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March 3, 2011

Mr. Paresh Khatri
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

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

Dear Mr. Khatri:

SOMA's "Workplan for Implementing a Limited Off-Site Investigation" at 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. 3-31-12
CIVIL
STATE OF CALIFORNIA

cc: Mr. Mohammad Pazdel w/enclosure

Workplan for Implementing a Limited Off-Site Investigation at:

Freedom Gas and Food
15101 Freedom Avenue
San Leandro, California

March 3, 2011

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 February 17, 2011.

Mansour Sepehr, PhD, PE
Principal Hydrogeologist

REGISTERED PROFESSIONAL ENGINEER
MANSOUR SEPEHR
No. C042928
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1. INTRODUCTION

1.1 Overview

SOMA Environmental Engineering, Inc. (SOMA) has prepared this workplan for implementing a limited off-site investigation at 15101 Freedom Avenue, San Leandro, California. During Fourth Quarter 2010 groundwater monitoring, elevated levels of petroleum hydrocarbons were detected in MW-6, an off-site well next to groundwater extraction well EX-2. As a result, SOMA recommended an off-site investigation study to evaluate the extent of off-site chemical plume and the effectiveness of the current groundwater extraction system to remove chemicals from impacted groundwater.

In a correspondence of February 17, 2011 to Mr. Mohammad Pazdel, property owner, Alameda County Health Care Services – Environmental Health Services (ACHCS) concurred with SOMA's recommendation and requested a workplan for conducting an off-site investigation around MW-6. This workplan provides details of the proposed off-site investigation as requested by ACHCS.

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. SITE CONCEPTUAL MODEL

The site is located in the San Leandro Valley at an elevation of approximately 54 feet above mean sea level with a moderate topographic gradient toward the south. The San Leandro Valley is within the San Francisco Bay – Santa Clara Valley depression, a northwest-to-southeast trending basin bounded on the east and west by mountains. The basin is characterized by Quaternary alluvium, chiefly fan and terrace deposits that are generally several hundred feet thick and flat lying.

There is no water body within a half-mile radius of the site. The nearest water body, Estudillo Canal, is located about 0.6 miles southwest. The next closest water body is San Leandro Creek, approximately 1.5 miles south. East of the site are the northwest-trending Hayward Fault Zone, the San Leandro Hills, and an assemblage of ultramafic metamorphic and volcanic rocks (California Division of Mines and Geology, 1990).

The United States Geological Survey (USGS) mapped the site on Late Pleistocene age (10,000 to 70,000 years old) alluvium consisting of irregularly interbedded clay, silt, sand and gravel. Due to the age of this alluvium, these stream-deposited sediments are typically more consolidated than alluvial deposits of Holocene age. In developed urban areas such as the Bay Area, earthwork construction often involves emplacement of artificial fill derived from nearby cuts or quarries. Artificial fill is emplaced over native earth materials to provide level building pads and base rock for roadways.

The site is located in the East Bay Groundwater Basin of the San Francisco Bay hydrologic study area. Water-bearing formations include the Santa Clara Formation of Plio-Pleistocene age and late Pleistocene, and recent sediments that have been grouped as Late Quaternary alluvium. Non–water-bearing units underlie the water-bearing formations and are exposed along the surface in the Diablo Range east of the site and Coyote Hills, near Newark, which is south of the site.

The cone penetrometer test (CPT) and membrane interface probe (MIP) program conducted by SOMA in September 2006 identified two main water-bearing zones (WBZs) within the depths explored by CPT, designated the First and Second WBZs. Based on CPT data, both WBZs appear to be laterally continuous across the site, and are separated by a laterally continuous aquitard.

