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June 20, 2014

Mr. Mark E. Detterman, PG, CEG
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Subject: Freedom Food and Gas (Formerly Freedom ARCO Mini-Mart)
Site Address: 15101 Freedom Avenue, San Leandro, California
STID 4473/RO0000473

Dear Mr. Detterman:

SOMA's "Workplan for Well Installation, Vapor Sampling, and MPE Operation" for the subject property has been uploaded to the State's GeoTracker database and Alameda County's FTP site for your review.

Thank you for your time in reviewing our report. Please do not hesitate to call me at (925) 734-6400, if you have questions or comments.

Sincerely,

Mansour Sepehr, Ph.D.,PE
Principal Hydrogeologist

REGISTERED PROFESSIONAL ENGINEER
MANSOUR SEPEHR
No. C042928
Exp. 3-31-16
CIVIL
STATE OF CALIFORNIA

cc: Mr. Mohammad Pazdel

Workplan for Well Installation, Vapor Sampling, and MPE Operation

Freedom Gas and Food
15101 Freedom Avenue
San Leandro, California

June 20, 2014

Project 2550

Prepared for

Mohammad Pazdel
1770 Pistacia Court
Fairfield, California

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PERJURY STATEMENT

Site Location: 15101 Freedom Avenue, San Leandro, California

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

M. A. Pazdel

Mohammad Pazdel
1770 Pistacia Court
Fairfield, California 94533
Responsible Party

CERTIFICATION

SOMA Environmental Engineering, Inc. submits this workplan on behalf of Mr. Mohammad Pazdel, owner of the property located at 15101 Freedom Avenue, San Leandro, California. This workplan has been prepared pursuant to the request of Alameda County Health Care Services – Environmental Health Services contained in correspondence dated May 23, 2014.

Mansour Sepehr, PhD, PE
Principal Hydrogeologist

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1. INTRODUCTION

1.1 Overview

SOMA Environmental Engineering, Inc. (SOMA) has prepared this workplan for the site located at 15101 Freedom Avenue, San Leandro, California. In a correspondence of May 23, 2014 to Mr. Mohammad Pazdel, property owner, Alameda County Health Care Services – Environmental Health Services (ACHCS) requested a work plan groundwater monitoring wells installation, a cost-benefit analysis of MPE system, and additional vapor sampling beneath the house on the neighboring property. This directive was issued in response to SOMA's recommendation in off-site investigation report dated March 7, 2014.

1.2 Site Location and Description

The site is located at the foot of the San Leandro Hills, along the west side of San Leandro Valley (Figure 1). It is bounded on the north by Freedom Avenue, on the east by Fairmont Avenue, on the south by residential properties and on the west by 151st Avenue. It currently operates as a Texaco gasoline service station with mini-mart, and retails Texaco-branded gasoline and diesel fuel. No automotive repair facility is on the site. There are three canopied product dispenser islands and three underground storage tanks (USTs) on-site: one 6,000-gallon diesel UST, one 8,000-gallon gasoline UST, and one 10,000-gallon gasoline UST. Figure 2 illustrates site features.

The site has operated as a gasoline service station since the 1960s. Mr. Pazdel, the responsible party, sold the property to Farrokh Hosseinyoun in 2010. Mr. Hosseinyoun subsequently sold the property to Mohammad Mashhoon in 2010. The station currently operates under the business name Freedom Gas and Food (formerly Freedom ARCO Mini-Mart). Previous site activities are summarized in Appendix A.

2. SCOPE OF WORK

The scope of work includes the following:

1. Off-Site Groundwater Monitoring Wells Installation
2. Additional Vapor Sampling in Residential Neighborhood
3. Additional MPE Events and Cost-Benefit Analysis

3. OFF-SITE GROUNDWATER MONITORING WELL INSTALLATION

In SOMA's report dated March 7, 2014, installation of additional groundwater monitoring wells was proposed. However, based on ACHCS directive dated May 23, 2014, new locations of off-site wells is being proposed in this work plan. MW-10 will be installed at the northern end of the center median in Fairmont Drive. MW-11 and MW-12 will be installed along the eastern side of Fairmont drive to the south of MIP-12 and MIP-16, respectively. Figure 3 shows locations of the proposed wells.

The scope of work has been organized into the following tasks:

1. Permit acquisitions, preparation of health and safety plan, and field preparation
2. Well Installation
3. Well Development and Survey
4. Waste Disposal
5. Report of results

Following are the description of above tasks.

3.1 Permit Acquisition and Other Preparatory Work

Since the proposed well locations are in the public-right-of way, an encroachment permit will be necessary. Prior to initiating field activities, SOMA will obtain required drilling and encroachment permits from Alameda County Public Works Agency and submit all the required drilling notifications.

SOMA will prepare a site-specific Health and Safety Plan (HASP). The HASP is a requirement of the Occupational Safety and Health Administration (OSHA), "Hazardous Waste Operation and Emergency Response" guidelines (29 CFR 1910.120) and the California Occupational Safety and Health Administration (Cal/OSHA) "Hazardous Waste Operation and Emergency Response" guidelines (CCR Title 8, section 5192). The HASP is designed to address safety provisions during field activities and protect the field crew from physical and chemical hazards resulting from drilling and sampling. It establishes personnel responsibilities, general safe work practices, field procedures, personal protective equipment standards, decontamination procedures, and emergency action plans. The HASP will be reviewed and signed by field staff and contractors prior to beginning field operations.

SOMA will visit the site and mark boring locations using chalk-based white paint and then contact Underground Service Alert (USA) to verify that drilling areas are clear of underground utilities. Following USA clearance, SOMA will retain a private utility locator to survey proposed drilling areas and locate any additional subsurface conduits.

3.2 Proposed Well Installation

A hollow stem auger (HSA) rig will be used during advancement and installation of the proposed off-site wells MW-10 through MW-12 in the First WBZ. These wells will be installed as 2-inch groundwater monitoring wells. The drilling crew will continuously sample for lithologic logging purposes and chemical content.

Cored soil will be checked for attributes characteristic of smear zone, hydrocarbon odors, visual staining, free product, and screened using a PID. PID readings will be noted on boring logs. The areas impacted by PHCs (based on field observations of PID, odor, and staining) or highly varied lithology will be sampled for chemical content. Upon soil sampling, retrieved 6-inch sections, and both ends of each sampling tube will be secured using Teflon tape. Samples will be immediately placed in a chilled ice chest. Soil samples will be delivered to California state-certified laboratories for analysis. No groundwater sample is planned for the time of well installation.

The upper portion of wells will consist of blank Schedule 40 PVC. A PVC cap will fitted to the bottom of each casing, without adhesives or tape. A 2/12 sand pack filter (with either 0.01 or 0.02-inch screen), or other appropriate sand pack based on the observed lithology, will be emplaced around the perforated screen at appropriate thickness and surged to consolidate the filter pack and eliminate voids. The filter pack will be emplaced 1-foot above the height of the top of the screens and sealed with a 1-foot-thick appropriately hydrated bentonite plug, followed by an annular seal of neat cement to surface.

Based on observations during the previous investigation, the proposed screen interval is between 20 and 30 feet bgs. Appendix C includes the geologic cross-sections DD' and EE' and a site map showing locations of cross-sections. The proposed screen interval will be adjusted pending the field observations of groundwater bearing and smear zones.

To protect wells from accidental damage or tampering, a traffic-rated utility box with internal steel protective covers and locking caps will be placed over each wellhead, and set in concrete, resting flush with existing grade. The well installation report will include well construction diagrams and boring logs.

3.3 Well Development, Sampling, and Survey

SOMA will develop newly installed wells a minimum of 72 hours following installation; see Appendix B for general well development procedures. The wells will be developed by bailing out sediment-rich groundwater followed by pumping and surging the wells. This process will continue until purged groundwater clarifies substantially and groundwater quality parameters have stabilized; slow water recoveries are anticipated and recovery rates will be recorded for future use.

The water-bearing intervals will be developed by surging and bailing, using a suitably sized surge block. Development of the water-bearing zone will continue until the well is producing clear water with less than 2 to 5 ppm by weight sand and/or other suspended solids. Groundwater stabilization parameters will be maintained during the development process and records of this data will be included as an appendix to SOMA's final report. At least three days after completion of well development, groundwater samples will be collected from the newly installed wells in 40-mL VOA vials, pre-preserved with hydrochloric acid, which will be completely filled and sealed properly to prevent air bubbles from forming within the headspace of the vials.

If this well installation coincides with the planned groundwater monitoring event, the post well installation sampling will not be implemented and instead groundwater samples will be collected during the scheduled monitoring event. Collected samples will be labeled with unique sample identifiers, date and time of sample collection, recorded on a chain-of-custody form, and placed in a cooled ice chest pending transport to a California state-certified analytical laboratory for analyses.

Once well installation is complete, SOMA will retain a licensed surveyor to survey all newly installed wells to comply with Geotracker requirements. The survey report will be included as an appendix to SOMA's final report.

