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Alameda County
Environmental Health

Paulette Satterley
14601 Guadalupe Dr.
Rancho Murieta, Ca 95683
Telephone 916-768-2003

May 25, 2012

Ms. Barbara Jakub
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Re: Fuel Leak Case No: RO0000133

Enclosed please find the *Additional Site Investigation Work Plan* dated 5-24-2012. This report was prepared by Taber Consultants of West Sacramento, California.

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

Sincerely,

Paulette Satterley

Paulette Satterley

ADDITIONAL SITE INVESTIGATION WORK PLAN

Former City of Paris Cleaners
3516 Adeline Street
Oakland, California 94608

USTCF Claim #002192

Prepared For:

Ms. Paulette Satterley
14601 Guadalupe Drive
Rancho Murieta, CA 95683

Prepared By:

Taber Consultants
3911 West Capitol Avenue
West Sacramento, CA 95691

Taber Consultants Project No. 2011-0107

May 24, 2012

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1.0 INTRODUCTION

1.1 Project Description

On behalf of the responsible party, Taber Consultants has prepared this *Additional Site Investigation Work Plan* for submittal to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) and Alameda County Health Care Services Agency (ACHSA). The proposed scope of work complies with the April 10, 2012, ACHSA directive requesting a work plan to investigate the downgradient extent of the plume.

1.2 Site Location and Description

The former City of Paris Cleaners, located at 3516 Adeline St., Oakland, California, is located at the southeastern corner of the intersection of 35th Street and Adeline Street in the northwest portion of the City of Oakland, California. Elevation at the site is approximately 30 feet above mean sea level (amsl). The site location is shown on Figure 1. A site plan is shown on Figure 2.

The site was a former dry cleaning, laundry and dyeing operation. The facility operated as City of Paris Cleaners and Dyers for about 40 years until the 1960's, but cleaning materials and tanks were not completely removed from the site until 1992. The site buildings remained vacant for a number of years following the closure of the dry cleaning operation, and then the owner converted them to residential and light commercial use. Ms. Debra Runyon acquired the property in July 2000. The site buildings have since been used as on-site living quarters and the City of Paris Studios (a workshop for art, art restoration, collectibles and hobbies).

1.3 Chronological Site History and Subsurface Investigations

In 1987, Frank Champion, the owner at that time, applied for permits to remove storage tanks at the site. Mr. Champion applied for five permits, obtaining permission to remove two 1000-gallon tanks, a 500-gallon tank, a 250-gallon tank and a 150-gallon tank. The underground storage tanks at the site were used to store Stoddard Solvent, the dry cleaning solvent used during operation of the dry cleaning facility until the 1960s when the facility was closed.

On October 4, 1990, Semco Company of San Mateo excavated and reported removing one 750-gallon and two 1,000-gallon underground tanks used to store Stoddard Solvent. Six soil samples were collected in conjunction with the UST removal.

On July 31 and August 1 and 2, 1991, Uriah Inc. (UES) performed a soil vapor survey at the site using photoionization technology (a Photovac TIP I) in an attempt to define the approximate boundaries of soil impacted by Stoddard Solvent. Soil vapors were found to be widely distributed across the site, but due to physical impediments posed by site structures, sidewalks, etc., the full extent of the impacted soil was not defined.

UES contracted W.A. Craig to over excavate the eastern portion of the tank pit on August 30, 1991. Approximately 44 cubic yards were excavated and placed in a cell for on-site bioremediation of the impacted soil. During over excavation, EUS reports that the contractor discovered an additional 250-gallon UST containing "a small volume of liquid" that was stored in a 55-gallon drum on site after removing an aliquot for analysis. This UST was removed and disposed by W. A. Craig on October 31, 1991. An additional 15 cubic yards was over excavated from the tank pit by W.A. Craig on January 27, 1992 and added to the on-site bioremediation cell.

On March 31, 1992, composite samples of the on-site bioremediated soil were analyzed to verify that sufficient hydrocarbon removal had occurred to reuse as fill on the site. No additional soils were excavated due to safety concerns regarding building foundation integrity; however soil samples were collected from the tank pit side walls. ACHCSA approved use of the bioremediated soil as backfill, and W. A. Craig backfilled the tank pit with bioremediated soil and clean fill on April 21, 1992.

On October 29 and 30, 1992, UES supervised on-site installation of ground water monitoring wells. Soils Exploration Services of Vacaville, California, installed three 30-foot monitoring wells. Initial depth to groundwater measurements in the wells ranged from 13 to 14 feet below grade. Beginning November 18, 1992, groundwater samples were analyzed for Total Petroleum Hydrocarbons as Stoddard Solvent (TPH-SS), TPH as diesel (TPH-D), TPH as gasoline (TPH-G), methyl tertiary butyl ether (MTBE), and benzene, toluene, ethyl benzene and total xylenes (BTEX). Samples from all three monitoring wells contained TPH-SS ranging from 630 parts per billion (ppb) in MW-2 to 11,000 ppb in MW-3. TPH-D, TPH-G, MTBE and BTEX concentrations were below laboratory detection limits.

On March 19, 1998, Dugan Associates of San Jose, California (Dugan) advanced six on and off-site soil borings to a total depth of 18 feet below grade. Five of the soil borings were advanced on the north side of 35th Street in the projected downgradient direction from the site (EB-2 through EB-6). One soil boring was advanced on-site to the northwest of the former UST location (EB-1). At each soil boring, Dugan collected a soil sample at 5, 10 and 15 feet below grade and one grab-groundwater sample at 18 feet below grade. The on-site soil boring (EB-1) groundwater sample concentration was 270,000 ppb TPH-SS, with one off-site groundwater sample (EB-5) reporting 780 ppb TPH-SS. Concentrations of analytes for all other groundwater samples from the soil borings were below laboratory detection limits. Soil samples at EB-1 contained 310 and 340 ppb of TPH-SS at 10 and 15 ft. below grade, respectively, and trace amounts of total xylenes and/or toluene.

In September, 1999, ACHSA issued a directive letter which required groundwater analysis for semi-volatile organics (SVOCs) and volatile organics (VOCs) historically associated with dry cleaning operations. In December 1999, using EPA method 625 and 3510, or 8270 and 3550, 1,2-dichlorobenzene (DCB), 1,1-dichloroethane (1,1 DCA), 2-methylnaphthalene and naphthalene were detected in samples from one or more wells. Concentrations of other SVOC and VOC analytes were below laboratory detection limits, including denser than aqueous phase liquids (DNAPLs, i.e. pentachlorophenol (PCP)). At that time Dugan defined a north-trending groundwater gradient at 0.003 ft./ft.

In their September, 1999 letter, the ACHSA also noted that according to a database search they believed a 97-foot industrial well had been drilled at the site. The well was located southeast of Monitoring Well 3 (Figure 2).

In March 2002, in compliance with an ACHSA directive letter, WellTest, Inc. (formerly Dugan and Associates) redeveloped the three monitoring wells (by purging 10 well-volumes) and sampled the three wells pursuant to quarterly monitoring responsibilities. WellTest, Inc. also sampled the industrial well on-site. The analytical results of the sampling indicated up to 11,000 micrograms per liter (µg/L) of TPH-SS in the sample from MW-1, no BTEX above laboratory detection limits, up to 31 µg/L MTBE in the sample from MW-3, 0.61 µg/L DCB in the sample from MW-1, and 130 µg/l Naphthalene in MW-1. The groundwater gradient was also defined to the southeast at 0.14 ft./ft., which appears to be an anomalously steep gradient for this site. This steep gradient may be a result of sediment blocking some or all of the screened section of one or more well. When Dugan redeveloped the wells in 2002, they appear to have adversely impacted the ability of the wells to adjust to changing water levels.

Taber Consultants, formerly Western Resource Management (WRM), assumed environmental consulting responsibilities for the site commencing in June 2007. Taber performed groundwater monitoring at the site for the first and second semiannual periods of 2009. In response to a query by ACHSA, Taber submitted a well completion report request to the California Department of Water Resources, in which undated well boring logs for a well at the City of Paris Cleaners, at 3516 Adeline Street, indicated a 97-foot industrial well on the site. Taber also found well drilling information for another industrial well drilled in 1927 for the City of Paris Cleaners, drilled to 295 feet. The location of this well is unknown, and the well could have been covered by buildings constructed after the well was taken out of service.

July 28, 2009, ACHCSA advised Responsible Parties that The California State Water Resources Control Board (State Water Board) had approved Resolution No. 2009-0042, which reduced quarterly groundwater monitoring requirements to semiannual or less frequent monitoring at all sites. In 2009, Taber reduced monitoring at the City of Paris Cleaners site to two semiannual monitoring events at the site in February and August. Corresponding reports were the First Semiannual and Second Semiannual Monitoring Reports.

In August of 2009 Taber Consultants evaluated using the HydraSleeve® no-purge sampling protocol at the site. With verbal authorization from Barbara Jakub of ACHCSA, on March 17, 2010, Taber Consultants implemented ongoing use of the HydraSleeve® sampling protocol for all wells at the site.

In March 2011 Taber Consultants resurveyed top of well casings during groundwater monitoring activities. In May 2011 Taber Consultants conducted site investigation activities which included: video well logging to evaluate well screen and casing condition; hydrogeology characterization using cone penetrometer testing (CPT), the GeoProbe® hydraulic profiling tool (CPT), continuous push soil borings; assessing distribution of impacted soil by analyzing soil samples and grab groundwater samples; and assessing site groundwater chemistry by analyzing grab groundwater samples for natural attenuation parameters. The findings of the investigation are detailed in the *Site Investigation Report, Human Health Risk Assessment Report,* and *Natural Attenuation Analysis Report* dated February 1, 2012.

1.4 Zimmerman Residence Plume

A source of TPH-G, BTEX and MTBE has been identified at the adjacent property to the south and southeast of the former City of Paris site. This site, referred to as the Zimmerman Residence, is located approximately 60 feet to the southwest and up-gradient/cross-gradient of the former City of Paris Cleaners site. The Zimmerman Residence property includes a residential building and a warehouse, and spans the distance from Adeline Street to Chestnut Street to the east.

On February 22, 2000, one 3,750-gallon gasoline UST was removed from the sidewalk between the warehouse building and Chestnut Street. The former UST location is approximately 220 feet southeast of the City of Paris site. Site investigations were conducted at the site in June 2006, October 2007, December 2007 and May 2008.

Soil and groundwater samples from the Zimmerman residence site contained TPH-G, TPH-D and BTEX. Maximum concentrations reported in groundwater samples from soil borings were 120,000 µg/L TPH-G (S-4), 12,000 TPH-D (SB-14), 10,000 µg/L benzene (SB-11), 930 µg/L toluene (pit water), 3,500 µg/L ethyl-benzene (S-4), and 7,900 µg/L xylenes (SB-11), respectively. Grab groundwater samples taken in May 2008 had concentrations of 740 µg/L TPH-G in soil boring SB-27 (east of the industrial well W-IND at the site), 3,600 µg/L TPH-G in soil boring SB-25 (on the southeast corner of the site), and 2,300 µg/L TPH-G in soil boring SB-26 (south of the monitoring wells at the site).