From approximately 12 to 22 feet below ground surface (bgs), the First WBZ occurs as an approximately 10- to 15-foot-thick interbedded sequence of sand, silty sand to sandy silt, cemented sand, and silt to clayey silt. The groundwater monitoring well network in the on- and off-site areas is completed within the First WBZ. Nine groundwater monitoring wells, six on-site and three off-site, are monitored quarterly. Groundwater elevations measured in wells over the period of record for quarterly groundwater monitoring (Second Quarter 2002 to Fourth Quarter 2008) reflect potentiometric head in the First WBZ, with the groundwater flow gradient in the First WBZ predominantly toward the south/southwest.

From approximately 32 to 50 feet bgs, the Second WBZ occurs as an approximately 5- to at least 35-foot-thick interbedded sequence of the same lithologic type as seen in the First WBZ. No groundwater monitoring wells are completed in the Second WBZ. During grab groundwater sampling activities in September 2006, after setting the discrete water sampler, groundwater elevations rose immediately above the top of the sampler and into the hollow push rods. This implies that groundwater in the Second WBZ reflects potentiometric pressure. Therefore, the Second WBZ can also be considered a confined aquifer. Because no groundwater monitoring wells are screened in the Second WBZ, the groundwater monitoring flow direction and degree of impact of the Second WBZ is not known.

The First and Second WBZs are separated by a 5- to 25-foot-thick, laterally continuous, unsaturated layer of clay, clayey silt, and silt. This unit is referred to as an aquitard. Of the two water-bearing zones beneath the site, it appears that the majority of site-related contaminants are present in the First WBZ.

Groundwater investigation results indicate that the Second WBZ has not been significantly impacted by petroleum hydrocarbons. Therefore, no active remediation is warranted. Results of SOMA's contaminant mass calculation indicate that there are over 1,338 pounds of petroleum hydrocarbons in subsurface soils and the smear zone beneath the site. In addition, there are about 2,374 pounds of chemicals in groundwater in dissolved and adsorbed phases.

Soil gas survey results indicated that soil vapors in subsurface do not pose a significant health risk to off-site residents. Multi-phase extraction (MPE) pilot test results have indicated that this technique is effective in removing petroleum hydrocarbons from groundwater. During the MPE pilot test in November 2007, 106 pounds of petroleum hydrocarbons were removed from the subsurface. Results of our evaluation indicate that because groundwater occurs at greater depths than utility lines, public utility lines and conduits in the vicinity do not act as preferential flow pathways.

Based on state Department of Water Resources records, 10 wells are located within 2,000 feet of the site. Three are hydraulically downgradient of the site, including two of unknown use and one irrigation well. Sensitive receptor survey results indicate that the off-site groundwater plume could impact two private wells, one reportedly located at 1575 153rd Street and the other at an unidentified address along Oriole Avenue. Analytical results for groundwater samples collected from well at 1573 153rd Street showed only tertiary-butyl alcohol (TBA), at 21 µg/L. The well on Oriole Street could not be sampled and is no longer operational.

Results of SOMA's corrective action evaluation indicated that a combination of pump-and-treat with an MPE system is the most effective and least costly alternative for removing petroleum hydrocarbons from the smear zone and the First WBZ. No active remediation of the Second WBZ is warranted. However, monitored natural attenuation (MNA) is recommended for the First and Second WBZs.

Results of SOMA's evaluation show that utilizing MPE on an intermittent basis is the most feasible and least costly alternative. Due to high costs of a permanent MPE system in connection with purchase, installation, operation and maintenance, as well as issues related to Bay Area Air Quality Management District (BAAQMD) permitting, it is not cost effective to utilize MPE on a permanent basis.

3. SCOPE OF WORK

The scope of work includes the following:

1. Prepare for field work, including acquiring permits and creating Health and Safety Plan;
2. Drill five soil borings using direct push technology (DPT) and collect soil and groundwater samples;
3. Analyze soil and groundwater samples;
4. Evaluate possible expansion of the groundwater extraction system;
5. Prepare report.