3.4 Laboratory Analysis

Collected soil and groundwater samples will be submitted to a California state-certified environmental laboratory for chemical analysis of the following using EPA Method 8260B:

- Total petroleum hydrocarbons as gasoline (TPH-g)
- BTEX
- Fuel oxygenates, additives and lead scavengers including MtBE, tertiary-butyl alcohol (TBA), ethyl tertiary-butyl ether (ETBE), diisopropyl ether (DIPE), tertiary-amyl methyl ether (TAME), 1,2-dichloroethane (1,2-DCA), 1,2-dibromomethane (EDB), ethanol, and naphthalene.

3.5 Waste Disposal

Soil and wastewater generated during boring activities will be temporarily stored on-site in separate DOT-rated, 55-gallon steel drums pending characterization and profiling and transport to an approved disposal-recycling facility.

4. ADDITIONAL VAPOR SAMPLING

In January 2014 SOMA collected a sample from the crawl space of the residence adjacent to the southern boundary of the Site. This vapor sample was analyzed for TPH-g, BTEX, Naphthalene and other VOCs. Results indicated that benzene concentrations (2.7 µg/m3) were above the Environmental Screening Levels (ESLs) established by San Francisco Regional Water Quality Control Board (RWQCB) for ambient and indoor air (0.084 µg/m3). Therefore, SOMA proposes to repeat crawl space sampling beneath the house. Along with the crawl space sample, SOMA will also collect an ambient air sample at the location illustrated on Figure 3.

This vapor sampling will be conducted in accordance with the most recent DTSC guidelines. Along with the contaminants of concern, oxygen, nitrogen, and tracer gas samples will also be collected. General field procedures to be followed are adopted from the DTSC document 'Guidance for the evaluation and mitigation of subsurface vapor intrusion to indoor air', dated October 2011 and are included in Appendix B.

5. ADDITIONAL MPE EVENTS

Since the Pilot test of November 2007, SOMA has conducted several successful MPE events at this site. The overall estimated total mass of VOCs extracted by previous MPE events is 2,737 pounds as of November 2013.

During the most recent groundwater monitoring event (Second Quarter 2014), free-product was observed in MPE-1, MPE-2, and MW-3. Therefore, SOMA will utilize MPE-1, MPE-2, MW-6, and MW-3.

The MPE operation will be performed using a self-contained mobile treatment system (MTS), equipped with an electrical generator, propane tank, liquid ring vacuum pump rated at 25-horsepower and 428-standard cubic feet per minute (scfm), electrical submersible pumps, air/water separator vessel, discharge hoses and traffic-rated hose ramps, downhole stingers, and a thermal oxidizer for vapor abatement. The oxidizer operates under a valid various locations BAAQMD permit. Both soil vapor and groundwater will be extracted from the subsurface. Extracted groundwater will be discharged into an existing treatment system.

Physical and chemical parameters including applied vacuum, soil vapor extraction flow rates, oxidizer temperature, volume of groundwater extracted, VOC concentrations, and depth to groundwater in observation wells, will be monitored, measured and recorded. VOC concentrations in the extracted soil vapor stream will be continuously monitored using a photoionization detector (PID) calibrated to hexane.

5.1 Smear Zone Dewatering

Steady-state dewatering of the smear zone at wells MPE-1, MPE-2, and MW-6 will be achieved and maintained during the MPE event by vacuum. Dewatering will be achieved by opening the dilution control valve at the extraction well to allow atmospheric air into the well casing, accelerating the removal of water from the well casing by vacuum. As the stinger is advanced into the well casing, water is removed by vacuum. As water is removed, vacuum is reestablished in the well casing and the stinger is advanced farther into the well casing. When the stinger reaches the base of the well casing, and water ceases to be removed by vacuum, the stinger will be elevated off the bottom of the well to maintain a steady-state groundwater flow into the well and to maximize mass removal rate out of the well, and then the dilution control valve is closed.

5.2 Soil Vapor Sampling and Analysis

Representative samples will be analyzed from the stack of the thermal oxidizer to show compliance with the Bay Area Air Quality Management District permit. Influent soil vapor samples will be collected through a sampling port located on the vacuum pump discharge manifold. Thermal oxidizer stack vapor samples will be collected through a sampling port located at the top of the stack. The air samples will be submitted under chain-of-custody documentation to a state certified analytical laboratory and analyzed for TPH-g using USEPA Analytical Method TO-3; and for BTEX and MtBE using USEPA Analytical Method TO-15.

Soil vapor samples (one influent and one effluent) will be collected during the first 24 hours of operation based on BAAQMD requirements. The effluent vapor sample collected at the oxidizer stack will be used to demonstrate compliance with the BAAQMD various locations permit.

5.3 Cost-Benefit Analysis of a Fixed MPE System

SOMA compared the feasibility and costs of installing a fixed MPE system at the site with using the MTS for MPE operation. A fixed system installation is not a feasible option due to the following reasons.

Firstly, the site does not have a 3-phase power currently which will be required to run the fixed MPE system. This in itself is an upfront expense of $40,000 in addition to the cost of the fixed system. Monthly power usage expenses will be high as well.

Secondly, continuous MPE operation is not feasible due to the proximity to the residential neighborhood. In the past, SOMA has received complaints about noise from the neighbors due to constant MPE operation and it is anticipated that response from the neighbors will be worse because a fixed system will operate a round the clock. If the system cannot operate at night, early morning, or on weekends due to noise complaints then it defeats the purpose of installing a fixed system.

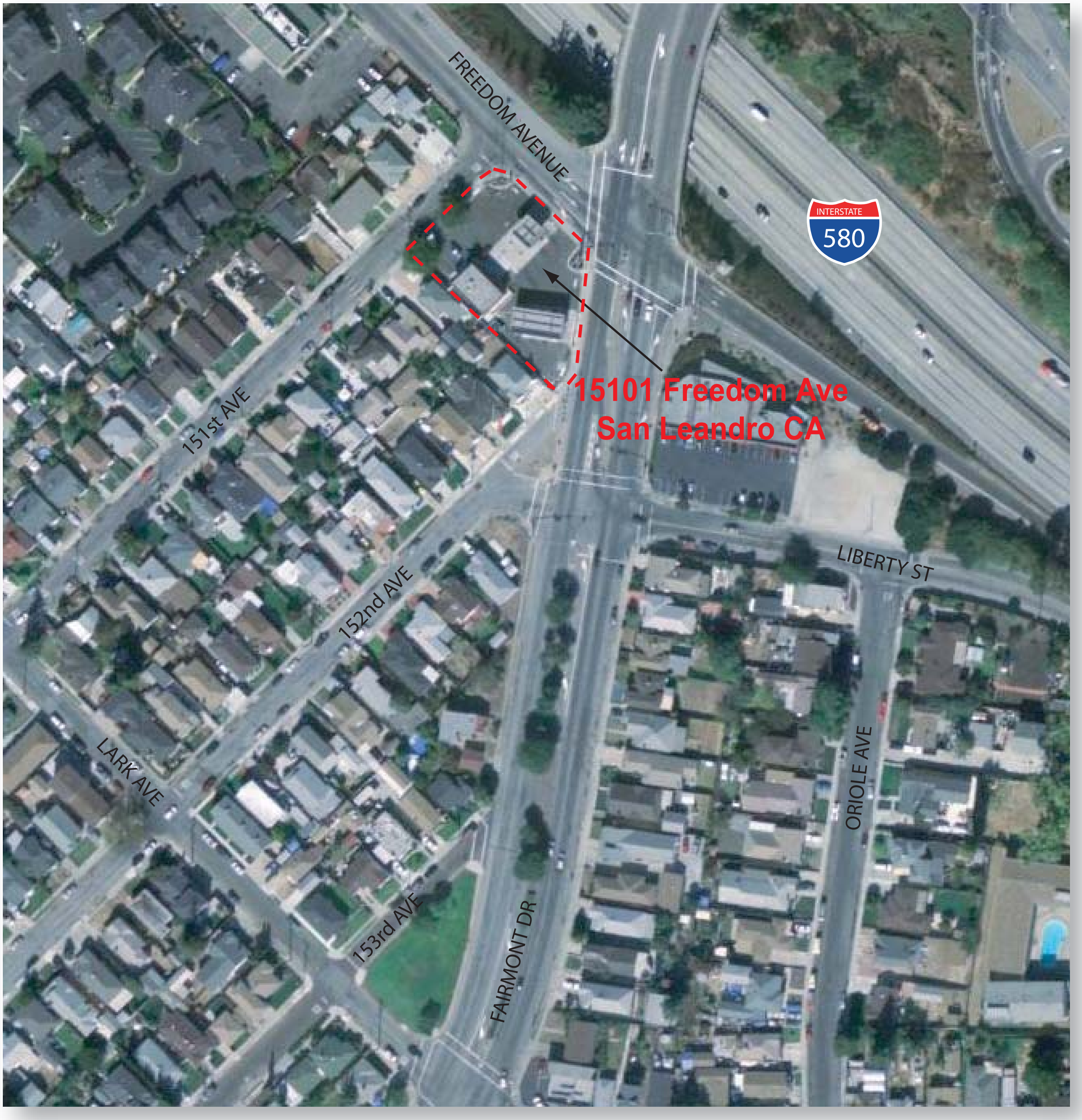
Additionally, based on SOMA's past experiences, continuous operation of MPE system for longer durations depletes soil vapor from the subsurface and reduces mass removal rates significantly. Whereas, pulsing the system gives residual contaminant mass some time to re-volatilize into the soil pores which can be removed by subsequent operation of the MPE system.