At the Zimmerman site, approximately 1,100 tons of gasoline-impacted soil was removed from the warehouse interior adjacent to Chestnut Street in March 2009. During soil removal, AEI Consultants (AEI), the environmental consultant for this project, reported that while no groundwater was collected from the excavation during excavation activities, a light sheen of free product was seen on the water seeping into the pit during excavation. In March, 2009, AEI injected hydrogen peroxide into the permeable bridge they had installed in the backfill area as a measure to treat the free product and to mitigate plume migration from the source. An injection well was installed in the tank excavation area at the Zimmerman residence in May 2009 to aerate impacted groundwater.

Correspondence from Alameda County dated December 29, 2008, notes that sorbed-phase soil concentrations of petroleum hydrocarbons further than 100 feet from the tank on Chestnut Street indicated an additional source was likely at the site.

Seven groundwater monitoring wells (MW-1 through MW-7) and one injection well (IW-1) are currently located at the Zimmerman Residence site. Groundwater monitoring has being ongoing since April 2009.

Based on the *First Semi-Annual Groundwater Monitoring* report dated September 30, 2011 by AEI Consultants Environmental & Engineering Services, elevated TPH-G and benzene concentrations have been detected in groundwater samples. The highest TPH-G and benzene concentrations indicated in the report were 27,000 µg/L (May 5, 2011 sample from MW-2) and 3,800 µg/L (August 27, 2009 sample from MW-3), respectively. The closest well to the former City of Paris site is MW-4 located approximately 60 feet southeast. Concentrations in MW-4 groundwater samples collected on May 5, 2011 were 5,900 µg/L TPH-G and 560 µg/L benzene. MTBE concentration have not been reported because of elevated reporting limits ranging from 5 and 1,200 µg/L; resulting in a lack of meaningful data regarding MTBE concentrations in groundwater at the Zimmerman Residence site.

2.0 PURPOSE

This *Site Investigation Workplan* is intended to present the scope of work required to complete site investigation and tasks at the City of Paris Cleaners site. On April 10, 2012, ACHSA directed Taber Consultants to perform the additional work and provide technical information that will provide an estimate of the westerly plume boundaries along Adeline Street. Information obtained from the exploration will help define the extent of petroleum hydrocarbons in soil and groundwater on the western portion of the site and improve understanding of the site hydrogeology in order to refine the Site Conceptual Model in preparation for remedial activity at the site.

Based on Frank Champion's recollection in 1987, Mr. Champion applied for five permits, obtaining permission to remove two 1000-gallon tanks, a 500-gallon tank, a 250-gallon tank and a 150-gallon tank. During 1990 tank removal operations, two 1000-gallon tanks and one 750-gallon tank were removed. During soil excavation operations in 1991 an additional 250-gallon tank was removed. This discrepancy, Mr. Champion's recollection that there were five tanks and only four have been removed, as well as slow degradation-in-place of the TPH-SS plume, suggests the possibility that another tank may be present on site. Geophysical exploration using ground-penetrating radar and other techniques is proposed to help determine if another tank is present as well as identify subsurface features in anticipation of future remediation activity.

3.0 PROPOSED FIELD ACTIVITIES

3.1 General

Taber Consultants proposes to conduct the following tasks to address data gaps at the site:

- Advance soil borings to shallow and deep groundwater zones in four locations on Adeline Street to the northwest of the source area.
- Advance a boring to 20 feet in each location in order to install a temporary PVC casing and collect groundwater in the shallow groundwater zone.
- Advance a boring to 40 feet in each location in order to collect soil samples and collect groundwater in the deep groundwater zone.
- Analyze soil samples for TPH-SS, TPH-G, benzene, toluene, ethyl benzene, and xylenes (BTEX), and fuel oxygenate MTBE.
- Analyzing soil samples for TPH-SS and TPH-G using a silica gel cleanup method to remove the potential for false positives from organic materials.
- Analyze groundwater samples for TPH-SS and TPH-G by EPA Method 8015B and BTEX and MTBE by EPA Method 8260B.
- Collect monitoring well samples from MW-1, MW-2, MW-3 and W-IND to quantify concentrations in these wells at the time of the borings to provide additional information regarding the plume status concurrent to the Adeline Street exploration.
- Conduct geophysical exploration to attempt to determine the presence of a previously unidentified TPH-SS tank.

3.2 Permits and Preliminary Work

Taber Consultants will obtain the required soil boring permits from the ACHSA. In addition, excavation and obstruction permits will be obtained from the City of Oakland.

Underground Service Alert (USA) will be notified 48 hours prior to boring advancement to locate any utilities in the vicinity of the planned well locations. As an additional precaution against encountering any buried utilities, the first five feet of each boring will be hand-augered.

All drill cuttings, rinsate water, and decontamination water will be stored in separate 55-gallon drums for temporary off-site storage, pending waste profiling and proper disposition. Waste disposition will be based on the analytical results of soil and groundwater samples collected and analyzed during the field investigation.

3.3 Soil Boring Logging and Sampling

Taber Consultants will advance off-site borings in four locations as shown on Figure 3. Taber Consultants will use a truck-mounted Geoprobe® rig equipped with a Dual-Tube sampling system that will provide continuous coring of soil using direct-push technology. The dual-tube system allows for soil and groundwater sample collection at discreet depths.

Borings advanced to 40 feet bgs will be continuously logged to full depth. Soil samples will be collected using a 2.25” outside diameter steel drive rod lined with a 1.75” diameter by 4 feet long acetate liner. The sampler will be driven into the soil and retrieved from the borehole. Upon retrieval, the acetate tubes will be inspected and soils logged based on the Unified Soils Classification System (USCS).

3.4 Field Screening

To provide a preliminary indication of petroleum hydrocarbons in the borings, a portable photo-ionization detector (PID) will be used to monitor for the presence of organic vapors in drill cuttings and drive samples. The PID measures relative concentrations of VOCs and is calibrated to an isobutylene standard.

The field screening will consist of filling a sealable plastic bag to about one-third capacity with soil and sealing the container. After allowing sufficient time for the soil vapor to equilibrate with the container’s headspace, the bag will be slightly opened or pierced to allow for insertion of the PID probe.

The concentrations of organic vapors detected by the PID will be recorded on the boring logs. Field screening will also include documenting visual indications for the presence of petroleum hydrocarbon impacts, such as staining, odors, discoloration, and/or chemical sheens.

3.5 VOC Soil Sampling

Depth-discrete samples will be collected by cutting off an approximately 6-inch long section of butyrate tubing filled with soil from the direct push boring and covering the ends with Teflon-lined caps. The sample tubes will be labeled and placed in an iced cooler for transportation to the project laboratory and submitted under Chain of Custody documentation to a California-certified environmental laboratory for analysis for TPH-SS, TPH-G, BTEX, and MTBE by EPA Methods 8015B and 8260B.

3.6 Groundwater Sampling and Analysis

Subsequent to advancing the borings, grab groundwater samples will be collected from the borings.

Groundwater samples at 20 feet bgs will be collected by setting a temporary well casing and screen using slotted PVC tubing and the GeoProbe casing in the open borehole to intersect groundwater. After sufficient groundwater has entered the temporary well screen, a sample will be collected and transferred to laboratory-supplied containers. Groundwater samples at 40 feet bgs will be collected from the bottom of the borehole. Groundwater samples will be collected using a Geopump and new disposable tubing. The groundwater samples will be collected in laboratory-supplied containers, labeled, stored and transported in an iced cooler under chain-of-custody documentation to a State of California-certified testing laboratory for analysis on a standard turn-around time. Groundwater samples will be analyzed for the following constituents of concern (COCs): TPH-SS, TPH-G, BTEX, and MTBE by EPA Methods 8015B and 8260B.

3.7 Ground Penetrating Radar

A geophysical investigation can be performed using a combination of vertical magnetic gradient (VMG), terrain conductivity (TC), ground penetrating radar (GPR), and hand-held metal detection (MD) methods. VMG is used to measure lateral variations of the earth's magnetic field within the survey area, and by inference, detect magnetic metal objects buried in the shallow subsurface. TC is used to characterize lateral variations of electrical conductivity in the subsurface that may be caused by buried objects or disturbed soil. GPR is used to image the shallow subsurface for evidence of USTs, underground utilities, buried debris, and possible backfilled areas. MD is used to delineate the locations and general outline of shallowly buried metallic objects. A more detailed discussion of these methods, data analysis, geophysical instrumentation, and limitations is presented in Appendix A.

Using a fiberglass measuring tape, a survey grid will be established inside the north fence line with the baselines parallel to the site enclosure's fence lines and with the western baseline parallel to Adeline Street. A series of roughly north-south traverses spaced 5feet apart and oriented perpendicular to 35th street will be marked out on the ground with spray paint to guide collection of VMG and TC data. VMG readings will be taken at approximately 3-foot intervals along the lines and TC readings will be taken at 5-foot intervals.

Following the VMG and TC data collection, the data will be uploaded to a laptop computer and processed on-site using Golden Software's "SURFER" software to produce VMG and TC contour maps. The corresponding contour maps then will be evaluated for VMG and TC variations that might be caused by magnetic objects, buried debris, and backfill zones. By comparing the locations of VMG and TC variations identified on the maps with the locations of above-ground objects in the field, variations which can be attributable to possible buried sources may be identified. Variations identified as possibly being due to buried sources would be considered as being anomalous and investigated further with the MD and GPR in an effort to more fully characterize them.

The MD exploration consists of carrying the hand-held MD instrument along a series of bidirectional traverses centered on identified VMG/TC anomalies. Traverses will be spaced approximately 3- to 5-feet apart and range in length from 20- to 3D-feet, but additional traverses with different spacing and length will be used as needed. If a metallic subsurface feature is detected, the outline will be marked on the ground with spray paint and the location mapped.

The GPR investigation will consist of collecting GPR data along a total of eight bidirectional traverses centered on identified MD anomalies. The GPR data will be processed using Geophysical Survey System's "RADAN" software to produce a series of 2-D vertical profile images of the shallow subsurface. The resulting GPR profiles will be evaluated for reflection patterns suggestive of USTs, buried structures, or other anomalous features.

4.0 WASTE MANAGEMENT

Any decontamination and purge water generated by site investigation activities will be placed in DOT-approved 55-gallon drums and labeled accordingly. The drums will be stored at the driller contractor facility pending laboratory analyses and selection of an appropriate disposition. Disposal of the cuttings and water will be completed by the drilling contractor. Drill cutting and water disposal is expected to be completed within 60 days of the receipt of the analytical results.

