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November 9, 2015

Alameda County Environmental Health  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502-6577

**RECEIVED**

By Alameda County Environmental Health 2:02 pm, Nov 12, 2015

**Re: 76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard, Oakland, California**

**ACEH Case No. RO0000409  
RWQCB Case No. 01-2474  
GeoTracker Global ID T0600102279**

I have reviewed the attached *Feasibility Study* dated November 10, 2015.

I agree with the conclusions and recommendations presented in the referenced report. The information in this report is accurate to the best of my knowledge and all local Agency/Regional Board guidelines have been followed. This report was prepared by AECOM, upon whose assistance and advice I have relied.

This letter is submitted pursuant to the requirements of California Water Code Section 13257(b)(1) and the regulating implementation entitled Appendix A pertaining thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Sincerely,

Nicole Arceneaux  
Project Manager

Attachment: *Feasibility Study*

# Feasibility Study

76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard  
Oakland, California

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Oakland, California

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RWQCB Case No. 01-2474

This document was prepared consistent with currently and generally accepted environmental consulting principles and practices. The material and data in this report were prepared under the supervision and direction of the undersigned.

  
Richard Jones, PE  
Project Engineer



  
Chad Roper, PhD  
Senior Project Manager

11/10/15

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## 1.0 Introduction

On behalf of Chevron Environmental Management Company's (EMC's) affiliate, Union Oil Company of California ("Union Oil"), AECOM is pleased to submit this Feasibility Study (FS) for 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California (Alameda County Health Care Services Agency, Environmental Health Services [ACEH] Case No. RO0000409, San Francisco Regional Water Quality Control Board [RWQCB] Case No. 01-2474) (**Figure 1**) (site). This FS has been prepared in response to the ACEH letter dated August 3, 2015 (**Appendix A**). AECOM recently conducted agency directed aquifer testing at this site, and the results of that testing were presented in a report dated July 14, 2015.

The ACEH letter dated August 3, 2015, referred to the recommendations in AECOM's aquifer testing report and stated "the results of the aquifer testing indicated that dewatering of the smear zone may be feasible" although this option was not the conclusion of the aquifer testing report. The letter then directed the preparation of this FS as recommended by the report and that the FS would identify data gaps associated with the selection and implementation of a remedial technology at the site.

The following sections summarize the site background, present the FS, and list data gaps, as well as provide conclusions from the current analysis and recommendations for future site activities.

## 2.0 Site Background

### 2.1 Site Description

The site is a 76 service station located at the northern corner of the intersection of MacArthur Boulevard and High Street within the city of Oakland, California (**Figure 1**). The station building is in the northern portion of the site. An automotive service bay is in the northern portion of the building and a mini-mart/cashier area is in the southern portion. Two dispenser islands are located on the southern portion of the site: one parallel to MacArthur Boulevard and one parallel to High Street. Previously prepared environmental documents (e.g., Delta Consultants [Delta] 2010a; 2010b) indicate that two 10,000-gallon gasoline underground storage tanks (USTs) are located in the southern portion of the site (**Figure 2**).

### 2.2 Site Vicinity Use

The site area consists of mixed commercial and residential development, with the following adjacent property uses (**Figure 2**):

- Northwest – The Oakland Veterinary Hospital (4258 MacArthur Boulevard) abuts the site to the northwest, beyond which is a pharmacy drug store.
- North and northeast – Single-family residences (4257 Masterson Street and 3627 High Street) abut the site to the north and northeast.
- East and southeast – High Street borders the site to the southeast, beyond which are a post office, apartment building (3618 to 3622 High Street), and commercial businesses (4300 to 4312 MacArthur Boulevard). Based on a review of the State Water Resources Control Board's (SWRCB's) GeoTracker database, a leaking underground storage tank (LUST) site was formerly located at 4300 MacArthur Boulevard – Chevron gasoline service station #93676 (Case No. 01-0371 which was closed in 1999) (SWRCB, 2015a).
- South – A vacant lot is located south of the site, beyond the intersection of MacArthur Boulevard and High Street. The GeoTracker database indicates that an open LUST case is located in this area, the former Robert's Tires facility, 4311-4333 MacArthur Boulevard (Case No. 01-3601) (SWRCB 2015b).
- Southwest and west – MacArthur Boulevard borders the site to the southwest, beyond which are a vacant lot and commercial businesses. The GeoTracker database indicates that Shell gasoline service station #13-5701 (4255 MacArthur Boulevard) was formerly located at the vacant lot. There is an open LUST case (Case No. 01-1366) associated with the former Shell service station (SWRCB 2015c).

Site and neighboring property uses are not expected to change significantly in the near future. The vacant lots are not expected to be redeveloped without resolution of the open LUST cases.

The property owner has requested permits to expand the convenience store at his location. This expansion will take his building to within 7 feet of the property line to the northwest adjacent to the Oakland Veterinary Hospital. The proposed footprint for the expanded building is shown on **Figure 2**. The property owner has provided plans for the expanded facility which are included as **Appendix B**. This expansion may begin as soon as the middle of 2016.

### 2.3 Topography and Site Elevation

The site is located in a highly urbanized area of Oakland at the base of the San Leandro Hills. Based on site survey data, surface elevations at the site range from 179.42 feet above mean sea level (amsl) at MW-4B to 173.99 feet amsl at MW-2B (Morrow Surveying 2013). Observations during the area reconnaissance on March 15, 2012, further revealed that the elevation at the northeastern boundary of the site is noticeably higher than at MW-4B. Additionally, the elevation at MW-5 is 169.67 feet amsl. MW-5 is located in the street in front of the Oakland Veterinary Hospital (adjacent to the northwestern portion of the site). To summarize, the southwestern portion of the site is at least 8 feet lower in elevation than the northeastern portion, and the western corner is approximately 4 feet lower in elevation than the southern corner.

Topography is significant for the purposes of feasibility assessment because remedial equipment generally requires level ground for installation or must be constructed to be level.

### 2.4 Site Geology

Based on a review of boring logs prepared by previous consultants, the site geology consists of unconsolidated deposits in a clay matrix, with some intermixed fine-to-medium-grained gravel (Environmental Resolutions Incorporated 1999; Delta 2007a; 2007b; 2008a; 2008b; 2009a; 2009b; 2010a; 2010b; Conestoga-Rovers & Associates 2011). Clay is predominant in the upper lithology with sandy/silty clay and clayey sand units, between approximately 1 to 15 feet below ground surface (bgs). The clay is underlain by clay interbedded with sandy clay, clayey sand, silty sands, and some gravelly sandy clay observed to the maximum depth explored (50.5 feet bgs). Recent soil borings advanced on-site have indicated the presence of high-plasticity, fatty clays from 1 to 20 feet bgs (AECOM 2014a). Available boring logs are provided in **Appendix C**.

### 2.5 Site Hydrogeology

Historical site assessments indicated the presence of a confined aquifer under hydrostatic pressure based on the initial depth to water during well installations. Well construction details are presented in **Table 1**. Soil observed during installation of the shallow monitoring wells (MW-9A/B, MW-10A/B, and MW-11A/B) was interpreted to be dry from approximately 11.5 to 16 feet bgs, at which point the soil appeared to be moist.

High-plasticity clays were observed for most soil borings from grade to total depth (15 to 20 feet bgs), which suggests a misinterpretation of static water during drilling activities. Following a review of historical boring logs, shallow depth to water was verified at several locations (SB-1, SB-4, SB-5, and SB-15), and almost all boring logs indicate high moisture content from approximately 5 feet bgs and deeper. Based on historical soil boring logs, and well installation in March 2013, AECOM concluded that the lithology beneath the site is relatively fine-grained; however, the aquifer is generally unconfined (AECOM 2013a).

Based on a review of boring logs (**Appendix C**) and groundwater monitoring data tables prepared by previous consultants, it was determined that discontinuous water-bearing zones may exist within the stratified clay matrices (Environmental Resolutions Incorporated 1999; Delta 2007a; 2007b; 2008a; 2008b; 2009a; 2009b; 2010a; 2010b; Conestoga-Rovers & Associates 2011). Soil boring logs indicate groundwater being encountered first between 4 (SB-1) and 42 (SB-11) feet bgs. During monitoring well installations in 1999, groundwater was encountered at an approximate depth of 23.5 feet bgs (MW-1, MW-2, MW-3, and MW-4). During well installations in 2001, groundwater was encountered at 6 and 5.5 feet bgs in MW-5 and MW-6, respectively. Additionally, groundwater was encountered at 15

feet bgs in MW-7 during installation in 2001. Groundwater was encountered at approximately 23.5 feet bgs in borings MW-1B, MW-2B, MW-3B, and MW-4B in 2010; however, significant moisture content was noted at 5 feet bgs and deeper in MW-1B and MW-2B.

To investigate the existence of shallow, unconfined water-bearing zones, AECOM installed six discreetly screened monitoring wells in March 2013. Following the well installations, it was concluded that the lithology beneath the site is relatively fine-grained; however, the groundwater is generally unconfined. Based on soil moisture observed in historical soil boring logs, the initial hydrogeologic evaluation (i.e., confined aquifer under hydrostatic pressure) was likely inaccurate (AECOM 2013b). This inaccuracy is further evidenced by shallow monitoring wells (MW-9A/B, MW-10A/B, and MW-11A/B) exhibiting a hydraulic head consistent with those installed to 25 feet bgs, and that recharge (although slow) did occur after purging during the most recent monitoring event (AECOM 2015b).

Soils observed during installation of these six wells were interpreted to be dry from approximately 11.5 to 16 feet bgs, at which point the soil appeared to be moist. High-plasticity clays were identified as present in most borings from grade to total depth (15 to 20 feet bgs), which suggests a misinterpretation of static water during drilling activities. Following a review of historical groundwater data, shallow depth to water was observed at most wells associated with the site, and almost all boring logs indicate high moisture content from approximately 5 feet bgs and deeper.

During the groundwater monitoring event conducted on July 21, 2015, the static groundwater elevation ranged from 163.20 feet (MW-2B) to 171.81 feet amsl (MW-4B). The depth to groundwater ranged from 2.58 (MW-5) to 10.35 (MW-2B) feet below the top of well casings (AECOM 2015b). **Table 2** shows groundwater data from the most recent event where a groundwater sample was analyzed (note: because events with chemical data were selected for **Table 2** elevation data from July 21, 2015, is not shown for wells mentioned above). Groundwater flow directions observed in 2015 events are consistent with the predominant historical groundwater flow at the site, which has been to the west (with variations to the southwest) at an average gradient of approximately 0.06 feet per foot.

## 2.6 Extent of Petroleum Hydrocarbon Impacts to Soil

Soil boring samples collected from 1997 to date indicate that soil contamination is largely confined to the upper 15 feet of the unsaturated zone. **Table 3** details the maximum results from historical soil samples for constituents of concern. A maximum benzene concentration of 7.8 milligrams per kilogram (mg/kg) was detected for soil boring SB-2 at 8.5 feet bgs in 2007. **Table 4** provides historical soil data for constituents of concern. A cross-section is provided as **Figure 4**. Historical cross sections are provided in **Appendix D**. **Figure 5** shows the maximum total petroleum hydrocarbons as gasoline (TPH-g) impacts and the depth at which that maximum was detected for site soil sample locations.

Hydrocarbon impacts at the site, based on the current data appear to be discontinuous. A critical example is the soil data from MW-1 and SB-19. MW-1 had the highest historical detection of TPH-g (6,800 mg/kg at 10.5 feet bgs) and, less than 5 feet away, SB-19 had a maximum TPH-g concentration of 1.6 mg/kg at 10 feet bgs. To the southeast and southwest of MW-1 hydrocarbon concentrations have been inconsistent as well both from location to location, and sometimes even within the same boring (i.e., MW-1B at 10 feet bgs).

## 2.7 Extent of Petroleum Hydrocarbon Impacts to Groundwater

Groundwater monitoring from 1999 to 2010 included monitoring of MW-1, MW-2, MW-3, and MW-4. These wells were screened from 5 to 25 feet bgs. In 2010, these wells were abandoned and replaced

with monitoring wells screened from 20 to 25 feet bgs (MW-1B, MW-2B, MW-3B, and MW-4B, respectively), located near the former well locations. Differences in groundwater concentrations at the same well locations (but different screen intervals) indicate significant impediments to vertical contaminant transport. Well construction details are provided in **Table 1**.

Groundwater impacts are characterized as limited to the area southwest of the former used-oil UST and southeast of the former gasoline USTs. It is not clear if these two areas of impacted groundwater connect into a single plume or are separate.

Current groundwater analytical data from wells with 5-foot screens (MW-9A/B, MW-10A/B/S, and MW-11A/B/S) indicate a non-uniform vertical distribution of groundwater impacts, likely due to the fine-grained nature of the subsurface soil. Impacts for deep-screened wells (20 to 25 feet bgs) are as much as three orders of magnitude less than those observed for the shallow-screened wells (10 to 15 feet bgs). Although concentrations for wells screened from 10 to 15 feet bgs are the highest, horizontal migration appears to be impeded by the soil type, and the plume appears to be largely contained to the site boundaries. Off-site, downgradient wells (MW-5 and MW-7) are screened from 5 to 25 feet bgs. Both wells have exhibited a declining trend for TPH-g, benzene, and methyl t-butyl ether (MTBE) since installation in 2001, suggesting that plume migration from the site is not occurring.

## **2.8 History of Remediation**

Approximately 1,350 tons of soil was excavated and removed during the gasoline UST removal activities in 1998 (Environmental Resolutions, Inc. 1998). In addition, approximately 4.6 tons of soil was overexcavated and removed during the used-oil UST removal.

Overpurging events were conducted at as many as three wells from 2001 to 2004 (MW-1, TP-1, and MW-7). Approximately 476,015 gallons of water was removed during that period. From available historical data, 1,590 gallons was extracted from MW-7 with the remainder being extracted from TP-1 and MW-1 (AECOM 2013a).

## 3.0 Feasibility Study

Three remedial technologies were evaluated for implementation at the site based on the Environmental Protection Agency's (EPA's) guidance document, *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites* (EPA 2004). In 2014, AECOM prepared a remedial technology screening and work plan for site assessment which evaluated eight remedial technologies (AECOM 2014b). From the screening report, bioventing and soil vapor extraction (SVE) were eliminated from consideration because they were considered soil-only remedial approaches and impacts at this site are primarily in groundwater and in saturated soil. Groundwater extraction and treatment was eliminated because, although dewatering would be expected to enhance biodegradation of soil impacts, this approach would be limited by the low porosity of the soils and slow rates of hydrocarbon desorption into the liquid phase. Air sparge with SVE was also eliminated due to the potential for air injection to push soil vapor off-site.

Additionally, the feasibility analysis focuses on impacts attributed to the former used-oil UST. This location was chosen as a higher priority based on communication with ACEH and their concern for potential off-site vapor migration.

The technologies carried into this FS are summarized in the Potential Remedial Approaches table (**Table 5**). Each remedial approach explicitly addresses petroleum hydrocarbon concentrations in both soil and groundwater. It is presumed that their application will also reduce or eliminate migration of impacted groundwater and/or soil vapor. This study also intends to identify data gaps and practical considerations that may affect remedial implementation.

### 3.1 Soil Excavation and Disposal

Soil excavation allows the physical removal of source material from the soil. This method is extremely effective at removing source material from the unsaturated zone; however, at or below the water table, significant challenges exist. Wet soil is heavier than dry soil; therefore, disposal costs would be significantly higher for saturated zone soil removal. Shallow groundwater, such as that present at the site, also presents a challenge and must be dewatered to retrieve deep soil impacts. Furthermore, groundwater impacts are not typically addressed during excavation activities (aside from dewatering) and can re-contaminate backfill material following the cessation of groundwater pumping.

Because the greatest soil impacts are considered to be below groundwater, it is assumed that dewatering will be required for excavation. There are several monitoring wells in the area that could be used for temporary dewatering. A discharge permit could be obtained from the East Bay Municipal Utilities District (EBMUD) for the purposes of dewatering during excavation and a sewer cleanout is available for a temporary connection to the publically owned treatment works (POTW). Dewatering may need to be initiated prior to the beginning of excavation to ensure that impacted soil is adequately dewatered for efficient excavation. Based on the results of aquifer testing at the site, it is estimated that an extraction total of approximately 1 gallons per minute (gpm) achieved from several wells would produce localized dewatering and approximately 1,500 gallons per day for discharge.

The dimensions of a potential excavation are provided on **Figure 2**. As can be seen in the figure, existing utility services including sewer, water and electric run through the area with the soil impacts attributed to the former used-oil UST. The presence of these utilities limits the lateral extent which can be safely excavated and limits the technologies which can be used for excavation. The lateral extent

shown on **Figure 2** sets a limit of within 2 feet of the utility for safety purposes. The planned expansion of the convenience store would also limit the size of the excavation if the excavation could not be completed before the expansion began.

The proposed excavation would be conducted via a combination of vacuum excavation and large-diameter drilling. The use of a backhoe was rejected due to the proximity to utilities and the building foundation and the need for shoring. Vacuum excavation uses compressed air to dislodge soil and a vacuum to lift it into a soil separator tank. This technique involves a vac-truck rig equipped with an air-knife tool to deliver the compressed air. The technique is commonly used to locate utilities and can be extended into the excavation without requiring a person to enter the excavation. If this approach cannot reach to the target depth (approximately 15 feet bgs.), additional excavation will be conducted via large-diameter augers. Large-diameter-auger excavation involves drilling a row of holes to the desired depth and backfilling each day with a slurry material. No shoring is required for this approach and no open hole hazards remain at the end of each drilling day. The excavation is estimated to require approximately 50 days to complete. Off-site disposal of excavated impacted soil is expected to require an additional 45 days.

The excavation shown on **Figure 2** has an area of 441 square feet, and it is estimated that approximately 5 feet of depth would need to be removed (from 10 to 15 feet bgs), resulting in approximately 82 cubic yards of soil for disposal. Prior to disposal, soil would need to be stored on-site in covered bins while it is being profiled for disposal. Soil bins are typically 18 feet by 8 feet and hold 20 yards of soil. The storage of soil in bins on-site would likely require a temporary reduction in the number of operating dispensers. Soil which is not impacted would also need to be stockpiled at the site so that it could be used as fill. Imported fill would also be required. Transport of soil to and from the site would represent an increase in the amount of truck traffic on local streets.

The site is currently an active fueling station. As a result, the excavation area will need to be fenced off to protect pedestrians, station customers, and Oakland Veterinary Hospital customers from the excavation activity. This restriction may further limit station operations. It is not unreasonable to expect that the station would be partially shutdown for the duration of the excavation.

Based on the need to dewater to expose impacted soil, the potential for impacted groundwater to re-contaminate backfill material, the limitations on the extent of excavation due to nearby utilities and potential convenience store expansion, and the safety, accessibility, and financial concerns associated with excavation and soil management at an active fueling station, excavation is considered infeasible for implementation at this site.

### **3.2 Multiphase Extraction**

Multiphase extraction (MPE) is an in-situ remedial technique that involves vacuum-enhanced extraction of groundwater, soil vapor, and light non-aqueous phase liquid (if present) through the use of high-vacuum blowers and/or groundwater pumps. This technique is used to maximize extraction rates of both vapor and liquids simultaneously from extraction wells. If effective, MPE may rapidly remove petroleum-impacted groundwater by vacuum-enhanced dewatering to expose the vadose, capillary fringe, and upper saturated zones to SVE. MPE is most effective in the remediation of volatile hydrocarbons that are present in soils of moderate-to-low permeability (e.g., silt or silty sands) where target zone dewatering can be accomplished by extracting water at reasonable flow rates. In addition, dewatering the saturated zone allows oxygenation of impacted soils exposed to airflow induced by SVE, which can improve aerobic biodegradation of hydrocarbons below the water table.

AECOM's "Remedial Technology Screening and Work Plan for Site Assessment" (AECOM 2014b), stated that "Based on the heterogeneity and fine-grained nature of the soil encountered at the depths of highest petroleum impacts, MPE is likely not a feasible technology." Fine-grained, low-permeability soils are expected to limit the effectiveness of any remedial approach involving the extraction of soil vapor or groundwater from the site. In their letter dated November 19, 2014, ACEH disagreed with the conclusion that MPE was infeasible at the site and requested a work plan for evaluation of remedial technologies.

Groundwater pumps can be used in a dual-phase extraction configuration to remove groundwater, or drop tubes (stingers) can be used in a two-phase extraction configuration where the liquids and vapors are removed simultaneously by the vacuum pump. Aquifer testing at the site has indicated that average groundwater extraction rates (0.31 to 0.95 gpm) are feasible for MPE (although this extraction was conducted without vacuum, which would be expected to increase the rate of groundwater extraction); however, the radius of dewatering was inconsistent in that test with some wells which were more distant from the extraction well showing much more influence than closer wells (AECOM 2015). Although groundwater extraction rates without vacuum appear favorable, the results of the aquifer test did not produce a continuous dewatered area, possibly indicating preferential flow paths in the soil. The success of MPE hinges on the ability to effectively dewater the fine-grained soils and sufficient hydrocarbon vapor mass removal rates.

Nothing is currently known about air flow in the subsurface at this site although the prevailing clay soils would be expected to have low air flow. The vacuum radius of influence (ROI) at the site is considered a data gap and would need to be determined prior to the implementation of MPE. The vacuum ROI can affect hydrocarbon mass removal rates, and the spacing of extraction wells. The vacuum-enhanced radius of dewatering should also be considered a data gap for this technology.

MPE is usually conducted on 4-inch or larger diameter wells that are screened across the smear zone. Currently no such wells are available at this site. An appropriately screened and constructed well should be installed for implementing MPE.

MPE is typically applied using liquid ring pumps or positive displacement blowers to apply a high-vacuum on the extraction well. Extracted hydrocarbon vapors are typically destroyed in thermal or catalytic oxidizers. These technologies are relatively noisy and can produce some odors, both of which could be disruptive to businesses such as the adjacent Oakland Veterinary Hospital or the nearby residences.

MPE extracts groundwater for treatment and disposal. For hydrocarbon-impacted sites, groundwater is usually treated with activated carbon and discharged for disposal. EBMUD can provide a temporary POTW discharge permit for periods of up to 2 years. A permit would need to be obtained prior to pilot testing, and EBMUD estimates their review time at approximately 1 month (personal communication).

MPE can be conducted using a fixed-base, permanent system or through temporary events using a mobile system. Each of these applications has distinct advantages and disadvantages which are discussed as follows.

### **3.2.1 MPE with a Fixed System**

A fixed MPE system is designed and built for continuous operations of more than 1 year. Based on the clay soils at this location, long-term operation is considered likely to be required for effectiveness.

Installation of a fixed MPE system requires a fairly large footprint and must be installed on a level foundation. Several potential locations were reviewed at the site based on the property owner's plans for expansion of the convenience store at the property, which is currently in permitting. A 15-foot by 35-foot footprint was selected as typical of other fixed MPE operations. Much of the site was considered infeasible for installation due to the grading at the site and the footprint of the convenience store and fuel dispensers.

Only one location was considered feasible for construction purposes and evaluated further: the northeastern edge of the property adjacent to the residential area (**Figure 3**). This location would require relatively little leveling, but would take up three parking spaces and is adjacent to the sidewalk. This location was chosen so that access to the waste-oil aboveground storage tank (AST) could be maintained. The final location for any remedial system on-site would have to be approved in a building permit from the City of Oakland.

From the treatment system, a trench would need to be run to the area to be remediated on the northwestern side of the site. This trench would need to be installed prior to the planned expansion of the convenience store so that trenching equipment would have adequate clearance. The trench would connect to the extraction well or wells and would transport soil vapor and groundwater to the treatment system. The trench would also carry treated water to the sewer connection. An alternative route for the trench across the front of the station may be feasible, but would cross more utility lines and its installation would cause a greater disruption to station activities.

Air emissions would need to be permitted by the Bay Area Air Quality Management District (BAAQMD). The proposed remediation system location is within 1,000 feet of St. Lawrence O'Toole Catholic School (approximately 450 feet northeast) and would be subject to a public notice requirement. Dedicated electric service to the remedial system would need to be added by Pacific Gas and Electric. They can typically install service to a temporary power pole within 3 to 6 months following the request. Depending on the mass of hydrocarbons that could be extracted from site soils, vapor-phase treatment would likely either be thermal or catalytic oxidation, and gas service may also be required from Pacific Gas and Electric.

Even without knowing the vapor ROI at the site and without having appropriate MPE wells in the target area, the drawbacks of installing an MPE system (proximity to a school, impact on gas station operations, extensive trenching, operating near residences, noise nuisance, etc.) at this site may be substantial enough for it to be considered infeasible.

### **3.2.2 MPE with a Mobile System**

Mobile systems generally operate under various locations permits for air emissions. A various locations permits under BAAQMD for this site would require special authorization to operate within 1,000 feet of a school. Although the permit allows operation up to 12 months at a location, mobile events generally range from 72 hours to 30 days in duration.

Typical equipment for mobile MPE events is truck-mounted and generator-driven. It consists of a liquid-ring vacuum pump, thermal oxidizer for vapor treatment, and a trailer-mounted activated carbon system for water treatment. The equipment used can produce similar in vacuum, vapor flow and treatment, and groundwater flow and treatment as most fixed systems. They are typically manned continuously for the duration of the MPE event. The total footprint of a mobile system is about the same as the fixed system except that the components, such as the trailer-mounted water treatment system can be placed in different configurations to match available space. Temporary hoses and

pipings are used for mobile MPE events and so trenching is not required. For the area being considered, it is likely that temporary pipes and hoses could be placed along the northwestern side of the property and fenced off with minimal impact to on-site traffic at the gas dispensers.

Vacuum ROI for this site is considered a data gap and pilot testing to close this data gap would likely be conducted with a mobile MPE unit.

As was stated previously, the ability to dewater fine-grained materials is critical to the success of MPE. In aquifer testing, site soils dewatered slowly and heterogeneously and the same result is considered likely for MPE. Clay soils identified in the impacted area also are expected to require a long time to dewater as well as to desorb hydrocarbons. Based on these two characteristics, short-term events are not expected to produce a lasting reduction in groundwater concentrations for constituents of concern.

### 3.3 Monitored Natural Attenuation

Natural attenuation refers to a variety of physical, chemical, and/or biological processes that reduce the mass, toxicity, mobility, volume, and/or concentration of contaminants in soil and/or groundwater (EPA 2004). Evaluation of the performance of natural attenuation strategies relies upon monitoring networks that can quantify changes in chemical concentration and/or mass and related geochemistry and hydrology that influence, or are products of, attenuation processes. This remedial approach is often referred to as monitored natural attenuation (MNA) (API 2007).