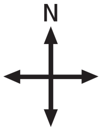
Therefore, it is appropriate to utilize the MTS for future MPE events instead of installing a fixed system on the site. SOMA proposes to conduct the next MPE event utilizing MPE-1, MPE-2, MW-3, and MW-6. This event will be conducted for at least 30 days. Progress of the event will be regularly evaluated based on the mass removal rates and if it seems effective then the event will be extended for two more weeks.

6. SCHEDULE

The workplan will be implemented upon receipt of written authorization from ACHCS. SOMA anticipates that the proposed work will be completed in eight to ten weeks following receipt of necessary approvals, authorizations, and permits. Field activities will be scheduled according to availability of necessary equipment and field personnel. The report will be submitted within 30 days of completing the field activities.

FIGURES





approximate scale in feet

0 150 300

Figure 1: Site vicinity map.

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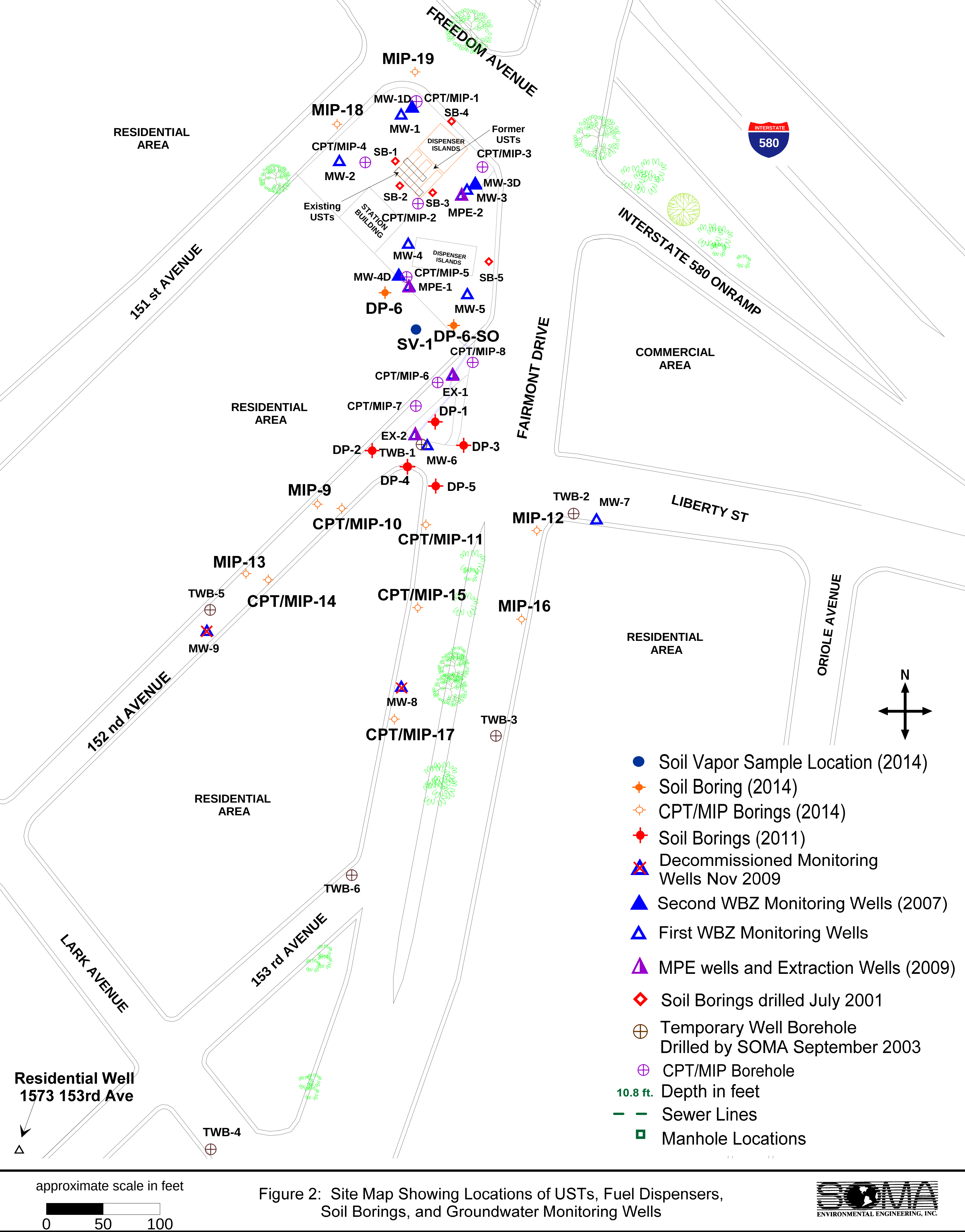


Figure 2: Site Map Showing Locations of USTs, Fuel Dispensers, Soil Borings, and Groundwater Monitoring Wells

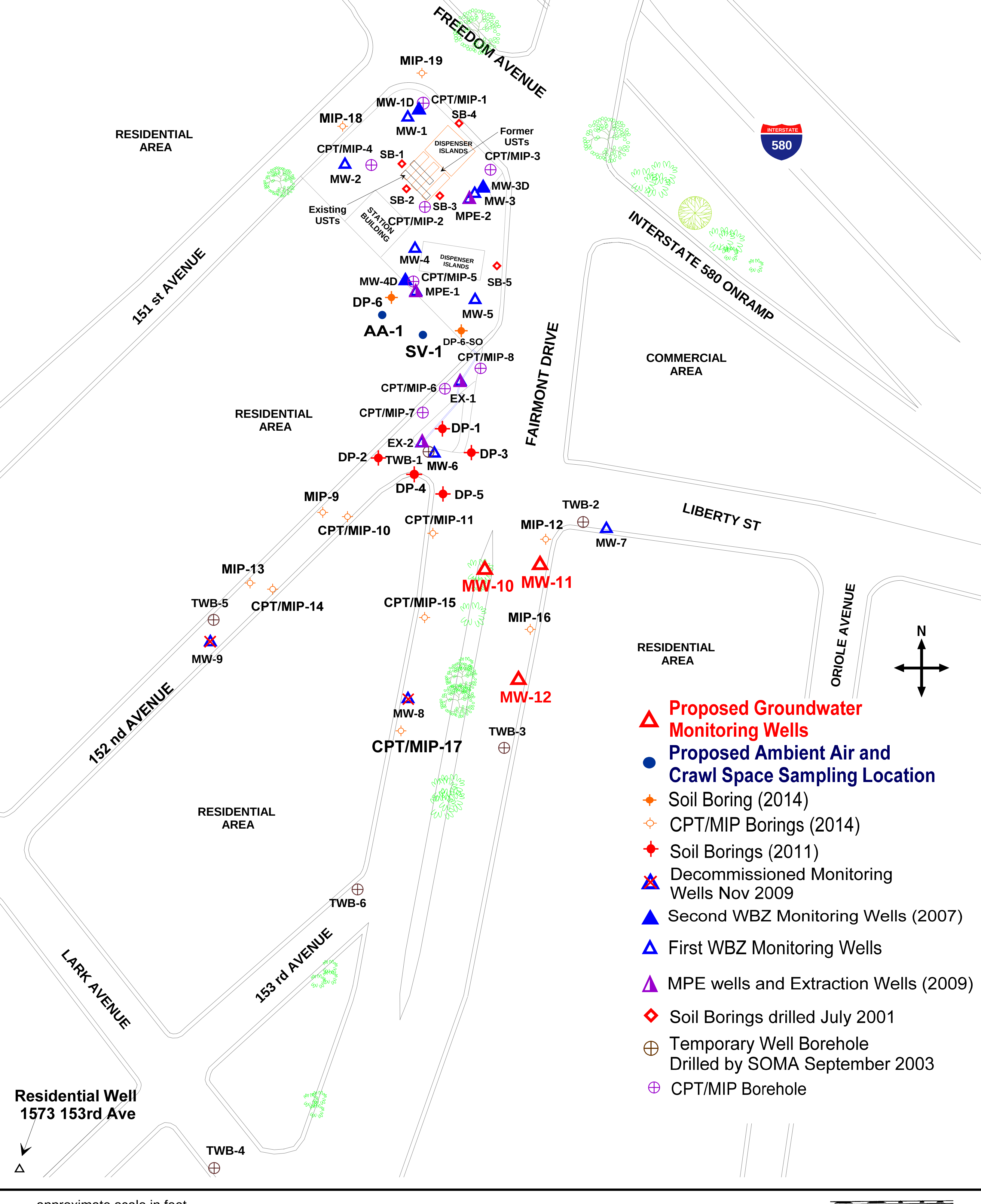


Figure 3: Proposed Well Locations of Off-Site Groundwater Monitoring Wells and Ambient Air and Crawl Space Vapor Sample