3.1 Preparation for Field Work

As required by the Occupational Safety and Health Administration (OSHA) Standard "Hazardous Waste Operations and Emergency Response" guidelines (29 CFR 1910.120), and by the California Occupational Safety and Health Administration (Cal/OSHA) "Hazardous Waste Operations and Emergency Response" guidelines (CCR Title 8, Section 5192), SOMA will prepare a site-specific Health and Safety Plan (HASP). The HASP will be reviewed and signed by field staff and contractors before beginning field operations, and will be in the possession of SOMA personnel while conducting work activities. The HASP will be updated as needed if field activities are modified, or if potential hazards not originally addressed in the HASP are identified.

Before initiating field assessment activities, SOMA will obtain required encroachment and drilling permits from the Alameda County Public Works Agency to drill proposed soil borings.

SOMA will notify Underground Service Alert (USA) to ensure drilling areas are clear of underground utilities. Following USA clearance, SOMA will retain a private utility locator to survey the proposed drilling areas and locate any additional subsurface conduits. Immediately prior to onset of drilling activities, each boring will be hand augered to a depth of 5 feet bgs.

3.2 Advance Soil Borings Within the First Water-Bearing Zone

SOMA proposes advancing five soil borings around MW-6 and EX-2 within the First WBZ at locations illustrated in Figure 3. Locations were selected based on the presence of elevated levels of site-related contaminants in MW-6, as discussed in the Fourth Quarter 2010 groundwater monitoring report dated January 11, 2011.

SOMA proposes utilizing DPT to advance these borings. Prior to boring advancement, depth to groundwater in the adjacent wells will be measured in order to verify the target boring depth. SOMA proposes advancing all borings in that area to a depth of 30 feet bgs unless above-mentioned depth-to-groundwater measurements dictate otherwise. Soil samples may be collected from areas of gross contamination of each boring for chemical analysis.

Each boring will be continuously cored, and descriptions of cored soil will be entered in logs in accordance with the Unified Soil Classification System (USCS). In addition, cored soil will be checked for hydrocarbon odors and visual staining, and screened using a photo-ionization detector (PID). PID readings will be noted in boring logs.

SOMA will collect grab groundwater samples using disposable bailers. A disposable bailer will be used to evacuate a desirable amount of groundwater and decant it slowly (to avoid volatilization) into appropriately preserved laboratory-supplied containers. Each sample will be labeled with a unique sample identifier and preserved on ice pending delivery to a certified analytical laboratory. All samples will be delivered to the laboratory for chemical analysis under appropriate chain-of-custody protocol.

Following groundwater sampling, borings will be destroyed with a neat cement grout mixture, tremmied into place, and completed at the surface with materials to match existing grade.

3.3 Laboratory Analyses of Soil and Groundwater Samples

As described in the previous section, groundwater samples, along with selected soil samples based on PID readings, will be submitted to a California state-certified environmental laboratory for chemical analysis of the following:

- Total petroleum hydrocarbons as gasoline (TPH-g)
- Benzene, toluene, ethylbenzene, total xylenes (collectively termed BTEX)
- Fuel oxygenates, additives and lead scavengers including methyl tertiary-butyl ether (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), and ethanol.

All analyses will be conducted using USEPA Method 8260B.

3.4 Waste Collection, Storage and Disposal

Soil cuttings and waste water generated during soil boring advancement will be temporarily stored on-site in a secure area in DOT-rated 55-gallon steel drums pending characterization, profiling, and transport to an approved disposal-recycling facility. Each drum will be labeled with site address, contents, date of accumulation, and contact phone number.

3.5 Evaluate Possible Expansion of Groundwater Extraction System

Based on results of groundwater analysis, the extent of off-site chemical plume will be evaluated. Once this assessment is complete, a graphic illustration will be created in which the current groundwater capture zone around extraction well EX-2 is superimposed on the chemical plume to evaluate whether the current groundwater extraction system effectively captures the plume. Based on results of this evaluation, a new groundwater extraction well may be proposed.