MNA is a non-intrusive remedial approach that depends upon natural processes to degrade and dissipate petroleum constituents in soil and groundwater. Processes involved in natural attenuation of petroleum products include aerobic and anaerobic biodegradation, dispersion/dilution, volatilization, and adsorption. Petroleum hydrocarbon constituents are generally biodegradable as long as indigenous microorganisms have an adequate supply of electron acceptors and nutrients; and toxic substances do not inhibit biological activity.

MNA may be an acceptable long-term option where data can establish that it is occurring. It is often applied following active remediation when the majority of the source has been removed, or for sites where it can achieve cleanup goals as effectively as other technologies. Given a reasonable timeframe for natural attenuation, the costs may be lower than active remediation.

MNA parameters typically include analysis for electron acceptors (sulfate and nitrate) and metabolites of carbon dioxide and ferric iron (methane and ferrous iron). Analytical results are presented in **Table 6**. Dissolved oxygen concentrations are measured in the field semi-annually. Groundwater samples collected semi-annually have been analyzed since January 2014 for MNA parameters including methane, nitrate, sulfate, ferrous iron, and dissolved manganese, to evaluate if natural attenuation by anaerobic biodegradation is occurring beneath the site. Based on the analytical results for MNA parameters, depleted concentrations of nitrate and sulfate (electron donors for anaerobic reduction) were observed for wells within the dissolved-phase hydrocarbon plume. Additionally, ferrous iron and dissolved manganese concentrations (byproducts of anaerobic reduction) are generally elevated for wells within the dissolved-phase hydrocarbon plume. Within the source area, methane (product of anaerobic hydrocarbon digestion) is also found to be elevated. These geochemical trends are indicative of anaerobic biodegradation occurring within the dissolved-phase hydrocarbon plume.

For MNA, it is important to monitor the site on an ongoing basis to evaluate if site risks change. The site currently possesses sufficient soil vapor and groundwater monitoring wells to determine if site

conditions are changing over time. However, the groundwater and soil vapor monitoring well networks should be evaluated in light of the planned expansion of the convenience store at the site.

Based on the current data, it appears that natural attenuation is occurring at the site and is a feasible remedial approach.

## 4.0 Data and Implementation Gaps

The preceding feasibility evaluation identified several key data and implementation gaps that would need to be addressed prior to a final technology selection.

### 4.1 Evaluation of Vacuum ROI

Just as the rate of groundwater extraction was determined by the aquifer test, extracting vapor from the subsurface is critical to the effectiveness of MPE. The vacuum ROI for this site is not known. If the vacuum ROI is too short, MPE may not be feasible.

### 4.2 Hydrocarbon Mass Removal Rates

Similar to the determination of vacuum ROI, the effectiveness of MPE depends on the mass of hydrocarbons that can be removed in the vapor stream over time. Although previous soil vapor testing at the site indicates that high concentrations of hydrocarbons are present in soil vapor, the rate at which vapor can be extracted has yet to be determined. Vapor mass removed is an expression of concentration, volume, and time. Target mass removal rates are in excess of 25 pounds per day.

### 4.3 Appropriate Wells for MPE

MPE wells are generally screened across the smear zone. Dewatering these wells opens the smear zone for vapor-phase transport of hydrocarbons to the treatment system. Currently, site wells in the area where the highest impacts have been encountered generally have 5-foot-long well screens. If the results of any testing are to be considered reliable, well construction should be appropriate for MPE.

## 5.0 Conclusions and Recommendations

Based on the analysis conducted in the preceding sections, AECOM makes the following conclusions.

- Excavation in the area associated with the former used-oil UST is considered infeasible due to the potential for impacted groundwater to re-contaminate backfill material, the limitations on the extent of excavation due to nearby utilities and potential convenience store expansion, and the safety, accessibility, and financial concerns associated with excavation and soil management at an active fueling station.
- Dewatering rates observed in the aquifer test may support MPE.
- The general feasibility of MPE cannot be determined with the existing data, but the site has drawbacks for the implementation of MPE that make it unfavorable:
  - Site is within 1,000 feet of a school; and
  - Site has residences and a veterinary hospital on adjacent parcels which would be subject to potential noise and odor concerns.
- Vacuum ROI is a data gap at the site. Due to the clay soils, the vacuum ROI is expected to be limited.
- Hydrocarbon mass removal rates using MPE are also unknown and are considered a data gap. High hydrocarbon concentrations and low vapor flow rates are expected which would result in a low mass removal rate.
- Current well diameters and screen intervals are poorly suited for remediation.
- A fixed remedial system would have the following drawbacks:
  - Grading and space requirements at the site limit the number of locations where a fixed system could be located.
  - The proposed location for fixed MPE system is adjacent to a residence.
  - The proposed location may limit parking at the gas station.
  - Trenching would be required to travel from the proposed location for the remedial system to the area associated with the former used-oil UST.
- A mobile remedial system could be employed to close data gaps at this site, but it is considered highly unlikely to produce lasting changes in groundwater concentrations at the site for constituents of concern.
- MNA is a feasible remedial approach at the site.

- The current monitoring and soil vapor well network may be impacted by the planned expansion at the facility.

Based on these conclusions, AECOM makes the following recommendations for future work.

- Existing well network should be evaluated on the basis of the planned convenience store expansion at the site and wells should be destroyed and replaced to maintain the ability to monitor groundwater at the site.
- The drawbacks associated with a fixed MPE system are considered sufficient that MPE should not be implemented at the site. Therefore, pilot testing with a mobile MPE system for the purpose of closing identified data gaps is not necessary.
- MNA should be implemented at the site with a monitoring program sufficient to assure all parties that impacts at the site do not represent an imminent human health risk.

## 6.0 References

- AECOM. 2012. Revised Work Plan for Vapor Intrusion Investigation and Risk Assessment. August 27.
- . 2013a. Conceptual Site Model Update, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California. November 13.
- . 2013b. Report on Limited Site Assessment, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California, ACEH Case No. RO0000409, RWQCB Case No. 01-2474. April 23.
- . 2013c. Report on Vapor Intrusion Investigation, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California. May 21.
- . 2013d. Report on Vapor Intrusion Investigation and Risk Assessment for the Oakland Veterinary Hospital Located at 4258 MacArthur Boulevard, Oakland, California. October 15.
- . 2014a. Well Installation Report, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California.
- . 2014b. Remedial Technology Screening and Work Plan for Site Assessment, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California.
- . 2015a. Aquifer Test Report, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California.
- . 2015b. Third Quarter 2015 Semiannual Groundwater Monitoring and Sampling Report, 76 Service Station No. 1156 (351645), 4276 MacArthur Boulevard, Oakland, California, Fuel Leak Case No. RO0000409 and GeoTracker Global ID T0600102279. October 14.
- Alameda County Health Care Services Agency, Environmental Health Services. 2013. Case File Review for Fuel Leak Case No. RO0000409 and GeoTracker Global ID T0600102279, Unocal #1156, 4276 MacArthur Boulevard, Oakland, CA 94619. November 21.
- API. 2007. Technical Protocol for Evaluating the Natural Attenuation of MTBE. Regulatory and Scientific Affairs Department, API Publication 4761, dated May 2007.
- ATC Associates, Inc. 2005. Quarterly Summary Report – Second Quarter 2005, 76 Service Station No. 1156/WNO1112, ATC Project No. 75.75118.1112, 4276 MacArthur Boulevard, Oakland, California. Prepared by ATC Associates, Inc., 6602 Owens Drive, Suite 100, Pleasanton, California 94588, 925-460-5300. Dated June 21.
- Conestoga-Rovers & Associates. 2011. Fourth Quarter 2011 Groundwater Monitoring and Sampling Report. Dated December 16. Prepared by Conestoga-Rovers & Associates, 5900 Hollis Street, Suite A, Emeryville, California, 94608.

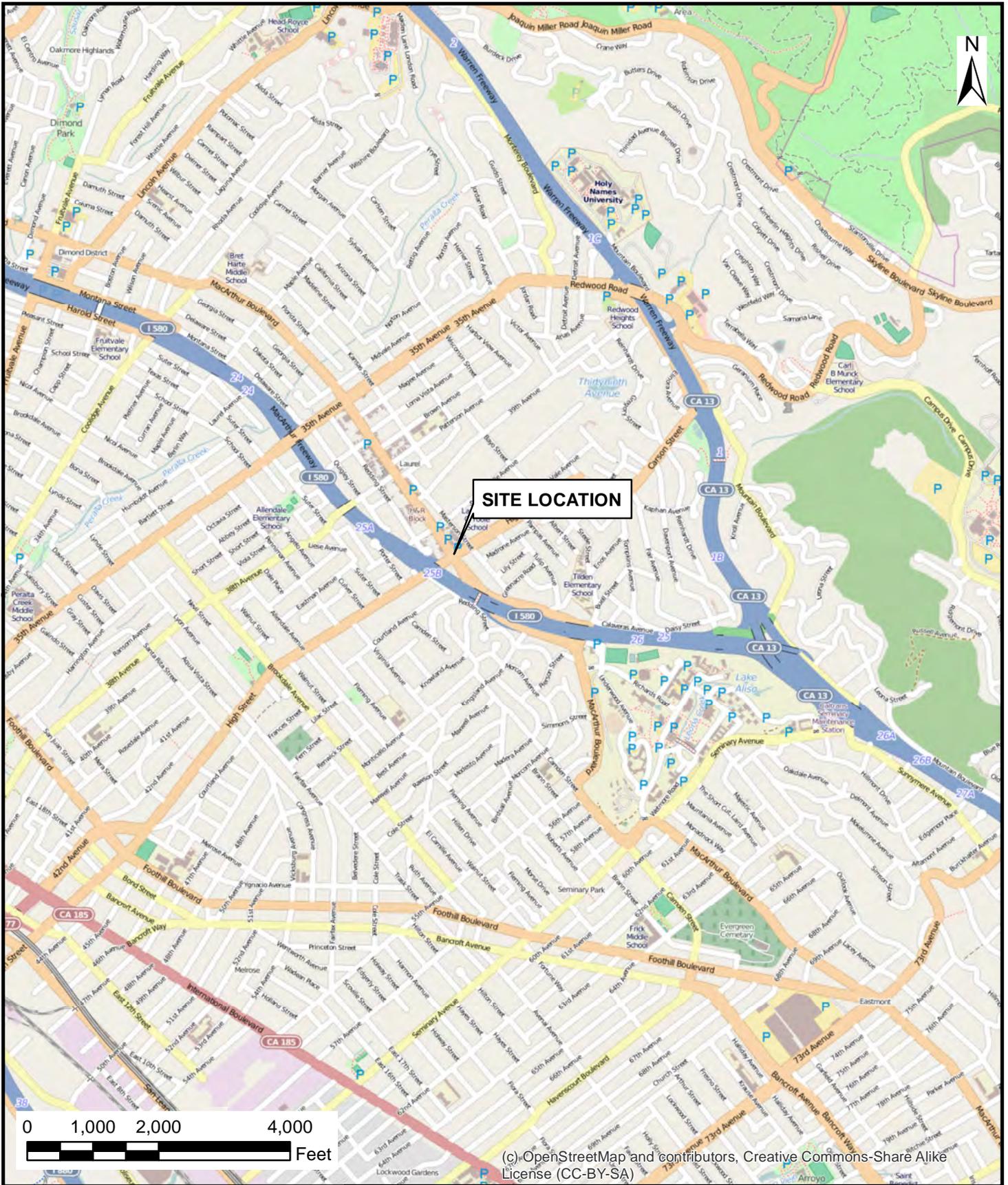
- Delta Consultants. 2007a. Work Plan – Site Investigation, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California, dated March 1. Prepared for ConocoPhillips Company, 76 Broadway, Sacramento, California. Prepared by Delta Consultants, 3164 Gold Camp Drive, Suite 200, Rancho Cordova, California 95670.
- . 2007b. Site Investigation Report, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California, dated December 28. Prepared for ConocoPhillips Company, 76 Broadway, Sacramento, California. Prepared by Delta Consultants, 3164 Gold Camp Drive, Suite 200, Rancho Cordova, California 95670.
- . 2008a. Draft Corrective Action Plan, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California, dated April 24. Prepared for ConocoPhillips Company, 76 Broadway, Sacramento, California. Prepared by Delta Consultants, 11050 White Rock Road, Suite 110, Rancho Cordova, California 95670.
- . 2008b. Aquifer and Utility Survey, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California, dated May 8. Prepared for ConocoPhillips Company, 76 Broadway, Sacramento, California. Prepared by Delta Consultants, 11050 White Rock Road, Suite 110, Rancho Cordova, California 95670.
- . 2009a (March 16). *Revised Work Plan – Site Investigation*, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California.
- . 2009b (September 8). *Site Investigation Report*, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California.
- . 2010a (March 1). *Work Plan for Additional Assessment*, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California.
- . 2010b (October 21). *Additional Assessment Report*, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California.
- Environmental Protection Agency. 2004. How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites, A Guide for Corrective Action Plan Reviewers. EPA 510-R-04-002. May 2004.
- Environmental Resolutions Inc. 1998. Underground Storage Tank and Associated Piping Replacement Report. 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California. August 28.
- Environmental Resolutions Inc. 1999. Well Installation Report. 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California. October 11.
- Miller Brooks Environmental, 2004. Summary of Potential Receptor Survey, 76 Service Station No. 1156, 4276 MacArthur Boulevard, Oakland, California, COP No. WNO.1112. Dated April 30.
- Morrow Surveying, 2013 (April 8). Monitoring well survey maps prepared by Morrow Surveying, 1255 Starboard Drive, West Sacramento, California 95691. Prepared for AECOM.

- State Water Resources Control Board (SWRCB). 2015a. GeoTracker Database. Available at:  
[http://geotracker.waterboards.ca.gov/profile\\_report.asp?global\\_id=T0600100340](http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600100340). Accessed  
November 10, 2015.
- . 2015b. GeoTracker Database. Available at:  
[http://geotracker.waterboards.ca.gov/profile\\_report.asp?global\\_id=T0600193302](http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600193302). Accessed  
November 10, 2015.
- . 2015b. GeoTracker Database. Available at:  
[http://geotracker.waterboards.ca.gov/profile\\_report.asp?global\\_id=T0600101261](http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600101261). Accessed  
November 10, 2015.

## 7.0 Limitations

This report has been prepared for ACEH on behalf of AECOM's client, EMC, and pertains to 76 Service Station No. 1156 (351645), located at 4276 MacArthur Boulevard, Oakland, California. In performing professional services, AECOM has applied present engineering and scientific judgment and used a level of effort consistent with the standard of practice measured on the date of the work and in the locale of the site for similar type studies. AECOM does not guarantee the accuracy or completeness of data collected by previous consultants. AECOM makes no warranty, express or implied, concerning any of the materials or services furnished. The analyses and interpretations in this report have been developed based on review of existing information pertaining to the site and review of analytical results.

## Figures



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**SITE LOCATION MAP**

76 Service Station No. 1156 (351645)  
 4276 MacArthur Boulevard  
 Oakland, California

FIGURE NUMBER:

1

DRAWN BY:

M. Scop

DATE:

08/06/2014

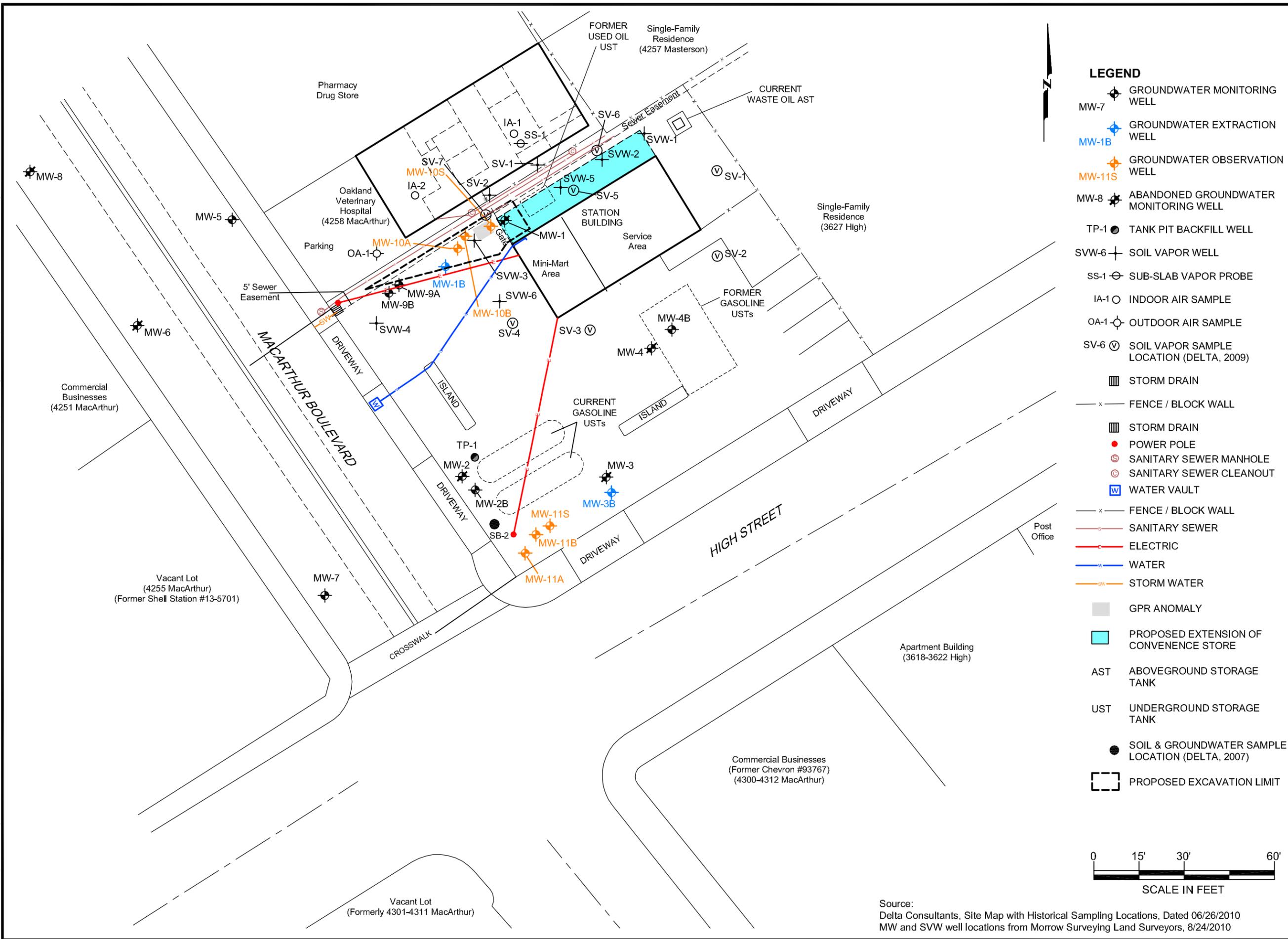
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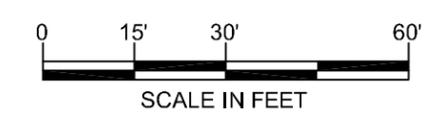
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FILENAME: j:\Client-Projects\76\_Products\351645-Oakland\_4276\_MacArthur\_Bldg\7.0\_Deliverables\7.2\_CADD-Graphics\Figure 2 Proposed Excavation\_2015Nov.dwg



- LEGEND**
- GROUNDWATER MONITORING WELL
  - GROUNDWATER EXTRACTION WELL
  - GROUNDWATER OBSERVATION WELL
  - ABANDONED GROUNDWATER MONITORING WELL
  - TANK PIT BACKFILL WELL
  - SOIL VAPOR WELL
  - SUB-SLAB VAPOR PROBE
  - INDOOR AIR SAMPLE
  - OUTDOOR AIR SAMPLE
  - SOIL VAPOR SAMPLE LOCATION (DELTA, 2009)
  - STORM DRAIN
  - FENCE / BLOCK WALL
  - STORM DRAIN
  - POWER POLE
  - SANITARY SEWER MANHOLE
  - SANITARY SEWER CLEANOUT
  - WATER VAULT
  - FENCE / BLOCK WALL
  - SANITARY SEWER
  - ELECTRIC
  - WATER
  - STORM WATER
  - GPR ANOMALY
  - PROPOSED EXTENSION OF CONVENIENCE STORE
  - ABOVEGROUND STORAGE TANK
  - UNDERGROUND STORAGE TANK
  - SOIL & GROUNDWATER SAMPLE LOCATION (DELTA, 2007)
  - PROPOSED EXCAVATION LIMIT



Source:  
Delta Consultants, Site Map with Historical Sampling Locations, Dated 06/26/2010  
MW and SVW well locations from Morrow Surveying Land Surveyors, 8/24/2010

REVISIONS	NO.	DESCRIPTION	DATE	BY			
DESIGNED BY:	C. Roper	DRAWN BY:	M. Scop	CHECKED BY:	C. Roper	APPROVED BY:	C. Roper

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**PROPOSED EXCAVATION SCENARIO**

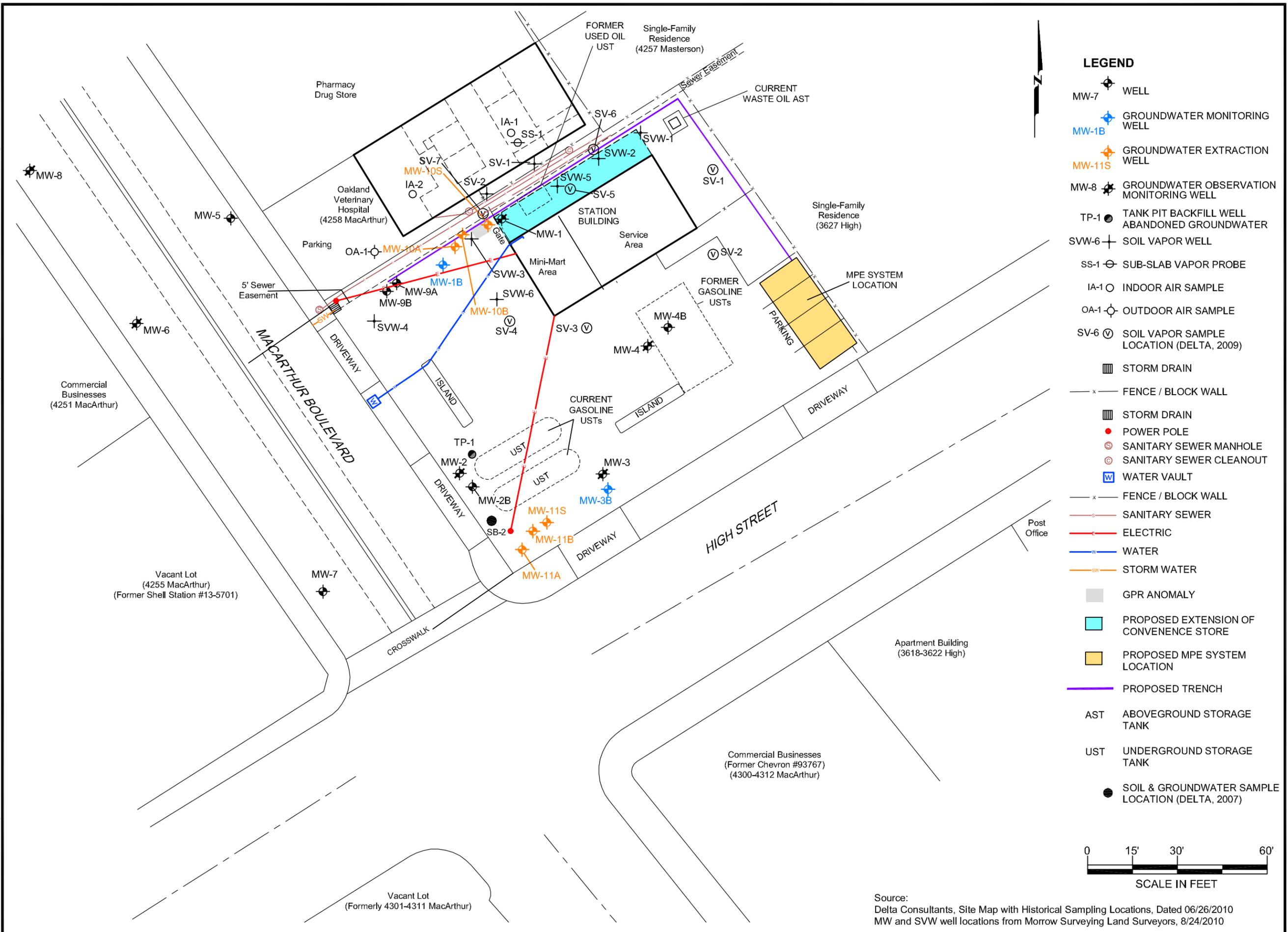
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4276 MacArthur Boulevard  
Oakland, California

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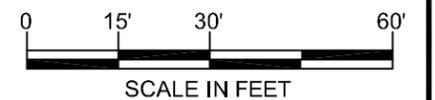
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FILENAME: j:\Client-Projects\76\_Products\351645-Oakland\_4276\_MacArthur\_Bldg\7.0\_Deliverables\7.2\_CADD-Graphics\Figure 3 Proposed MPE System location\_2015Nov.dwg



- LEGEND**
- MW-7 WELL
  - MW-1B GROUNDWATER MONITORING WELL
  - MW-11S GROUNDWATER EXTRACTION WELL
  - MW-8 GROUNDWATER OBSERVATION MONITORING WELL
  - TP-1 TANK PIT BACKFILL WELL ABANDONED GROUNDWATER
  - SVW-6 SOIL VAPOR WELL
  - SS-1 SUB-SLAB VAPOR PROBE
  - IA-1 INDOOR AIR SAMPLE
  - OA-1 OUTDOOR AIR SAMPLE
  - SV-6 SOIL VAPOR SAMPLE LOCATION (DELTA, 2009)
  - STORM DRAIN
  - FENCE / BLOCK WALL
  - STORM DRAIN
  - POWER POLE
  - SANITARY SEWER MANHOLE
  - SANITARY SEWER CLEANOUT
  - WATER VAULT
  - FENCE / BLOCK WALL
  - SANITARY SEWER
  - ELECTRIC
  - WATER
  - STORM WATER
  - GPR ANOMALY
  - PROPOSED EXTENSION OF CONVENIENCE STORE
  - PROPOSED MPE SYSTEM LOCATION
  - PROPOSED TRENCH
  - AST ABOVEGROUND STORAGE TANK
  - UST UNDERGROUND STORAGE TANK
  - SOIL & GROUNDWATER SAMPLE LOCATION (DELTA, 2007)