APPENDIX A
Previous Activities

In May 1999, three 10,000-gallon USTs, approximately 250 feet of product piping, and six product dispensers were removed from the site (Geo-Logic, 1999). A total of 21 soil samples were collected for laboratory analyses from the removal areas, including seven from the east and west sides of the UST removal excavation, at depths ranging from 12 to 14 feet below ground surface (bgs), and 14 from beneath the fuel dispensers and product delivery piping ranging in depth from 2.5 to 3.5 feet bgs. Samples were analyzed for the following: total petroleum hydrocarbons as gasoline (TPH-g); benzene, toluene, ethylbenzene, xylenes (BTEX); and methyl tertiary-butyl ether (MtBE). Analysis results indicated the need for removal of additional soil from product piping areas and the UST removal excavation. Concentrations of TPH-g, BTEX and MtBE in soil samples from the UST removal excavation were elevated relative to those from the product piping and dispenser areas, where concentrations were relatively low. Following overexcavation, three soil samples were collected for laboratory analysis from the enlarged UST removal excavation ranging in depth from 16.5 to 24.5 feet bgs, and one from the product delivery piping at 5 feet bgs. Laboratory analysis detected elevated concentrations in soil samples at 24.5 feet bgs from the UST removal excavation relative to those at 16.5 and 19.5 feet bgs. Low concentrations of petroleum hydrocarbons were detected in the soil sample from the product delivery piping.

In July 1999, one 14,000-gallon UST divided into a 6,000-gallon unit for diesel and an 8,000-gallon unit for gasoline, and one 20,000-gallon UST for gasoline were installed at the site (Geo-Logic, 1999).

On January 3, 2000, ACHCS notified the property owner, Mr. Pazdel, of an unauthorized release that had occurred during removal of old USTs in May 1999. ACHCS requested a preliminary site assessment.

On July 5, 2001, a soil and groundwater investigation was conducted at the site to delineate the extent of soil and groundwater impact discovered during removal of the USTs, product delivery piping and product dispensers in May 1999 (CSS Environmental Services, 2001). Five soil borings, SB-1 through SB-5, were advanced using direct-push methods, to a maximum depth of 31 feet bgs. Groundwater was encountered in borings at depths ranging from 29 to 30 feet bgs, and stabilized at depths ranging from 17 to 20 feet bgs. Ten soil samples were collected from borings for laboratory analysis of TPH-g, BTEX and MtBE. Analytical results revealed elevated concentrations between 19 and 25.5 feet bgs. Maximum concentrations of TPH-g and BTEX in samples were 470,000 µg/kg, 2,600 µg/kg, 16,000 µg/kg, 12,000 µg/kg, and 73,000 µg/kg, respectively. MtBE was not detected in any soil samples. Grab groundwater samples were collected from each boring for laboratory analysis of TPH-g, BTEX and MtBE. Maximum concentrations of TPH-g and benzene in boring samples were 83,000 µg/L and 19,000 µg/L, respectively. MtBE was detected in four of five grab groundwater samples, at a maximum concentration of 87,000 µg/L.

In April 2002, groundwater monitoring wells MW-1 through MW-5 were installed on the site to a total depth of 30 feet bgs, and competed with well screens installed between 15 and 30 feet bgs. The wells were installed to evaluate the groundwater flow gradient and the extent of dissolved-phase fuel hydrocarbons in groundwater (SOMA, 2002). Groundwater was first encountered at depths ranging from approximately 25 to 29 feet bgs, and stabilized at depths ranging from 21 to 23 feet bgs. Five soil samples were collected from borings for laboratory analyses of TPH-g, BTEX and MtBE. Results revealed elevated concentrations of TPH-g and BTEX between 21 and 26 feet bgs, coincident with the depth at which groundwater was first encountered in the boreholes. No MtBE was detected in soil samples. Groundwater samples were initially collected from each monitoring well during Second Quarter 2002 (May 2002) for laboratory analyses of TPH-g, BTEX and MtBE (SOMA, 2002a). Maximum concentrations of TPH-g, benzene and MtBE in groundwater samples were 44,000 µg/L, 6,000 µg/L and 12,000 µg/L, respectively. Groundwater was determined to flow south across the site. Elevated levels of dissolved-phase hydrocarbons in the farthest downgradient monitoring well indicated off-site migration.

Between August and October 2003, a soil and groundwater investigation was conducted to evaluate off-site extent of dissolved-phase hydrocarbon migration with groundwater (SOMA, 2003). The investigation included a sensitive receptor survey to locate water supply wells and/or water bodies within a 2,000-foot radius of the site, and a conduit study to identify underground utilities adjacent to the site beneath Freedom Avenue, Fairmont Drive and 153rd Avenue. Soil borings TWB-1 through TWB-6 were advanced to depths ranging from 30 to 44 feet bgs, at locations ranging from 125 to 750 feet hydraulically downgradient from the site. Fourteen soil samples were collected at depths ranging from 16 to 39 feet bgs for laboratory analysis of TPH-g, BTEX, MtBE and 1,2-dichloroethene (1,2-DCE). Results revealed soil impact off-site to a maximum distance of 265 feet hydraulically downgradient of the site, at depths ranging from 18 to 31.5 feet bgs. Elevated concentrations were detected at depths ranging from 21.5 to 24.5 feet bgs, approximately 125 feet hydraulically downgradient from the site. Concentrations of benzene, MtBE and 1,2 DCE were not detected in soil samples. Grab groundwater samples were collected from each boring for laboratory analysis of TPH-g, BTEX, MtBE and 1,2-dichloroethane (1,2-DCA). Maximum concentrations of TPH-g and benzene were 410,000 µg/L and 2,200 µg/L, respectively, detected in a boring 125 feet hydraulically downgradient of the site. Maximum concentration of MtBE was 34 µg/L, detected in a boring 265 feet hydraulically downgradient of the site. The investigation resulted in preliminary identification of two water-bearing zones beneath the site and proximity. The sensitive receptor survey identified 10 wells within 2,000 feet of the site. Three are located hydraulically downgradient of the site: one irrigation well and two wells of unknown use. The remaining wells are either hydraulically upgradient or crossgradient of the site. No water body was identified within a 0.5-mile distance from the site. The conduit study revealed two sewer lines beneath Fairmont Drive and 153rd Avenue; it was determined that neither was submerged by groundwater.

In September 2004, an additional soil and groundwater investigation was conducted to further evaluate the extent of dissolved-phase hydrocarbon migration with groundwater off-site (SOMA 2004). Groundwater monitoring wells MW-6 thru MW-9 were installed downgradient from the site to total depths ranging from 21 to 33 feet bgs, and completed with well screens ranging from 4 to 15 feet long installed at the base of each well. Groundwater was first encountered at depths ranging from approximately 15 to 20 feet bgs, and stabilized at depths ranging from 12 to 17 feet bgs. Four soil samples were collected from one monitoring well borehole. Soil samples were not collected from other boreholes because of extensive and unexpected lateral lithologic changes encountered between the well boreholes during drilling, necessitating continuous coring that precluded soil sample collection. Collected samples were analyzed for TPH-g and BTEX; neither was detected.

During this investigation, an attempt was made to collect a groundwater sample from an irrigation well hydraulically downgradient from the site, identified by the sensitive receptor survey conducted between August and October 2003. The irrigation well had been unused for some time and, subsequently, no groundwater sample could be collected.

An attempt was made to locate another well of unknown use hydraulically downgradient from the site, also identified by the sensitive receptor survey. This well could not be located despite canvassing of the surrounding residential neighborhood with written requests for information. Based on results of this investigation and the previous investigation conducted between August and October 2003, one water-bearing zone was identified to consist of discontinuous water-bearing layers and stringers separated by discontinuous clay lenses of varying thickness. Additionally, a preferential flow pathway study was proposed consisting of a possible buried stream channel trending north to south beneath the eastern portion of the site, and extending off-site to the south, beneath the intersection of 153rd Avenue, Fairmont Drive and Liberty Avenue, which is hydraulically downgradient from the site.