3.6 Reporting

The report will document boring advancement and all related activities, and discuss results of soil and groundwater sample analyses and of our further evaluation of the existing groundwater extraction system and its possible expansion. The report will also include the following:

- field conditions observed during soil boring advancement activities, including boring logs describing soil types encountered, sample intervals, and PID vapor readings;
- laboratory analytical results of soil and groundwater samples collected during boring advancement.

4. SCHEDULE

The workplan will be implemented upon receipt of written authorization from ACHCS. SOMA anticipates that the proposed work will be completed in five 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

N

approximate scale in feet

0 150 300

Figure 1: Site vicinity map.

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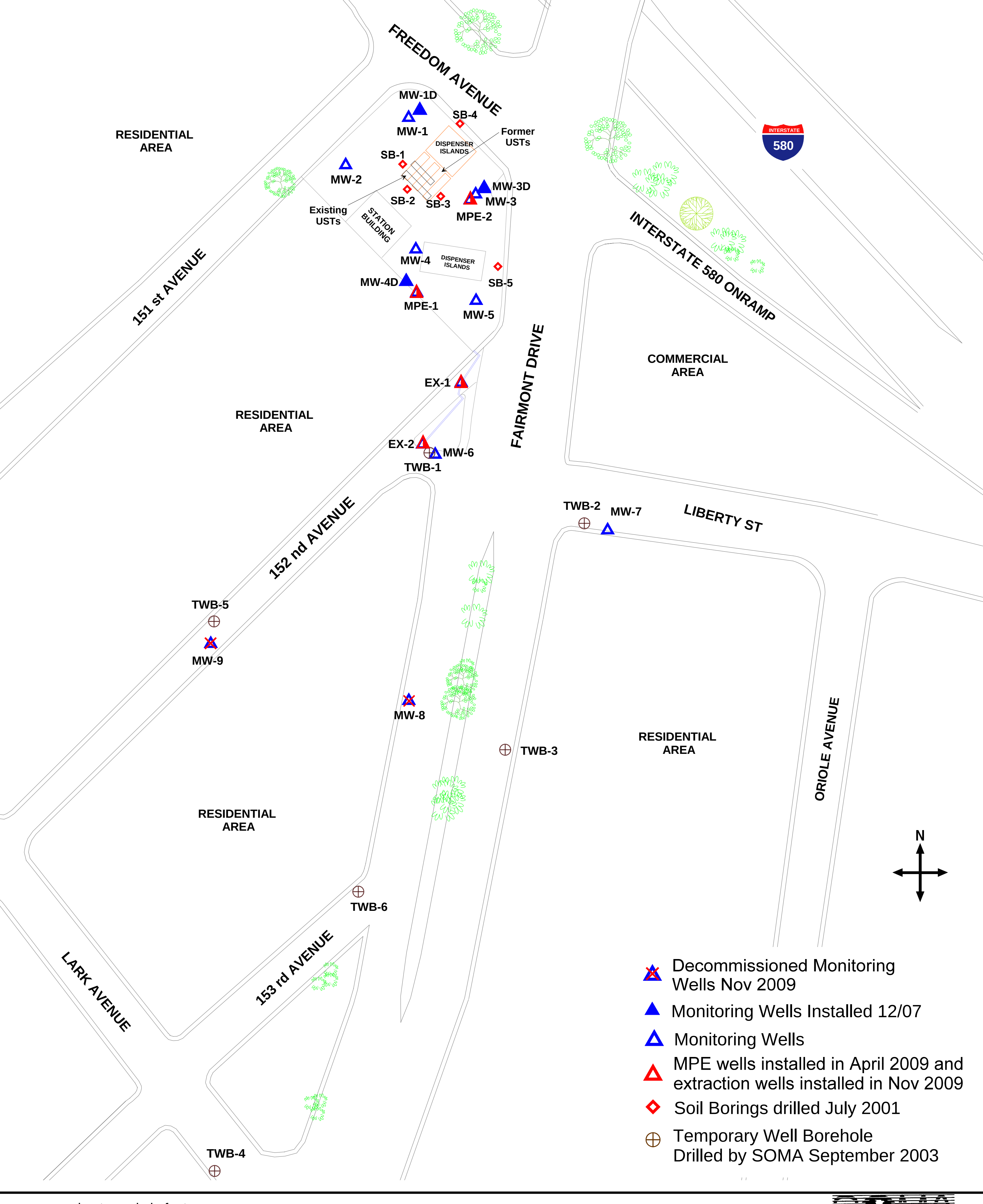