Source:  
Delta Consultants, Site Map with Historical Sampling Locations, Dated 06/26/2010  
MW and SVW well locations from Morrow Surveying Land Surveyors, 8/24/2010

REVISIONS	NO.	DESCRIPTION	DATE	BY:			
DESIGNED BY:	C. Roper	DRAWN BY:	M. Scop	CHECKED BY:	C. Roper	APPROVED BY:	C. Roper

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**MPE SYSTEM LOCATION**

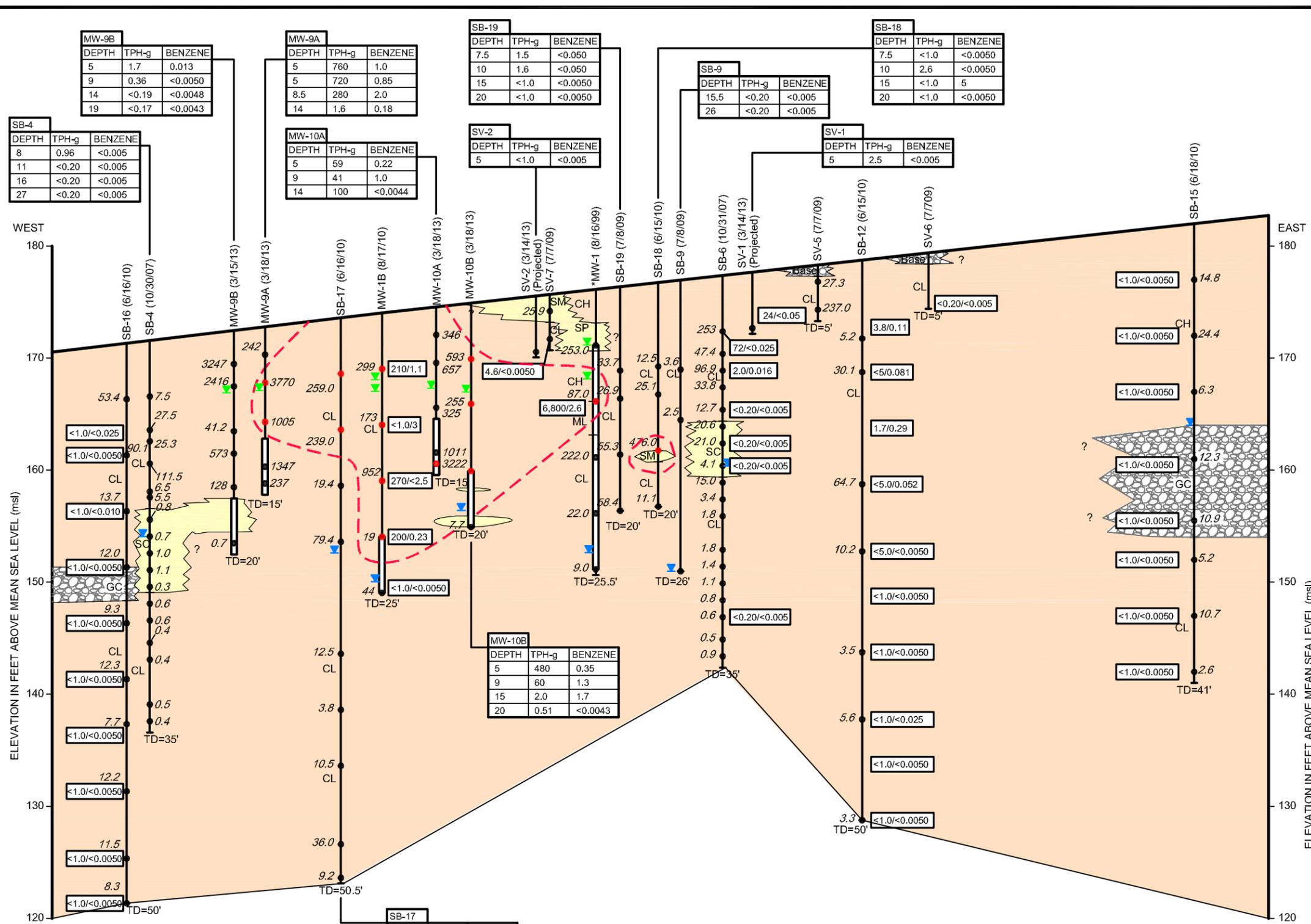
76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard  
Oakland, California

DATE: 11/10/2015  
PROJECT NUMBER: 60343407-04.10  
SCALE: 1" = 30'

FIGURE NUMBER:  
**3**

SHEET NUMBER:  
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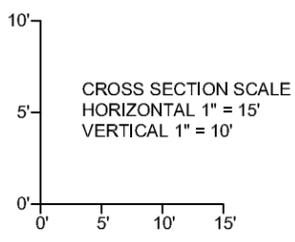
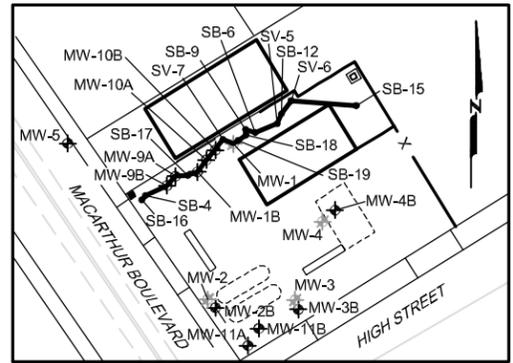


### LEGEND

- WELL IDENTIFICATION (DATE DRILLED)
- PHOTOIONIZATION DETECTOR (PID) READING ONLY (parts per million)
- TPH-g CONCENTRATION >100 mg/kg AND/OR BENZENE CONCENTRATION > 1.1 mg/kg
- SCREEN INTERVAL
- GROUNDWATER ENCOUNTERED DURING DRILLING
- HISTORIC HIGH/LOW GROUNDWATER LEVEL
- TOTAL DEPTH (feet below ground surface)
- ABANDONED
- BENZENE
- TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-g)
- NOT DETECTED AT OR ABOVE INDICATED PRACTICAL QUANTITATION LIMIT
- ALL CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM (mg/kg)
- EXTENT OF TPHg OVER 100 mg/kg BENZENE OVER 1.1 mg/kg
- GRAVELS (Base, GC)
- SANDS (SC, SM, SP)
- FINES (CL, CH, ML)

### NOTE

ELEVATION IS APPROXIMATE, ELEVATION WAS DETERMINED BY USING THE MW-5, MW-2 MIDPOINT; MW-1, MW-1B EXACT ELEVATIONS; AND CHANGE IN ELEVATION BASED ON GOOGLE EARTH ELEVATIONS.



REVISIONS	DESCRIPTION	DATE	BY
1	MW-9A, MW-9B, MW-10A, MW-10B	12/05/2013	BCP

DESIGNED BY: C. Schnell  
 DRAWN BY: M. Scop  
 CHECKED BY: N. Pryor  
 APPROVED BY: B. Evans

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### CROSS SECTION A-A'

76 Service Station No. 1156 (351645)  
 4276 MacArthur Boulevard  
 Oakland, California

SCALE: AS NOTED  
 DATE: 11/9/2015  
 PROJECT NUMBER: 60283732

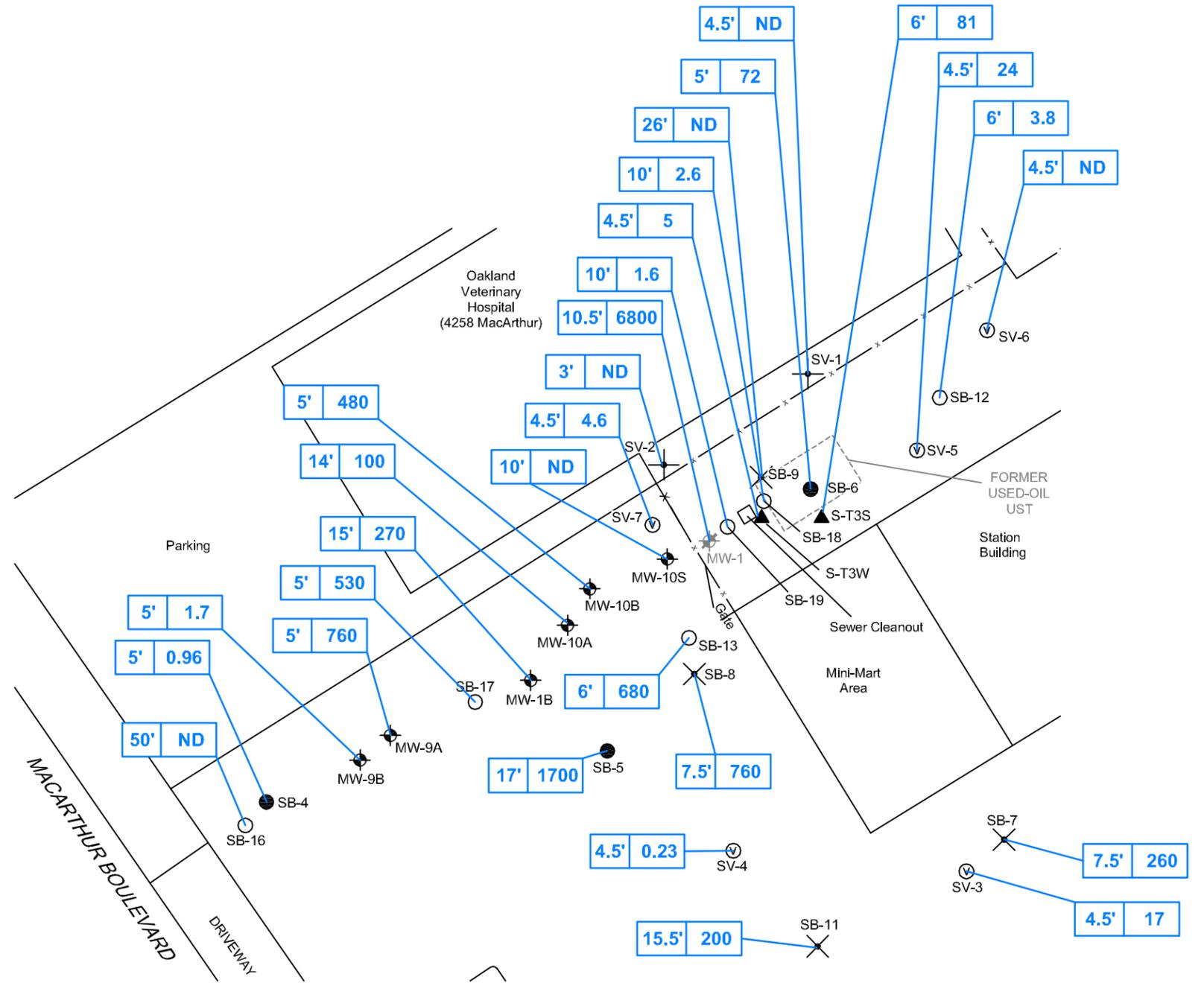
FIGURE NUMBER:  
**4**

SHEET NUMBER:  
 X

**Legend**

- Groundwater Monitoring Well
- Destroyed Groundwater Monitoring Well
- Tank Pit Backfill Well
- Soil Vapor Well (AECOM, 2013)
- Soil Boring (Delta, 2010)
- Soil & Groundwater Sample (Delta, 2009)
- Soil Vapor Sample (Delta, 2009)
- Soil & Groundwater Sample (Delta, 2007)
- Soil Sample (TOSCO, 1998)
- Soil Vapor Sample (Pacific, 1997)
- Storm Drain
- Fence / Block Wall
- UST Underground Storage Tank
- AST Aboveground Storage Tank
- TPH-g Concentration in Milligrams per Kilograms (mg/Kg)
- Sample Depth (feet below ground surface)
- TPH-g Total Petroleum Hydrocarbons as gasoline
- ND Not Detected

**NOTE:**  
 The highest value is shown.  
 When ND occurs, the total depth of the boring is shown.



## Tables

**Table 1**  
**Well Construction Details**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

<b>Well ID</b>	<b>Well Installation Date</b>	<b>Casing Diameter (in.)</b>	<b>Boring Depth (ft. bgs)</b>	<b>Screen Interval (ft. bgs)</b>	<b>Screen Size (in.)</b>	<b>Filter Pack (ft. bgs)</b>	<b>Bentonite Seal (ft. bgs)</b>	<b>Grout Interval (ft. bgs)</b>
MW-1*	7/16/1999	2	26.5	5-25	0.01	4-26.5	3-4	0-3
MW-1B	8/17/2010	2	25	20-25	0.02	19-25	18-19	0.5-18
MW-2*	7/16/1999	2	26.5	5-25	0.01	4-26.5	3-4	0-3
MW-2B	8/16/2010	2	25	20-25	0.02	19-25	18-19	0.5-18
MW-3*	7/16/1999	2	31.5	5-25	0.01	4-27	3-4; 27-31.5	0-3
MW-3B	8/16/2010	2	25	20-25	0.02	19-25	18-19	0.5-18
MW-4*	7/16/1999	2	26.5	5-25	0.01	4-26.5	3-4	0-3
MW-4B	8/13/2010	2	25	20-25	0.02	19-25	18-19	0.5-18
MW-5	8/29/2001	2	25	5-25	0.02	4-25	3-4	0.5-3
MW-6	8/29/2001	2	25	5-25	0.02	4-25	3-4	0.5-3
MW-7	8/29/2001	2	25	5-25	0.02	4-25	3-4	0.5-3
MW-8	10/30/2007	2	25	15-25	0.01	13-25	11-13	1-11
MW-9A	3/18/2013	2	15	10-15	0.02	8-15	1.5-8	1-1.5
MW-9B	3/18/2013	2	20	15-20	0.02	13-20	1.5-13	1-1.5
MW-10A	3/18/2013	2	15	10-15	0.02	8-15	1.5-8	1-1.5
MW-10B	3/18/2013	2	20	15-20	0.02	13-20	1.5-13	1-1.5
MW-10S	6/12/2014	4	10	6.5-10	0.02	3.5-10	1-3.5	n/a
MW-11A	3/19/2013	2	15	10-15	0.02	8-15	1.5-8	1-1.5
MW-11B	3/19/2013	2	20	15-20	0.02	13-20	1.5-13	1-1.5
MW-11S	6/11/2014	4	10	6.5-10	0.02	3.5-10	1-3.5	n/a

**NOTES:**

\* = Destroyed and replaced with "B" well in 2010

ft. bgs = Feet below ground surface

in. = Inches

ID = Identification

n/a = Not available

**Table 2**  
**Current Groundwater Monitoring Data and Analytical Results**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

WELL ID	DATE SAMPLED	TOC* (ft)	DTW (ft)	LNAPL THICKNESS (ft)	GWE* (ft)	OIL AND GREASE (µg/L)	TPH-DRO W/SGC (µg/L)	TPH-GRO (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	COMMENTS
MW-1B	1/27/2015	174.06	6.63	0	167.43	--	ND<40	ND<50	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-2B	1/27/2015	173.55	4.98	0	168.57	--	ND<40	ND<50	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-3B	7/21/2015	177.77	7.28	0	170.49	--	280	4,200	210	100	570	220	
MW-4B	1/27/2015	179.07	5.83	0	173.24	--	ND<40	ND<50	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-5	1/27/2015	169.18	1.96	0	167.22	--	ND<40	ND<50	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-7	1/27/2015	172.11	6.93	0	165.18	--	ND<40	150	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-9A	7/21/2015	173.01	5.87	0	167.14	--	170	7,100	2,700	22	190	23	
MW-9B	1/27/2015	172.78	5.38	0	167.40	--	ND<40	ND<50	ND<0.30	ND<0.30	ND<0.30	ND<0.60	
MW-10A	7/21/2015	174.48	7.32	0	167.16	--	530	22,000	15,000	190	1,000	960	
MW-10B	7/21/2015	174.62	7.58	0	167.04	--	46	2,600	780	27	100	130	
MW-10S	7/21/2015	175.57	5.92	0	169.65	ND<5,000	ND<40	ND<50	1.6	ND<0.30	6.2	ND<0.60	
MW-11A	7/21/2015	175.37	5.39	0	169.98	--	700	56,000	11,000	6,900	1,800	12,000	
MW-11B	7/21/2015	174.65	5.37	0	169.28	--	430	23,000	10,000	770	960	1,200	
MW-11S	7/21/2015	176.09	6.13	0	169.96	ND<5,000	280	5,100	670	18	420	240	
QA	7/21/2015	--	--	--	--	--	--	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	

**NOTES:**

\* TOC and GWE are in feet above mean sea level

Oil and grease analyzed by Environmental Protection Agency (EPA) Method 1664A HEM

TPH-DRO with SGC analyzed by EPA Method 8015B/TPHd

TPH-GRO analyzed by EPA Method 8015B

BTEX analyzed by EPA Method 8260B

µg/L = Micrograms per liter

-- = Not available/not sampled

B = Benzene

DTW = Depth to water below TOC

E = Ethylbenzene

ft = Feet

GWE = Groundwater elevation

ID = Identification

LNAPL = Light non-aqueous phase liquid

ND<# = Analyte not detected at or above indicated practical quantitation limit

QA = Trip blank

T = Toluene

TOC = Top of casing

TPH-DRO W/SGC = Total petroleum hydrocarbons-diesel range organics with silica gel cleanup

TPH-GRO = Total petroleum hydrocarbons-gasoline range organics

X = Total xylenes

**Table 3**  
**Maximum Historical Concentrations for Constituents of Concern in Soil**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

<b>Constituent</b>	<b>Boring Identification</b>	<b>Sampling Date</b>	<b>Depth (feet bgs)</b>	<b>Concentration (mg/kg)</b>
TPH-g	B1/MW-1	1999	10.5	6,800
Benzene	SB-2	2007	8.5	7.8
Toluene	SB-2	2007	8.5	51
Ethylbenzene	B1/MW-1	1999	10.5	110
Total Xylenes	B1/MW-1	1999	10.5	470
MTBE	MW-11B	2013	19	7.9

**NOTES:**

mg/kg = milligrams/ kilogram

MTBE = methyl t-butyl ether

bgs = below ground surface

TPH-g = Total petroleum hydrocarbons as gasoline

**Table 4**  
**Historical Soil Analytical Data**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

Boring	Depth (ft)	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	EDB	EDC	TBA	Ethanol	TPHg (8015M)	TPHd	TPHmo	TPH C8 - C9	TPH C10 - C11	TPH C12 - C14	TPH C15 - C16	TPH C17 - C18	TPH C19 - C20	TPH C21 - C22	TPH C23 - C28	TPH C29 - C32	TPH C33 - C36	TPH C37 - C40	TPH C41 - C43	TPH C44+	TPH (Total)
S-6-T1N	6	3/23/1998	0.9	ND	14	100	--	--	--	--	--	1,200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-9.5-T1S	9.5	3/23/1998	1.5	ND	5.6	33	--	--	--	--	--	590	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-7-T2S	7	3/23/1998	1	0.74	6.8	51	--	--	--	--	--	670	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-6-T2N	6	3/23/1998	ND	ND	0.15	0.41	--	--	--	--	--	83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-6.5-T35*	6.5	3/23/1998	0.55	1.3	1.2	11	--	--	--	--	--	130	78,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-2-D1	2	4/9/1998	ND	ND	ND	ND	--	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3-D2	3	4/9/1998	ND	ND	ND	0.13	--	--	--	--	--	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3-D3	3	4/9/1998	1.6	15	18	99	--	--	--	--	--	590	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3-D4	3	4/9/1998	ND	ND	ND	0.07	--	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3-PL1	3	4/9/1998	ND	ND	ND	8.4	--	--	--	--	--	160	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3.5-PL2	3.5	4/9/1998	ND	ND	ND	0.45	--	--	--	--	--	63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-4.5-T3W	4.5	4/9/1998	ND	0.066	ND	0.011	--	--	--	--	--	5	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-3-T3S	3	4/9/1998	0.043	ND	0.0091	ND	--	--	--	--	--	1.6	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-6-T3S	6	4/9/1998	0.64	1.4	1.1	5.9	--	--	--	--	--	81	560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-10.5-B1 (MW-1)	10.5	7/16/1999	2.6	25	110	470	ND	--	--	--	--	6,800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-10.5-B2 (MW-2)	10.5	7/16/1999	ND	ND	ND	ND	ND	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-10.5-B3 (MW-3)	10.5	7/16/1999	0.32	0.43	0.28	1.8	0.6	--	--	--	--	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-10.5-B4 (MW-4)	10.5	7/16/1999	1.1	0.32	0.46	1.3	0.71	--	--	--	--	22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-20.5-B4 (MW-4)	20.5	7/16/1999	ND	ND	0.0069	ND	ND	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-5-MW5	5	8/29/2001	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	--	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-5-MW6	5	8/29/2001	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	--	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-5-MW7	5	8/29/2001	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	--	--	<1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
S-10-MW7	10	8/29/2001	0.18	<0.025	0.085	0.234	<0.25	--	--	--	--	<5.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	10	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	220	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	15	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	20	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-1	7	11/6/2007	<0.25	<0.25	4.2	17	<0.25	--	--	--	--	360	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12	11/6/2007	<0.025	<0.025	1.7	2.2	<0.025	--	--	--	--	20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8.5	11/6/2007	<0.005	<0.005	0.067	0.3	<0.005	--	--	--	--	2.3	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-2	33.5	11/6/2007	<0.005	0.012	0.26	0.14	<0.005	--	--	--	--	3.1	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8.5	11/5/2007	7.8	51	24	120	<2.5	--	--	--	--	1,200	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12	11/5/2007	1.2	<0.25	2.3	12	1.2	--	--	--	--	120	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-3	20	11/5/2007	0.016	0.011	0.0079	0.029	0.029	--	--	--	--	0.29	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	25	11/5/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7	11/2/2007	<0.005	<0.005	<0.005	<0.01	0.015	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-4	15	11/2/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	20	11/2/2007	<0.005	<0.005	<0.005	<0.01	0.34	--	--	--	--	0.33	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	25	11/2/2007	<0.005	<0.005	<0.005	<0.01	0.24	--	--	--	--	0.27	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-5	8	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	0.96	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	16	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	27	10/30/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-6	7	11/1/2007	0.28	0.31	1.7	8.6	<0.12	--	--	--	--	150	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12	11/1/2007	<0.025	<0.025	<0.025	<0.05	<0.025	--	--	--	--	6	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	17	11/1/2007	3	13	28	99	<1.0	--	--	--	--	1,700	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	22	11/1/2007	0.009	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SV-1-S	30	11/1/2007	0.0087	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5	10/31/2007	<0.025	<0.025	0.047	<0.01	<0.025	--	--	--	--	72	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8.5	10/31/2007	0.016	<0.005	0.016	<0.01	0.016	--	--	--	--	2	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12	10/31/2007	<0.005	<0.005	<0.005	<0.01	0.016	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	15	10/31/2007	<0.005	<0.005	<0.005	<0.01	0.029	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SV-2-S	17	10/31/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	30.5	10/31/2007	<0.005	<0.005	<0.005	<0.01	<0.005	--	--	--	--	<0.20	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SV-1-S	4.5	7/7/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SV-2-S	3	7/7/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.5	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Table 4  
Historical Soil Analytical Data  
76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard  
Oakland, California**