On November 21, 2005, ACHCS requested that the property owner submit a workplan for a soil and water investigation by January 21, 2006. It was submitted on December 28, 2005 (SOMA, 2005) and proposed installation of eight cone penetrometer test (CPT), membrane interface probe (MIP) borings to refine hydrogeologic conditions using CPT technology on- and off-site. The purpose of this investigation was to define the horizontal and vertical extent of the soil and groundwater impact on- and off-site using MIP technology, and to collect soil and groundwater samples for laboratory analyses to support MIP findings.

Based on a telephone conversation between SOMA and ACHCS, an addendum to SOMA's December 2005 workplan was prepared and submitted on March 3, 2006. The workplan provided further clarification for advancing the CPT/MIP as requested by ACHCS.

On April 10, 2006, SOMA oversaw drilling of CPT/MIP boreholes. Fisch Environmental, SOMA's subcontractor, used a Geoprobe 6600. Because of unforeseen subsurface drilling conditions, and the fact that Fisch's drilling rig was not strong enough to drill through the hard subsurface materials, drilling could not advance beyond 35 feet bgs in any of the CPT/MIP locations despite three days effort. An ACHCS representative was present during this operation. On April 26, using a hollow stem auger, a CPT calibration borehole was drilled to 47 feet bgs. Because CPT/MIP boreholes could not be advanced to targeted depths, Gregg Drilling was selected to drill CPT/MIP boreholes at a later date, and Fisch's compensation was to be appropriately reduced.

In a letter dated May 29, 2006, ACHCS reduced the quantity of on-site CPT/MIP borings from six to five, altered some boring locations, adjusted depths at which to collect groundwater samples, and requested development of a site conceptual model (SCM) and corrective action plan (CAP) along with an interim remediation and migration control evaluation. ACHCS established a November 30, 2006 deadline for report submittal.

On September 7, 2006, SOMA resumed the field investigation. To characterize site lithology and hydrogeology, and evaluate lateral and vertical distribution of soil and groundwater impact on- and off-site, SOMA supervised advancement of eight CPT/MIP borings by Gregg, using a 25-ton CPT rig. The MIP portion of the study was performed by Fisch utilizing an MIP probe attached to Gregg's CPT probe. After completion of the CPT/MIP program, eight borings were advanced using direct-push drilling methods, in the immediate proximity of the CPT/MIP borings. These borings were advanced to collect soil and groundwater samples for laboratory analyses to support MIP findings.

Investigation results were presented by SOMA in "Additional Soil and Groundwater Investigation Report and Initial Conceptual Site Model, Texaco Gasoline Service Station, 15101 Freedom Avenue, San Leandro, California," dated November 27, 2006. The report also included an interim remediation and migration control evaluation.

In summary, the report described two main water-bearing zones designated as the First and Second water-bearing zones (WBZs). Both WBZs appear to be laterally continuous across the site and hydraulically downgradient of the site, and are separated by a laterally continuous aquitard. Moderately weathered fuel hydrocarbons are adsorbed to soil or dissolved in groundwater within the First and Second WBZs. The source area in the First WBZ appears to be in proximity to the location of the former USTs and the existing fuel dispensers in both the north and southeast portions of the site. A source area for the Second WBZ is indeterminate because limited data for the Second WBZ was generated by the investigation. The site is located in an area of primarily residential properties with a commercial property to the east. Population/receptors exposed to fuel hydrocarbons in soil and groundwater of the First WBZ on- and off-site include current and future on-site workers and current off-site commercial workers and residents. Sources are fuel hydrocarbons adsorbed to soil, and dissolved-phase hydrocarbons in groundwater, of the First WBZ. Exposure pathways for on-site receptors are inhalation of volatile emissions from impacted soil and groundwater of the First WBZ. The only exposure pathway for off-site residents appears to be incidental ingestion of groundwater from the First and Second WBZs. The soil interim remediation alternatives evaluated included soil excavation, soil vapor extraction (SVE), and multi-phase extraction (MPE). Groundwater interim remediation alternatives included groundwater extraction, ozone sparging and hydrogen peroxide injection.

ACHCS correspondence dated March 14, 2007 directed that a workplan be prepared to address ACHCS comments contained therein and SOMA's recommendations in the November 27, 2006 report.

A workplan detailing proposed monitoring well installation, soil gas survey and remediation feasibility study was submitted to ACHCS on April 11, 2007 and approved in ACHCS correspondence dated October 18, 2007.

SOMA submitted "Additional Soil and Groundwater Investigation for Remedial Investigation and Feasibility Study" on March 14, 2008. ACHCS comments included in correspondence dated April 25, 2008 were addressed by SOMA's correspondence dated June 9, 2008.

In December 2007 SOMA installed three groundwater monitoring wells within the Second WBZ (MW-1D, MW-2D, and MW-3D) to approximately 60 feet bgs. A soil vapor study was conducted utilizing four soil gas sampling probes (SGS-1 through SGS-4, advanced to 5 feet bgs). Based on results of the soil gas sampling, concentrations of COCs in soil gas at the site are not considered a significant risk to human health.

In March 2009, ACHCS approved SOMA's CAP and initiated a public comment period for affected stakeholders to comment on SOMA's remedial action plan. On April 27, 2009, SOMA installed extraction wells MPE-1 and MPE-2 onsite. In their May 2009 correspondence, ACHCS approved SOMA's recommendation to decommission MW-8 and MW-9, off site wells that have consistently demonstrated COCs below ESLs and laboratory detection limits. November

2009, SOMA installed EX-1 and EX-2 off-site, within the downgradient plume and installed a groundwater extraction and treatment system at the site.

Quarterly and/or Semi-Annual groundwater monitoring/sampling has been regularly conducted at the site since Second Quarter 2002. Currently there are 14 groundwater monitoring wells, ten on-site and four off-site.

SOMA conducted MPE pilot testing between November 13 and 16, 2007. An estimated VOC mass of 106 lbs was removed during testing, at a mass removal rate of 35 lbs/day over 72 hours. Several week-long and extended MPE events have been conducted at the site with a total of 2,737 lbs of VOCs being removed as of November 2013.

The groundwater extraction system was initiated on December 9, 2009.

In July 20 and 21, 2011, SOMA advanced five soil borings in the vicinity of MW-6 and EX-2 within the First WBZ. TPH-g was detected above environmental screening levels (ESL) published by SB Bay Region RWQCB in DP-4 (located in the sidewalk area) at 24 feet bgs (140 mg/kg). TPH-g in all other soil samples was either below the laboratory-reporting limit or below ESL (100 mg/kg). Toluene was the only other contaminant of concern (COC), and was detected above ESL (2.9 mg/kg) in DP-1 at 20 feet bgs (2.94 mg/kg), and in DP-4 at 24 feet bgs (6.79 mg/kg). TPH-g in grab groundwater samples from advanced soil borings ranged from 1,500 µg/L (DP-3) to 84,000 µg/L (DP-1). Maximum benzene concentration was detected in DP-5 at 290 µg/L; Maximum MtBE and TBA were detected in DP-3 at 150 µg/L and 40 µg/L, respectively, and were below laboratory-detection limits in the other borings.

Based on ACEH directive dated April 22, 2013, SOMA submitted a data gaps workplan along with an updated site conceptual model on July 22, 2013 and an addendum was submitted on October 17, 2013. ACEH approved the workplan on October 30, 2013.

In October 2013, SOMA obtained a sample of free-product from MW-6 and had the laboratory run fingerprinting analysis on it. The laboratory reported that chromatographic pattern for the sample included a wide range of peaks in C6 through C12 range. However, this pattern did not resemble that of TPH-g or any other light-end distillates for which the laboratory has standards.

During January and February 2014, SOMA advanced eleven cone penetrometer test (CPT) and/or membrane interface technology (MIP) borings (MIP-9 through MIP-19) to the south of DP-4 and DP-5 and upgradient of the source on 151st Avenue. DP-6 was installed in the backyard of adjacent residential property and DP-6-SO was installed on-site. An air sample was obtained from the crawl space of the same adjacent property. Based on the results of this investigation, ACEH requested installation of three off-site groundwater monitoring wells, and an additional crawl space air sample.

APPENDIX B
General Field Procedures

Hollow Stem Auger Drilling/Monitoring Well Installation

Utility Locating

Prior to drilling, boring locations are marked with white paint or other discernible marking, and cleared for underground utilities through Underground Service Alert (USA). In addition, the first five feet of each borehole are air-knifed, or carefully advanced with a hand auger if shallow soil samples are necessary, to help evaluate the presence of underground structures or utilities.

Borehole Advancement

Pre-cleaned hollow stem augers (typically 8 to 10 inches in diameter) are advanced using a drill rig for the purpose of collecting samples and evaluating subsurface conditions. Upon completion of drilling and sampling, if no well is to be constructed, the augers are retracted, and the borehole is filled with neat cement grout, mixed at a ratio of 6 gallons of water per 94 pounds of Portland cement, through a tremmie pipe to displace standing water in the borehole. In areas where the borehole penetrates asphalt or concrete, the borehole is capped with an equivalent thickness of asphalt or concrete patch to match finish grade.