5.0 REPORT

Following completion of the field activities, a report will be prepared summarizing the results of the investigation. The report will be completed within 60 days of receipt of analytical results and will include:

- An investigation report presenting investigation methods, comparison of analytical data to water quality objectives, and recommendations for further work;
- Figures depicting sampling locations, analytical results and cross-sections;
- Tables summarizing analytical data; and
- Appendices containing laboratory reports, geophysical reports and other additional information.

6.0 SCHEDULE

Permitting for the soil borings will commence immediately upon approval of the work plan by ACHSA. The subsurface investigation is expected to be completed within 90 days of work plan approval, depending upon drill rig availability. The *Additional Site Investigation Report* will be submitted within 90 days of the completion of the site investigation.

7.0 REPORT DISTRIBUTION

Ms. Paulette Satterley
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Paula Champion-Braig
280 Mountain Ave.
Piedmont, Ca. 94611-3506

Ms. Barbara Jakub
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1131 Harbor Parkway, Suite 250
Alameda CA, 94502

Ms. Cherie McCaulou
San Francisco Bay Regional Water Quality Control Board
1515 Clay St., Suite 1400
Oakland, CA 94612

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8.0 REMARKS AND SIGNATURE

The interpretations and/or conclusions contained in this report represent our professional opinions and are based in part on information supplied by the client. These opinions are based on currently available information and were developed in accordance with currently accepted geologic, hydrogeologic, and engineering practices in Alameda County in 2012. Other than this, no warranty is implied or intended.

This report has been prepared solely for the use of Ms. Paulette Satterley. Any reliance on this report by third parties shall be at such parties' sole risk. The work described herein was performed under the direct supervision of the professional geologist, registered with the State of California, whose signature appears below.

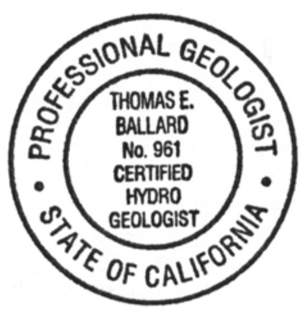
We appreciate the opportunity to provide you with geologic, engineering and environmental consulting services and trust this report meets your needs. If you have any questions or concerns, please call us at (916) 371-1690.

Sincerely,

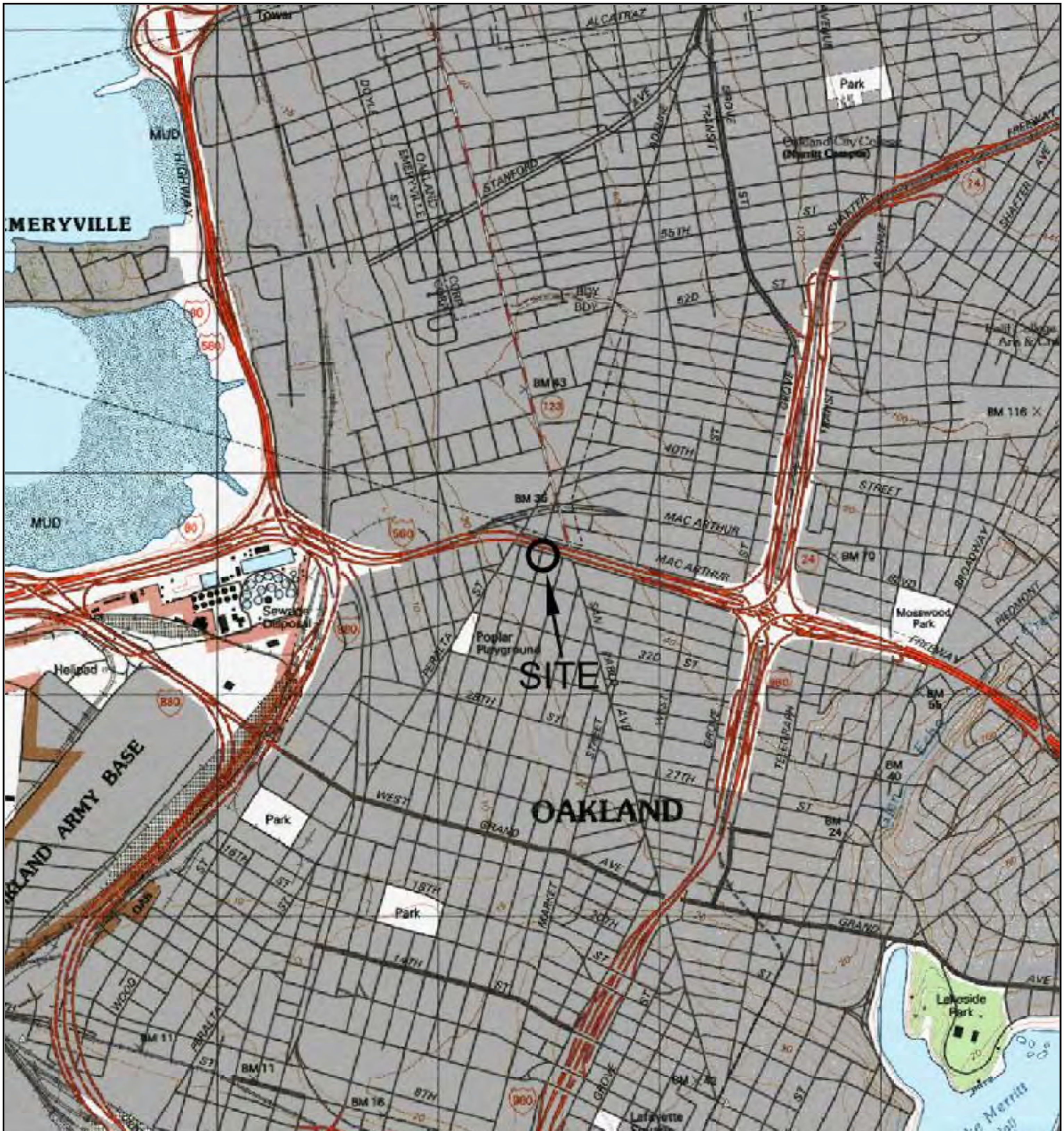
Taber Consultants

Ellen Pyatt, MSc.
Project Geologist

Thomas E. Ballard, P.G. #7299, C.H.G. #961
Principal Hydrogeologist



FIGURES



Scale: 1:24,000

Source:
USGS West Oakland Quadrangle Topographic Map Report, 7.5 Minute Series (topgraphic), dated 1993

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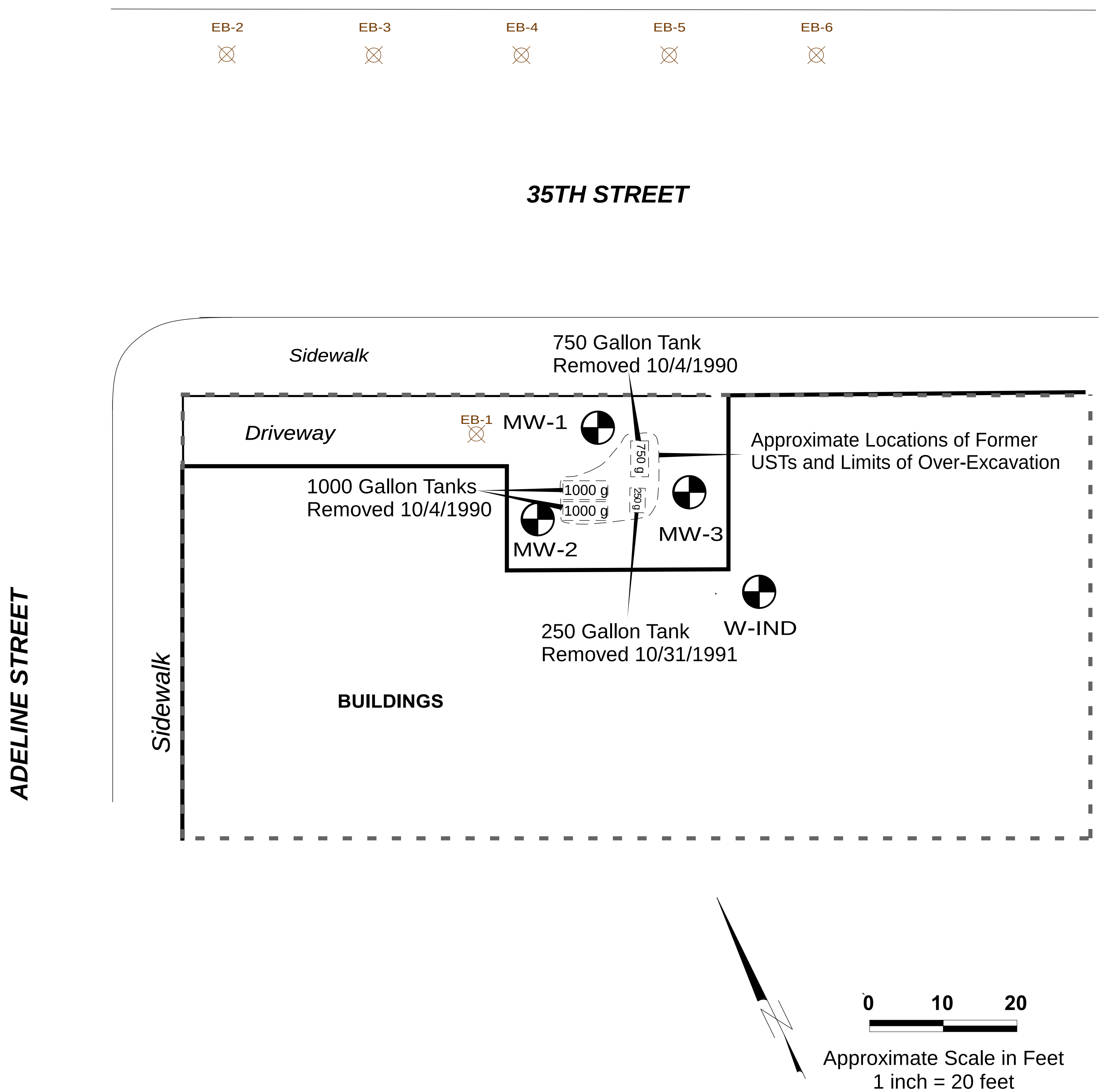
Former City of Paris Cleaners

3516 Adeline Street
Oakland, California

Vicinity Map

2011-0107	May 2012	Figure 1



LEGEND

EB-1	Soil Boring (1998)
MW-2	Groundwater Monitoring Well
W-IND	Industrial Well
1000 g	Approximate Locations Former Underground Storage Tanks
- - - -	Approximate Site Boundary (Assessor's Parcel Number 5-478-23)