Boring	Depth (ft)	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDB	EDC	TBA	Ethanol	TPHg (8015M)	TPHd	TPHmo	TPH C8 - C9	TPH C10 - C11	TPH C12 - C14	TPH C15 - C16	TPH C17 - C18	TPH C19 - C20	TPH C21 - C22	TPH C23 - C28	TPH C29 - C32	TPH C33 - C36	TPH C37 - C40	TPH C41 - C43	TPH C44+	TPH (Total)	
SV-3-S	4.5	7/7/2009	<0.025	<0.025	<0.025	<b>0.15</b>	<0.025	<0.25	<0.025	<0.025	<5.0	<b>17</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SV-4-S	4.5	7/7/2009	<b>0.027</b>	<0.005	<0.005	<0.01	<b>0.02</b>	<b>0.16</b>	<0.005	<0.005	<1.0	<b>0.23</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SV-5-S	4.5	7/7/2009	<0.05	<0.05	<0.05	<b>0.15</b>	<0.05	<0.5	<0.50	<0.50	<10	<b>24</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SV-6-S	4.5	7/7/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.05	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SV-7-S	4.5	7/7/2009	<0.005	<0.005	<0.005	<1.0	<0.005	<0.05	<0.005	<0.005	<1.0	<b>4.6</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-7	7.5-8	7/9/2009	<0.50	<0.50	<b>5.7</b>	<b>32</b>	<0.50	<5.0	<0.50	<0.50	<100	<b>260</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15.5-16	7/9/2009	<b>0.008</b>	<0.005	<0.005	<b>0.023</b>	<b>0.0085</b>	<0.05	<0.005	<0.005	<1.0	<b>1.3</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	23-23.5	7/9/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.05	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-8 @ 7.0-7.5	7.0-7.5	7/10/2009	<0.50	<0.50	<b>7.7</b>	<1.0	<0.50	<10	<0.50	<0.50	<250	<b>760</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-9 @ 15.5-16	15.5-16	7/8/2009	<0.005	<0.005	<0.005	<0.01	<b>0.019</b>	<0.05	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-9 @ 26	26	7/8/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.05	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-10	12-12.5	7/10/2009	<0.50	<0.50	<b>6.1</b>	<b>46</b>	<0.50	<5.0	<0.50	<0.50	<100	<b>400</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	18-18.5	7/10/2009	<0.50	<0.50	<b>5</b>	<b>34</b>	<0.50	<5.0	<0.50	<0.50	<100	<b>290</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	22.5-23	7/10/2009	<0.005	<0.005	<0.005	<b>0.056</b>	<0.005	<0.05	<0.005	<0.005	<1.0	<b>0.78</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-11	7.5-8	7/10/2009	<0.05	<0.50	<b>0.5</b>	<b>0.77</b>	<0.50	<0.50	<0.50	<0.50	<10	<b>41</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15.5-16	7/10/2009	<b>0.26</b>	<b>0.0094</b>	<0.005	<b>0.015</b>	<0.005	<0.50	<0.005	<0.005	<1.0	<b>200</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	41-41.5	7/10/2009	<0.005	<0.005	<0.005	<0.01	<0.005	<0.05	<0.005	<0.005	<1.0	<0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-12	6	6/15/2010	<b>0.11</b>	<0.0050	<b>0.37</b>	<b>0.44</b>	<0.0050	<0.0050	<0.0050	<b>0.11</b>	<1.0	<b>3.8</b>	<2.0	<b>28</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/15/2010	<b>0.081</b>	<0.0050	<b>0.43</b>	<b>0.5</b>	<0.0050	<0.0050	<0.0050	<b>0.091</b>	<1.0	<5	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/15/2010	<b>0.29</b>	<0.0050	<b>0.45</b>	<b>0.58</b>	<0.0050	<0.0050	<0.0050	<b>0.062</b>	<1.0	<b>1.7</b>	<100	<b>830</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	6/15/2010	<b>0.052</b>	<0.0050	<b>0.41</b>	<b>0.72</b>	<0.0050	<0.0050	<0.0050	<b>0.05</b>	<1.0	<5.0	<2.0	<b>11</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	26	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<5.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	30	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	35	6/15/2010	<0.0050	<0.0050	<b>0.0068</b>	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	41	6/15/2010	<0.025	<0.025	<0.025	<0.050	<0.025	<0.025	<0.025	<0.25	<5.0	<1.0	<2.0	<b>12</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	45	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
50	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<b>24</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-13	6	6/18/2010	<0.50	<0.50	<b>4.4</b>	<1.0	<0.50	<0.50	<0.50	<5.0	<100	<b>680</b>	<b>76</b>	<100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-14	8	6/17/2010	<b>0.073</b>	<b>0.26</b>	<b>1.7</b>	<b>8</b>	<b>0.0088</b>	<0.0050	<0.0050	<0.050	<1.0	<b>9.9</b>	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/17/2010	<b>0.28</b>	<b>0.21</b>	<b>1.7</b>	<b>7.9</b>	<b>0.033</b>	<0.0050	<0.0050	<b>0.093</b>	<1.0	<b>35</b>	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/17/2010	<b>0.097</b>	<0.0050	<b>0.031</b>	<b>0.051</b>	<b>0.031</b>	<0.0050	<0.0050	<b>0.081</b>	<1.0	<1.0	<10	<b>100</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	20	6/17/2010	<b>0.0064</b>	<b>0.0099</b>	<b>0.05</b>	<b>0.24</b>	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<b>17</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	26	6/17/2010	<b>0.0076</b>	<b>0.012</b>	<b>0.085</b>	<b>0.36</b>	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<b>31</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	30	6/17/2010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	35	6/17/2010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	40	6/17/2010	<0.0050	<0.0050	<b>0.014</b>	<b>0.079</b>	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<b>19</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
45	6/17/2010	<b>0.018</b>	<0.0050	<b>0.27</b>	<b>1</b>	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<b>20</b>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
50	6/17/2010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-15	5	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	21.5	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	26.5	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	30	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	35	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
40	6/18/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

**Table 4**  
**Historical Soil Analytical Data**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

Boring	Depth (ft)	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDB	EDC	TBA	Ethanol	TPHg (8015M)	TPHd	TPHmo	TPH C8 - C9	TPH C10 - C11	TPH C12 - C14	TPH C15 - C16	TPH C17 - C18	TPH C19 - C20	TPH C21 - C22	TPH C23 - C28	TPH C29 - C32	TPH C33 - C36	TPH C37 - C40	TPH C41 - C43	TPH C44+	TPH (Total)
SB-16	8	6/16/2010	<0.025	<0.025	<0.025	<0.050	<0.025	<0.025	<0.025	<0.25	<5.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	15	6/16/2010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<2.0	<1.0	<99	<500	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	20	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	25	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	30	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	0.041	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	35	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	40	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB-17	5	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.050	<1.0	530	<2.0	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/16/2010	0.021	<0.0050	0.0081	<0.010	0.024	<0.0050	<0.0050	0.17	<1.0	130	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	0.13	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	6/16/2010	0.11	0.0093	0.5	0.058	0.011	<0.0050	<0.0050	<0.050	<1.0	9.8	<2.0	130	--	--	--	--	--	--	--	--	--	--	--	--	--	
	25	6/16/2010	<0.0050	<0.0050	0.031	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<20	<100	--	--	--	--	--	--	--	--	--	--	--	--	--	
	30	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	35	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	40	6/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-18	7.5	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<200	<1000	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/15/2010	<0.0050	<0.050	0.081	<0.10	<0.050	<0.050	<0.050	<0.50	<10	2.6	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/15/2010	5	25	51	210	<0.25	<0.25	<0.25	<2.5	<50	<1.0	6.7	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
SB-19	7.5	6/15/2010	<0.050	<0.050	<0.050	<0.10	<0.050	<0.050	<0.50	<10	1.5	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	6/15/2010	<0.050	<0.050	<0.050	<0.10	<0.050	<0.050	<0.50	<10	1.6	<2.0	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	0.017	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	39	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	6/15/2010	<0.0050	<0.0050	<0.0050	<0.010	0.013	<0.0050	<0.0050	<0.050	<1.0	<1.0	<2.0	11	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-1B	5	8/17/2010	1.1	0.054	4.5	0.48	<0.0050	<0.0050	0.031	<0.050	<1.0	210	31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	8/17/2010	3	9.8	57	220	0.3	<2.5	<2.5	<25	<500	<1.0	2.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	8/17/2010	<2.5	6.2	38	150	<2.5	<2.5	<2.5	<25	<500	270	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	8/17/2010	0.23	0.15	2.4	0.88	0.061	<0.010	<0.010	<0.10	<2.0	200	<200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-2B	5	8/16/2010	0.009	<0.0050	0.011	0.12	0.03	<0.0050	<0.0050	<0.050	<1.0	<1.0	<200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	8/16/2010	<0.0050	0.02	0.28	0.84	0.0085	<0.0050	<0.0050	<0.050	<1.0	54	<2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	8/16/2010	<0.0050	<0.0050	0.32	0.69	0.25	<0.0050	<0.0050	<0.050	<1.0	55	<200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	8/16/2010	0.076	0.18	1.1	3.3	0.099	<0.025	<0.025	<0.25	<5	4.4	<1200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-3B	5	8/16/2010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	8/16/2010	0.018	0.075	0.1	0.54	<0.0050	<0.0050	<0.0050	<0.050	<1.0	1.3	<20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	8/16/2010	<5	20	33	180	<5	<5	<5	<50	<1000	310	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	8/16/2010	<0.12	0.46	0.38	2	<0.12	<0.12	<0.12	<1.2	<25	<1.0	<20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-4B	5	8/13/2010	<0.0050	<0.0050	0.025	<0.010	<0.0050	<0.0050	<0.0050	<0.050	<1.0	<1.0	<20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	10	8/13/2010	<0.025	<0.025	0.43	0.15	<0.025	<0.025	<0.025	<0.25	<5	15	27	<10	--	--	--	--	--	--	--	--	--	--	--	--	--	
	15	8/13/2010	<0.50	0.89	41	170	<0.50	<0.50	<0.50	<5	100	840	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	20	8/13/2010	<0.50	<0.50	0.76	4.3	<0.50	<0.50	<0.50	<5	100	1.1	<2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-9A	5	3/18/2013	1	0.32	12	1.1	<0.12	<1.2	<25	<0.12	--	760	--	--	<1.0	<1.0	4.3	4.3	1.5	2	2.2	11	14	7.3	--	--	--	
	5	3/18/2013	0.85	<0.12	10	8.2	<0.12	<1.2	<23	<0.12	--	720	--	--	<1.0	1.9	5	4.7	1.8	2.3	2.7	18	20	11	--	--	--	
	8.5	3/18/2013	2	0.15	2.5	4.8	<0.10	<1.0	<21	<0.10	--	280	--	--	<1.0	1.4	2.6	2.9	1.4	1.8	2.4	11	6.2	3.2	--	--	--	
	14	3/18/2013	0.18	<0.0044	0.054	<0.0089	<0.0044	0.26	<0.89	<0.0044	--	1.6	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	

**Table 4  
Historical Soil Analytical Data  
76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard  
Oakland, California**

Boring	Depth (ft)	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDB	EDC	TBA	Ethanol	TPHg (8015M)	TPHd	TPHmo	TPH C8 - C9	TPH C10 - C11	TPH C12 - C14	TPH C15 - C16	TPH C17 - C18	TPH C19 - C20	TPH C21 - C22	TPH C23 - C28	TPH C29 - C32	TPH C33 - C36	TPH C37 - C40	TPH C41 - C43	TPH C44+	TPH (Total)
MW-9B	5	3/18/2013	0.013	<0.0050	0.1	0.026	<0.0050	<0.050	<0.99	<0.0050	--	1.7	--	--	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	<1.0	--	--	--	--
	9	3/18/2013	<0.0050	<0.0050	<0.0050	<0.0099	<0.0050	<0.050	<0.99	<0.0050	--	0.36	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	14	3/18/2013	<0.0048	<0.0048	<0.0048	<0.0097	<0.0048	0.092	<0.97	<0.0048	--	<0.19	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	19	3/18/2013	<0.0043	<0.0043	<0.0043	<0.0086	<0.0043	<0.043	<0.86	<0.0043	--	<0.17	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
MW-10A	5	3/18/2013	0.22	<0.0045	0.03	<0.0090	0.013	<0.045	<0.90	<0.0045	--	59	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	--	--	--	--
	9	3/18/2013	1	0.093	0.21	0.68	0.018	<0.040	<0.81	<0.0040	--	41	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	14	3/18/2013	<0.0044	0.42	<0.0044	<0.0089	0.018	<0.044	<0.89	<0.0044	--	100	--	--	<1.0	2.8	3.3	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	<1.0	--	--	--	--
MW-10B	5	3/18/2013	0.35	<0.0043	6.4	8.1	<0.0043	<0.043	<0.86	<0.0043	--	480	--	--	<1.0	1.2	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	9	3/18/2013	1.3	0.034	0.34	4.4	<0.0040	<0.040	<0.79	<0.0040	--	60	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	15	3/18/2013	1.7	0.029	0.053	0.13	0.0054	<0.0043	<0.86	<0.0043	--	2	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	20	3/18/2013	<0.0043	<0.0043	<0.0043	<0.0086	<0.0043	<0.043	<0.86	<0.0043	--	0.51	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
MW-11A	5	3/19/2013	1.6	0.38	34	59	<0.10	<1.0	<21	<0.10	--	680	--	--	<1.0	12	38	46	6.7	6.3	6.3	25	21	12	--	--	--	--
	9	3/19/2013	6.5	29	19	97	0.32	<0.99	<20	<0.099	--	1,200	--	--	<1.0	1.3	2.6	3.5	1.5	2.2	1.9	7.4	3.5	<1.0	--	--	--	--
	14	3/19/2013	<0.0043	<0.0043	<0.0043	<0.0043	0.0087	0.22	<0.87	<0.0043	--	0.36	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
MW-10S	2	6/12/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5	6/12/2014	<1.0	2.8	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	2.8	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7	6/12/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8.5	6/12/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10	6/12/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-11B	5	3/19/2013	<0.0043	<0.0043	<0.0043	<0.0087	<0.0043	<0.043	<0.87	<0.0043	--	<0.17	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	10	3/19/2013	0.3	0.0082	0.18	0.22	0.12	0.3	<0.84	<0.0042	--	14	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	10	3/19/2013	0.22	0.007	0.16	0.22	0.1	0.28	<0.79	<0.0040	--	31	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
	14	3/19/2013	0.89	0.13	0.17	0.71	0.19	0.59	<0.99	<0.0050	--	13	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--
MW-11S	2	6/11/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	11	<1.0	<1.0	27	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.4	11	5.1	6.4	<1.0	<1.0	27
	4	6/11/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	<1.0	<1.0	15	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.7	8	3.5	<1.0	<1.0	<1.0	15
	6	6/11/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.2	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	4.2	1.3	<1.0	<1.0	<1.0	<10
	8	6/11/2014	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	10	6/11/2014	<1.0	1.9	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	--	<1.0	1.9	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	

**NOTES:**

All results in milligrams per kilogram (mg/kg)

-- = Not analyzed

<# = Analyte not detected at or above indicated laboratory practical quantitation limit

ft = Feet

ND = Not detected

TPH = Total petroleum hydrocarbons

TPHd = TPH as diesel

TPHg = TPH as gasoline

TPHmo = TPH as motor oil

MTBE = methyl t-butyl ether

EDB = 1,2-dibromoethane

EDC = 1,2-dichloroethane (1,2-DCA)

TBA = tert-butyl alcohol

**Table 5**  
**Potential Remedial Approaches**  
76 Service Station No. 1156 (351645)  
4276 MacArthur Boulevard  
Oakland, California

REMEDIAL ACTION	METHOD DESCRIPTION	SITE-SPECIFIC IMPLEMENTATION	PROTECTION OF HUMAN HEALTH AND ENVIRONMENT	DATA GAPS
Soil Excavation and Disposal	Physically removes impacted soil via excavation.	Remaining source material may be located beneath existing structures, which would limit the extent of excavation. Requires some dewatering because impacted soils appear to be below current water level. Expect a substantial disruption of current business. Requires transportation of excavated soils to an appropriate landfill.	Effectively removes source material within low permeability soils and limits potential groundwater impacts.	Permit for temporary treated water discharge would need to be obtained. Possible re-contamination if all impacted soil is not removed.
Multiphase Extraction (fixed system)	Groundwater is extracted with vacuum enhancement to expose impacted soil for SVE. Water extraction can be accomplished using high vacuums and/or active pumping.	Requires effective dewatering of submersed soils to expose soil containing contaminant. Vacuum enhanced dewatering radius of influence expected to be less than 10 feet based on aquifer test. Installation of extraction and treatment system is necessary in limited space. Air permit needed for treated vapors. Discharge permit needed for water disposal. Long-screened remedial wells (4 inches in diameter or greater) appropriate to MPE are not currently installed at the site.	Provides aggressive contaminant removal but can be limited by preferential pathways.	Vapor radius of influence is unknown. Vapor extraction flow rates are unknown. Clay soils expected to respond more slowly than other soil types. Limited space is available on-site to install a fixed system. Utilities would need to be extended to site. Permits for air and water discharge of treated materials would need to be obtained. Noise and odor may affect nearby businesses and residences. Onsite parking spaces will be taken up with remedial compound.
Multiphase Extraction (mobile events)	Groundwater is extracted with vacuum enhancement to expose impacted soil for SVE. Water extraction can be accomplished using high vacuums and/or active pumping.	Requires effective dewatering of submersed soils to expose soil containing contaminant. Dewatering radius of influence expected to be less than 10 feet based on aquifer test. Discharge permit needed for water disposal. Long-screened remedial wells (4 inches in diameter or greater) appropriate to MPE are not currently installed at the site.	Provides aggressive contaminant removal but can be limited by preferential pathways.	Vapor radius of influence is unknown. Vapor extraction flow rates are unknown. Clay soils expected to respond more slowly than other soil types and may make temporary events ineffective. Permit for treated water discharge needs to be obtained. Noise and odor may affect nearby businesses and residences.
Monitored Natural Attenuation (soil and groundwater)	Passive approach which monitors natural processes that degrade chemical constituents in soil and groundwater.	Historical groundwater concentration trends suggest natural attenuation already occurs at the site.	Concentrations of constituents of concern above Maximum Contaminant Levels are limited vertically and horizontally to the stabilized plume, but should eventually be reduced by natural degradation.	None - Natural attenuation parameters are monitored currently and a monitoring network is in place to observe any changes to site risks.

**Table 6**  
**Historical Groundwater Analytical Results - Monitored Natural Attenuation Parameters**  
**76 Service Station No. 1156 (351645)**  
**4276 MacArthur Boulevard**  
**Oakland, California**

WELL ID	DATE	NITRATE AS			IRON (II) SPECIES (µg/L)	DISSOLVED MANGANESE (µg/L)
		METHANE (mg/L)	NO3 (mg/L)	SULFATE (mg/L)		
MW-1B	1/16/2014	0.013	7.2	19	ND<100	120
MW-2B	1/16/2014	0.0021	ND<0.44	7.9	ND<100	260
MW-3B	1/16/2014	12	ND<0.44	1.0	5,200	3,300
	7/22/2014	13	ND<0.44	1.8	5,900	3,300
	1/27/2015	11	ND<0.44	1.8	1,600	3,700
	<b>7/21/2015</b>	<b>4.3</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>2,600</b>	<b>8.5</b>
MW-4B	1/16/2014	0.0079	12	28	ND<100	70
MW-5	1/16/2014	0.0027	4.5	27	ND<100	5.2
MW-7	1/16/2014	0.081	ND<0.44	4.1	2,200	300
MW-9A	1/16/2014	2.5	ND<0.88	8.6	2,400	1,500
	7/22/2014	1.9	ND<0.88	ND<2.0	6,800	1,600
	1/27/2015	1.7	14	ND<1.0	6,200	1,400
	<b>7/21/2015</b>	<b>0.91</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>6,000</b>	<b>1,300</b>
MW-9B	1/16/2014	0.0017	4.7	18	ND<100	630
MW-10A	1/16/2014	1.7	ND<0.44	ND<1.0	5,800	1,100
	7/22/2014	2.8	ND<0.44	ND<1.0	7,200	1,200
	1/27/2015	2.0	--	--	--	--
	<b>7/21/2015</b>	<b>1.0</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>5,500</b>	<b>1,200</b>
MW-10B	1/16/2014	0.63	ND<0.44	ND<1.0	7,300	5,400
	7/22/2014	0.064	ND<0.44	ND<1.0	4,200	5,000
	1/27/2015	0.67	ND<0.44	ND<1.0	6,400	5,000
	<b>7/21/2015</b>	<b>0.20</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>5,300</b>	<b>1,100</b>
MW-10S	1/27/2015	0.25	ND<0.44	72	700	1,200
	<b>7/21/2015</b>	<b>0.50</b>	<b>ND&lt;0.44</b>	<b>51</b>	<b>2,400</b>	<b>1,600</b>
MW-11A	1/16/2014	2.3	ND<0.44	ND<1.0	7,900	3,700
	7/22/2014	4.6	ND<0.44	ND<1.0	6,100	4,600
	1/27/2015	3.9	ND<0.44	ND<1.0	7,000	4,100
	<b>7/21/2015</b>	<b>2.7</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>8,400</b>	<b>1,500</b>
MW-11B	1/16/2014	0.31	ND<0.44	5.2	6,600	1,100
	7/22/2014	0.48	ND<0.44	ND<1.0	2,700	1,600
	1/27/2015	0.68	ND<0.44	ND<1.0	8,800	1,500
	<b>7/21/2015</b>	<b>0.48</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>3,100</b>	<b>1,800</b>
MW-11S	7/22/2014	0.50	ND<0.44	30	1,900	1,800
	1/27/2015	0.30	ND<0.44	22	690	1,200
	<b>7/21/2015</b>	<b>0.65</b>	<b>ND&lt;0.44</b>	<b>ND&lt;1.0</b>	<b>5,200</b>	<b>1,700</b>

**NOTES:**

µg/L = Micrograms per liter

-- = Not sampled

ID = Identification

mg/L = Milligrams per liter

ND<# = Analyte not detected at or above indicated practical quantitation limit

# **Appendix A**

## **Agency Correspondence**



ENVIRONMENTAL HEALTH SERVICES  
ENVIRONMENTAL PROTECTION  
1131 Harbor Bay Parkway, Suite 250  
Alameda, CA 94502-6577  
(510) 567-6700  
FAX (510) 337-9335

August 3, 2015

Nicole Arceneaux  
Chevron Environmental Management Company  
6101 Bollinger Canyon Road  
San Ramon, CA 94583  
(Sent via E-mail to:  
[nicole.arceneaux@Chevron.com](mailto:nicole.arceneaux@Chevron.com))

Ed Ralston  
Phillips 66 Company  
76 Broadway  
Sacramento, CA 95818  
(Sent via E-mail to: [Ed.C.Ralston@p66.com](mailto:Ed.C.Ralston@p66.com))

Rajan Goswamy  
4276 MacArthur Boulevard  
Oakland, CA 94619  
(Sent via E-mail to: [rajgoswamy@sbcglobal.net](mailto:rajgoswamy@sbcglobal.net))

Carole Quick and Lorraine Mudgett  
10214 SW Stuart Court  
Portland, OR 97224-4304

Subject: Case File Review for Fuel Leak Case No. RO0000409 and GeoTracker Global ID T0600102279, Unocal #1156, 4276 MacArthur Boulevard, Oakland, CA 94619

Dear Ms. Arceneaux, Mr. Ralston, Ms. Quick, Ms. Mudgett, and Mr. Goswamy:

Alameda County Environmental Health (ACEH) staff has reviewed the fuel leak case file for the above-referenced site, including the document entitled, "Aquifer Test Report," dated July 14, 2015 (Report). The Report, which was prepared on behalf of Chevron Environmental Management Company by ACECOM, presents results from aquifer testing. The results of the aquifer testing indicated that dewatering of the smear zone may be feasible. Based on these results, the Report concluded that more data are needed to develop an effective remedial approach and recommended preparation of a feasibility study. The feasibility study would be expected to identify any data gaps related to feasible remedial technologies. We have no objection to the preparation of a feasibility study and request that you submit a Feasibility Study no later than October 8, 2015. Groundwater monitoring is to be continued on a semiannual basis; please present the results in the reports requested below.

### **TECHNICAL REPORT REQUEST**

Please upload technical reports to the ACEH ftp site (Attention: Jerry Wickham), and to the State Water Resources Control Board's GeoTracker website according to the following schedule and file-naming convention:

- **October 8, 2015** – Feasibility Study Report  
File to be named: SWI\_R\_yyyy-mm-dd RO409
- **October 12, 2015** – Semi-Annual Groundwater Monitoring Report  
File to be named: GWM\_R\_yyyy-mm-dd RO409

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

Responsible Parties  
RO0000409  
August 3, 2015  
Page 2

If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at [jerry.wickham@acgov.org](mailto:jerry.wickham@acgov.org). Online case files are available for review at the following website: <http://www.acgov.org/aceh/index.htm>. If your email address does not appear on the cover page of this notification, ACEH is requesting you provide your email address so that we can correspond with you quickly and efficiently regarding your case.

Sincerely,

Jerry Wickham, California PG 3766, CEG 1177, and CHG 297  
Senior Hazardous Materials Specialist

Attachment: Responsible Party(ies) Legal Requirements/Obligations

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Maureen Dorsey, Oakland Veterinary Clinic, 4258 MacArthur Boulevard, Oakland, CA 94619

Chad Roper, AECOM, 1220 Avenida Acaso, Camarillo, CA 93012 (*Sent via E-mail to:*  
[chad.roper@aecom.com](mailto:chad.roper@aecom.com))

Perry Pineda, Shell Oil Products US, 20945 S. Wilmington Ave., Carson, CA 90810-1039 (*Sent via*  
*Sent via E-mail to:* [perry.pineda@shell.com](mailto:perry.pineda@shell.com))

Peter Schaefer, Conestoga-Rovers & Associates, 5900 Hollis Street, Suite A  
Emeryville, CA 94608 (*Sent via E-mail to:* [pschaefer@croworld.com](mailto:pschaefer@croworld.com))

Jerry Wickham, ACEH (*Sent via E-mail to:* [jerry.wickham@acgov.org](mailto:jerry.wickham@acgov.org))  
GeoTracker, e-File

## Attachment 1

### Responsible Party(ies) Legal Requirements / Obligations

#### REPORT REQUESTS

These reports are being requested pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to an unauthorized release from a petroleum UST system, and require your compliance with this request.

#### ELECTRONIC SUBMITTAL OF REPORTS

ACEH's Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of reports in electronic form. The electronic copy replaces paper copies and is expected to be used for all public information requests, regulatory review, and compliance/enforcement activities. Instructions for submission of electronic documents to the Alameda County Environmental Cleanup Oversight Program FTP site are provided on the attached "Electronic Report Upload Instructions." Submission of reports to the Alameda County FTP site is an addition to existing requirements for electronic submittal of information to the State Water Resources Control Board (SWRCB) GeoTracker website. In September 2004, the SWRCB adopted regulations that require electronic submittal of information for all groundwater cleanup programs. For several years, responsible parties for cleanup of leaks from underground storage tanks (USTs) have been required to submit groundwater analytical data, surveyed locations of monitoring wells, and other data to the GeoTracker database over the Internet. Beginning July 1, 2005, these same reporting requirements were added to Spills, Leaks, Investigations, and Cleanup (SLIC) sites. Beginning July 1, 2005, electronic submittal of a complete copy of all reports for all sites is required in GeoTracker (in PDF format). Please visit the SWRCB website for more information on these requirements ([http://www.waterboards.ca.gov/water\\_issues/programs/ust/electronic\\_submittal/](http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/)).

#### PERJURY STATEMENT

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "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." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

#### PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6735, 6835, and 7835.1) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately registered or certified professional. For your submittal to be considered a valid technical report, you are to present site specific data, data interpretations, and recommendations prepared by an appropriately licensed professional and include the professional registration stamp, signature, and statement of professional certification. Please ensure all that all technical reports submitted for this fuel leak case meet this requirement.

#### UNDERGROUND STORAGE TANK CLEANUP FUND

Please note that delays in investigation, later reports, or enforcement actions may result in your becoming ineligible to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse you for the cost of cleanup.

#### AGENCY OVERSIGHT

If it appears as though significant delays are occurring or reports are not submitted as requested, we will consider referring your case to the Regional Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to \$10,000 per day for each day of violation.

<b>Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC)</b>	<b>REVISION DATE:</b> May 15, 2014
	<b>ISSUE DATE:</b> July 5, 2005
	<b>PREVIOUS REVISIONS:</b> October 31, 2005; December 16, 2005; March 27, 2009; July 8, 2010, July 25, 2010
<b>SECTION:</b> Miscellaneous Administrative Topics & Procedures	<b>SUBJECT:</b> Electronic Report Upload (ftp) Instructions

The Alameda County Environmental Cleanup Oversight Programs (LOP and SLIC) require submission of all reports in electronic form to the county's ftp site. Paper copies of reports will no longer be accepted. The electronic copy replaces the paper copy and will be used for all public information requests, regulatory review, and compliance/enforcement activities.