Figure 2: Site Map Showing Locations of USTs, Fuel Dispensers, Soil Borings, and Groundwater Monitoring Wells

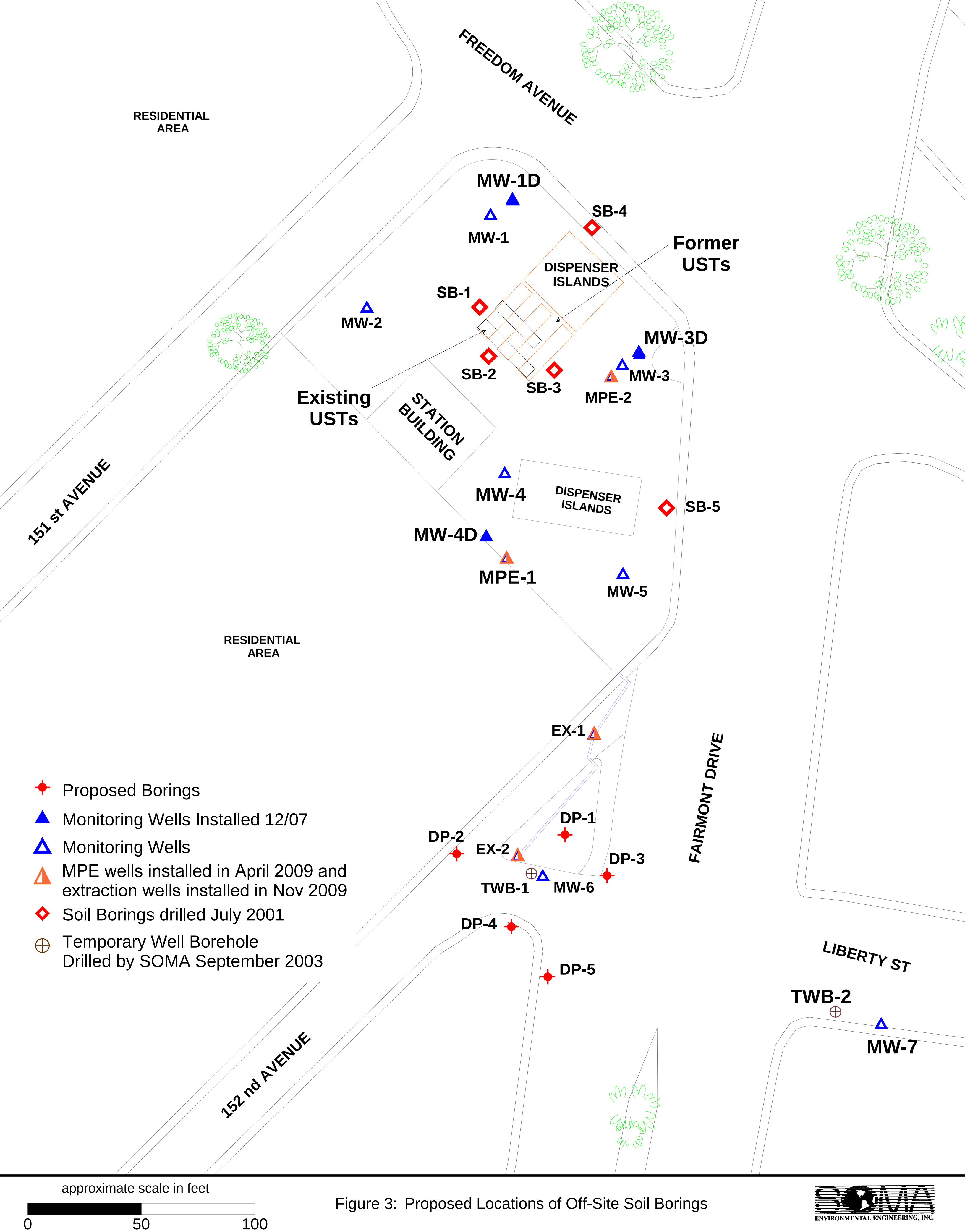

Figure 3: Proposed Locations of Off-Site Soil Borings

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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 now Semi-Annual groundwater monitoring/sampling has been regularly conducted at the site since Second Quarter 2002. Currently there are 12 groundwater monitoring wells, eight 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. Week long MPE events have been conducted at the site with a total of 576 lbs of VOCs being removed as of June 2010.

The groundwater extraction system was initiated on December 9, 2009 and has removed and treated 621,180 gallons of groundwater as of April 2010 and approximately 10.89 lbs of hydrocarbons.

APPENDIX B
Field Procedures

GENERAL FIELD PROCEDURES

Hydraulic Push (GEOPROBE) Drilling

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 borehole location for underground structures or utilities.

Borehole Advancement

Pre-cleaned push rods (typically one to two inches in diameter) are advanced using a hydraulic push type rig for the purpose of collecting samples and evaluating subsurface conditions. The drill rod serves as a soil sampler, and an acetate liner is inserted into the annulus of the drill rod prior to advancement. Once the sample is collected, the rods and sampler are retracted and the sample tubes are removed from the sampler head. The sampler head is then cleaned, filled with clean sample tubes, inserted into the borehole and advanced to the next sampling point where the sample collection process is repeated.

Soil Sample Collection

The undisturbed soil samples intended for laboratory analysis are cut away from the acetate sample liner using a hacksaw, or equivalent tool, in sections approximately 6 inches in length. The 6-inch samples are lined at each end with Teflon® sheets and capped with plastic caps. Labels documenting job number, borehole identification, collection date, and depth 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. The remaining collected soil that has not been selected for laboratory analysis is logged using the