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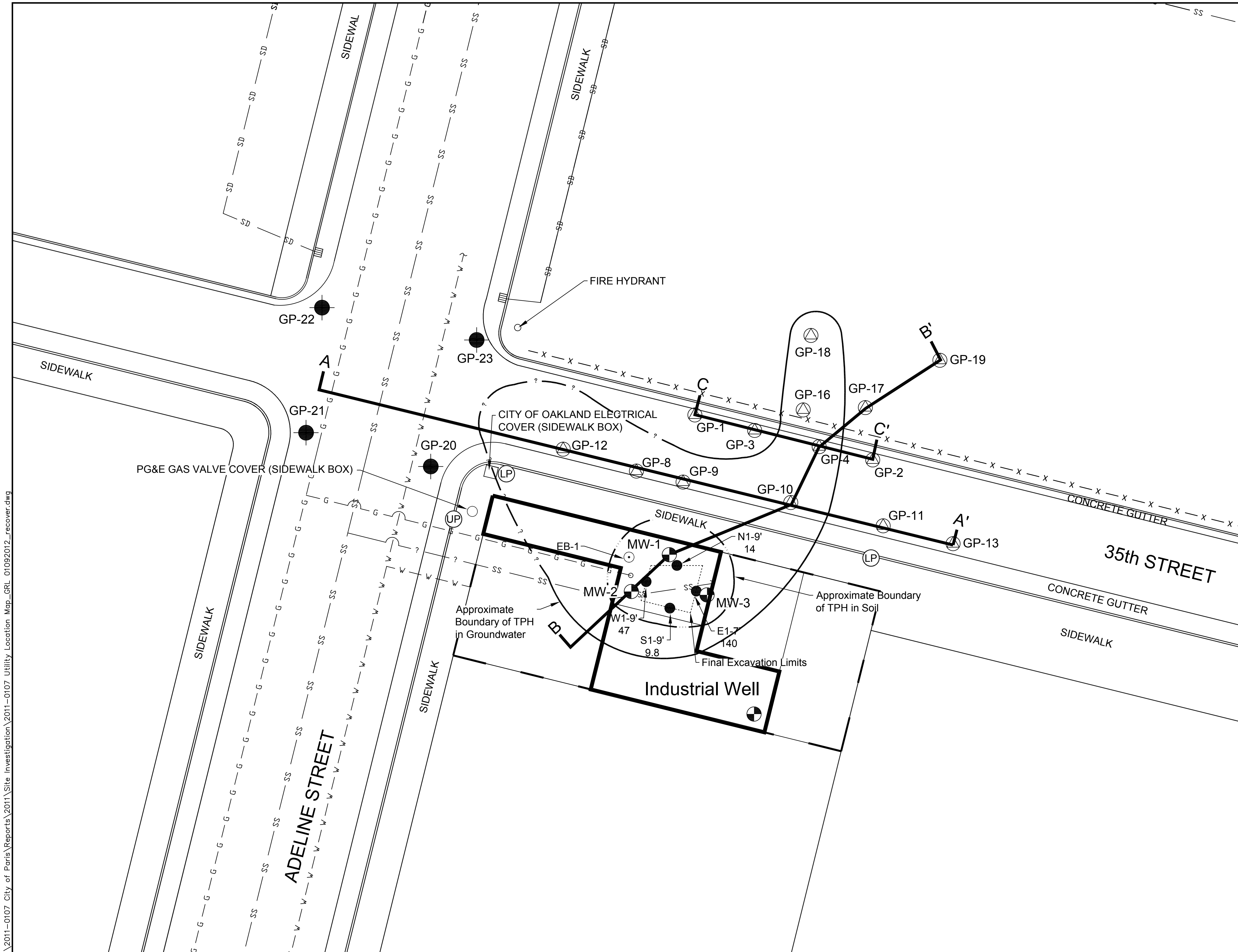
Oakland, California

Site Map

2011-0107	May 2012	Figure 2



NOTES

1. All locations are approximate and are referenced from existing site features.
2. Water and sanitary sewer lines to property site were not identified by locator or from records search. However they are shown here based on field observation and approximation of main lines located on Adeline Street.

LEGEND:

A — A'	Cross Section Location
	Approximate Lateral extent of TPH–SS in soil (includes concentrations quantified by the laboratory as TPH–G, but noted as non–typical TPH pattern in gasoline range)
?	Approximate Lateral extent of TPH–SS in groundwater (includes concentrations quantified by the laboratory as TPH–G, but noted as non–typical TPH pattern in gasoline range). ? NW boundary to be explored
	Geophysical investigation exploration.
GP-23	Proposed Boring Locations
GP-19	Soil Boring May 2011 (Taber Consultants)
EB-1	Soil Boring 3–19–98
W1-9	Sidewall Soil Sample, Final Excavation Limits 1–27–92
MW-1	Approximate Location of Well
UP	Approximate Location of Utility Pole
LP	Approximate Location of Light Pole
— W —	Approximate Location of Water Line
— G —	Approximate Location of Gas Line
— SS —	Approximate Location of Sanitary Sewer Line
— SD —	Approximate Location of Storm Drain
— · —	Approximate Location of Unknown Discontinuous Signal
— X —	Approximate Location of Fence
— —	Approximate Site Boundary
	Inlet for Storm Drain

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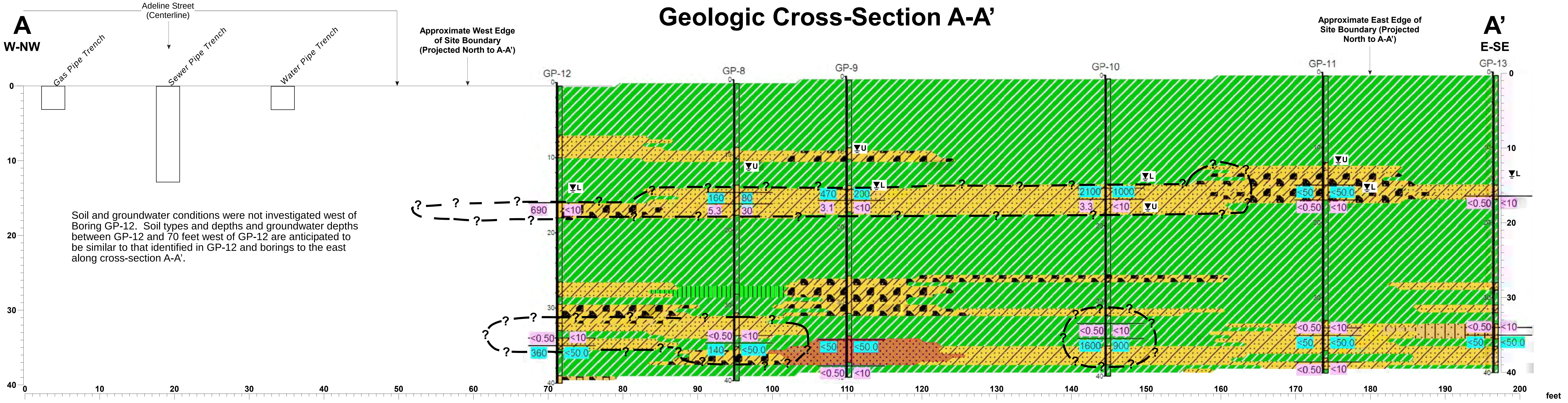
Oakland, California

Cross-Section Locations and Approximate Plume Boundaries

2011-0107	May 2012	Figure 3

V:\Job Archive\2011\2011-0107 City of Paris\Reports\2011\Site Investigation\2011-0107 Utility Location Map_GRL 01092012_recover.dwg

Geologic Cross-Section A-A’



Explanation

Borehole

TPH-G Concentration	TPH-SS Concentration	
<50	<50.0	in Groundwater [ug/L]
<0.50	<10	in Soil [mg/kg]

Vertical Scale 1"=10'
Horizontal Scale 1"=10'

Lithology Index

- GW Clean gravel
- GM Gravel with fines
- GC Gravel with fines
- SW Clean sand
- SP Clean sand
- SM Sand with fines
- SC Sand with fines
- ML Silt
- CL Clay

TPH-SS = total petroleum hydrocarbons as Stoddard Solvent

TPH-G = total petroleum hydrocarbons as gasoline

All TPH-G results for soil and groundwater reported by the laboratory as “non-typical pattern for gasoline range.” The reported TPH-G is likely TPH-SS.

ug/L = micrograms per liter

mg/kg = milligrams per kilogram

<50 = not detected at or above indicated laboratory reporting limit

Unless otherwise noted all soil samples shown were collected in the saturated zone of the upper and lower groundwater zones.

▼U Upper zone groundwater level. Measured in boring after sampling. May not represent static water level (upper unconfined zone) because sufficient time for water level stabilization may not have occurred before backfilling borings.

▼L Lower zone groundwater level. Measured through direct-push sample pipe after sampling. May not represent potentiometric surface of water (lower confined zone) because sufficient time for water level stabilization may not have occurred before backfilling borings.

—?— Approximate extent of TPH-SS in groundwater (includes concentration quantified by the laboratory as TPH-G noted as not typical of gasoline).

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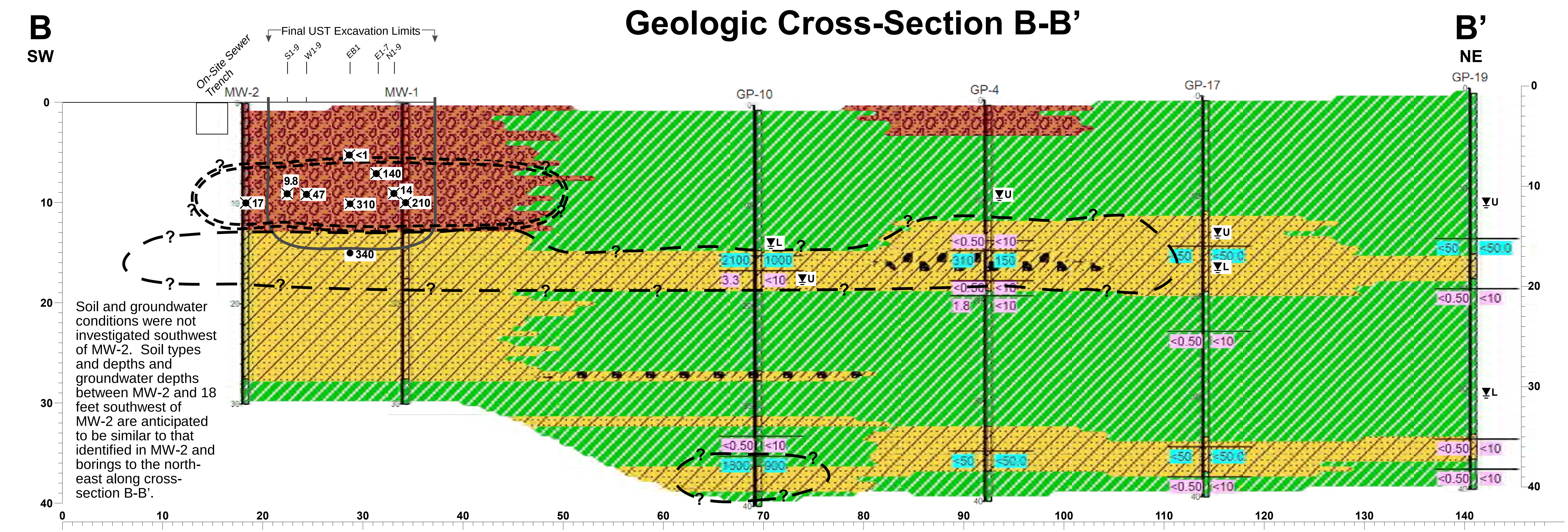
FORMER CITY OF PARIS CLEANERS