## REQUIREMENTS

- **Please do not submit reports as attachments to electronic mail.**
- Entire report including cover letter must be submitted to the ftp site as **a single portable document format (PDF) with no password protection.**
- It is **preferable** that reports be converted to PDF format from their original format, (e.g., Microsoft Word) rather than scanned.
- **Signature pages and perjury statements must be included and have either original or electronic signature.**
- **Do not password protect the document.** Once indexed and inserted into the correct electronic case file, the document will be secured in compliance with the County's current security standards and a password. **Documents with password protection will not be accepted.**
- Each page in the PDF document should be rotated in the direction that will make it easiest to read on a computer monitor.
- Reports must be named and saved using the following naming convention:

RO#\_Report Name\_Year-Month-Date (e.g., RO#5555\_WorkPlan\_2005-06-14)

## Submission Instructions

- 1) Obtain User Name and Password
  - a) Contact the Alameda County Environmental Health Department to obtain a User Name and Password to upload files to the ftp site.
    - i) Send an e-mail to [deh.loptoxic@acgov.org](mailto:deh.loptoxic@acgov.org)
  - b) In the subject line of your request, be sure to include "**ftp PASSWORD REQUEST**" and in the body of your request, include the **Contact Information, Site Addresses**, and the **Case Numbers (RO# available in Geotracker) you will be posting for.**
- 2) Upload Files to the ftp Site
  - a) Using Internet Explorer (IE4+), go to <ftp://alcoftp1.acgov.org>
    - (i) Note: Netscape, Safari, and Firefox browsers will not open the FTP site as they are NOT being supported at this time.
  - b) Click on Page located on the Command bar on upper right side of window, and then scroll down to Open FTP Site in Windows Explorer.
  - c) Enter your User Name and Password. (Note: Both are Case Sensitive.)
  - d) Open "My Computer" on your computer and navigate to the file(s) you wish to upload to the ftp site.
  - e) With both "My Computer" and the ftp site open in separate windows, drag and drop the file(s) from "My Computer" to the ftp window.
- 3) Send E-mail Notifications to the Environmental Cleanup Oversight Programs
  - a) Send email to [deh.loptoxic@acgov.org](mailto:deh.loptoxic@acgov.org) notify us that you have placed a report on our ftp site.
  - b) Copy your Caseworker on the e-mail. Your Caseworker's e-mail address is the entire first name then a period and entire last name @acgov.org. (e.g., firstname.lastname@acgov.org)
  - c) The subject line of the e-mail must start with the RO# followed by **Report Upload**. (e.g., Subject: RO1234 Report Upload) If site is a new case without an RO#, use the street address instead.
  - d) If your document meets the above requirements and you follow the submission instructions, you will receive a notification by email indicating that your document was successfully uploaded to the ftp site.

## **Appendix B**

### **Proposed Convenience Store Expansion Plans**

70' WIDE PUBLIC RIGHT OF WAY  
**MAC-ARTHUR BLVD.**

LOT 37  
 APN: 030-1981-151

S56°39'03"W  
 109.90'

S56°39'03"W  
 29.96'

APN: 030-1981-149  
 LOT 50

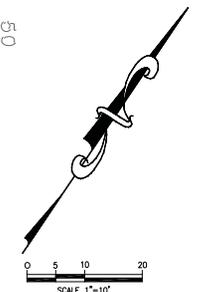
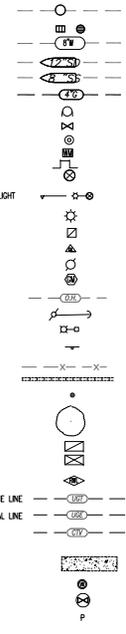
APN: 030-1981-150  
 EXISTING BUILDING

**HIGH STREET**  
 90' WIDE PUBLIC RIGHT OF WAY

**SURVEY NOTES**

- 1) PRELIMINARY TITLE REPORT PREPARED BY FIRST AMERICAN TITLE, ORDER NUMBER: NS-327968-SAC1, Dated as of October 29, 2007 WAS USED FOR THE PREPARATION OF THIS SURVEY.
- 2) THE POSITION OF IDENTIFIED RECORD EASEMENTS HAVE BEEN PLOTTED USING RECORD DESCRIPTIONS. SURFACE FACILITIES HAVE BEEN PLOTTED USING FIELD INFORMATION. THE ACTUAL LOCATIONS OF UNDERGROUND FACILITIES SHOULD BE VERIFIED PRIOR TO ANY NEW CONSTRUCTIONS.
- 3) THIS IS NOT A BOUNDARY SURVEY. ADDITIONAL FIELD SURVEY AND RESEARCH WILL BE REQUIRED TO ESTABLISH THE ACTUAL BOUNDARY.
- 4) NO MONUMENTS WERE SET AS A PART OF THIS SURVEY. MONUMENTS WHICH WERE FOUND ARE SHOWN HEREON.
- 5) PROPERTY LINE SHOWN IS LOCATED USING RECORD SURVEY RECORDED IN BOOK 32 OF SURVEYS AT PAGE 22 AND MONUMENTS FOUND IN MAC-ARTHUR BLVD, WATSON STREET, HIGH STREET AND MARBELLE AVE. AS SHOWN ON RECORD SURVEY RECORDED IN BOOK 32 OF SURVEYS AT PAGE 22, ALAMEDA COUNTY RECORDS.
- 6) THE TYPES, LOCATION, SIZES AND/OR DEPTHS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. INTERESTED PARTIES ARE CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF SUCH UNDERGROUND UTILITIES. STUKAM CONSULTING ENGINEERS, INC. ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS. PRESUMPTIVE EASEMENTS MAY EXIST OVER THOSE FACILITIES WHICH ARE NOT WITHIN THE RECORD EASEMENT.

**LEGEND**



REVISIONS	BY	DATE

DEVELOPER:

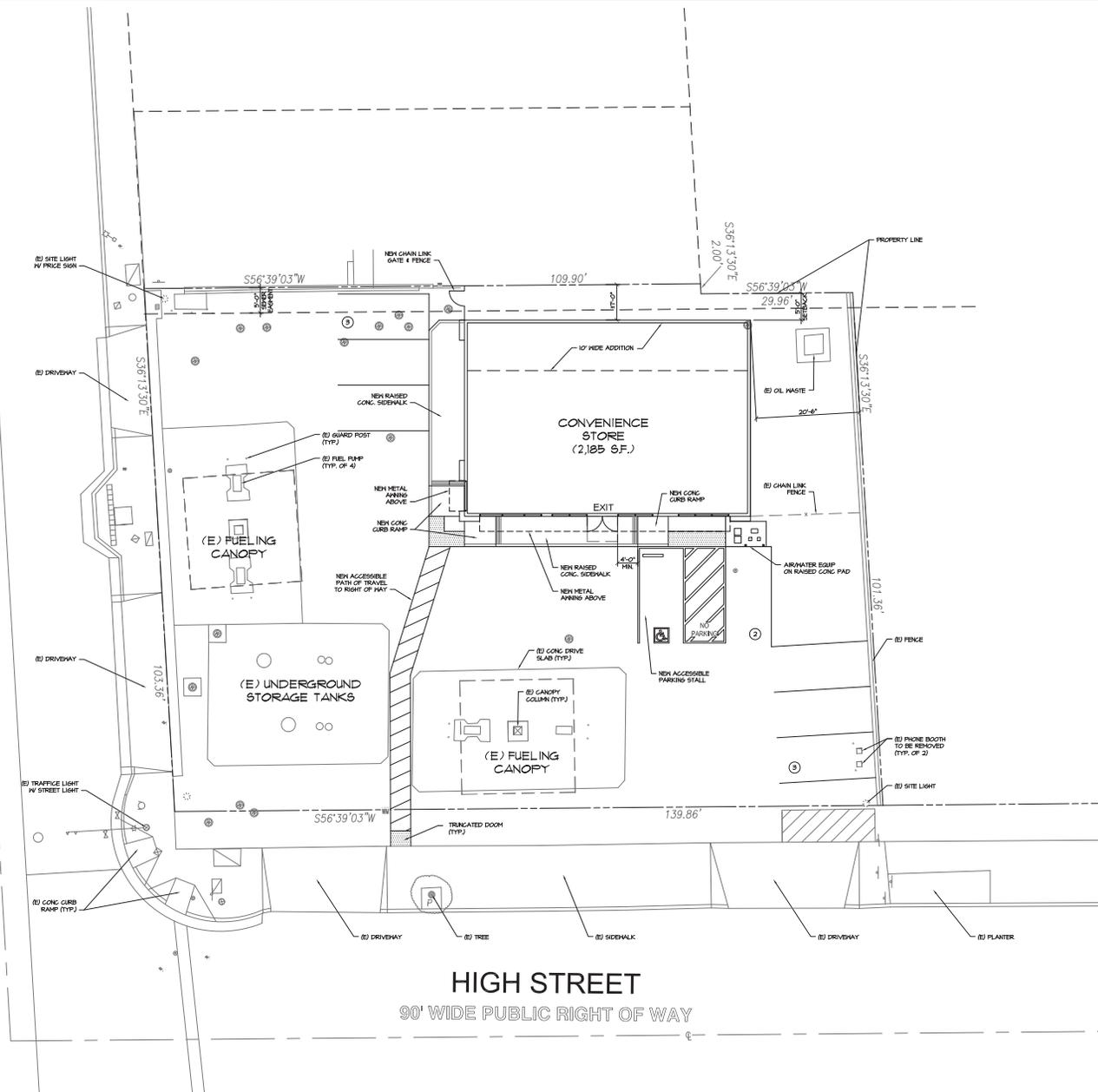
**STUKAM CONSULTING ENGINEERS, INC.**  
 8989 GREENBACK LANE 2nd Floor  
 ORANGEVALE, CA 95662  
 (916) 835 5791  
 (916) 968-6316 FAX

TOPOGRAPHIC SURVEY  
**4276 MACARTHUR BLVD**  
 GAS STATION & SERVICE STATION  
 APN: 030-1981-150  
 CITY OF OAKLAND ALAMEDA COUNTY CALIFORNIA  
 JOB NO. 2015-008 | Designated EIS | Checkdate: EIS | Date: 08-04-15

SHEET  
 1  
 OF 1 SHEETS  
 PROJECT #  
 2015-008

S:\1-Projects\15-10601-029 MacArthur Blvd. 0408\DWG\15-10601-029.dwg modified by mizanor at Sep 11, 2015 - 11:26am

70' WIDE PUBLIC RIGHT OF WAY  
MAC-ARTHUR BLVD.



**1 SITE PLAN**  
1" = 10'-0"



**DRAWING INDEX**

SD1	SITE PLAN
1 OF 1	TOPOGRAPHIC SURVEY
AJ1	EXISTING AND NEW FLOOR PLANS
A21	CONVENIENCE STORE BUILDING ELEVATIONS

**SITE INFO**

APN 30-190-50-1  
 JURISDICTION: CITY OF OAKLAND, CA  
 CURRENT ZONING: ON-2 NEIGHBORHOOD COMMERCIAL  
 LOT AREA: 14581 S.F.

**SITE PLAN LEGEND**

- NEW CONCRETE PAVING
- 4 FT. WIDE (MIN) ACCESSIBLE ROUTE OF TRAVEL, SHALL NOT EXCEED 5% SLOPE IN THE DIRECTION OF TRAVEL AND 2% CROSS SLOPE
- EXISTING TO REMAIN

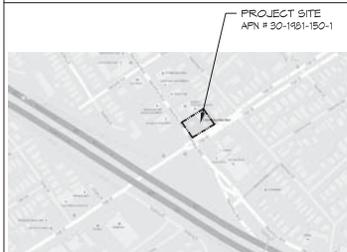
**PROJECT DIRECTORY**

**ARCHITECT**  
 M I ARCHITECTS, INC.  
 2223 OLYMPIC BLVD. SUITE 100  
 WALNUT CREEK, CA 94595  
 TEL: (925) 291-1114  
 FAX: (925) 945-1508  
 CELL: (925) 818-1875  
 MR. MITHANA BERAHMI, ARCHITECT

**DEVELOPER**  
 MR. RAJ GOSHWAMY  
 4276 MACARTHUR BLVD  
 OAKLAND, CA 94611  
 TEL: (510) 861-6540

**CIVIL ENGINEER**  
 STIKAM CONSULTING ENGINEERS, INC.  
 8881 GREENBACK LANE, 2ND FLOOR  
 ORANJEVALE, CA 95662  
 TEL: (916) 835-5791  
 FAX: (916) 858-6396  
 MR. FAREED T. SIDDIGI, P.E.

**VICINITY MAP**



M I Architects, Inc.  
 ARCHITECTURE  
 PLANNING  
 MANAGEMENT  
 DESIGN  
 2223 OLYMPIC BLVD.,  
 SUITE 100  
 WALNUT CREEK, CA  
 94595  
 925-291-1114 Tel  
 925-945-1508 Fax  
 925-818-1875 Cell  
 mihano@michitect.com  
 www.michitect.com

NOT FOR CONSTRUCTION

CONVENIENCE STORE  
 CONVERSION & ADDITION  
 4276 MACARTHUR BLVD  
 OAKLAND, CA 94611

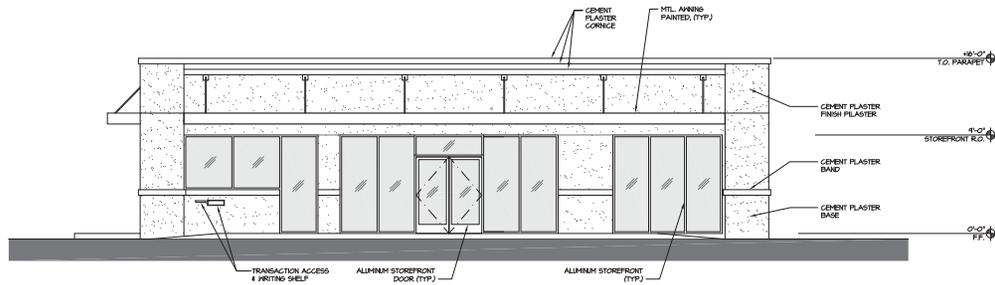
ISSUED FOR CONSTRUCTION
ISSUED FOR PLAN CHECK
ISSUED FOR PLANNING
NO. DATE DESCRIPTION
△
△
△
△

SITE PLAN  
 PROJECT # 15-10601  
 DRAWN BY CHECKED: MH  
 SCALE: AS NOTED DATE: 08-05-15

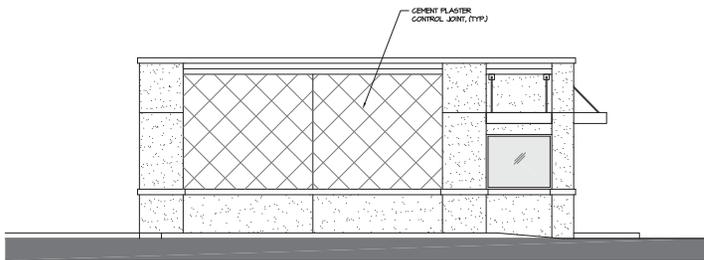
**SD1**

SHEET OF

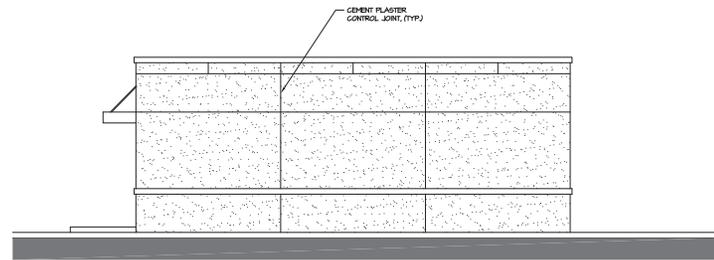
S:\1-Projects\15-10601-1026-MacArthur Blvd. Conversion\15-10601-1026-MacArthur Blvd. Conversion.dwg (Purvis) 15-10601-1026-MacArthur Blvd. Conversion.dwg modified by mhuang2 at Sep 11, 2015 - 11:35am



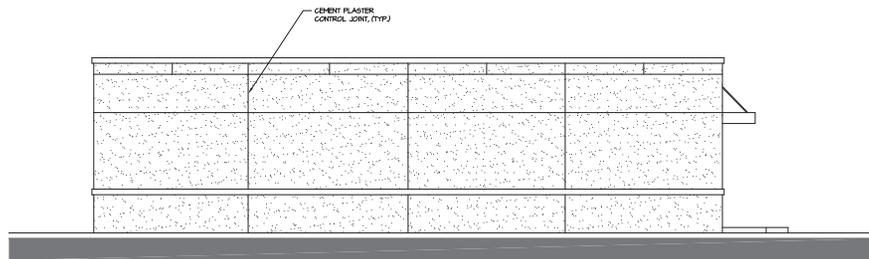
**A SOUTH EAST ELEVATION**  
3/16" = 1'-0"



**B SOUTH WEST ELEVATION**  
3/16" = 1'-0"



**C NORTH EAST ELEVATION**  
3/16" = 1'-0"



**D NORTH WEST ELEVATION**  
3/16" = 1'-0"



**M I Architects, Inc.**  
ARCHITECTURE  
PLANNING  
MANAGEMENT  
DESIGN  
2221 OLYMPIC BLVD.,  
SUITE 100  
WALNUT CREEK, CA  
94545  
925-261-1114 Tel  
925-443-1881 Fax  
925-678-4675 Cell  
mhuang@miarchitect.com  
www.miarchitect.com

NOT FOR  
CONSTRUCTION

CONVENIENCE STORE  
CONVERSION & ADDITION  
4276 MACARTHUR BLVD  
OAKLAND, CA 94619

ISSUED FOR CONSTRUCTION  
ISSUED FOR PLAN CHECK  
ISSUED FOR PLANNING

NO.	DATE	DESCRIPTION
1		
2		
3		
4		

CONVENIENCE STORE  
BUILDING ELEVATIONS  
PROJECT # 15-10601  
DRAWN BY CHECKED: MH  
SCALE: AS NOTED DATE: 08-06-15

**A2.1**

SHEET OF

# **Appendix C**

## **Soil Boring Logs**



Project No.: 2235 Boring: P1 / MW1 Plate: APPENDIX  
 Site: Tosco 76 Service Station 11 Date: 7/16/99  
 Drill Contractor: Woodward Drilling

Sample Method: Split Spoon Geologist: MARK S. DOCKUM  
 Drill Rig: B57 Bore Hole Diameter: 8" Signature: *[Signature]*  
 Location: 10 Feet North of Northwestern Corner Registration: R.G. 4412  
 of Station Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						2 1/2" asphalt	
					CH	Clay, grayish green, very moist, high plasticity	
5	39	253			SP	Sand, fine-grained, grayish green, moist, no plasticity, black staining	
					CH	Clay, grayish green, very moist, high plasticity	
10	27	87			ML	Silty sand, fine-grained sand, black, very moist, no plasticity. (65% silt, 35% sand)	
					CL	Clay, with some sand, medium-grained, light olive brown, medium plasticity, wet	
15	36	222					
20	37	22				sandy clay, strong brown, (40% sand, 60% clay)	
						yellow orange, high plasticity, very moist	
25	33	9					
						Total depth at 26.5 feet. Groundwater encountered at 23'7".	

Casing Diameter: 2" Slot Size: 010, Sand Size: 2/12, Grout: Portland I.I.

# Delta Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/17/2010  
 Drilling Method: HAS Hole Diameter: 8"  
 Sampling Method: Split Spoon Hole Depth: 25'  
 Casing Type: Sch 40 Well Diameter: 2"  
 Slot Size: 0.02 Well Depth: 25'  
 Gravel Pack: 2/12

Boring/Well No: **MW-1B**  
 Page 1 of 2

Elevation: Northing: Easting:

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill Casing					1			Airknife to 5'
					2			Brown and grayish-sgrren clay
					3			
					4			
			299	MW-1B -5	5		CL	Greenish-gray sandy lean clay with gravel, 15% sand, 15%, gravel, strong odor, damp
					6			
					7			
					8			
			173	MW-1B -10	10		CL	Black lean clay with sand, mottled with granular black organic material, 20% sand, strong odor, moist
					11			
					12			
					13			
					14			
			952	MW-1B -15	15		CL	Brown sandy clay, fine-course sand, 35% sand, strong odor, damp
					16			
					17			
					18			
					19			
			19	MW-1B -20	20		CL	Black sandy lean clay with gravel, 30% sand, 10% gravel, strong odor, wet
					21		CL	Brn lean clay with sand, 25% sand, some odor, damp
					22			

# Delta

**Environmental Consultants, Inc.**

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/17/2010  
 Drilling Method: HAS Hole Diameter: 8"  
 Sampling Method: Split Spoon Hole Depth: 25'  
 Casing Type: Sch 40 Well Diameter: 2"  
 Slot Size: 0.02 Well Depth: 25'  
 Gravel Pack: 2/12 First Water Depth: 23.5'  
 Static Water Depth:

Boring/Well No: **MW-1B**  
 Page 2 of 2

Elevation: Northing: Easting:

Well Completion Backfill Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
	▼		44	MW-1B -25	23		CL	Brown sandy gravely clay, 25% sand, 10% gravel, saturated, mild odor
					24		CL	Brown sandy clay, 15% samp, mild odor, damp
					25			Total Depth = 25'
					26			
					27			
					28			
					29			
					30			
					31			
					32			
					33			
					34			
					35			
					36			
					37			
					38			
					39			
					40			
					41			
					42			
					43			
					44			



Project No.: 2235 Boring: BZ/MWZ Plate: APPENDIX

Site: Tosco 76 Service Station 1156 Date: 7/16/99

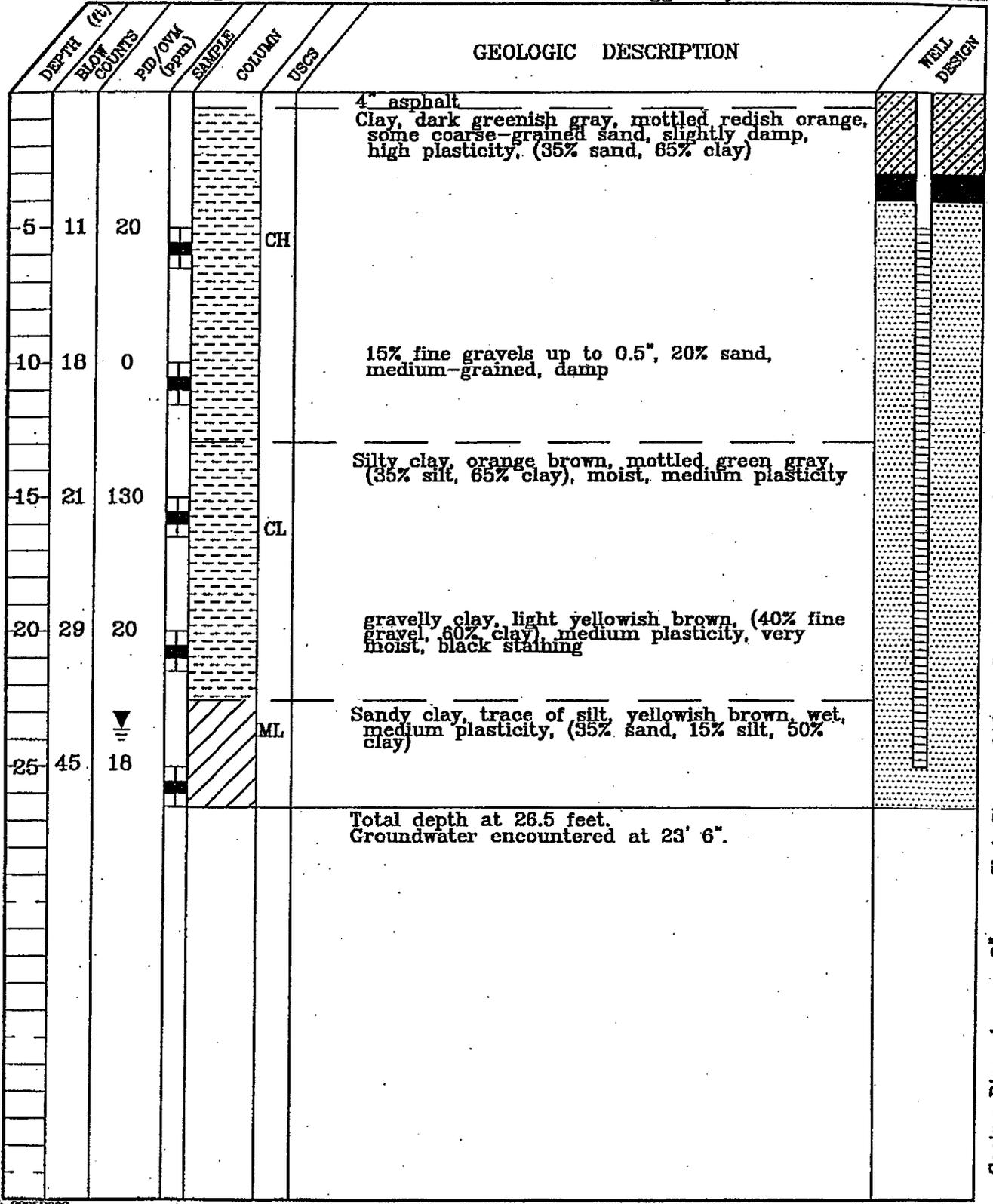
Drill Contractor: Woodward Drilling

Sample Method: Split Spoon Geologist: MARK S. DOCKUM

Drill Rig: B57 Bore Hole Diameter: 8" Signature: *Mark S. Dockum*

Location: 2 Feet East of Southernmost Driveway Registration: R.G. 4412

Along MacArthur Boulevard Logged by: Dylan Crouse



Casing Diameter: 2" Slot Size: .010, Sand Size: 2/12, Grout: Portland I, II

# Delta Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/16/2010  
 Drilling Method: HAS Hole Diameter: 8"  
 Sampling Method: Split Spoon Hole Depth: 25'  
 Casing Type: Sch 40 Well Diameter: 2"  
 Slot Size: 0.02 Well Depth: 25'  
 Gravel Pack: 2/12

Boring/Well No: **MW-2B**  
 Page 1 of 2

▼ First Water Depth:  
 ▼ Static Water Depth:

Elevation: Northing: Easting:

Well Completion		Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing									
				181	MW-2B-5	1			CL	Airknife to 5' Brown and greenish lean clay with sand
						2				
						3				
						4				
						5			CL	Light brown/green mottled lean clay with sand, 15% sand, strong odor, damp
						6				
						7				
				0	MW-2B-10	8				
						9				
						10			CH	Greenish fat clay, dense, damp, odor
						11				
						12				
						13				
						14				
				120	MW-2B-15	15			CL	Green lean clay with sand, 15% med-course sand, damp, odor
						16				
						17				
						18				
						19				
				8	MW-2B-20	20			CL	Dark borwn lean clay with sand, 15% sand, fine-med sand, damp, odor
						21				
						22				

# Delta

**Environmental Consultants, Inc.**

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/16/2010  
 Drilling Method: HAS Hole Diameter: 8"  
 Sampling Method: Split Spoon Hole Depth: 25'  
 Casing Type: Sch 40 Well Diameter: 2"  
 Slot Size: 0.02 Well Depth: 25'  
 Gravel Pack: 2/12  First Water Depth: 23.5'  
 Static Water Depth:

Boring/Well No: **MW-2B**  
 Page 2 of 2

Elevation: Northing: Easting:

Well Completion Backfill Casing	Water Level	Moisture Content	PTD Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
			190	MW-2B -25	23			Brown lean clay with sand, 25% sand, some gravel, mild odor
					24		CL	Black/brown mottled clay, damp, mild odor
					25		CL	
					26			Total Depth = 25'
					27			
					28			
					29			
					30			
					31			
					32			
					33			
					34			
					35			
					36			
					37			
					38			
					39			
					40			
					41			
					42			
					43			
					44			



Project No.: 2235 Boring: B3/MW3 Plate: APPENDIX

Site: Tosco 76 Service Station 1156 Date: 7/16/99

Drill Contractor: Woodward Drilling

Sample Method: Split Spoon Geologist: MARK S. DOCKUM

Drill Rig: B57 Bore Hole Diameter: 8" Signature: *[Handwritten Signature]*

Location: Approximately 15' South West of Southern- Registration: R.G. 4412

most Dispenser Island Parallel to High Street Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PTD/OTM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
4 1/2						asphalt	
5-18	235				CH	Clay, dark yellowish brown, mottled, trace of medium-grained sand, slightly damp, high plasticity, (15% sand, 85% clay)	
						brown, mottled gray, dry	
10-33	265					staining, trace of coarse gravel and rootlets (15% gravel, 85% clay), slightly damp	
15-25	81				CL	Sandy clay, greenish gray, mottled, orange, some medium-grained sand, slight plasticity, caliche present, (35% sand, 65% clay)	
20-36	9				CH	Clay, strong brown, slight mottling, trace of medium-grained sand, 20% sand, high plasticity, black staining, 80% clay	
						Gravel, yellowish brown, wet	
25-25	0				CH	Clay, trace of medium-grained sand, yellowish brown, very moist, high plasticity, (15% sand)	
					GW	Gravel, orange, slight plasticity, wet	
						Clay, yellowish brown, moist, high plasticity	
30-22	0				CH		
						Total depth at 31.5 feet. Groundwater encountered at 23.3 feet. Static groundwater at 12 feet.	