During the drilling process, a physical description of the encountered soil characteristics (i.e. moisture content, consistency or density, odor, color, and plasticity), drilling difficulty, and soil type as a function of depth are described on boring logs. The soil cuttings are classified in accordance with the uses.

Split-Spoon Sampling

The precleaned split spoon sampler lined with three 6-inch long brass or stainless steel tubes is driven 18 inches into the underlying soils at the desired sample depth interval. The sampler is driven by repeatedly dropping a 140-pound hammer a free fall distance of 30 inches. The number of blows (blow count) to advance the sampler for each six-inch drive length is recorded on the field logs. Once the sampler is driven the 18-inch drive length or the sampler has met refusal (typically 50 blows per six inches), the sampler is retrieved.

Of the three sample tubes, the bottom sample is generally selected for laboratory analysis. The sample is carefully packaged for chemical analysis by capping each end of the sample with a Teflon sheet followed by a tight-fitting plastic cap, and sealing the cap with nonvolatile organic compound (VOC), self-adhering silicon tape. A label is affixed to the sample indicating the sample identification number, borehole number, sampling depth, sample collection date and time, and job number. The sample is then annotated on a chain-of custody form and placed in an ice-filled cooler for transport to the laboratory.

The remaining soil samples are used for soil classification and field evaluation of headspace volatile organic vapors, where applicable, using a photo ionization or flame ionization detector calibrated to a calibration gas (typically isobutylene or hexane). VOC vapor concentrations are recorded on the boring logs.

Grab Groundwater Sample Collection

Grab groundwater samples are collected by lowering a pre-cleaned, single-sample polypropylene, disposable bailer down the borehole or temporary casing. The groundwater sample is discharged from the bailer to the sample container through a bottom emptying flow control valve to minimize volatilization.

Collected water samples are discharged directly into laboratory provided, pre-cleaned, vials or containers and sealed with Teflon-lined septum, screw-on lids. Labels documenting sample number, well identification, collection date and time, type of sample and type of preservative (if applicable, i.e. HCI for TPPH, BTEX, and fuel oxygenates) are affixed to each sample. The samples are then placed into an ice-filled cooler for delivery under chain-of-custody to a laboratory certified by the State of California to perform the specified tests.

Groundwater Monitoring Well Installation and Development

Groundwater monitoring wells are constructed by inserting or tremmieing well materials through the annulus of the hollow stem auger. The groundwater monitoring wells are constructed with a screen interval determined from the encountered soil stratigraphy, to maintain a proper seal at the surface (minimum three feet), to allow flow from permeable zones into the well, and to avoid penetrating aquicludes. Groundwater wells are installed in accordance with the conditions of the well construction permit issued by the regulatory agency exercising jurisdiction over the project site.

The well screen generally consists of schedule 40 polyvinyl chloride (PVC) casing with 0.01 to 0.02-inch factory slots. As a general rule, 0.01-inch slots are used in fine-grained silts and clays, and 0.02-inch slots are used in coarse-grained materials. The screen is then filter packed with #2/12 or #3 sand, or equivalent, for the 0.01 and 0.02 inch slots, respectively.

Once the borehole has been drilled to the desired depth, the well screen and blank well casing are inserted through the annulus of the hollow stem augers. The well screen is sand packed by tremmieing the appropriate filter sand through the annulus between the casing and augers while slowly retracting the augers. During this operation, the depth of the sand pack in the auger is continuously sounded to make sure that the sand remains in the auger annulus during auger retraction to avoid short-circuiting the well. The sand pack is tremmied to approximately two feet above the screen, at which time pre-development surging is performed to consolidate the sand pack. Additional sand is added as necessary so that the sand pack extends approximately two feet above top of screen. Following construction of the sand pack, a one to two foot thick bentonite seal is tremmied over the sand and hydrated in place. The remainder of the borehole is backfilled with Portland neat cement grout (or the equivalent), mixed at ratio of 6 gallons of water per 94 pounds of neat cement. The well head is then capped with a locking cap and secured with a lock to protect the well from surface water intrusion and vandalism.

The well head is further protected from damage with traffic a rated well box in paved areas or locking steel riser in undeveloped areas. The protective boxes or risers are set in concrete. The details of well construction are recorded on well construction logs.
Following well construction, the wells are developed in accordance with agency protocols by intermittently surging and bailing the wells. Development is determined to be sufficient once pH, conductivity, and temperature stabilize to within s 0.1, s 3%, and s 10%, respectively.

Groundwater Monitoring Well Sampling

Depth to Groundwater/SPH Thickness Measurements

Prior to the beginning of purging and sampling the wells, the depth to groundwater and thickness of SPH, if present, within each well casing are measured to the nearest 0.01 foot using either an electronic water level indicator or an electronic oil-water interface probe. This is done in within as narrow a time frame as possible, and before the first well is purged. Measurements are taken from a point of known elevation on the top of each well casing as determined in accordance with surveys by licensed land surveyors.

Groundwater Monitoring Well Purging

Groundwater wells are purged using low-flow protocol at a flow rate of less the 1 liter per minute using a bladder pump. The purge intake is placed opposite the portion of the saturated zone expected to contain the greatest hydrocarbon impact, and the depth of the purge intake is recorded during and after purging. The water level in each well is monitored, and care is taken that the well is not dewatered. The conductivity, temperature, and pH of the delivered effluent are monitored and recorded using a flow-through cell during purge operations. Purge operations are determined to be sufficient once three successive measurements of pH, conductivity, and temperature of the purged water at 3 to 5 minute intervals following the evacuation of on system or line volume vary by s 0.1, s 3%, and s 10%, respectively. System or line volumes, actual purge volumes, and the purging equipment used are recorded on the field data sheets.

Groundwater Sample Acquisition, Handling, and Analysis

Following purging operations, groundwater samples are collected from each of the wells, using a low-flow bladder pump. The groundwater sample is discharged from the pump tubing to the sample container before the water passes through the flow-through cell. The sampling equipment is recorded on the field data sheets.

Collected water samples are discharged directly into laboratory provided, pre-cleaned, and chemically preserved sample containers for the analyses requested. Preservatives are used in the samples if appropriate for the analyses, i.e., hydrochloric acid (HCI) for TPPH, BTEX, and fuel oxygenates by EPA Method 8260B.

Labels documenting sample number, well identification, collection date and time, type of sample and type of preservative (if applicable) are affixed to each sample. The samples are then placed into an ice-filled cooler for delivery under chain of custody to a certified laboratory. The type of preservative used is documented on the chain of custody form.

To help assure the quality of the collected samples and to evaluate the potential for cross contamination during transport to the laboratory, a distilled-water trip blank accompanies the samples in the cooler. The trip blank is analyzed for the presence of volatile organic compounds of concern. For petroleum hydrocarbons, the trip blank is typically analyzed for TPPH, BTEX, and fuel oxygenates by EPA Method 8260.

Organic Vapor Procedures

Soil samples are collected for analysis in the field for ionizable organic compounds using a PID with a 10.2 eV lamp. The test procedure involves measuring approximately 30 grams from an undisturbed soil sample, placing this subsample **in** a Ziploc™-type bag or in a clean glass jar, and sealing the jar with aluminum foil secured under a ring-type threaded lid. The container is warmed for approximately 20 minutes (in the sun); then the head-space within the container is tested for total organic vapor, measured in parts per million as benzene (ppm;

volume/volume). The instrument is calibrated prior to drilling. The results of the field-testing are noted on the boring logs. PID readings are useful for indicating relative levels of contamination, but cannot be used to evaluate petroleum hydrocarbon levels with the confidence of laboratory analyses.

Equipment Decontamination

Equipment that could potentially contact subsurface media and compromise the integrity of the samples is carefully decontaminated prior to drilling and sampling. Drill augers and other large pieces of equipment are decontaminated using high-pressure hot water spray. Samplers, groundwater pumps, liners and other equipment are decontaminated in an Alconox scrub solution and double rinsed in clean tap water rinse followed by a final distilled water rinse.

The rinsate and other wastewater are contained in 55-gallon DOT-approved drums, labeled (to identify the contents, generation date and project) and stored on-site pending waste profiling and disposal.

Soil Cuttings and Rinsate/Purge Water

Soil cuttings and rinsate/purge water generated during drilling and sampling are stored on-site in DOT-approved 55-gallon steel drums pending characterization. A label is affixed to the drums indicating the contents of the drum, suspected contaminants, date of generation, and the boring number from which the waste is generated. A licensed waste disposal contractor removes the drums from the site to an appropriate facility for treatment/recycling

Crawl Space Vapor Sampling

Air within a crawl space can be sampled as a method to evaluate vapor intrusion. Crawl space air should be less affected than indoor air by lifestyle choices of the building's occupants, such as household product use and smoking. Hence, the results of crawl space air sampling should be easier to interpret than indoor air sampling results. To use contaminant concentrations in crawl space air for evaluating vapor intrusion, an attenuation factor of 1.0 should be used, which is consistent with USEPA guidance. Thus, for evaluation purposes, the contaminant concentration in indoor air is assumed to be equal to the concentration in crawl space air. *(DTSC 2011)*

Indoor Air Sampling

Indoor air sampling should be conducted under conservative conditions. In general, the windows of the building should be closed. However, certain exceptions may be necessary if sampling is done in the summer in a building that is not air conditioned. Likewise, ingress and egress activities should be minimized. Heating, ventilation, and air conditioning (HVAC) systems should be operated normally for the season and time of day. During colder months, heating systems should be operating for at least twenty-four hours prior to the scheduled sampling event to maintain normal indoor temperatures above 65°F before and during sampling.

