	
PROJECT NO: 320-01-01				



DESIGNED BY:	CHECKED BY: JEG	**RI SHALLOW GROUNDWATER ELEVATIONS & MTBE RESULTS** ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	DATE: 08/06/2008	FIGURE: 7
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01				



DESIGNED BY:	CHECKED BY: JEG	**RI SHALLOW GROUNDWATER BENZENE RESULTS** ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	DATE: 08/06/2008	FIGURE: **8**
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01				



DESIGNED BY:	CHECKED BY: JEG	**PROPOSED OZONE INJECTION WELL LOCATIONS** ST. FRANCIS PIE SHOP UST SITE 1125 67TH STREET OAKLAND, CALIFORNIA	DATE: 08/06/2008	FIGURE: **9**
DRAWN BY: JEG	SCALE:		GRIBI	
PROJECT NO: 320-01-01				