Casing Diameter: 2" Slot Size: .010" Sand Size: 2/12" Grout: Portland I.II

# Delta Consultants

Project No: C101156      Client: COP  
 Logged By: Alan Buehler      Location: Oakland  
 Driller: Gregg Drilling      Date Drilled: 8/16/2010  
 Drilling Method: HAS      Hole Diameter: 8"  
 Sampling Method: Split Spoon      Hole Depth: 25'  
 Casing Type: Sch 40      Well Diameter: 2"  
 Slot Size: 0.02      Well Depth: 25'  
 Gravel Pack: 2/12     
   
     ▼ First Water Depth:  
     ▽ Static Water Depth:

Boring/Well No: MW-3B  
 Page 1 of 2

Elevation:      Northing:      Easting:

Well Completion		Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing									
				6	MW-3B-5	1			CL	Airknife to 5' Brown lean clay with sand, some gravel, no odor
						2				
						3				
						4				
						5			CL	Light brown/greenish mottled clay, moist, slight odor
						6				
						7				
						8				
						9				
				36	MW-3B-10	10			CH	Light brown/green/black mottled lean clay with sand, 15% fine sand, damp, mild odor
						11				
						12				
						13				
						14				
				790	MW-3B-15	15			CL	Light brown/green mottled lean clay with sand, 20% fine-med sand, damp, strong odor
						16				
						17				
						18				
						19				
				9	MW-3B-20	20			CH	Light brown fat clay, damp, mild odor
						21			CL	Dark brown lean clay with sand, 15% fine sand, damp, mild odor
						22				

# Delta Environmental Consultants, Inc.

Project No: C101156      Client: COP  
 Logged By: Alan Buehler      Location: Oakland  
 Driller: Gregg Drilling      Date Drilled: 8/16/2010  
 Drilling Method: HAS      Hole Diameter: 8"  
 Sampling Method: Split Spoon      Hole Depth: 25'  
 Casing Type: Sch 40      Well Diameter: 2"  
 Slot Size: 0.02      Well Depth: 25'  
 Gravel Pack: 2/12       First Water Depth: 23.5'  
     Static Water Depth:

Boring/Well No: **MW-3B**  
 Page 2 of 2

Elevation:      Northing:      Easting:

Well Completion Backfill Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
			15	MW-3B -25	23		CL	
					24			
					25			Light brown lean clay with sand, 30% fine-med sand, moist, very slight odor Total Depth = 25'
					26			
					27			
					28			
					29			
					30			
					31			
					32			
					33			
					34			
					35			
					36			
					37			
					38			
					39			
					40			
					41			
					42			
					43			
					44			



Project No.: 2235 Boring: B4/MW4 Plate: APPENDIX  
 Site: Tosco 76 Service Station 1156 Date: 7/16/99  
 Drill Contractor: Woodward Drilling

Sample Method: Split Spoon Geologist: MARK S. DOCKUM  
 Drill Rig: B57 Bore Hole Diameter: 8" Signature: *[Handwritten Signature]*  
 Location: 18 Feet North of Southernmost Dispenser Registration: R.G. 4412  
 Island Parallel High Street Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppid)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
5-17	309					4 1/2" asphalt Clay, greenish gray, mottled, orange slightly damp, high plasticity	
10-22	253			CH		trace of medium-grained sand, slightly moist	
15-19	4					moist	
20-28	4					brownish yellow, black staining, 20% gravel, 20% medium-grained sand, moist	
25-36	0					brown, mottled, olive yellow, moist, black staining	
Total depth at 26.5 feet. Groundwater encountered at 23.6 feet.							

Casing Diameter: 2" Slot Size: #10, Sand Size: 2/12, Grout: Portland II

# Delta Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/13/2010  
 Drilling Method: HAS Hole Diameter: 8"  
 Sampling Method: Split Spoon Hole Depth: 25'  
 Casing Type: Sch 40 Well Diameter: 2"  
 Slot Size: 0.02 Well Depth: 25'  
 Gravel Pack: 2/12

Boring/Well No: MW-4B  
 Page 1 of 2

▼ First Water Depth:  
 ▽ Static Water Depth:

Elevation: Northing: Easting:

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
					1		GC	Airknife to 5' Brown clayey gravel with sand,
					2			
					3			
					4			
			2.1	MW-4B-5	5		GW	Well graded gravel with sand, cobbles up to 4"
					6		SW-SM	Greenish gray well graded sand with silt and gravel, 60% sand, 20% gravel, no odor
					7			
					8			
					9			
			1401	MW-4B-10	10		SW-SM	Black well graded sand with silt, 60% fine sand, strong odor
					11			
					12			
					13			
					14			
			19.5	MW-4B-15	15		CL	Brown/green mottled lean clay with sand, 15% fine sand, some odor
					16			
					17			
					18			
					19			
					20		CL	Brown/black mottled sandy lean clay, 30% fine-med sand, some odor
					21			
					22			

# Delta Environmental Consultants, Inc.

Project No: C101156      Client: COP  
 Logged By: Alan Buehler      Location: Oakland  
 Driller: Gregg Drilling      Date Drilled: 8/16/2010  
 Drilling Method: HAS      Hole Diameter: 8"  
 Sampling Method: Split Spoon      Hole Depth: 25'  
 Casing Type: Sch 40      Well Diameter: 2"  
 Slot Size: 0.02      Well Depth: 25'  
 Gravel Pack: 2/12      ▼ First Water Depth: 23.5'  
    ∇ Static Water Depth:

Boring/Well No: **MW-4B**  
 Page 2 of 2

Elevation:      Northing:      Easting:

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill					23			
Casing					24			
			19	MW-4B -25	25		CL	Brown lean clay, 10% fine-med sand, some odor Total Depth = 25'
					26			
					27			
					28			
					29			
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					43			
					44			



Project No.: 2235 Boring: MW5 Plate: Attachment  
 Site: Tosco 76 Service Station 1156 Date: 8/29/01  
 Drill Contractor: Woodward Drilling Company, Inc.

Sample Method: Split Spoon Geologist: JOHN B. BOBBITT  
 Drill Rig: BK-81 Bore Hole Diameter: 8" Signature: *[Signature]*  
 Location: Eastern side of MacArthur Boulevard Registration: R.G. 4313  
 approximately 40 feet north of site Logged by: Rob Saur

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
5	23	8.3				6" Concrete	
10	27	7.7			CL	CLAY WITH SAND AND TRACE OF GRAVEL: greenish gray, moist, high plasticity, fine-grained sand, fine-grained poorly-sorted subangular gravel.	
15	57	11.2				SANDY CLAY: orange brown, moist, low plasticity, fine-grained sand.	
20	30				ML	SANDY SILT: orange brown, moist, low plasticity, fine-grained sand.	
25	38	7.7				light brown, wet.	
						Boring Terminated at 25 feet. Boring converted to groundwater monitoring well. Groundwater encountered at 6 feet.	

Casing Diameter: 2" Slot Size: 0.020" Sand Size: #30 Grout: Portland Cement



Project No.: 2235 Boring: MW6 Plate: Attachment  
 Site: Tosco 76 Service Station 1156 Date: 8/29/01  
 Drill Contractor: Woodward Drilling Company, Inc.

Sample Method: Split Spoon Geologist: JOHN B. ROBBITT  
 Drill Rig: BK-81 Bore Hole Diameter: 8" Signature: [Signature]  
 Location: Western side of MacArthur Boulevard Registration: R.G. 4313  
approx. 30 feet north of Shell station Logged by: Rob Saur

DEPTH (ft)	BLOW COUNTS	PD/OTM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						6" Concrete	
5	24	10.6			ML	CLAYEY SILT: greenish gray, very moist, medium plasticity.	
10	19	10.0			ML	light brown, trace of fine-grained sub-angular sand (approx. 5%).	
15	24	6.0			ML	CLAYEY SILT WITH SAND: light brown, fine-grained sub-angular sand (approx. 15%).	
20	48	7.7			SM	SAND WITH SILT: orange brown, wet, medium-grained well-sorted well-rounded sand.	
25	50 5"					Boring terminated at 25 feet. Boring converted to groundwater monitoring well. Groundwater encountered at 5.5 feet.	

Casing Diameter: 2" Slot Size: 0.020, Sand Size: #3, Grout: Portland Cement



Project No.: 2235 Boring: MW7 Plate: Attachment  
 Site: Tosco 76 Service Station 1156 Date: 8/29/01  
 Drill Contractor: Woodward Drilling Company, Inc.  
 Sample Method: Split Spoon Geologist: JOHN B. ROBBITT  
 Drill Rig: BK-81 Bore Hole Diameter: 8" Signature: [Signature]  
 Location: Western side of MacArthur Boulevard Registration: R.G. 4313  
approx. 40 feet north of High Street Logged by: Rob Saur

DEPTH (ft)	BLOW COUNTS	PD/OVM (ppp)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						6" Concrete	
5	50 5"	25				SANDY SILT: brown with bluish green mottling, moist, low plasticity, 40% fine-grained sand.	
10	36	236					
15	35	8.9			ML	light brown, wet.	
20	25	57					
25	50 5"	19.3				reddish brown, 30% medium-grained sand.	
						Boring terminated at 25 feet. Boring converted to groundwater monitoring well. Groundwater encountered at 15 feet.	

Casing Diameter: 2" Slot Size: 0.020, Sand Size: #3, Grout: Portland Cement

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Well No: **MW-8**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Boulevard**

Date Drilled: **10/30/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

Page 1 of 2

Drilling Method: **HSA**

Hole Diameter: **8"**

Sampling Method: **Split Spoon**

Hole Depth: **25'**

Casing Type: **Schedule 40 PVC**

Well Diameter: **2"**

Slot Size: **0.010"**

Well Depth: **25'**

Gravel Pack: **#2/12**

First Water Depth: **23'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Elevation

Northing

Easting

## LITHOLOGY / DESCRIPTION

Well Completion		Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing							
								<p>Well Box</p> <p>Neat Cement</p> <p>Static Water Level: ▼</p>
		moist	0.1	Air-Knife @ 5:9:46	1		CL	Concrete = 6"
					2			Silty clay; black and brown; medium soft; medium to high plasticity; low toughness; trace orange mottling; moist; (0,0,100)
					3			
					4			
					5	↑	CL	Lean clay; black; medium stiff; medium plasticity and toughness; some fine sand; some fine to medium sub round gravel; moist; no odor; (15,20,65)
					6	↓		
					7			
					8			
					9			
		moist	0.2	@ 10*: 9:51	10	↑		Tan; some orange mottling; trace roots; some black staining; slight odor; (5,15,80)
					11	↓		
					12			
					13			
					14			
		moist	0.2	@ 15*: 9:56	15	↑	CL	Sandy clay; tan; orange mottling; trace roots; trace black staining; medium stiff; medium plasticity and toughness; sand fine grain; moist; no odor; (0,40,60)
					16	↓		
					17			
					18			
		moist	0.2	@ 20*: 10:P37	19	↑		Soft; medium to high plasticity; low toughness; (0,30,70)
					20	↓		
					21			
					22		SC	

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Well No: **MW-8**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Boulevard**

Date Drilled: **10/30/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

Page 2 of 2

Drilling Method: **HSA**

Hole Diameter: **8"**

Sampling Method: **Split Spoon**

Hole Depth: **25'**

Casing Type: **Schedule 40 PVC**

Well Diameter: **2"**

Slot Size: **0.010"**

Well Depth: **25'**

Gravel Pack: **#2/12**

First Water Depth: **23'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Elevation                      Northing                      Easting

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing								
		▽				23			
						24	↑		<b>SC Clayey sand; tan; orange mottling; medium grain; poorly graded; loose; wet; no odor (0,65,35)</b>
						25	↓		
						26			<b>Total Depth = 25 feet bgs</b>
						27			
						28			
						29			
						30			
						31			
						32			
						33			
						34			
						35			
						36			
						37			
						38			
						39			
						40			
						41			
						42			
						43			
						44			

# Delta Consultants

Project No: **C101156151**  
 Logged By: **Tabbitha Croy**  
 Driller: **Gregg Drilling & Testing**  
 Drilling Method: **HSA**  
 Sampling Method: **Continuous**  
 Casing Type: **NA**  
 Slot Size: **NA**  
 Gravel Pack: **NA**

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd**  
**Oakland, CA**  
 Hole Diameter: **4"**  
 Hole Depth: **35'**  
 Well Diameter: **NA**  
 Well Depth: **NA**  
 First Water Depth: **4'**

Boring No: **SB-1**  
 Date Drilled: **11/6/07**  
 Page 1 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 ▲\* = Selected for lab analysis

Elevation      Northing      Easting

Well Completion Backfill Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement	▽	wet	6.2	Air-Knife	1			<b>Asphalt - 6"</b> Fill; tan, with medium gravel; surrounded; no plasticity; high toughness; soft; moist; (45,5,50)	
					2			Fill; some clay; brown; gravel medium to coarse; sub rounded; some fine sand; moist	
					3				
					4				
					5				@ 4' large rocks; subround; wet; trace fine sand and clay; (90,5,5)
					6				
					7	▲			<b>CL</b> Lean clay; olive green; some fine to medium sand; some orange mottling; medium stiff; medium plasticity and toughness; wet; strong odor (0,30,70)
					8	▼			
					9	▲			Some black specs
					10	▼			Some black and red staining
					11	▲			
					12	▼			Sand fine to medium grain (0,40,60)
					13	▲			<b>SC</b> Poorly graded sand with clay; brown; some olive green mottling and gray staining; sand fine to medium grain; soft; loose; wet; strong odor (0,70,30)
					14	▼			
					15	▲			Red brown with orange and olive green mottling; medium stiff; (0,50,50)
					17	▼			<b>CL</b> Lean clay; some fine to medium sand; red brown with orange mottling and black specs; medium plasticity and toughness; medium stiff; wet; strong odor; (0,35,65)
					18	▲			
					19	▼			
					20	▲			Stiff; trace medium gravel; sand medium grain; (5,35,60)
					21	▼			
					22	▲			Some black staining

# Delta Consultants

Project No: **C101156151**  
 Logged By: **Tabbitha Croy**  
 Driller: **Gregg Drilling & Testing**  
 Drilling Method: **HSA**  
 Sampling Method: **Continuous**  
 Casing Type: **NA**  
 Slot Size: **NA**  
 Gravel Pack: **NA**

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd**  
**Oakland, CA**  
 Hole Diameter: **4"**  
 Hole Depth: **35'**  
 Well Diameter: **NA**  
 Well Depth: **NA**  
 First Water Depth: **4'**

Boring No: **SB-1**  
 Date Drilled: **11/6/07**  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 \* = Selected for lab analysis

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Elevation		Northing		Easting		LITHOLOGY / DESCRIPTION
Backfill	Casing					Depth (feet)	Sample Recovery Interval	Soil Type				
Neat Cement			wet	61.1		23					(5,40,55)	
			wet	78.1	@ 25 9:13	24					A lot of black specs, very stiff; sand medium to coarse; low plasticity; high toughness; odor; (5,40,55)	
			wet	41.2	@ 27 9:15	25					Tan; some black specs; trace orange mottling; coarse sand; trace fine gravel; sub angular; very stiff; (5,35,60)	
			wet	53.9		26					Red brown with orange mottling; soft; no plasticity; sand fine to medium; crumbles easily; (5,40,55)	
			wet	76.8		27					No orange mottling; medium stiff; low plasticity; (0,40,60)	
			wet	38.3		28					Stiff; red brown; some tan mottling; a lot of black specs; sand fine grain; trace coarse sand; (0,35,65)	
			wet	65.8	@ 33.5* 9:32	29					Medium stiff; red brown with black specs; medium plasticity and toughness	
						30					<b>SC</b> Poorly graded sand with clay; trace fine gravel; sand medium to coarse; red brown and orange; dark red staining; hard but crumbles easily; some black specs; gravel sub angular; wet; odor; (5,65,30)	
						31						
						32						
						33						
						34						
				35								
				36								
				37								
				38								
				39								
				40								
				41								
				42								
				43								
				44								

TD = 35 feet bgs

# Delta

Consultants

Project No: **C101156151** Client: **ConocoPhillips**  
 Logged By: **Tabbitha Croy** Location: **4276 MacArthur Blvd**  
 Driller: **Gregg Drilling & Testing** **Oakland, CA**  
 Drilling Method: **HSA** Hole Diameter: **4"**  
 Sampling Method: **Continuous** Hole Depth: **35'**  
 Casing Type: **NA** Well Diameter: **NA**  
 Slot Size: **NA** Well Depth: **NA**  
 Gravel Pack: **NA** First Water Depth: **22'**

Boring No: **SB-2**  
 Date Drilled: **11/5/07**  
 Page 1 of 2

- ▽ = First Water
- ▼ = Static Groundwater
- \* = Selected for lab analysis

Elevation Northing Easting

Well Completion Backfill Casing	Static Water Level	Moisture Content	PTD Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement					1			<b>Asphalt - 2"</b>	
					2			<b>CL Lean clay with gravel; tan; low to medium plasticity; high toughness; stiff; moist; gravel fine to medium; (30,0,70)</b>	
					3				
					4				
			moist	932.0	@ 5 8:43	5	▲		Tan with olive green mottling; medium plasticity and toughness; some silt; trace fine sand; moist; strong odor; (0,10,90)
			moist	1599	@ 7 8:45	6	▲		Red brown specs; some roots; medium stiff; trace fine gravel; (5,25,70)
			moist	1307	@ 8.5* 8:47	7	▲		(5,40,55)
			moist	1528	@ 10 8:49	8	▲		<b>SC Clayey sand; tan and olive green; some red brown mottling; red specs; sand fine to medium medium stiff; crumbles easily; no plasticity; gravel fine grain; moist; strong odor; (15,50,35)</b>
			moist	1335	@ 12* 8:51	9	▲		Loose; some black specs; red brown and tan
			moist	1227	@ 13.5 8:53	10	▲		<b>CL Lean clay; red brown; some olive green mottling; stiff; silty; some fine sand; some black specs; low plasticity; high toughness; moist; strong odor; (0,35,65)</b>
			moist	762	@ 15 8:55	11	▲		Sand fine to medium; trace fine gravel; red brown and tan; some olive green; (5,25,70)
			moist	308	@ 17 8:57	12	▲		Medium stiff; medium plasticity and toughness; red brown; some olive green; some black specs; (0,35,65)
			moist	182	@ 18.5 8:59	13	▲		Red brown; some pink staining; olive green mottling; crumbles easily; some fine gravel; (10,35,55)
			moist	124	@ 20* 9:04	14	▲		Red brown; doesn't crumble easily; some fine sand; odor; (0,40,60)
			wet	228	@ 22 9:06	15	▲		Medium soft; medium sand; trace fine gravel; some black specs; low plasticity; high toughness; (10,40,50)
		▽				16	▼		<b>SC Clayey sand; red brown with orange mottling;</b>

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Boring No: **SB-2**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Blvd**

Date Drilled: **11/5/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

Page 2 of 2

Drilling Method: **HSA**

Hole Diameter: **4"**

Sampling Method: **Continuous**

Hole Depth: **35'**

Casing Type: **NA**

Well Diameter: **NA**

Slot Size: **NA**

Well Depth: **NA**

Gravel Pack: **NA**

First Water Depth: **22'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Elevation		Northing		Easting		LITHOLOGY / DESCRIPTION		
Backfill	Casing					Depth (feet)	Sample Recovery Interval	Soil Type						
Neat Cement			wet	55.1	@ 25* 9:30	23	↓					black specs; silty; sand fine to medium; fine gravel loose; slightly cemented; wet; odor; (15,50,35)		
			wet	51.2		24	↑						Cemented; very stiff; sand medium grain; red brown; some orange mottling; (5,55,40)	
			wet	14.6		26	↓						<b>CL</b> Lean clay; red brown and tan with orange mottling; some black specs; medium stiff; medium plasticity and toughness; sand fine grain; wet; odor; (0,40,60)	
			wet	21.1		27	↑						Red brown with tan mottling	
			wet	13.7		28	↓						Black specs; stiff; trace fine gravel; low plasticity; high toughness; (5,35,60)	
			wet	2.3		29	↑						Some pink staining Medium soft; (5,40,55)	
			wet	11.1		30	↓						Red brown with black specs; very stiff; some fine sand; slight odor; (0,30,70)	
						31	↑						Medium stiff; (0,20,80)	
						32	↓							
						33	↑							
				34	↓									
				35	↑									
				36										
				37										
				38										
				39										
				40										
				41										
				42										
				43										
				44										

**TD = 35 feet bgs**

# Delta Consultants

Project No: **C101156151**  
 Logged By: **Tabbitha Croy**  
 Driller: **Gregg Drilling & Testing**  
 Drilling Method: **HSA**  
 Sampling Method: **Continuous**  
 Casing Type: **NA**  
 Slot Size: **NA**  
 Gravel Pack: **NA**

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd**  
**Oakland, CA**  
 Hole Diameter: **4"**  
 Hole Depth: **35'**  
 Well Diameter: **NA**  
 Well Depth: **NA**  
 First Water Depth: **21'**

Boring No: **SB-3**  
 Date Drilled: **11/2/07**  
 Page 1 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 \* = Selected for lab analysis

Elevation      Northing      Easting

Well Completion Backfill Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement					1			<b>Concrete - 6"</b>
					2			<b>CL Silty clay</b> ; tannish brown; medium plasticity; medium soft; low to medium toughness; moist; (0,0,100)
					3			@ 3' lean clay; stiff; medium plasticity; high toughness; moist; (0,0,100)
					4			
		moist	1.1	@ 5 8:54	5	↑		Some black streaks; tan; some red brown specs; some medium sand; no odor; (0,15,85)
		moist	0.7	@ 7* 8:57	7	↑		Some gray streaks; (0,20,80)
		moist	0.4	@ 8.5 9:00	9	↑		Some black specs; some white caliche; trace fine gravel; sand medium to coarse; (5,25,70)
		moist	0.6	@ 10 9:02	10	↑		Tan with red brown mottling
					11			
		moist	0.8	@ 12 9:04	12	↑		Red brown with tan; black specs; trace fine gravel; (10,25,65)
		moist	0.6	@ 13.5 9:07	14	↑		A lot of black specs; crumbles easily
		moist	0.6	@ 15* 9:09	15	↑		Very stiff; low plasticity
					16			
		moist	0.8	@ 17 9:11	17	↑		More sand; some silt; (5,35,60) <b>Silty lean clay</b> ; red brown with tan mottling; soft; some black specs; (0,35,65)
		moist	2.6	@ 18.5 9:15	19	↑		Trace fine gravel; medium soft; medium plasticity; crumbles easily; silty; (5,40,565)
		wet	36.1	@ 20* 9:21	20	↑		
					21			<b>SC Clayey sand</b> ; poorly graded with fine gravel; sand fine to medium; red brown with tan mottling; soft; loose; trace black specs; wet; slight odor; (5,55,40)
		wet	8.8		22			

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Boring No: **SB-3**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Blvd**

Date Drilled: **11/2/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

Page 2 of 2

Drilling Method: **HSA**

Hole Diameter: **4"**

Sampling Method: **Continuous**

Hole Depth: **35'**

Casing Type: **NA**

Well Diameter: **NA**

Slot Size: **NA**

Well Depth: **NA**

Gravel Pack: **NA**

First Water Depth: **21'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Elevation                      Northing                      Easting