DTSC recommends the following when conducting indoor air sampling:

1) Sampling Duration. For the first sampling event, indoor air samples should be collected over a

24-hour period to ensure diurnal fluctuations in vapor intrusion and indoor air concentrations are included in the sampling period. After vapor intrusion is confirmed, sampling events should be conducted to produce representative concentrations of the monitored compounds over the anticipated daily exposure period for building occupants. Hence, air samples should be collected over a 24-hour period for residential structures, over an 8-hour period for non-residential structures, and over a typical school day for students. When feasible, 24-hour and 8-hour sampling may be conducted during the same sampling event. In some cases, indoor air samples may be collected with passive samplers for longer sampling periods.

2) Number of Sampling Events. One indoor air sampling event is not representative of continuous long-term exposure within a building. Multiple sampling events should be conducted to characterize exposure over the long-term. Numerous sampling events may be required within a building before DTSC would consider “no further action” for the exposure pathway. At a minimum, sampling data should be obtained over two seasons; late summer/early autumn and late winter/early spring. The data evaluation and contingency plan for the site should guide decisions regarding the objective and number of sampling events.

3) Number of Samples and Locations. All floors of a residential structure potentially subject to vapor intrusion should be sampled for indoor air quality. All occupied areas, as well as basements, should be sampled. Based on site-specific conditions, it may be necessary to sample all units of an apartment building. Sampling devices should be located in the breathing zone, approximately 3 to 5 feet off the ground for adults and at lower sampling heights if the receptors of concern are children as in a daycare center or school. Samples should be collected in the center of the room, away from doors. At a minimum, it is recommended that sampling points include the primary living area and likely locations for subsurface vapor entry (typically the bathroom or kitchen). For multi-storied residential buildings, at least one sample should be collected on each floor. When sampling an office building, the number and locations of samples should be based on site-specific conditions. In office buildings, samples should be collected from primary work areas and near the points of vapor entry (such as sumps, elevator shafts or floor drains) to help define the potential routes of entry.

4) Sampling Equipment. When sampling indoor air with evacuated canisters, extra canisters, pressure gauges, and flow regulators should be taken into the field in case the integrity of some of the canisters is compromised or if some flow regulators and pressure gauges malfunction. Each sampling canister should have a dedicated vacuum gauge. The gauge is needed to verify the canister is properly evacuated prior to initiation of sampling and to demonstrate that the canister is slightly depressurized upon completion of the sampling. Likewise, the gauge will indicate whether the canister’s flow regulator is functioning properly during sample collection. Flow regulators should be configured to produce a constant sampling rate. Sampling canisters, along with all flow regulators and pressure gauges, should be certified clean to the laboratory’s method reporting limit.

Collecting air samples in canisters is currently the predominant sampling method used for indoor air investigations. Canisters provide quantitative analytical data and achieve the low detection limits needed to support risk assessments. USEPA Region 9 is currently evaluating the use of passive air samplers for indoor air investigations by conducting comparison studies with canisters at several sites in California. Other researchers have also conducted comparison studies. Passive samplers offer several advantages over canisters, including lower cost, simplicity and versatility of use, small size, unobtrusive appearance, and potential to collect samples over longer time periods than canister samplers. At present, passive samplers appear to have potential as a reliable alternative to canister sampling in certain applications, particularly as a screening tool for identifying structures for further indoor air evaluation. The use of passive samplers for screening or as a supplement to canister sampling should be based on the contaminants, site conditions, and project DQOs. As passive sampler technology becomes further developed, and high quality, quantitatively accurate results for contaminant concentrations in indoor air can be achieved, data from passive samplers may be used in quantitative risk assessments. *(DTSC 2011)*

APPENDIX C

Geologic Cross-Sections

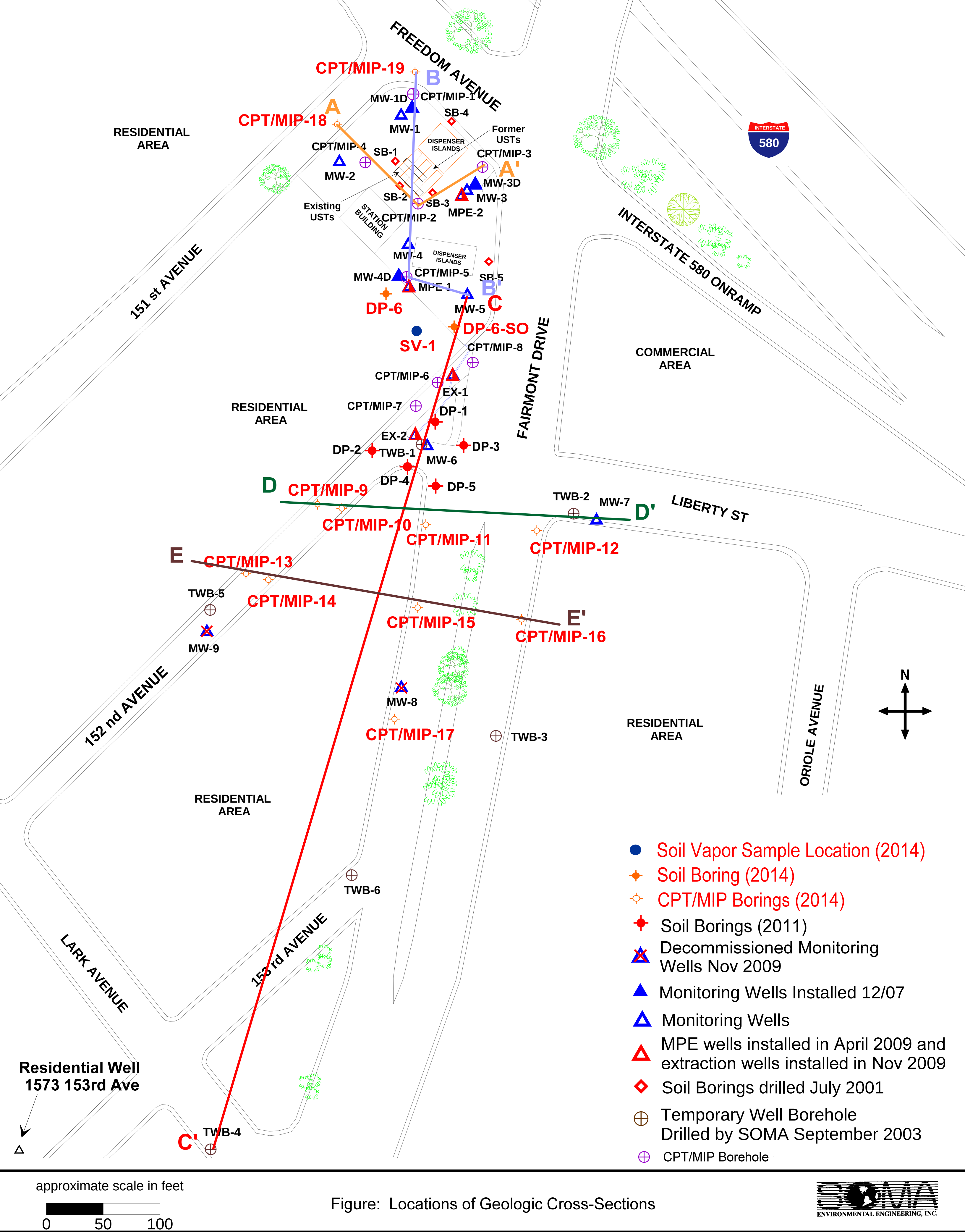
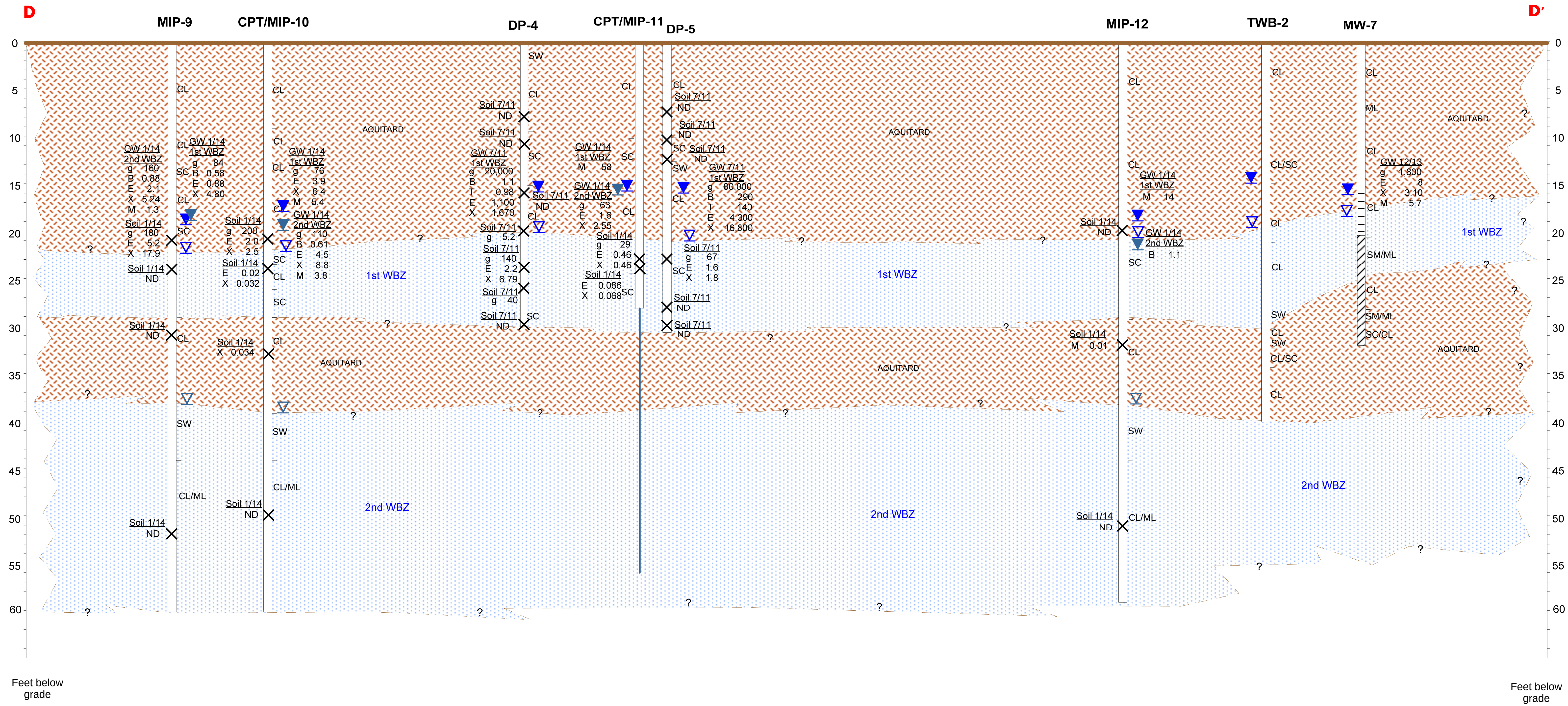
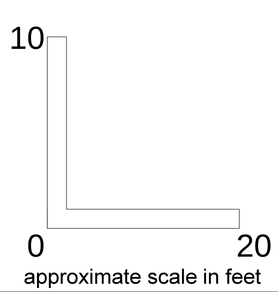