3516 Adeline Street
Oakland, CA 94608

Geologic Cross-Section A-A’

2011-0107	February 2012	Figure 4

Geologic Cross-Section B-B’



Explanation

Borehole

TPH-G Concentration	TPH-SS Concentration	
<50	<50.0	in Groundwater [ug/L]
<0.50	<10	in Soil [mg/kg]

Vertical Scale 1"=10'
Horizontal Scale 1"=10'

Lithology Index

- GW Clean gravel
- GM Gravel with fines
- GC Gravel with fines
- SW Clean sand
- SP Clean sand
- SM Sand with fines
- SC Sand with fines
- ML Silt
- CL Clay

TPH-SS = total petroleum hydrocarbons as Stoddard Solvent

TPH-G = total petroleum hydrocarbons as gasoline

All TPH-G results for soil and groundwater reported by the laboratory as “non-typical pattern for gasoline range.” The reported TPH-G is likely TPH-SS.

ug/L = micrograms per liter

mg/kg = milligrams per kilogram

<50 = not detected at or above indicated laboratory reporting limit

Unless otherwise noted all soil samples shown were collected in the saturated zone of the upper and lower groundwater zones.

▽U Upper zone groundwater level. Measured in boring after sampling. May not represent static water level (upper unconfined zone) because sufficient time for water level stabilization may not have occurred before backfilling borings.

▽L Lower zone groundwater level. Measured through direct-push sample pipe after sampling. May not represent potentiometric surface of water (lower confined zone) because sufficient time for water level stabilization may not have occurred before backfilling borings.

—?— Approximate extent of TPH-SS in groundwater (includes concentration quantified by the laboratory as TPH-G noted as not typical of gasoline).

= = = Approximate extent of TPH-SS in soil. Includes bioremediated TPH-SS soil used as excavation backfill.

S1-9, W1-9, E1-7, and N1-9 are post-excavation sidewall samples representative of soil conditions at the time of final excavation.

EB-1 is a post-excavation characterization soil boring near the final excavation boundary.

⌘ Soil sample in unsaturated zone and TPH-SS concentration in mg/kg

● Soil sample in saturated zone and TPH-SS concentration in mg/kg

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FORMER CITY OF PARIS CLEANERS

3516 Adeline Street
Oakland, CA 94608

Geologic Cross-Section B-B’

2011-0107	February 2012	Figure 5

TABLES

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
SITE INVESTIGATION 2011
Former City of Paris Cleaners
3516 Adeline Street, Oakland, California 94608

Boring Identification	Sample Identification	Sample Date	TPH-SS	TPH-G	TPH-D	TPH-FO	TPH-MO	TPH-K	Benzene	Toluene	Ethyl benzene	Xylenes	MTBE
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
GP-1	GP-1-17	5/2/2011	<1.0	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-1-32.5	5/2/2011	<1.0	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-2	GP-2-17	5/2/2011	<1.0	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-2-36	5/2/2011	<1.0	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-3	GP-3-16.5	5/6/2011	<10	<0.50	NA	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-4	GP-4-14	5/6/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-4-18	5/6/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-4-19-5[a]	5/6/2011	<10	**1.8**	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-5	GP-5-6.5	5/5/2011	<10	<0.50	<1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-5-28	5/5/2011	<10	<0.50	<1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50
GP-6	GP-6-11.5	5/5/2011	<10	<0.50	<1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50
GP-7	GP-7-8	5/6/2011	<10	<0.50	<1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-7-16	5/6/2011	NA	<0.50	<1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50
GP-8	GP-8-16.5[a]	5/12/2011	**30**	**5.3**	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-8-34	5/12/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-9	GP-9-16.5[a]	5/12/2011	<10	**3.1**	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-9-38.5	5/12/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-10	GP-10-16.5[a]	5/13/2011	<10	**3.3**	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-10-33	5/13/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-11	GP-11-17	5/13/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-11-34	5/13/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-11-38.5	5/13/2011	<10	<0.50	NA	NA	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-12	GP-12-16[a]	5/19/2011	<10	**690**	<1.0	<10	NA	NA	<1000	<1000	<1000	<1000	<500
	GP-12-34	5/19/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-13	GP-13-16.5	5/19/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-13-34	5/19/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-16	GP-16-19[a]	5/17/2011	<10	**20**	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	**3.0**	<0.50

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
SITE INVESTIGATION 2011

Former City of Paris Cleaners

3516 Adeline Street, Oakland, California 94608

Boring Identification	Sample Identification	Sample Date	TPH-SS	TPH-G	TPH-D	TPH-FO	TPH-MO	TPH-K	Benzene	Toluene	Ethyl benzene	Xylenes	MTBE
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
	GP-16-38	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-17	GP-17-23.5	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-17-38	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-18	GP-18-19	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-18-38	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
GP-19	GP-19-20	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50
	GP-19-38	5/17/2011	<10	<0.50	<1.0	<10	NA	NA	<1.0	<1.0	<1.0	<1.0	<0.50

Explanation:

TPH-SS = Total petroleum hydrocarbons as Stoddard Solvent

TPH-G = Total petroleum hydrocarbons as gasoline

TPH-D = Total petroleum hydrocarbons as diesel

TPH-FO = Total petroleum hydrocarbons as fuel oil

TPH-MO = Total petroleum hydrocarbons as motor oil

TPH-K = Total petroleum hydrocarbons as kerosene

MTBE = Methyl tertiary-butyl ether

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

<1.0 = Not detected at or above indicated laboratory reporting limit

NA = Not Analyzed.

TABLE 2
GROUNDWATER ELEVATION AND ANALYTICAL RESULTS
SUMMARY
City of Paris Cleaners
3516 Adeline Street, Oakland, California 94608

		Elevation Summary			Analytical Summary										
Well ID	Date	Top of Casing Elevation amsl)	Depth to Water BTOC)	Groundwater Elevation (feet amsl)	TPH-SS	TPH-G	Benzene	Toluene	Ethyl benzene	Xylenes (ug/l)	MTBE	1,2-DCB	1,1-DCA	2-Methyl-Naphthalene	Naphthalene
Groundwater Sample Locations															
EB1-18	03/19/98	18' bgs Groundwater Grab Sample			**270000**	--	<5.0	**93**	**66**	**1700**	<100	--	--	--	--
EB2-18	03/19/98	18' bgs Groundwater Grab Sample			<1.0	--	<0.5	<0.5	<0.5	<0.5	<5.0	--	--	--	--
EB3-18	03/19/98	18' bgs Groundwater Grab Sample			<1.0	--	<0.5	<0.5	<0.5	<0.5	<5.0	--	--	--	--
EB4-18	03/19/98	18' bgs Groundwater Grab Sample			<1.0	--	<0.5	<0.5	<0.5	<0.5	<5.0	--	--	--	--
EB5-18	03/19/98	18' bgs Groundwater Grab Sample			**780**	--	<0.5	<0.5	<0.5	**2**	<5.0	--	--	--	--
EB6-18	03/19/98	18' bgs Groundwater Grab Sample			<1.0	--	<0.5	<0.5	<0.5	<0.5	<5.0	--	--	--	--
MW-1	11/18/92	17.44	13.99	3.45	**1800**	NA	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-1	11/4/1993	17.44	16.79	0.65	**2000**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-1	3/8/1994	17.44	14.14	3.3	**150**	NA	**35**	**40**	**72**	**120**	NA	--	--	--	--
MW-1	8/2/1994	17.44	13.18	4.26	**2100**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-1	2/8/1995	17.44	10.92	6.52	**620**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-1**	7/8/1996	17.44	11.62	5.82	**37000**	**110000**	**1.6**	<0.5	<0.5	**74**	**7.9**	--	--	--	--
MW-1	10/9/1996	17.44	14.11	3.33	**42000**	NA	<0.5	**5**	<0.5	<0.5	NA	--	--	--	--
MW-1	3/18/1997	17.44	12.37	5.07	**2600**	NA	<0.5	**1.5**	**1.5**	**9.6**	<6.0	--	--	--	--
MW-1	6/19/1997	17.44	13.26	4.18	**660**	NA	<0.5	<0.5	**1.2**	**0.71**	<5.0	--	--	--	--
MW-1	11/14/1997	17.44	11.45	5.99	**10000**	NA	<0.5	<0.5	**110**	**1.2**	<5.0	--	--	--	--
MW-1	12/15/1999	17.44	11.31	6.13	<20	<50	<0.5	<0.5	<0.5	<0.5	NA	<0.5	**0.59**	<0.5	<0.5
MW-1	03/22/02	17.44	8.97	8.47	**11000**	--	--	--	--	--	<5.0	--	--	--	**130**
MW-1	04/15/03	17.44	9.23	8.21	**3900**	--	<2.5	<2.5	<2.5	**3**	**9**	--	--	--	--
MW-1	03/26/04	17.44	10.32	7.12	**30000**	**24000**	<50	<50	<50	<50	<500	--	--	--	--
MW-1	09/30/04	17.44	11.53	5.91	**3800**	**2600**	<0.5	<0.5	<0.5	**2.7**	<5	--	--	--	--
MW-1	09/09/05	17.44	13.63	3.81	**15000**	**11000**	c	<5	<5	**15**	<50	--	--	--	--
MW-1	11/30/07	17.44	13.95	3.49	--	--	--	--	--	--	--	--	--	--	--
MW-1	12/20/07	17.44	11.51	5.93	**45000**	**110000**	**20**	**50**	**20**	**100**	<5	--	--	--	--
MW-1	05/23/08	17.44	14.14	3.3	**4200**	<500	<1	<1	<1	**20**	<0.50	--	--	--	--
MW-1	08/12/08	17.44	13.78	3.66	**4000**	**12000**	<1	<1	<1	<1	<0.50	--	--	--	--
MW-1	12/18/08	17.44	10.71	6.73	**9900**	**2700**	<1	<1	<1	<1	<0.50	--	--	--	--
MW-1	02/19/09	17.44	8.91	8.53	**500**	**3100**	<10	<10	<10	<10	<5	--	--	--	--
MW-1	08/11/09	17.44	13.35	4.09	**13000**	**7800**	<10	<10	<10	<10	**5.9**	--	--	--	--

TABLE 2
GROUNDWATER ELEVATION AND ANALYTICAL RESULTS
SUMMARY
City of Paris Cleaners
3516 Adeline Street, Oakland, California 94608