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing								
Neat Cement			wet	3.7	@ 25* 9:48	23	↓		Breaks easily
						24	↑		Sand mostly medium grain; trace fine sand; red brown
			wet	1.8		25	↑		<b>CL</b> Lean clay with sand; fine to medium; red brown and tan with orange mottling; some red specs; stiff; low plasticity; high toughness; wet; no odor; (0,35,65)
			wet	1.7		26	↓		Some black specs; red brown and some tan; medium stiff; trace fine gravel; (5,40,55)
			wet	0.7		27	↑		Stiff; sand fine grain; tan with red brown mottling; (0,30,70)
			wet	0.5		28	↓		Tan; some red brown mottling; trace medium sand; very stiff; wet; (0,30,70)
			wet	1.1		29	↑		Trace gravel; sand medium to fine grain; wet; (5,30,65)
			wet	1.8		30	↓		A lot of black specs; red brown with tan mottling; sand fine grain; some medium grain; (0,25,75)
						31	↑		
						32	↓		
				33	↑				
				34	↓				
				35	↑				
				36					
				37					
				38					
				39					
				40					
				41					
				42					
				43					
				44					

**TD = 35 feet bgs**

# Delta Consultants

Project No: **C101156151** Client: **ConocoPhillips**  
 Logged By: **Tabbitha Croy** Location: **4276 MacArthur Blvd**  
 Driller: **Gregg Drilling & Testing** **Oakland, CA**  
 Drilling Method: **HSA** Hole Diameter: **4"**  
 Sampling Method: **Continuous** Hole Depth: **35'**  
 Casing Type: **NA** Well Diameter: **NA**  
 Slot Size: **NA** Well Depth: **NA**  
 Gravel Pack: **NA** First Water Depth: **17.5'**

Boring No: **SB-4**  
 Date Drilled: **10/30/07**  
 Page 1 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 \* = Selected for lab analysis

Elevation Northing Easting

Well Completion Backfill Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement								<b>Asphalt - 6"</b>	
					1			<b>CL</b> Lean clay; tan to olive green; medium plasticity; medium toughness; stiff; moist; some black staining; (0,0,100)	
					2				
					3				
					4				
			moist	7.5	@ 5 3:30	5	▲		Very stiff; high toughness; some red specs; trace medium sand; odor; (0,5,95)
			moist	27.5	@ 8* 3:32	6	▲		
			moist	25.3	@ 9 3:35	7	▲		Orange mottling
			moist	11.5	@ 11 3:37	8	▲		Tan some gray staining; stiff
			moist	6.5	@ 13.5* 3:39	9	▲		Tan and red brown; some medium sand; slight odor; (0,25,75)
			moist	5.5	@ 14 3:40	10	▲		Trace fine gravel; (5,30,65)
			moist	0.8	@ 16* 3:43	11	▲		<b>SC</b> Clayey sand; red brown and tan; slightly cemented but crumbles easily; soft; no plasticity; high toughness; sand medium grain; moist; slight odor; (5,60,30)
		▽	wet	0.7		12	▲		Low plasticity; sand fine to medium; wet; (0,60,40)
			wet	1		13	▲		Trace gray staining
			wet	1.1		14	▲		
			wet	0.3		15	▲		No plasticity; (0,65,35)
						16	▲		
						17	▲		
						18	▲		
						19	▲		
						20	▲		
						21	▲		
					22	▲			

# Delta Consultants

Project No: **C101156151** Client: **ConocoPhillips**  
 Logged By: **Tabbitha Croy** Location: **4276 MacArthur Blvd**  
 Driller: **Gregg Drilling & Testing** **Oakland, CA**  
 Drilling Method: **HSA** Hole Diameter: **4"**  
 Sampling Method: **Continuous** Hole Depth: **35'**  
 Casing Type: **NA** Well Diameter: **NA**  
 Slot Size: **NA** Well Depth: **NA**  
 Gravel Pack: **NA** First Water Depth: **17.5'**

Boring No: **SB-4**  
 Date Drilled: **10/30/07**  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 \* = Selected for lab analysis

Elevation Northing Easting

Well Completion Backfill Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement		wet	0.6	@ 27* 4:15	23	▼	CL	Lean clay; tan to red brown; medium soft; medium plasticity and toughness; some fine sand; moist; no odor; (0,15,85)
		wet	0.6		24	▲		
		moist	0.4		25	▼		
		moist	0.4		26	▲		
		moist	0.4		27	▼		
		moist	0.4		28	▲		
					29	▼		
					30	▲		
					31	No Recovery		
		moist	0.5		32	▼		
	moist	0.4	33	▲				
			34	▼				
			35	▲				
			36					
			37					
			38					
			39					
			40					
			41					
			42					
			43					
			44					

TD = 35 feet bgs

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Boring No: **SB-5**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Blvd**

Date Drilled: **11/1/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

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Drilling Method: **HSA**

Hole Diameter: **4"**

Sampling Method: **Continuous**

Hole Depth: **35'**

Casing Type: **NA**

Well Diameter: **NA**

Slot Size: **NA**

Well Depth: **NA**

Gravel Pack: **NA**

First Water Depth: **18'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Elevation

Northing

Easting

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing								
Neat Cement					Air-Knife				<p><b>Asphalt - 5"</b></p> <p><b>CL Lean clay</b>; olive green; medium stiff; medium plasticity and toughness; some medium sand and trace fine gravel; some gray staining; moist; strong odor; (10,25,65)</p> <p>Trace white caliche; very stiff; low plasticity; high toughness; with medium to coarse sand; trace fine gravel; (10,30,60)</p> <p>Tan and olive green; some red brown mottling; some medium sand; (0,20,80)</p> <p>Low to medium plasticity</p> <p>(0,25,75)</p> <p>Trace fine gravel; low plasticity; medium soft; (5,25,70)</p> <p>Crumbles easily; (5,35,60)</p> <p>Red brown with olive green mottling; stiff; (0,35,65)</p> <p><b>SC Clayey sand</b>; red brown and olive; trace gravel; green; poorly graded; loose; soft; crumbles easily; medium sand; fine gravel; wet; odor; (10,50,40)</p> <p>Red brown; soft; sand fine grain; trace fine gravel; black specs; medium plasticity and toughness; wet; odor; (5,50,45)</p>
			moist	468	@ 5 11:11	5	↑		
			moist	688	@ 7* 11:19	7	↑		
			moist	638	@ 8.5 11:20	9	↑		
			moist	573	@ 10 11:22	10	↑		
			moist	623	@ 12* 11:25	12	↑		
			moist	570	@ 13.5 11:27	14	↑		
			moist	532	@ 15 11:30	15	↑		
		▽	moist	157	@ 17* 11:32	17	↑		
			wet	100		19	↑		
			wet	53.6	@ 20 11:41	20	↑		
			wet	57	@ 22* 11:44	22	↑		

# Delta Consultants

Project No: **C101156151**

Client: **ConocoPhillips**

Boring No: **SB-5**

Logged By: **Tabbitha Croy**

Location: **4276 MacArthur Blvd**

Date Drilled: **11/1/07**

Driller: **Gregg Drilling & Testing**

**Oakland, CA**

Page 2 of 2

Drilling Method: **HSA**

Hole Diameter: **4"**

Sampling Method: **Continuous**

Hole Depth: **35'**

Casing Type: **NA**

Well Diameter: **NA**

Slot Size: **NA**

Well Depth: **NA**

Gravel Pack: **NA**

First Water Depth: **18'**

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Well Completion		Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Elevation		Northing		Easting		LITHOLOGY / DESCRIPTION
Backfill	Casing					Depth (feet)	Recovery Interval	Soil Type				
Neat Cement			wet	51.8		23	▼					<b>CL</b> Lean clay; tan with red brown mottling; black specs; fine sand; medium soft; medium plasticity and toughness; wet; odor; (0,30,70)  Some fine to medium sand; moist; slight odor  Stiff; (0,15,85) Tan and red brown with some olive green mottling  Medium stiff; (0,35,65)  <b>SC</b> Clayey sand; red brown; some black specs; trace fine gravel; sand medium grain; soft; loose; no plasticity; wet; slight odor; (10,50,40)  Some olive green mottling; medium stiff  <b>CL</b> Lean clay; light tan to olive green; stiff; some coarse sand; trace black specs; low to medium plasticity; high toughness; moist; odor; (0,15,85)
			moist	7.3		24	▲					
			moist	8.6		25	▼					
			moist	11.4		26	▲					
			wet	16.8	@ 30*	27	▼					
			wet	14.1	12:07	28	▲					
			moist	13.5		29	▼					
						30	▲					
						31	▼					
						32	▲					
				33	▼							
				34	▲							
				35	▼							
				36								
				37								
				38								
				39								
				40								
				41								
				42								
				43								
				44								

**TD = 35 feet bgs**

# Delta Consultants

Project No: **C101156151**  
 Logged By: **Tabbitha Croy**  
 Driller: **Gregg Drilling & Testing**  
 Drilling Method: **HSA**  
 Sampling Method: **Continuous**  
 Casing Type: **NA**  
 Slot Size: **NA**  
 Gravel Pack: **NA**

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd**  
**Oakland, CA**  
 Hole Diameter: **4"**  
 Hole Depth: **35'**  
 Well Diameter: **NA**  
 Well Depth: **NA**  
 First Water Depth: **17'**

Boring No: **SB-6**  
 Date Drilled: **10/31/07**  
 Page 1 of 2

▽ = First Water

▼ = Static Groundwater

\* = Selected for lab analysis

Well Completion		Elevation			Northing		Easting		LITHOLOGY / DESCRIPTION
Backfill	Casing	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type		
Neat Cement								<b>Asphalt - 3"</b>	
					1			<b>CL</b> Lean clay; olive green; medium stiff; medium plasticity and toughness; some tan coloring; some medium sand; medium to coarse gravel; moist; slight odor; (15,25,60)	
					2				
					3				
		moist	253	@ 5* 1:02	5	▲		Strong odor	
					6				
		moist	47.4	@ 7 1:05	7	▲		Stiff; sand fine to medium grain; (0,20,80)	
					8				
		moist	96.9	@ 8.5* 1:07	9	▲		Tan with olive green mottling; (0,25,75)	
					10				
		moist	33.8	@ 10 1:09	10	▲		Red brown and tan with olive green mottling; (0,30,70)	
					11				
		moist	12.7	@ 12* 1:11	12	▲		Low plasticity; high toughness; medium stiff; odor; (0,40,60)	
					13				
		moist	20.6	@ 13.5 1:14	14	▲		<b>SC</b> Clayey sand; red brown and tan; black specs; medium soft; slightly cemented but crumbles easily; poorly graded; no plasticity; high toughness; sand fine to medium; moist; odor; (0,55,45)	
					15			Red brown with black specs; (0,70,35)	
		moist	21	@ 15* 1:16	15	▲			
					16				
		wet	4.1	@ 17* 1:19	17	▲		Olive green and tan; some gray staining; loose; sand medium to coarse; wet; (0,65,35)	
					18				
		wet	15		19	▲		<b>CL</b> Lean clay with sand; red brown with black specs; sand fine grain; medium stiff; medium plasticity and toughness; wet; odor; (0,40,60)	
					20				
		wet	3.4		20	▲		Moist; slight odor; (0,30,70)	
					21				
		moist	1.8		22	▲		With fine to medium gravel; coarse sand; low	

# Delta Consultants

Project No: **C101156151**  
 Logged By: **Tabbitha Croy**  
 Driller: **Gregg Drilling & Testing**  
 Drilling Method: **HSA**  
 Sampling Method: **Continuous**  
 Casing Type: **NA**  
 Slot Size: **NA**  
 Gravel Pack: **NA**

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd**  
**Oakland, CA**  
 Hole Diameter: **4"**  
 Hole Depth: **35'**  
 Well Diameter: **NA**  
 Well Depth: **NA**  
 First Water Depth: **17'**

Boring No: **SB-6**  
 Date Drilled: **10/31/07**  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater  
 \* = Selected for lab analysis

Well Completion		Static Water Level	Elevation			Northing		Easting	LITHOLOGY / DESCRIPTION
Backfill	Casing		Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	
Neat Cement			moist	1.8	@ 24.5 1:30	23	▼	plasticity; high toughness; moist; (15,35,50)  Red brown to tan; ;some medium sand; trace fine gravel; stiff; low plasticity; high toughness; moist; no odor; (5,30,65)  Tan; some red brown spec; medium plasticity; (0,10,90)  Some black specs; medium soft; no plasticity; fine to medium red brown sand; high toughness; (0,25,75)  Dark brown and tan; stiff; some black staining; no odor; (0,40,60)  Olive green and tan; fine to medium sand; trace fine gravel; very stiff; some black specs but no staining; (5,25,70)  (0,20,80)	
			moist	1.4		24	▲		
			moist	1.1		25	▼		
			moist	0.8		26	▲		
			moist	0.6	@ 30.5* 1:43	27	▼		
			moist	0.5		28	▲		
			moist	0.9		29	▼		
						30	▲		
						31	▼		
						32	▲		
					33	▼			
					34	▲			
					35	▼			
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				
								<b>TD = 35 feet bgs</b>	

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgan Location: **4276 MacArthur Blvd.**  
 Driller: **Gregg Drilling** Oakland, California  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 30'  
 Casing Type: N/A First Water Depth: 23.5  
 Slot Size: N/A Static Water Depth: 6.21  
 Gravel Pack: N/A Well Depth: N/A

Boring No: SB-7  
 Date Drilled: 07/09/09  
 Page 1 of 2

▽ = First Water  
 ▼ = Static Groundwater

Boring Completion		Elevation			Northing		Easting		LITHOLOGY / DESCRIPTION	
Backfill	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Soil Type			
Neat Cement	▼	Moist	3.9 ppm	Air-Knife	1		CL	<b>Lean Clay with Sand;</b> light olive green to dark brown, stiff, medium plastic, hydrocarbon odor present.		
					2					
					3					
					4					
					5					
		Moist	▼	Moist	64.1 ppm	Air-Knife	6		CL	<b>Lean Clay with Sand;</b> olive green-brown, moist, medium stiff, fine to medium grained sand, strong hydrocarbon odor, visible contamination, low to medium plastic.
							7			
							8	×	CL	<b>Lean Clay with Sand;</b> same as above
							9			
							10			
							11		CL	<b>Lean Clay with Sand;</b> same as above, with increased stiffness; visible contamination, and strong petroleum hydrocarbon odor.
							12			
							13			
							14			
							15		CL	<b>Lean Clay with Sand;</b> brown to red brown, fine to coarse grained sand, low plasticity increased sand content, increasing moisture, slight hydrocarbon odor, stiff.
							16	×		
							17			
							18			
							19			
							20			
							21		CL	<b>Lean Clay with Sand;</b> same as above with increasing sand content; very stiff to hard.
							22			

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgar Location: **4276 MacArthur Blvd.**  
 Driller: **Gregg Drilling**  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 30.0'  
 Casing Type: N/A First Water Depth: 23.5  
 Slot Size: N/A Static Water Depth: 6.5'  
 Gravel Pack: N/A Well Depth: N/A

Boring No: SB-7  
 Date Drilled: 07/09/09  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater

Elevation Northing Easting

Boring Completion	Static Water Level	Moisture Content	PTD Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement	▽	Moist	0.5 ppm		23		✗	CL	<b>Lean Clay with Sand;</b> same as above; very strong hydrocarbon odor. <b>Clayey Sand;</b> brown, medium to coarse grained sand with clay, medium dense to dense, moist to wet, some olive green smearing. <b>Silty Sand;</b> brown, wet, medium to coarse grained, strong hydrocarbon odor. <b>Lean Clay with Sand;</b> brown, low to medium plastic, stiff, hydrocarbon odor.  <b>Poorly Graded Sand;</b> light brown.
		Moist		24				SC	
		Wet		25				SM	
		Moist		26				CL	
				27					
				28					
				29				SP	
				30					
				31					
				32					
		33							
		34							
		35							
		36							
		37							
		38							
		39							
		40							
		41							
		42							
		43							
		44							

**Total Depth of Boring = 30' bgs.**  
 Soil Sample SB-7@ 7.5-8' collected at 15:05 7/9/2009.  
 Soil Sample SB-7@ 15.5-16' collected at 15:10 7/9/2009.  
 Soil Sample SB-7 @ 23-23.5' collected at 15:15 7/9/2009.

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgan Location: **4276 MacArthur Blvd.**  
 Driller: **Gregg Drilling** Oakland, California  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 8.5'  
 Casing Type: N/A First Water Depth: N/A  
 Slot Size: N/A Static Water Depth: N/A  
 Gravel Pack: N/A Well Depth: N/A

Boring No: SB-8  
 Date Drilled: 07/10/09  
 Page 1 of 1

▽ = First Water  
 ▼ = Static Groundwater

Boring Completion		Elevation			Northing		Easting		LITHOLOGY / DESCRIPTION
Backfill	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Analyzed	Soil Type	
Neat Cement		Moist		Air-Knife & Hand Augered	1			CL	<b>Lean Clay with Sand;</b> thumb to fist sized gravel, with non-native pumice fill and black fines; high petroleum hydrocarbon odor.
					2				
			3						
			4						
			5						
		Very Moist	1453 ppm			6		GP	<b>Gravel with Sand;</b> gray, fine to medium grained with presence of possible compressed asphalt; visible black product; very moist.
					7				
			8						
						9			<b>Total Depth of Boring = 8.5' bgs.</b> <i>Note that boring was terminated at 8.5' bgs due to drilling conditions. At 7'bgs drillers indicated a slight resistance was felt on the rig. A sudden push through and drop was then recorded while advancing from 8.0-8.5' bgs, at which point a vibrating feel in the rod was felt.</i>  Soil sample SB-8 @ 7-7.5' collected at 13:21 7/10/2009.
						10			
						11			
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			
						21			
						22			

# Delta Consultants

Project No: C101156      Client: **ConocoPhillips**      Boring No: SB-9  
 Logged By: S. Meninger/ C. Morgan      Location: **4276 MacArthur Blvd.**      Date Drilled: 07/08/09  
 Driller: **Gregg Drilling**      Oakland, California      Page 1 of 2  
 Drilling Method: Macrocore      Hole Diameter: 3"  
 Sampling Method: Continuous      Hole Depth: 26.5'  
 Casing Type: N/A      First Water Depth: 26'  
 Slot Size: N/A      Static Water Depth: 24'  
 Gravel Pack: N/A      Well Depth: N/A

▽ = First Water  
 ▼ = Static Groundwater

Elevation      Northing      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample		Soil Type	LITHOLOGY / DESCRIPTION				
						Recovery	Analyzed						
Neat Cement			3.6 ppm	Air-Knife & Hand Augered	1			CL	<b>Lean clay with sand;</b> light olive green to brown, medium plasticity, thick.				
					2								
					3								
					4								
					5								
								2.5 ppm		6		CL	<b>Lean clay with sand;</b> same as above with gravel; visible contamination, and mild petroleum hydrocarbon odors.
					7								
					8								
					9								
					10								
										12		CL	<b>Lean clay with sand;</b> brown to orange brown, dry, medium plasticity, firm.
					13								
										16		CL	<b>Same as above.</b>
					17								
										20		CL	<b>Same as above.</b>
					21								
					22								

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgan Location: 4276 MacArthur Blvd.  
 Driller: **Gregg Drilling** **Oakland, CA**  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 26'  
 Casing Type: N/A First Water Depth: 26'  
 Slot Size: N/A Static Water Depth: 24'  
 Gravel Pack: N/A Well Depth: 26'

Boring No: **SB-9**  
 Date Drilled: 07/08/09  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater

Elevation Northing Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement	▼				23			CL	Same as above, with increased sands.
	▼				24				
					25				
					26				
					27				<b>Total Depth of Boring = 26' bgs.</b>
					28				Soil Sample SB-9@26' collected @ 18:40 07/08/09.
					29				
					30				
					31				
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgan Location: **4276 MacArthur Blvd.**  
 Driller: **Gregg Drilling** Oakland, California  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 23'  
 Casing Type: N/A First Water Depth: 16  
 Slot Size: N/A Static Water Depth: 6.21  
 Gravel Pack: N/A Well Depth: N/A

Boring No: SB-10  
 Date Drilled: 07/08/09  
 Page 1 of 2

∇ = First Water  
 ▼ = Static Groundwater

Elevation Northing Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION		
Neat Cement 	Static Water Level: ∇ at 6.21 ft	Moisture Content	1.8 ppm	Air-Knife & Hand Augered	1			CL	<b>Lean clay with sand;</b> olive green to brown, medium plastic, medium stiff, mild hydrocarbon odor; possible fill material.		
					2						
					3						
					4						
					5						
				Wet- Perched water in former UST pit.	899 ppm		6			GP	<b>Gravel with Sand;</b> gray, fine to medium gravel with fine to medium grained sand, loose, wet, fill material from former UST pit, no odor.
		7									
		8									
		9									
		10									
				Moist	7.6 ppm		11			SP	<b>Poorly Graded Sand with Gravel;</b> gray to dark gray, fine to medium grained sand, loose, wet, very strong hydrocarbon odor.
		12									
		13									
		14									
		15									
				Moist	545 ppm		16			SC	<b>Clayey Sand;</b> Dark gray, loose, wet, fine to medium grained sand, very strong hydrocarbon odor, visible contamination, trace fine gravel.
		17									
		18									
		19									
		20									
				Moist	6.6 ppm		21			CL	<b>Lean Clay with Sand;</b> brown with olive green mottling, stiff, low to medium plastic, fine to coarse grained sand, slight odor, trace fine gravel.
		22									

# Delta Consultants

Project No: C101156 Client: **ConocoPhillips**  
 Logged By: S. Meninger/ C. Morgan Location: 4276 MacArthur Blvd.  
 Driller: **Gregg Drilling** **Oakland, California**  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 28'  
 Casing Type: N/A First Water Depth: 16'  
 Slot Size: N/A Static Water Depth: 28'  
 Gravel Pack: N/A Well Depth: N/A

Boring No: SB-10  
 Date Drilled:  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater

Elevation Northing Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement	▼	moist	1.1 ppm		23		<input checked="" type="checkbox"/>	CL	Same as above, with increased sands.
					24				
					25				
					26				
					27				<b>Total Depth of Boring =</b>
					28				Soil Sample SB-10@ 12-12.5' collected at 7:55 07/10/09.
					29				Soil Sample SB-10@ 18-18.5' collected at 8:00 07/10/09.
					30				Soil Sample SB-10@ 22.5-23' collected at 8:05 07/10/09.
					31				
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				



Project No: C101156 Client: **ConocoPhillips** Boring No: SB-11  
 Logged By: S. Meninger/ C. Morgan Location: **4276 MacArthur Blvd.** Date Drilled: 07/10/09  
 Driller: **Gregg Drilling** Oakland, California Page 1 of 2  
 Drilling Method: Macrocore Hole Diameter: 3"  
 Sampling Method: Continuous Hole Depth: 44'  
 Casing Type: N/A First Water Depth: 42'  
 Slot Size: N/A Static Water Depth: N/A  
 Gravel Pack: N/A Well Depth: N/A

∇ = First Water  
 ▼ = Static Groundwater

Boring Completion		Elevation			Northing		Easting		LITHOLOGY / DESCRIPTION				
Backfill	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Soil Type						
Neat Cement			405 ppm	Air-Knife & Hand Augered	1		CL	<b>Lean clay with sand;</b> light olive green to brown, medium stiff to stiff, low to medium plasticity.					
					2								
					3								
					4								
					5								
								6.8 ppm		6		CL	<b>Lean clay with sand;</b> olive green, gray, brown; fine to medium coarse grained sand; trace fine to medium grained gravel; low plasticity; moist; strong hydrocarbon odor.
								16.7 ppm		7			
										8	✗		
										9		CL	<b>Lean clay with sand;</b> entirely green in color, very stiff to hard.
										10			
										11			<b>Lean clay with sand;</b> brown and olive green, moist, very stiff to hard, very strong hydrocarbon odor, low to medium plastic.
										12		CL	
										13			
								108 ppm		14			<b>Lean clay with sand;</b> decreasing sand content, medium to high plasticity, increasing moisture, slight hydrocarbon odor, very stiff to hard, trace fine gravel, visible contamination. *Driller reports very hard direct pushing.
										15			
										16	✗	CL	
										17			
										18			<b>Lean clay with sand;</b> brown with green mottling, medium plastic, trace fine gravel, slight odor, increasing moisture.
										19			
										20		CL	
										21			
										22			



Project No: C101156  
 Logged By: S. Meninger/ C. Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method: Macrocore  
 Sampling Method: Continuous  
 Casing Type: N/A  
 Slot Size: N/A  
 Gravel Pack: N/A

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, CA**  
 Hole Diameter: 3"  
 Hole Depth: 44'  
 First Water Depth: 42'  
 Static Water Depth: N/A  
 Well Depth: N/A

Boring No: SB-11  
 Date Drilled: 07/10/09  
 Page 2 of 2

▽ = First Water  
 ▼ = Static Groundwater

		Elevation			Northing		Easting			
Boring Completion	Static Water Level	Moisture Content	PTD Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement		Wet	5.8 ppm		23			CL	Poorly graded sand; brown, wet, no odor. Wetness in small portion-Not first water.	
					24			CL		Same as above; less visible contamination, increasing sand content.
		25								
		26								
		27								
		28			6.7 ppm			CL	Lean clay with sand; brown and olive green, increasing moisture, less visible contamination.	
		29								
		30								
		31								
		32			6.8 ppm		CL		Same as above; increasing sand content, visible contamination, red brown.	
		33								
		34								
		35								
		36			5.7 ppm		CL		Same as above; increasing moisture content.	
		37								
		38								
		39								
		40			7.5 ppm		CL		Same as above; wet.	
		41								
		42	▽							
		43								
		44								
										<b>Total Depth of Boring = 44' bgs.</b> SB-11 samples collected at 10:50, 10:55 & 11:00

# Delta Consultants

Project No: C101156  
 Logged By: A.Buehler  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
 Oakland, CA  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-12**  
 Date Drilled: 06/14/10  
 Page 1 of 3

▽ = First Water

▼ = Static Groundwater

Elevation

Northing

Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION			
Neat Cement				Hand Augered	1							
					2							
					3							
					4							
					5							
					5.2		SB-12 @ 12 9:44	6			CL	Sandy lean clay with gravel; brown with visible green contamination; moist.
								7				
								8				
								9				
					30.1		SB-12 @ 10 9:58	10			CL	Sandy lean clay clay; light brown; wet.
								11				
								12				
								13				
								14				
					NA		SB-12 @ 15 10:25	15			CL	Same as above. Saturated.
								16				
								17				
								18				
								19				
					64.7		SB-12 @ 20 10:36	20			CL	Sandy lean clay; brown; moist.
								21				
								22				