Figure: Locations of Geologic Cross-Sections



EXPLANATION



- Static groundwater in borings & wells
- Groundwater encountered during well borehole drilling
- Monitoring well screen interval
- ? Inferred contact

Note: Analytical Soil and Groundwater Data for CPT borings taken from soil borings (GS)

Membrane Interface Probe (MIP) PID + FID response interval

122 - PID readings ppm VOCs

N, L, M, S: No, Light, Medium, Strong PHC Odor

GW - GroundWater (ug/L)
Soil (ug/kg)

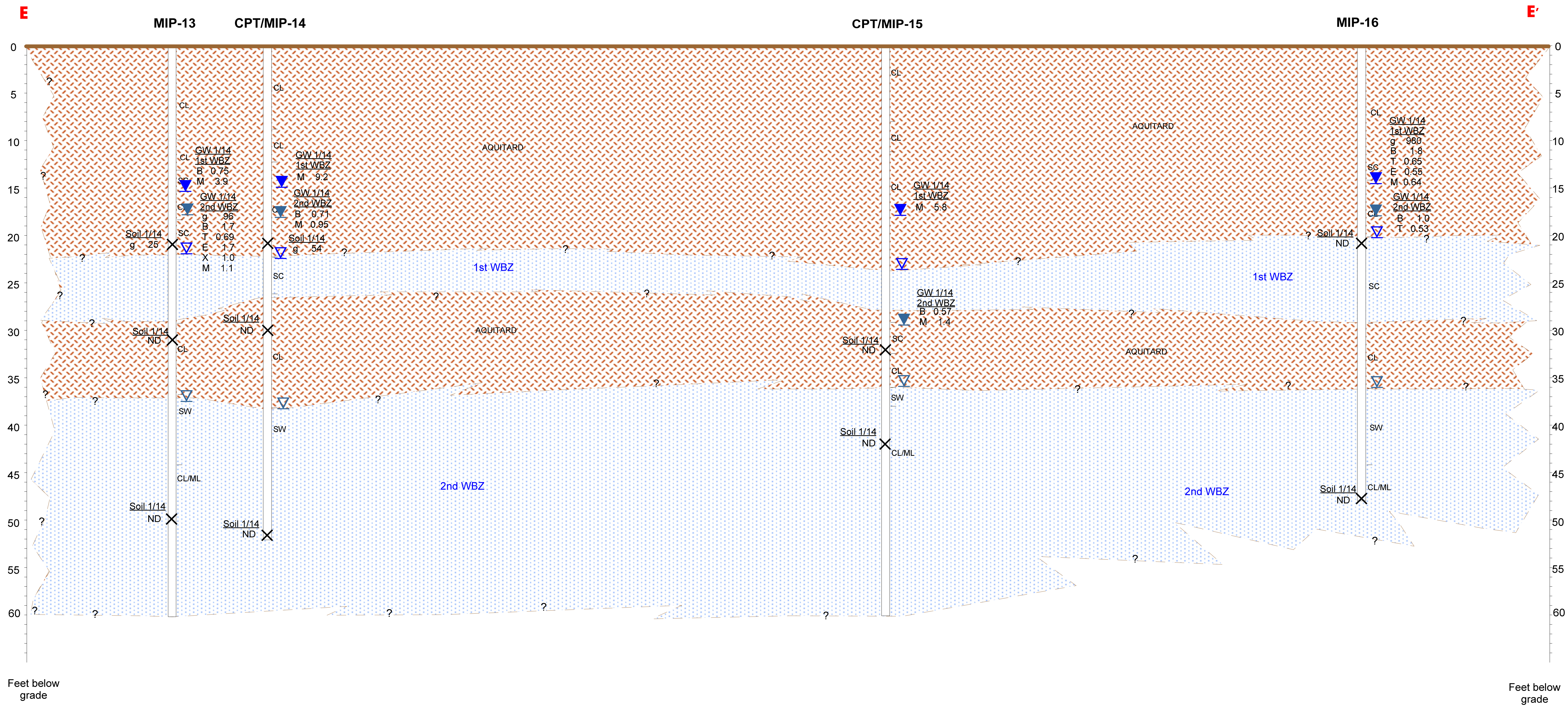
ug/L	g - TPH-g
ug/L	B - Benzene
ug/L	M - MtBE
ug/L	T - TBA

Unified Soil Classification System

CL	Clay	CL-Sa	Sandy Clayey
SP	Sand, Poorly Graded	CL-Si	Silty Clay
SW	Sand, Well Graded	CL-Gv	Gravelly Clay
GW	Gravel, Well Graded	GP-Sa	Sandy Gravel
ML	Silt		
SM	Silty Sand		

Geologic Cross-Section DD'

SOMA ENVIRONMENTAL ENGINEERING, INC.



EXPLANATION

Static groundwater in borings & wells

Groundwater encountered during well borehole drilling

Monitoring well screen interval

? Inferred contact

Note: Analytical Soil and Groundwater Data for CPT borings taken from soil borings (GS)

Membrane Interface Probe (MIP) PID + FID response interval

122 - PID readings ppm VOCs

N, L, M, S: No, Light, Medium, Strong PHC Odor

10
0 20
approximate scale in feet

GW - GroundWater (ug/L)
Soil (ug/kg)

ug/L	g - TPH-g
ug/L	B - Benzene
ug/L	M - MtBE
ug/L	T - TBA

Unified Soil Classification System

CL	Clay	CL-Sa	Sandy Clayey
SP	Sand, Poorly Graded	CL-Si	Silty Clay
SW	Sand, Well Graded	CL-Gv	Gravelly Clay
GW	Gravel, Well Graded	GP-Sa	Sandy Gravel
ML	Silt		
SM	Silty Sand		

Geologic Cross-Section EE'

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