		Elevation Summary			**Analytical Summary**										
Well ID	Date	Top of Casing Elevation amsl)	Depth to Water BTOC)	Groundwater Elevation (feet amsl)	TPH-SS	TPH-G	Benzene	Toluene	Ethyl benzene	Xylenes (ug/l)	MTBE	1,2-DCB	1,1-DCA	2-Methyl-Naphthalene	Naphthalene
MW-1 NP	*08/11/09*	*17.44*	*13.35*	*4.09*	***6000***	***10000***	*<10*	*<10*	*<10*	*<10*	*<5*	--	--	--	--
MW-1	03/17/10	17.44	9.31	8.13	**4000**	**12000**	<20	<20	<20	**20**	<10	--	--	--	--
MW-1	08/18/10	17.44	12.65	4.79	**2000**	**6900**	<100	<100	<100	<100	<50	--	--	--	--
MW-1	03/23/11	31.30	6.75	24.55	**8800**	**8100**	<10	<10	<10	<10	<5	--	--	--	--
MW-1[a]	08/25/11	31.30	11.35	19.95	**2100**	**7200**	<1	<1	<1	<1	**2.1**	--	--	--	--
MW-1	02/22/12	31.30	11.35	19.95	**5000**	**4200**	<100	<100	<100	<100	<50	--	--	--	--
MW-2	11/18/92	17.31	13.18	4.13	**630**	NA	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-2	11/04/93	17.31	14.84	2.47	**3200**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-2	03/08/94	17.31	11.5	5.81	**45**	NA	**1.4**	**2**	**11**	**19**	NA	--	--	--	--
MW-2	08/02/94	17.31	13.14	4.17	**170**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-2	02/08/95	17.31	8.18	9.13	**570**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-2**	07/08/96	17.31	11.06	6.25	**1800**	**2800**	<0.5	**2.6**	**15**	**24**	**6.3**	--	--	--	--
MW-2	10/09/96	17.31	12.38	4.93	**4100**	NA	<0.5	**0.57**	<0.5	<0.5	NA	--	--	--	--
MW-2	03/18/97	17.31	10.61	6.7	**240**	<0.5	**0.57**	<0.5	<0.5	**5.3**	NA	--	--	--	--
MW-2	06/19/97	17.31	11.68	5.63	**2500**	NA	<0.5	<0.5	**9.1**	<0.5	<5.0	--	--	--	--
MW-2	11/14/97	17.31	10.61	6.7	**130**	NA	<0.5	<0.5	**0.9**	**1.2**	<5.0	--	--	--	--
MW-2	12/15/99	17.31	10.97	6.34	<20	<50	<0.5	<0.5	<0.5	<0.5	NA	<0.5	**0.53**	<0.5	**49**
MW-2	03/22/02	17.31	8.82	8.49	**170**	**13000**	**410**	**1000**	**210**	**1100**	<5.0	--	--	--	<10
MW-2	04/15/03	17.31	8.52	8.79	**99**	--	<0.5	<0.5	<0.5	**0.76**	**10**	--	--	--	--
MW-2	03/26/04	17.31	9.32	7.99	**120**	**93**	<0.5	<0.5	<0.5	**0.76**	**5.4**	--	--	--	--
MW-2	09/30/04	17.31	11.62	5.69	<50	<50	<0.5	<0.5	<0.5	<0.5	<5	--	--	--	--
MW-2	09/09/05	17.31	12.75	4.56	**120**	**98**	<0.5	<0.5	<0.5	<0.5	<5	--	--	--	--
MW-2	11/30/07	17.31	11.06	6.25	--	--	--	--	--	--	--	--	--	--	--
MW-2	12/20/07	17.31	9.95	7.36	<50	**3000**	<1	**1.6**	<1	**2.4**	**2.9**	--	--	--	--
MW-2	05/23/08	17.31	12.46	4.85	**300**	**1100**	<1	<1	<1	<1	**3.5**	--	--	--	--
MW-2	08/12/08	17.31	12.08	5.23	**2200**	**350**	<1	<1	<1	<1	<0.50	--	--	--	--
MW-2	12/18/08	17.31	10.58	6.73	**300**	<50	<1	<1	<1	<1	**7.3**	--	--	--	--
MW-2	02/19/09	17.31	8.22	9.09	**300**	**300**	<1	<1	<1	<1	**3.4**	--	--	--	--
MW-2	08/11/09	17.31	13.00	4.31	**600**	**610**	<1	<1	<1	<1	**3.8**	--	--	--	--
MW-2	03/17/10	17.31	8.95	8.36	<50	<50	<1	<1	<1	<1	**1.8**	--	--	--	--
MW-2	08/18/10	17.31	12.15	5.16	<50.0	**70**	<1.0	<1.0	<1.0	<1.0	**2.4**	--	--	--	--
MW-2	03/23/11	31.03	6.22	24.81	**200**	<50	<1.0	<1.0	<1.0	<1.0	**3.6**	--	--	--	--

TABLE 2
GROUNDWATER ELEVATION AND ANALYTICAL RESULTS
SUMMARY
City of Paris Cleaners
3516 Adeline Street, Oakland, California 94608

		Elevation Summary			**Analytical Summary**										
Well ID	Date	Top of Casing Elevation amsl)	Depth to Water BTOC)	Groundwater Elevation (feet amsl)	TPH-SS	TPH-G	Benzene	Toluene	Ethyl benzene	Xylenes (ug/l)	MTBE	1,2-DCB	1,1-DCA	2-Methyl-Naphthalene	Naphthalene
MW-2	08/25/11	31.03	11.06	19.97	<50	<50	<1.0	<1.0	<1.0	<1.0	**1.5**	--	--	--	--
MW-2	02/22/12	31.03	10.61	20.42	**400**	**250**	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--
MW-3	11/18/92	17.44	13.93	3.51	**11000**	NA	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-3	11/04/93	17.44	15.16	2.28	**320**	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-3	03/08/94	17.44	13.43	4.01	**45**	NA	**0.8**	**0.9**	**5**	**10**	NA	--	--	--	--
MW-3	08/02/94	17.44	12.82	4.62	<20	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-3	02/08/95	17.44	7.62	9.82	<20	<50	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-3**	07/08/96	17.44	10.97	6.47	**2500**	**2200**	**1**	<0.5	**8.8**	**8**	**10**	--	--	--	--
MW-3	10/09/96	17.44	11.84	5.6	**2600**	NA	<0.5	<0.5	<0.5	<0.5	NA	--	--	--	--
MW-3	03/18/97	17.44	10.16	7.28	**2500**	NA	<0.5	**0.61**	**0.63**	**5.2**	NA	--	--	--	--
MW-3	06/19/97	17.44	11.40	6.04	**21000**	NA	<0.5	<0.5	**11**	<0.5	<5.0	--	--	--	--
MW-3	11/14/97	17.44	10.71	6.73	**1,400**	NA	<0.5	<0.5	**28**	**28**	<5.0	--	--	--	--
MW-3	12/15/99	17.44	10.96	6.48	<20	<50	<0.5	<0.5	<0.5	<0.5	NA	**0.87**	**0.57**	**25**	**88**
MW-3	03/22/02	17.44	10.97	6.47	**420**	<50	<0.5	<0.5	<0.5	<0.5	**31**	--	--	--	<50
MW-3	04/15/03	17.44	8.31	9.13	**2700**	--	<0.5	<0.5	<0.5	<0.5	**40**	--	--	--	--
MW-3	03/26/04	17.44	8.61	8.83	**2700**	**1900**	<1.7	<1.7	<1.7	**4.3**	<17	--	--	--	--
MW-3	09/30/04	17.44	11.1	6.34	**3900**	**2600**	<0.5	<0.5	<0.5	**3.2**	<10	--	--	--	--
MW-3	09/09/05	17.44	13.75	3.69	**4000**	**2600**	<0.5	<0.5	**0.57**	**2.7**	**12**	--	--	--	--
MW-3	11/30/07	17.44	13.9	3.54	--	--	--	--	--	--	--	--	--	--	--
MW-3	12/20/07	17.44	10.79	6.65	**18000**	**12000**	<1	**1.6**	**1.1**	**2.4**	**9.2**	--	--	--	--
MW-3	05/23/08	17.44	15.2	2.24	**900**	**3000**	<1	<1	<1	<1	**9.1**	--	--	--	--
MW-3	08/12/08	17.44	14.14	3.3	**1900**	**4300**	<1	<1	<1	<1	**6.5**	--	--	--	--
MW-3	12/18/08	17.44	12.53	4.91	**5000**	**610**	<1	**1**	<1	<1	**20**	--	--	--	--
MW-3	02/19/09	17.44	11.11	6.33	**1500**	**1300**	<1	**1**	<1	<1	**9**	--	--	--	--
MW-3	08/11/09	17.44	15.22	2.22	**1000**	**2200**	<10	<10	<10	<10	**7.3**	--	--	--	--
MW-3 NP	*08/11/09*	*17.44*	*15.22*	*2.22*	***3000***	***6700***	*<10*	*<10*	*<10*	*<10*	*<5*	--	--	--	--
MW-3	03/17/10	17.44	11.94	5.5	**3000**	**4600**	<10	<10	<10	<10	**9.4**	--	--	--	--
MW-3	08/18/10	17.44	12.86	4.58	**1000**	**3500**	<50	<50	<50	<50	<25	--	--	--	--
MW-3[a]	03/23/11	31.13	3.58	27.55	**500**	<50	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--
MW-3	08/25/11	31.13	11.85	19.28	<50	**2300**	<1.0	<1.0	<1.0	<1.0	**4.5**	--	--	--	--
MW-3	02/22/12	31.13	10.84	20.29	**2000**	**1900**	<10	<10	<10	<10	<5.0	--	--	--	--

TABLE 2
GROUNDWATER ELEVATION AND ANALYTICAL RESULTS
SUMMARY
City of Paris Cleaners
3516 Adeline Street, Oakland, California 94608