United Soil Classification System (USCS) under the direction of a State Registered Professional Geologist, and is field screened for organic vapors using a photo-ionization detector (PID), or an equivalent tool. Soil cuttings generated are stored in Department of Transportation (DOT) approved 55-gallon steel drums, or an equivalent storage container.

Groundwater Sample Collection

Once the desired groundwater sampling depth has been reached, a Hydropunch tip is affixed to the head of the sampling rods. The Hydropunch tip is advanced between approximately 6 inches to one foot within the desired groundwater sampling zone (effort is made to emplace the Hydropunch screen across the center and lower portion of the water table), and retracted to expose the Hydropunch screen.

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

Because the sampling section of the non-discrete groundwater sampler is not protected or sealed, this sampler should only be used where cross contamination from overlying materials is not a concern. Discrete groundwater samplers are driven to the sample interval, and then o-rings, a protective tube/sheath, and an expendable point provide a watertight seal.

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 type of preservative (if applicable, e.g., 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.

Borehole Completion

Upon completion of drilling and sampling, the rods are retracted. Neat cement grout, mixed at a ratio of 6 gallons of water per 94 pounds of Portland cement, is introduced, *via* a tremmie pipe, and pumped to displace standing water in the borehole. Displaced groundwater is collected at the surface into DOT approved 55-gallon steel drums, or an equivalent storage container. In areas where the borehole penetrates asphalt or concrete, the borehole is capped with an equivalent thickness of asphalt or concrete patch to match finished grade.

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 headspace 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 onsite 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. The drums are removed from the site by a licensed waste disposal contractor under manifest to an appropriate facility for treatment/recycling.