		Elevation Summary			**Analytical Summary**										
Well ID	Date	Top of Casing Elevation amsl)	Depth to Water BTOC)	Groundwater Elevation (feet amsl)	TPH-SS	TPH-G	Benzene	Toluene	Ethyl benzene	Xylenes (ug/l)	MTBE	1,2-DCB	1,1-DCA	2-Methyl-Naphthalene	Naphthalene
W-IND	03/22/02	NA	--	--	<50	**190**	<0.5	<0.5	<0.5	**0.8**	<5.0	--	--	--	--
W-IND	04/15/03	NA	--	--	--	--	--	--	--	--	--	--	--	--	--
W-IND	03/26/04	NA	--	--	**500**	**200**	<0.5	<0.5	<0.5	<0.5	<5	--	--	--	--
W-IND	09/30/04	NA	--	--	<50	<50	<0.5	<0.5	<0.5	<0.5	<5	--	--	--	--
W-IND	09/09/05	NA	--	--	<50	<50	<0.5	<0.5	<0.5	<0.5	<5	--	--	--	--
W-IND	11/30/07	NA	12.92	--	--	--	--	--	--	--	--	--	--	--	--
W-IND	12/20/07	NA	11.68	--	<50	**500**	<1	**1**	<1	**2.2**	<.50	--	--	--	--
W-IND	05/23/08	NA	12.72	--	**300**	**250**	<1	**3.7**	<1	**2.4**	<0.50	--	--	--	--
W-IND	08/12/08	NA	13.42	--	<50	<50.0	<1	<1	<1	<1	<0.50	--	--	--	--
W-IND	12/18/08	NA	12.65	--	<50	<50	<1	<1	<1	<1	**0.7**	--	--	--	--
W-IND	02/19/09	NA	9.74	--	<50	<50	<1	<1	<1	<1	<0.5	--	--	--	--
W-IND	08/11/09	NA	14.13	--	<50	<50	<1	<1	<1	<1	<0.5	--	--	--	--
W-IND	03/17/10	NA	9.78	--	<50	<50	<1	<1	<1	<1	<0.5	--	--	--	--
W-IND	08/18/10	NA	12.84	--	<50	<50	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--
W-IND	03/23/11	32.48	8.32	24.16	<50	<50	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--
W-IND	08/25/11	32.48	12.34	20.14	<50	<50	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--
W-IND	02/22/12	32.48	11.84	20.64	<50	<50	<1.0	<1.0	<1.0	<1.0	<0.50	--	--	--	--

Explanation:

TPH-G = Total petroleum hydrocarbons as gasoline, analyzed by EPA Method 8015B.
TPH-SS = Total petroleum hydrocarbons as stoddard solvent, analyzed by the 8015B.
Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8260B.
MTBE = Methyl tertiary-butyl ether, analyzed by EPA Method 8260B.

amsl = Above mean sea level.
BTOC = Below top of casing.
-- = not analyzed

ug/l - Micrograms per liter.
<1.0 = Not detected at or above indicated laboratory reporting limit.

NA = Data not available
•• Components found in tbe gasoline range, however they are not characteristic of gasoline components.
NP = HydraSleeve® no purge protocol
On March 17, 2010, Taber Consultants implemented the HydraSleeve® no purge protocol for all wells.
On March 23, 2011, Taber Consultants resurveyed top of casing elevations for all wells.
MW-3[a] During the 3/23/11 monitoring event, Taber Consultants replaced a damaged well cap. See First Semiannual Monitoring Report 2011 for discussion.

APPENDIX A
GEOPHYSICAL METHODOLOGY INSTRUMENTATION, DATA ANALYSIS, AND LIMITATIONS

Vertical Magnetic Gradient (VMG)

VMG Methodology

VMG is a magnetic method commonly used to detect ferrous objects. This is accomplished by measuring the variations of the earth's magnetic field within a given area. Since the magnetic field at any given point on the earth's surface is the vector sum of the earth's field combined with the magnetic fields of nearby metal objects, by removing or suppressing the earth's field the local magnetic variations due to ferrous objects may be determined. The basis for vertical magnetic gradient surveying starts with obtaining the total intensity of the magnetic field at two different elevations. These are referred to as total field measurements (TF) and are recorded in units of nanoTesla (nT). However, in environmental and engineering investigations, it is often more useful to determine the vertical rate of change of the magnetic intensity. This is referred to as the vertical magnetic gradient (VMG), and is measured in units of nanoTesla/meter (nT/m).

While both TF and VMG measurements are related to the same phenomena (i.e. the magnetic field), each has certain advantages over the other. However, the VMG method is often chosen because of the following:

1) VMG measurements are generally less affected by nearby *above* ground objects, especially objects to the side of the instrument. This reduces magnetic interference caused by such objects.

2) VMG measurements are not affected by temporal (diurnal) variations in the earth's magnetic field, unlike TF measurements. This eliminates one more variable from the data.

3) VMG effects attenuate more rapidly with increasing distance from magnetic sources (i.e. drops off as a function of $1/r^4$ versus $1/r^3$ as with total field), thus allowing more precise determination of a buried object's location.

It should be noted, however, that because the VMG method is very sensitive, the effects of small near surface objects can be amplified and act as a source of noise in VMG data.

Instrumentation

A vertical magnetic gradiometer is the device that is used to obtain the VMG data. The instrument typically used by NORCAL is a Geometrics 858 Cesium-vapor magnetometer. This instrument operates on the"optical pumping" principle and consists of a console and two total field magnetic sensors that are mounted on a vertical staff. One sensor is mounted at about shoulder-height and the other sensor is mounted at about knee-height. The magnetometer console features a built-in computer that stores the raw TF data, calculates the VMG values, and records survey grid information. The instrument obtains the VMG values by simultaneously measuring the total magnetic field intensity at the two sensors, taking their difference in magnetic intensity, and then dividing by their separation distance. The survey information is recorded and later uploaded to a field computer for further processing.

Computer Processing

VMG data are typically processed in the field on a portable computer. The uploaded data are converted into a format suitable for contouring using the program SURFER from Golden Software. This program calculates an evenly spaced array of values (data grid) based on the measured field data. These gridded values are then contoured to produce VMG contour maps for interpretation.

Contour Map Interpretation

Generally speaking, in a region with fairly uniform magnetic conditions the VMG values will vary smoothly from one area to another. Under these conditions, contour lines are usually spaced far apart. In contrast, in those areas where VMG variations are stronger, the contours are closely spaced. In some cases the variations are so strong that the contours become highly contorted and convoluted. These contorted contours may form roughly concentric circles, tightly wound loops and whorls, or elongated parallel lines. Actual magnitude and shape of the contour lines is dependent on the relative position and size of the magnetic object with respect to the location of the magnetic sensors.

Roughly concentric circles that look like bull's-eyes are generally referred to as monopoles. Monopoles that are roughly limited in extent to the data point spacing of the sampling grid are often caused by relatively small, near surface objects with limited cross-section. These typically consist of well caps, pull boxes, balls of wire, etc. On the other hand, larger monopoles that extend across an area of several data points are typically associated with larger, deeper objects such as well casings, reinforced concrete footers, ends of pipelines, etc. In other cases, two monopoles, one positive and one negative, may be in close proximity and form a paired of high-low closures known as a dipole. Dipoles are often, but not always, attributed to larger objects such as USTs, vaults, buried ordnance, etc. that have a substantial diameter or width.

Irregular patterns of loops and whorls are often indicative of several magnetic objects being present with variable shape, mass, and distribution. These VMG patterns are the most difficult to interpret. Past experience has shown that such patterns are usually associated with debris fields, landfills, and demolition sites.

A series of parallel contours typically indicates that an elongate object such as a building wall, fence, or underground pipeline is the magnetic source.

Regardless of whether the contours form monopoles, dipoles, or irregular whorls, if there are no obvious nearby above ground sources that could cause such magnetic variations, then subsurface objects are suspected. Contours are typically considered anomalous when large differences in data readings (on the order of several hundred to several thousands of nT/m) from one data station to the next are displayed. The anomalous variations are called VMG anomalies.

Limitations

Buried ferrous metal objects produce localized variations in the earth's magnetic field. The magnetic intensity associated with these objects depends on the mass of the metal and the distance the metal object is from the magnetometer sensor. As a general rule, anomaly magnitude typically decreases and anomaly width increases as distance (depth) to the source increases, thereby making detection more difficult. In addition, the ability to detect a buried metal object is based on the intensity of these variations in contrast to the intensity of background variations. The intensity of background variations is based on the amount of above and below ground metal that is present within the survey area. Cultural features such as chain-link fences, buildings, debris, railroad spurs, utilities, above ground electric lines, etc. typically produce magnetic variations with high intensities. These variations may mask the magnetic effects from buried metal objects and thus make it very difficult to determine whether the magnetic variations are associated with below ground metal or above/below ground cultural features.

Terrain Conductivity (TC)

Methodology

The TC method provides information on the lateral variation of the electrical conductivity of the subsurface. These changes in conductivity can arise from natural changes in soil composition or from buried foreign objects. Operating on the principle of electromagnetic induction, the method utilizes an instrument having two coils separated by a fixed distance. One of these coils transmits a primary signal that induces a current flow (secondary signal) in the earth. The other coil senses this secondary signal. For measurement purposes the secondary signal is broken down into both quadrature and in-phase components. The quadrature component is used to determine the value of electrical conductivity and is measured in milliSiemens/meter (mS/m). This component is useful for detecting both metallic and non-metallic objects. The in-phase component also changes with conductivity, but varies in a different way than the quadrature component. This component is useful when only the location of metallic objects is of interest. In-phase measurements are expressed in parts-per-thousand (PPT).

When highly resistive material is encountered, as is the case for most earth material, there is a linear relationship between the quadrature component and conductivity. When highly conductive materials like metals are encountered, both quadrature and in-phase components can be quite large and their behavior is often non-linear. While this non-linear effect can make the measurement of both components useful in looking for buried metal, it is typically the quadrature component that is analyzed. This is because the quadrature component is affected by both metallic and non-metallic materials, whereas the in-phase component is affected primarily only by metals.

Instrumentation

The instrument typically used by NORCAL for shallow subsurface investigations is a Geophysical Survey Systems EMP 400 Profiler multi-frequency terrain conductivity meter. This instrument works on the principle of radio-induction and consists of a pair of transmitting and receiving coils mounted at opposite ends of a horizontal boom approximately 4 feet in length and a control console in between. The separation distance of the coils and the chosen operating frequency combine to determine the effective sampling depth of the instrument. For most investigations we use an frequency of 15 KHz, which usually translates into an effective depth of investigation of approximately 6 feet since approximately 75% of the cumulative response of the instrument comes from this portion of the subsurface (for a homogeneous half-space). The device is carried by the operator at ankle-level and TC readings are taken by pressing a trigger button. The device automatically stores the TC values as well as station locations and any field notes that it can be up-loaded to a computer for processing.

Computer Processing

TC data are typically processed in the field on a portable computer. The uploaded data are converted into a format suitable for contouring using the program SURFER from Golden Software. This program calculates an evenly spaced array of values (data grid) based on the measured field data. These gridded values are then contoured to produce TC contour maps for interpretation.

Contour Map Interpretation

Generally speaking, in a region with fairly uniform conductivity conditions the TC values will vary smoothly from one area to another. Under these conditions, contour lines are usually spaced far apart. In contrast, in those areas where lateral TC variations are stronger, the contours are more closely spaced. In some cases the variations are so strong that the contours become highly contorted. These contorted contours may form roughly concentric circles suggestive of bull's-eyes, tightly wound loops and whorls similar to finger prints, or elongated parallel lines. Actual magnitude and shape of the contour lines is dependent on the how rapidly the conductivity of the subsurface changes and if there are any metallic objects present that can affect the instrument readings.

Roughly concentric circles are generally referred to as monopoles. Monopoles that are roughly limited in extent to the data point spacing of the sampling grid are often caused by relatively small, near surface metallic objects with limited cross-section. These typically consist of well caps, pull boxes, balls of wire, etc. On the other hand, larger monopoles that extend across an area of several data points are typically associated with larger, deeper objects such USTs, concrete pads, backfilled zones, etc.

Irregular patterns of loops and whorls are often indicative of several conductive objects with variable shape, size, conductivity, and distribution being present. These irregular TC patterns are the most difficult to interpret. Past experience has shown that such patterns are usually associated with debris fields, landfills, and demolition sites.

A series of generally parallel contour lines typically indicates the source is an elongate object such as a building wall, fence, or underground pipeline. If the parallel contours are more or less straight, then this indicates the object was oriented roughly parallel to the direction of the EM31's coil boom during data collection. If the contour lines form a series of parallel, undulating contours (also referred to as a "herring bone" pattern), then this indicates the source was oriented roughly perpendicular to the EM31's boom during data collection.
Regardless of whether the contours form discrete monopoles, irregular patterns, or parallel lines, if there are no obvious nearby above ground sources that could cause such variations, then subsurface objects are suspected. TC contours are typically considered anomalous when differences larger than a few tens of milliSiemens per meter (mS/m) are displayed from one data station to the next.

Limitations

Buried ferrous metal objects often produce large localized variations, or anomalies, in terrain conductivity. As a general rule, anomaly magnitude typically decreases, and anomaly width increases, as distance (depth) to the source increases. This can make detection of small, deeply buried metallic objects difficult. In addition, the ability to detect a buried metal object is based on the intensity of these variations in contrast to the intensity of background variations. The intensity of background variations is based on the conductivity of the soil and the amount of above and below ground metal present within a survey area. Cultural features such as chain link fences, buildings, debris, railroad spurs, utilities, above ground electric lines, etc. typically produce variations with high intensities. These variations may mask the TC effects of buried metal objects and thus make it very difficult to determine whether the variations are associated with below ground metal or known above/below ground cultural features.

Apart from the physical limitations of the instrument and the unwanted effects from secondary objects, the ability to detect subsurface features is also dependent upon the density of data acquisition points. If the distance between data acquisition points is significantly larger than the size of the target object, then the object may not be detected.

Metal Detection (MD)

MD Methodology

This method uses the principle of electromagnetic induction to detect shallowly buried metal objects such as USTs, metal utility conduits, rebar in concrete, manhole covers, and various metallic debris. This is done by carrying a hand-held radio transmitter-receiver unit above the ground and continuously scanning the surface. A primary coil broadcasts a radio signal from a transmitter which induces secondary electrical currents in metal objects. These secondary currents in turn produce a magnetic field which is detected by the receiver.

Instrumentation

The MD instrument that we typically use for shallow subsurface investigations is a Fisher TW-6 pipe and cable locator. This instrument is expressly designed to detect metallic pipes, cables, USTs, manhole covers, and other large, shallowly buried metallic objects. The instrument operates by generating both a meter reading (unitless) and an audible response when near a metal object. The peak instrument response usually occurs when the unit is directly over the object. The TW-6 does not provide a recordable data output that can be used for later computer processing. Results are generally limited to marking the interpreted outlines of detected objects in the field and mapping their locations.

Limitations

In general, the response of the MD instrument is roughly proportional to the horizontal surface area of near surface buried objects (typically in the upper three or four feet). This relationship can be used to advantage in discriminating between metal debris, reinforced concrete pads, and pipelines.

However, in the presence of above ground metal objects such as fences, walls, parked cars, and metal debris, this is no longer valid. In some instances, the presence of such objects can make it very difficult to determine whether the instrument responses are associated with below ground targets or above ground cultural features. When multiple sources are present it may not be possible to identify individual targets. Also, relatively large objects that have a limited horizontal cross-section such as well casing and fence posts are sometimes difficult to detect.

Ground Penetrating Radar (GPR)

GPR Methodology

Ground penetrating radar is a method that provides a continuous, high resolution graphical cross-section of the shallow subsurface. The method entails repeatedly radiating an electromagnetic pulse into the ground from an antenna as it is moved along a traverse. Reflected signals are received by an antenna (often the same one used to generate the signal) and sent to a control unit for processing. The control unit then converts the varying amplitude of reflected radar signals as a function of time into a cross-sectional image showing signal amplitude as a function of depth.

GPR is particularly sensitive to variations of two electrical properties. One property is conductivity (the ability of a material to conduct a charge when a field is applied) and the other is permittivity (the ability of a material to hold a charge when a field is applied). These two properties determine how far a signal can propagate. They also determine the strength of reflected signals that can be generated at material boundaries. Most soil and earthen-like materials such as concrete are electrically resistive and have a relatively low permittivity. As a result, they are relatively transparent to electromagnetic energy. This means that only a portion of the radar signal incident upon them is reflected back to the surface. On the other hand, when the signal encounters an object composed of a material that has the opposite electrical properties, especially one with a high permittivity (such as metal) much of the incident energy is reflected.

Instrumentation

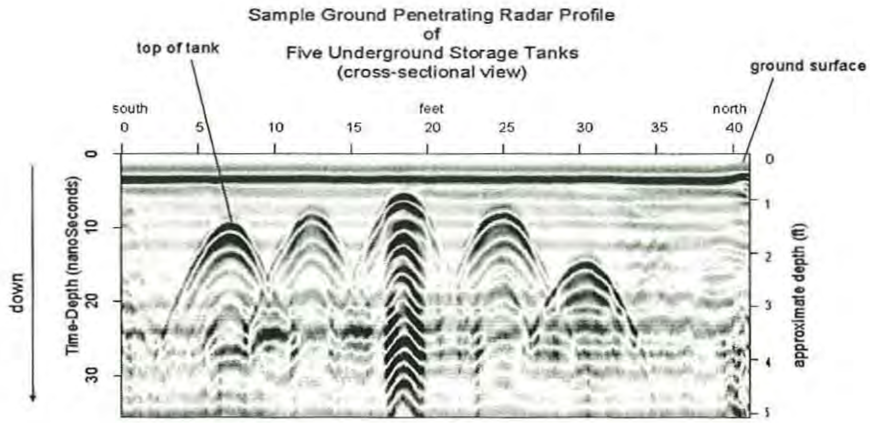
We typically perform GPR surveys using a Geophysical Survey Systems, Inc. SIR-2000 Subsurface Interface Radar System equipped with a 500 megahertz (MHz) transducer. This unit is comprised of a combined control/data recording console that is connected by a telemetry cable to the antenna. This system is often chosen for investigating environmental sites since it usually provides both the resolution and depth penetration needed for characterizing the upper three to four feet of the subsurface.

Data Interpretation

The interpretation of GPR data involves examining the graphical records for reflections from buried objects. GPR records display changes in reflected signal strength and arrival time with changes in horizontal position. Strong signals appear dark and weak reflections appear light. Reflections that arrive earlier in time are placed in the upper portions of the record and reflections that arrive later are placed lower, towards the bottom of the records. Horizontal position is across the top of the record.

In areas with relatively uniform conditions, with no buried objects producing reflections, the records typically appear as a series of alternating dark and light horizontal bands. In areas where there are subsurface objects producing reflections, the horizontal banding is disrupted. Discrete objects typically produce reflections having the appearance of inverted "U"s, forming what are known as "hyperbolic reflections". Metallic objects often produce markedly strong reflections, in many cases forming multiple reflections appearing as a series of inverted U's cascading down the record. Non-metallic objects can produce similar reflections, but the multiples are typically much weaker.

A sample profile from a different site with five adjacent steel USTs is presented below:



Note: the "Time Depth" of 35 nanoSeconds at the bottom of this profile corresponds to a true depth of approximately 5 feet for this example only. Actual depth to bottom of other profiles may be different.

An object's burial depth may also be estimated from GPR profiles. As mentioned above, GPR measures signal amplitude as a function of time. However, the translation of the radar signal's travel time (technically known as time-depth) to an actual distance (true depth) is not always a simple one. Strictly speaking, in order to translate from time-depth to true depth the signal velocity within each time interval must be known. Since this is not routinely determined in the field, estimated velocities are often used for determining the approximate depth to a reflector. The empirical values for GPR signal propagation velocities within commonly encountered soils are obtained from published tables.

<u>Limitations</u>

The ability to detect subsurface targets is dependent on specific site conditions. These conditions include depth of burial, the size or diameter of the target, the condition of the specific target in question, the type of backfill material associated with the target, and the surface conditions over the target. Typically, the depth of detection will be reduced as the clay and/or moisture content in the subsurface increases. As a result, depths of detection (using a 500 Mhz antenna) typically range from as deep as six feet to as little as a few inches.

Electromagnetic Line Location (EMLL)

EMLL Methodology

This method uses radio signals that are emitted by conductive utility lines to trace out their alignments. Under certain conditions, metallic utility conduits and pipelines can act as radio antennas. Energized utilities like electric, telephone, and grounded water lines often carry electrical currents. Radio signals are radiated from the lines as a result of these currents. These types of signals are referred to as "passive signals" since only a receiver tuned to the appropriate frequency is required to trace them. Other utilities like natural gas lines, drain lines, cathodic protection lines, etc. are not normally energized and thus require a radio signal placed on them in order to be traced. These types of signals are referred to as "active signals" and are placed on the lines by a radio transmitter, either by induction or by directly connecting a lead to them.

Whether the radio signal is passive or active, the surface trace of a line is determined the same way. A specialized radio receiver is carried along a series of traverses and the strength of the emitted signal noted. In most cases, the line is located below the point where the signal is strongest. After a series of traverses have been completed and the position of strongest signal strength has been determined, the alignment of the utility becomes apparent.

EMLL Instrument

The EMLL instrument used for this investigation was a Radio Detection RD 400. This instrument consists of a specialized radio receiver and a separate transmitter. The receiver is a multi-frequency, multiple antenna device that is capable of determining the relative strength and direction of signals broadcast from buried pipes and cables. The receiver generates both a meter reading (unitless) and an audible response when near an energized line. It does not provide any recordable output. The receiver is usually capable of tracing a line buried to a depth of about ten feet. The transmitter is a multi-frequency device with variable power output. In most cases, the highest power setting is sufficient to trace out a line for several hundred feet.

EMLL Limitations

The EMLL works by detecting radio signals. In many cases, the sources of these signals are from isolated known subsurface utility lines. In some cases however, other signals may be present. These other signals may be emitted by overhead electric and telephone lines, grounded water lines, and commercial radio towers. These other signals may distort or completely mask the primary signal of interest. In other cases, the primary signal may actually "jump" from one underground conductor to another, leading to erroneous results. Finally, traceable currents can only be detected as long as there is electrical continuity. Metal conduits having insulating joints and non-metallic utilities cannot be traced with EMLL.