# Delta Consultants

Project No: C101156  
 Logged By: A. Buehler  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
 Oakland, CA  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-12**  
 Date Drilled:  
 Page 2 of 3

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion Backfill	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement					23			
					24			
					25			
			10.2		SB-12 @ 26 10:45		CL	Same as above, very stiff with large gravel
					27			
					28			
					29			
			NA		SB-12 @ 30 10:47		CL	Same as above; damp.
					31			
					32			
			3.5		SB-12 @ 35 10:58		CL	Same as above.
					36			
				37				
				38				
				39				
				40			No recovery.	
		5.6		SB-12 @ 41 11:42		CL	Sandy clay; <10% sands; brown; moist; slight odor.	
				42				
				43				
				44				

# Delta Consultants

Project No: C101156  
 Logged By: A. Buehler  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
 Oakland, CA  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: SB-12  
 Date Drilled:  
 Page 3 of 3

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement			NA	SB-12 @ 45 11:45	45			CL	Same as above with 20% gravel; 10% sand; damp.
					46				Sandy clay; light brown; 20% sand, no odor.
					47				
					48				
					49				
					50			CL	Same as above, with 15% gravel and 15% sand.
			3.3		SB-12 @ 50 11:54	50			<b>Boring terminated at 50 feet bgs.</b>
						51			
						52			
						53			
						54			
						55			
						56			
						57			
						58			
						59			
						60			
						61			
						62			
						63			
						64			
					65				
					66				

# Delta Consultants

Project No: C101156  
 Logged By: A.Buehler  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
 Oakland, CA  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: SB-13  
 Date Drilled: 06/18/10  
 Page 1 of 1

▽ = First Water

▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample		Soil Type	LITHOLOGY / DESCRIPTION
						Recovery	Analyzed		
Neat Cement				Hand Augered	1				
					2				
					3				
					4				
				SB-13	5				
				@ 6	6				Black, sandy, granular, tar-like material, very strong odor
				8:45	6				<b>Boring terminated at 6 feet bgs due to refusal.</b>
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				
					21				
					22				

# Delta Consultants

Project No: C101156  
 Logged By: C. Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, CA**  
 Hole Diameter: 3"  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-14**  
 Date Drilled: 06/17/10  
 Page 1 of 3

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Analyzed	Soil Type	LITHOLOGY / DESCRIPTION				
										Backfill			
Neat Cement	▽			Hand Augered	1			CL	Clay; green, visible contamination; with some tan, black and white gravel.				
					2								
					3								
					4								
					5								
							3335	SB-14 @ 8 11:50	8			CL	Lean Clay with sand; gray with visible green contamination, strong odor; moist.
							5553	SB-14 @ 10 11:50	9				
									10				
									11				
									12				
									13				
									14				
							107.5	SB-14 @ 15 11:54	15			CL	Same as above, with small coarse grained white and tan gravel at 16.5 to 18 feet bgs; moist.
									16				
									17				
									18				
									19				
									20			CL	Same as above, with increased fines at 21 feet bgs.
							11.2	SB-14 @ 20 12:01	21				
									22			GC	Same as above, with continued increased fines; gravel also present. Clayey Gravel with sand, thumb-sized white

# Delta Consultants

Project No: C101156  
 Logged By: C.Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method:  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, CA**  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-14**  
 Date Drilled: 06/17/10  
 Page 2 of 3

▽ = First Water

▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement					23				rock present; less odor than at previous depths.
					24				
					25				
			11.9		SB-14 @ 26 12:07			CH	Sandy fat clay with gravel; gray, tan, moist.
						27			
						28			
						29			
			NA		SB-14 @ 30 12:07			CH	Same as above.
						31			
						32			
						33			
			10.5		SB-14 @ 35 12:16			CL	Lean clay; light brown to tan; some small grained gravel; firm; slight odor; moist.
						36			
						37			
						38			
						39			
			18.5		SB-14 @ 40 12:22			CL	Same as above, with increased moisture and softness.
						41			
						42			
						43			
						44			

# Delta Consultants

Project No: C101156  
 Logged By: C.Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method:  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, CA**  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: SB-14  
 Date Drilled: 06/17/10  
 Page 3 of 3

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion Backfill	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement	▽		14.5	SB-14 @45 12:28	45		CL	<p>Possible second water bearing zone.            Sandy lean clay with silt to 48 feet bgs, then clay with sand and gravel to bottom of boring.</p> <hr style="border-top: 1px dashed black;"/> <p><b>Boring terminated at 50.5 feet bgs.</b></p>	
					46				
					47				
					48				
					49				
					50				
				10.6	SB-14 @ 50 12:28	51			
					52				
					53				
					54				
					55				
					56				
					57				
					58				
					59				
					60				
					61				
					62				
					63				
					64				
					65				
				66					



# Delta Consultants

Project No: C101156  
 Logged By: C.Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method:  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, CA**  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-15**  
 Date Drilled: 06/17/10  
 Page 2 of 2

▽ = First Water

▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
										Backfill
Neat Cement					23					
					24					
					25					
					26					
				10.9	SB-15 @ 26.5 2:18	27			GC	Same as above.
						28			CL	Sandy lean clay with with gravel, fine grained sands and gravel, more saturated (saturation due to sluff during drilling)
				5.2	SB-15 @ 30 2:18	30				
						31				
						32				
						33				
						34				
				10.7	SB-15 @ 35 2:24	35			CL	Same as above, moist.
						36				
						37				
						38				
						39				
				2.6	SB-15 @ 40 2:40	40			CL	Same as above.
						41				<b>Boring terminated at 41 ft due to refusal.</b>
						42				
						43				
						44				

# Delta Consultants

Project No: C101156  
 Logged By: A. Buehler  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method: Direct Push  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 Mac Arthur Blvd.**  
**Oakland, CA**  
 Hole Diameter: 3"  
 Hole Depth: 5.5'  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-16**  
 Date Drilled: 6/17/10  
 Page 1 of

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
										Backfill
Neat Cement				Air-Knife	1					
					2					
					3					
					4					
				53.4		5				
						6				
						7				
			moist		SB-16 @ 8'	8			CL	Lean clay; brown with green mottling, 5% sand, moist, strong odor.
						9				
			moist	90.1	SB-16 @ 10'	10				
						11				
			moist		10:49	12			CL	Lean clay; light brown, <5% fine grained sand, very dense/firm, moist, strong odor.
						13				
						14				
				13.7	SB-16 @ 15'	15			CL	Same as above, with light brown and orange mottling to 16 feet bgs.
					12:55	16				
						17				
						18			CL	Same as above to 21 feet bgs.
						19				
				12.0	SB-16 @ 20'	20			GC	Clayey gravel with sand, bown, wet
					1:00	21				
						22				



# Delta Consultants

Project No: C101156      Client: **ConocoPhillips**  
 Logged By: A. Buehler      Location: **4276 Mac Arthur Blvd.**  
 Driller: **Gregg Drilling**      **Oakland, CA**  
 Drilling Method: Sonic      Hole Diameter: 3"  
 Sampling Method: Direct Push      Hole Depth: 5.5'  
 Casing Type:      First Water Depth:  
 Slot Size:      Static Water Depth:  
 Gravel Pack:      Well Depth:

Boring No: SB-16  
 Date Drilled: 6/17/10  
 Page 3 of 3

▽ = First Water

▼ = Static Groundwater

Elevation      Northing      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION		
Neat Cement			11.5		45						
					46			CL	Clay; brown with <5% coarse grained sand very dense; moist.		
					47	SB-16 @ 46' 1:46					
					48				CL	Clay; tan with orange mottling <10% sand with some gravel; moist; very dense/firm.	
					49						
				8.3		SB-16 @ 50' 1:48	50				Boring Terminated @ 50' bgs.
							51				
							52				
							53				
							54				
							55				
							56				
							57				
							58				
							59				
							60				
							61				
							62				
							63				
							64				
							65				
				66							

# Delta Consultants

Project No: C101156

Logged By: C. Morgan

Driller: **Gregg Drilling**

Drilling Method: Sonic

Sampling Method: Direct Push

Casing Type:

Slot Size:

Gravel Pack:

Client: **ConocoPhillips**

Location: **4276 Mac Arthur Blvd.**

**Oakland, California**

Hole Diameter: 3"

Hole Depth:

First Water Depth:

Static Water Depth:

Well Depth:

Boring No: SB-17

Date Drilled: 06/16/10

Page 1 of 3

▽ = First Water

▼ = Static Groundwater

Elevation

Northing

Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
										Backfill
Neat Cement	▽			Hand Augered	1					
					2					
					3					
					4					
					5				CL	Sandy lean clay; gray with visible green contamination; trace amount of wood chips and coarse grained sand, pea to thumb sized gravel from 6-8 feet bgs.
					6					
					7					
					8				CL	Same as above, however sand becomes fine grained. Clay has more tan and orange coloring with hints of green contamination. Strong petroleum hydrocarbon odor.
					9					
					10					
					11					
					12					
					13				CL	Sandy lean clay with gravel, pea to thumb sized gravel, green and gray, moist, strong hydrocarbon odor.
					14					
					15				CL	Lean Clay with sand; tan, orange and some white and red mottling; more firm, and more coarse grained sand; moist.
					16					
					17					
					18				CL	Sandy lean clay with gravel, green, and white trace roots; rounded to subrounded, thumb sized gravel, very moist.
					19					
					20					
					21				CL	Same as above, however sandy clay becomes orange to tan; still very moist.
					22					

259.0

SB-17 @ 5 10:25

239.0

SB-17 @ 10 10:28

19.4

SB-17 @ 15 10:30

79.4

SB-17 @ 20 10:11

# Delta Consultants

Project No: C101156  
 Logged By: C. Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method: Direct Push  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 Mac Arthur Blvd.**  
**Oakland, California**  
 Hole Diameter: 3"  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-17**  
 Date Drilled: 06/16/10  
 Page 2 of 3

▽ = First Water

▼ = Static Groundwater

Elevation	Northing	Easting
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Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement			NA	SB-17 @ 25 10:17	23		CL	Same as above, with increased firmness.
					24			
					25			
					26			
					27			
					28			
					29			
					30			
					31		CL	
					32			
					33			
					34			
					35		CL	
					36			
					37			
					38			
					39			
					40		CL	
					41			
					42			
43								
44								

12.5

3.8

10.5

SB-17 @ 30 10:20

SB-17 @ 35 10:24

SB-17 @ 40 10:44

# Delta Consultants

Project No: C101156

Client: **ConocoPhillips**

Boring No: SB-17

Logged By: C. Morgan

Location: **4276 Mac Arthur Blvd.**

Date Drilled: 06/16/10

Driller: **Gregg Drilling**

**Oakland, California**

Page 3 of 3

Drilling Method: Sonic

Hole Diameter: 3"

Sampling Method: Direct Push

Hole Depth:

Casing Type:

First Water Depth:

Slot Size:

Static Water Depth:

Gravel Pack:

Well Depth:

▽ = First Water

▼ = Static Groundwater

Elevation	Northing	Easting
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Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION	
Neat Cement					45					
					46					
				36	SB-17 @ 47 11:02	47			CL	same as above.
						48				
						49				
				9.2	SB-17 @ 50 11:03	50				
						51				<b>Boring terminated at 50.5 feet bgs.</b>
						52				
						53				
						54				
						55				
						56				
						57				
						58				
						59				
						60				
						61				
						62				
						63				
						64				
						65				
					66					

# Delta Consultants

Project No: C101156  
 Logged By: C. Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, California**  
 Hole Diameter:  
 Hole Depth:  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: **SB-18**  
 Date Drilled: 06/14/10  
 Page 1 of 1

▽ = First Water

▼ = Static Groundwater

Elevation

Northing

Easting

Boring Completion	Static Water Level	Moisture Content	PTD Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Backfill					1				
				Hand Augered	2				
					3				
					4				
					5				
			12.5	SB-18 @ 7.5 3:05	8			CL	Fat clay, gray and green, some thumb sized white gravel/rock, moist.
			25.1	SB-18 @ 10 3:13	10				
					11				
					12				
					13				
			476.0	SB-18 @ 15 3:19	15			SM	Fine grained silty sand; black, saturated, very strong odor
					16			CH	Fat clay with sand, tan and gray, visible contamination.
					17				
					18				
					19				Clay with silt and sand; tan to gray; increased moisture; fine grained sand more abundant in bottom of sample with tan and orange coloring.
			11.1	SB-18 @ 20 3:26	20			CL	<b>Boring terminated at 20 feet bgs.</b>
					21				
					22				

Neat Cement

# Delta Consultants

Project No: C101156  
 Logged By: C. Morgan  
 Driller: **Gregg Drilling**  
 Drilling Method: Sonic  
 Sampling Method:  
 Casing Type:  
 Slot Size:  
 Gravel Pack:

Client: **ConocoPhillips**  
 Location: **4276 MacArthur Blvd.**  
**Oakland, California**  
 Hole Diameter: 3"  
 Hole Depth: 20'  
 First Water Depth:  
 Static Water Depth:  
 Well Depth:

Boring No: SB-19  
 Date Drilled: 06/15/10  
 Page 1 of 1

▽ = First Water  
 ▼ = Static Groundwater

Elevation                      Northing                      Easting

Boring Completion	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Recovery	Sample Analyzed	Soil Type	LITHOLOGY / DESCRIPTION
Neat Cement				Hand Augered	1				
					2				
					3				
					4				
					5				
					33.7	SB-19 @ 7.5 2:30		CL	Lean clay; gray with visible green contamination, some gravel.
					26.9	SB-19 @ 10 2:30		CL	Same as above.
					55.3	SB-19 @ 15 2:30		CL	Sandy lean clay; light brown to tan; some green contamination present; very firm; moist.
					58.4	SB-19 @ 20 2:52		CH	Fat clay with gravel; gray and some orange increased moisture; slight odor.
									<b>Boring terminated at 20 feet bgs.</b>

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-1**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		SM	Sand with Gravel (SM) - Possible fill material, brown to red brown, moist, medium dense to dense, medium to coarse sand
Bent. Grout		Moist			2			
Bent. Chips					3		SM	Silty Sand (SM) - Light brown, moist, medium dense, fine to coarse grained sand
#2/12 Sand		Moist			4			
				<b>SV-1-S</b>	5			Boring Terminated at 5' bgs. Groundwater Not Encountered
					6			
					7			Soil Sample SV-1-S collected at 10:15 7/7/2009
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3' - 4'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-2**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		SM	Silty Sand with Gravel (SM) - Brown, moist, medium dense, no odor, fine to coarse sand, well graded fine to medium grained gravel
Bent. Grout		Moist			2			
Bent. Chips					3			
#2/12 Sand		Moist		SV-2-S	4			Boring Terminated at 4' bgs. Groundwater Not Encountered
					5			Soil Sample SV-2-S collected at 14:05 7/7/2009
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

**Boring: SV-3**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		<b>SM</b>	<b>Silty Sand with Gravel (SM)</b> - Dark brown, medium dense, moist, no odor, fine to medium grained sand, possible fill material
Bent. Grout		Moist	17.2		2			
Bent. Chips					3		<b>CL</b>	<b>Lean Clay with Sand (CL)</b> - Dark brown, moist, medium plastic, stiff, hydrocarbon odor, lenses of olive green
#2/12 Sand		Moist	78.9		4			
				<b>SV-3-S</b>	5			Boring Terminated at 5' bgs. Groundwater Not Encountered
					6			
					7			Soil Sample SV-3-S collected at 13:25 7/7/2009
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-4**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		CL	<b>Lean Clay (CL)</b> - Dark brown with black mottling, moist, stiff, medium plastic
Bent. Grout		Moist	14.8		2			
Bent. Chips					3		CL	<b>Sandy Lean Clay (CL)</b> - Dark olive green to black, moist, medium stiff, medium plastic, slight hydrocarbon odor
#2/12 Sand		Moist	21.6		4			
				<b>SV-4-S</b>	5		ML	<b>Clayey Silt (ML)</b> - light brown with black mottling, moist, very dense, non-plastic
					6			Boring Terminated at 5' bgs. Groundwater Not Encountered
					7			Soil Sample SV-4-S collected at 12:40 7/7/2009
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-5**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		GW	<b>Well-Graded Gravel with Sand (GW)</b> - light brown, dense, medium grained, moist, possible fill material
Bent. Grout		Moist	27.3		2			
Bent. Chips					3		CL	<b>Lean Clay (CL)</b> - Gray/black to olive green, moist, medium stiff, medium, plastic, hydrocarbon odor
#2/12 Sand		Moist	237		4			
				<b>SV-5-S</b>	5			Boring Terminated at 5' bgs. Groundwater Not Encountered
					6			
					7			Soil Sample SV-5-S collected at 11:00 7/7/2009
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-6**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1		GW	Well-Graded Gravel with Sand (GW) - light brown, dense, medium grained, dry to moist, possible fill material.
Bent. Grout		Moist			2			
Bent. Chips					3		CL	Lean Clay with Sand (CL) - light olive green, moist, soft to stiff, low plastic, strong hydrocarbon odor
#2/12 Sand		Moist			4			
				SV-6-S	5			Boring Terminated at 5' bgs. Groundwater Not Encountered
					6			
					7			Soil Sample SV-6-S collected at 9:45 7/7/2009
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta Consultants

Project No: **C101156203**  
 Logged By: **S. Meninger/C. Morgan**  
 Driller: **Gregg**  
 Drilling Method: **Hand Auger**  
 Sampling Method: **Hand Drive**  
 Casing Type: **N/A**  
 Slot Size: **N/A**  
 Gravel Pack: **3.5' - 5'**

Client: **ConocoPhillips**  
 Location: **Oakland, CA**  
 Date Drilled: **7/7/2009**  
 Hole Diameter: **3.5"**  
 Hole Depth: **5'**  
 Well Diameter: **N/A**  
 Well Depth: **N/A**  
 First Water Depth: **N/A**  
 Static Water Depth: **N/A**

Boring: **SV-7**  
 Page 1 of 1

Location Map

Well Completion	Water Level	Moisture Content	PTD Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Interval	Soil Type	LITHOLOGY / DESCRIPTION
Asphalt					1			SM	<b>Gravelly Sand with Clay (SM)</b> - Brown to black, moist, medium dense to dense, medium grained gravel, possible fill material
Bent. Grout		Moist	25.9		2				
Bent. Chips					3			CL	<b>Lean Clay (CL)</b> - Blue-gray to light olive green, moist, stiff, medium plastic, slight hydrocarbon odor
#2/12 Sand		Moist	54.5		4				
				<b>SV-7-S</b>	5				Boring Terminated at 5' bgs. Groundwater Not Encountered
					6				
					7				Soil Sample SV-7-S collected at 11:30 7/7/2009
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				
					21				
					22				

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/9/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: **SVW-1**  
 Page 1 of 2

Elevation: Northing: Easting:

Well Completion		Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing								
See Construction Detail						1			CL Brown lean clay with sand and gravel, moist
						2			
						3			
						4			
						5		CH	Green/gray fat clay
									Total Depth = 5'
						6			
						7			
						8			
						9			
						10			
						11			
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			
						21			
					22				

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/9/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: SVW-2

Page 1 of 2

Elevation: Northing: Easting:

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill Casing					1		CL	Brown/green lean clay with sand and gravel, 20% sand, some gravel, cobbles, moist
				2				
				3				
				4				
					5		CH	Green/gray clay
					6			Total Depth = 5'
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

See Construction Detail

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/9/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: SVW-3  
 Page 1 of 2

Elevation: Northing: Easting:

Well Completion Backfill Casing	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
See Construction Detail					1		CL	Brown/green lean clay with sand and gravel, strong odor
					2			
					3		CH	Gray/green clay, strong odor
					4			
					5		Total Depth = 5'	
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/10/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: **SVW-4**

Page 1 of 2

Elevation: Northing: Easting:

Well Completion Backfill Casing	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
See Construction Detail					1		CL	Dark brown/greenish lean clay with sand, strong odor
					2			
					3		CH	Green/brown clay, stong odor
					4			
					5		Total Depth = 5'	
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/9/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: SVW-5

Page 1 of 2

Elevation: Northing: Easting:

Well Completion	Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
See Construction Detail					1		CL	Green/gray/black lean clay with sand, some gravel, wood debris, strong odor
					2			
					3		CH	Greenish gray clay, strong odor
					4			
					5		Total Depth = 5'	
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

# Delta

Consultants

Project No: C101156 Client: COP  
 Logged By: Alan Buehler Location: Oakland  
 Driller: Gregg Drilling Date Drilled: 8/9/2010  
 Drilling Method: Hand Auger Hole Diameter: 36"  
 Sampling Method: Hole Depth: 5'  
 Casing Type: 1/4" Tubing Well Diameter: 1/4"  
 Slot Size: Well Depth: 5'  
 Gravel Pack: #30

Boring/Well No: SVW-6

Page 1 of 2

Elevation: \_\_\_\_\_ Northing: \_\_\_\_\_ Easting: \_\_\_\_\_

Well Completion		Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery Interval	Soil Type	LITHOLOGY / DESCRIPTION
Backfill	Casing								
See Construction Detail						1		CL	Green/gray lean clay with sand, some gravel, some odor, asphalt debris
						2			
						3			
						4			
						5		CH	Green/brown clay, strong odor
									Total Depth = 5'
						6			
						7			
						8			
						9			
						10			
						11			
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			
						21			
						22			



AECOM Environment  
1220 Avenida Acaso  
Camarillo, CA 93012  
(805) 388-3775  
www.aecom.com

Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60\* Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-9A

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 10-15 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-18-13 / 13:05

Depth of Boring: 15 FT BGS

Drilling Contractor: ABC

Backfill: grout

Date/Time Finished: 03-18-13 / 13:20

Water Level: Not Encountered

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
0-5						CL	(0-5") ASPHALT		
5-2.5					242	CH	(5"- 2.5') LEAN CLAY, Dark Gray (5Y 3/1), medium-plastic, 90% clay, 5% silt, 5% fine-grained gravel, stiff, dry, Hydrocarbon odor		
2.5-6						CH	(2.5-6') FAT CLAY, Olive Gray (5Y4/2), high-plastic, 90% clay, 5% silt, 5% fine-grained gravel, very stiff, dry, Hydrocarbon odor		
6-9					3770	CL	(6-9') LEAN CLAY, Olive Gray (5Y4/2), medium-plastic, 80% clay, 10% silt, 10% fine-grained gravel, very stiff, dry, Hydrocarbon odor		
9-12.5					1005	CH	(9-12.5') FAT CLAY, Olive Gray (5Y4/2), high-plastic, 80% clay, 10% silt, 10% fine-grained gravel, very stiff, dry, Hydrocarbon odor		
12.5-15					1347	CL	(12.5- 15') LEAN CLAY, Dark Reddish Gray (4/2) / Olive Yellow (5Y 6/6) mottled, medium-plastic, 70% clay, 10% silt, 15% fine-grained gravel, 5% fine to coarse-grained sand, very stiff, dry, Iron staining starts at 13 Feet		
5	5.0, 5.0Dup								
8.5			8 9	2					
10			11, 11						
			9 12 13	1.5					
			13 14 15	1.5					
14			8 10	1	237				
15			12, 14						

Notes: Continuous Split Spoon from 8 Feet



AECOM Environment  
1220 Avenida Acaso  
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(805) 388-3775  
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Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60° Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-9B

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 15-20 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-15-13 / 13:20

Depth of Boring: 20 FT BGS

Drilling Contractor: ABC

Backfill: grout

Date/Time Finished: 03-15-13 / 14:00

Water Level: Not Encountered

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
								(0-6") ASPHALT	<p>2" Diameter Sched. 40 PVC Concrete Slurry Hydrated Bentonite Chips Monterey No. 3 Sand 0.020" Slotted Screen</p>
						CL	(6"-2.5') LEAN CLAY, very dark gray (5Y 3/1), medium-plastic, 90% clay, 5% silt, 5% gravel, medium dense, dry, Hydrocarbon odor (stronger at 4')		
					3247	CH	(2.5-7.0') FAT CLAY, olive gray (5Y 4/2), high-plastic, 90% clay, 5% silt, 5% gravel, stiff, dry, Hydrocarbon odor		
5	5.0				2416	CL			
						CL	(7.0-12') LEAN CLAY WITH SILT, SAND, AND LITTLE GRAVEL, olive gray (5Y 4/2), medium-plastic, 80% clay, 10% silt, 10% fine-grained gravel, very stiff, dry, Mn nodules, fine sand laminations		
10	9.0		6 8 9, 11	2	41.2	CL			
						CL	(12-13.5') LEAN CLAY, Dark Reddish Gray (4/2) / Olive Yellow (5Y 6/6) mottled, medium-plastic, 80% clay, 10% silt, 10% fine to coarse-grained gravel, very stiff, dry, Iron staining at 12 feet, odor decreasing at 13 feet, brownish yellow (10YR 6/6)		
						ML	(13.5-15') SILT WITH SAND, olive (5Y 5/3) mottled, low-plastic, 60% silt, 30% fine-grained sand, 10% clay, dense, dry		
15	14.0		6 8 9, 11	1.5 2	7.9 128	ML			
						SM	(15-18') SILTY SAND WITH GRAVEL, light brown (7.5YR 6/4), 40% fine to medium-grained sand, 40% silt, 20% fine to coarse-grained gravel (max size 0.5 inches), medium dense, moist		
						ML	(18-20') SILT WITH SAND AND GRAVEL, red brown (5YR 4/4), low-plastic, 50% silt, 20% fine to medium-grained sand, 20% fine-coarse grained gravel (max size 0.5 inches), 10% clay, medium dense, moist, slight odor at 18.5-18.8 feet in layer of coarse gravel		
20	19.0		6 8 9, 9 10, 12	2	0.7	ML			

Notes: Continuous Split Spoon from 8 Feet



AECOM Environment  
1220 Avenida Acaso  
Camarillo, CA 93012  
(805) 388-3775  
www.aecom.com

Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60\* Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-10A

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 10-15 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-18-13 / 10:40

Depth of Boring: 15 FT BGS

Drilling Contractor: ABC

Backfill: grout

Date/Time Finished: 03-18-13 / 11:00

Water Level: Not Encountered

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
0-2						ML	(0-2") ASPHALT		<p>2" Diameter Sched. 40 PVC Concrete Slurry Hydrated Bentonite Chips Monterey No. 3 Sand 0.020" Slotted Screen</p>
2-3				346	CL	(2'-3') CLAY WITH LITTLE GRAVEL, black (7.5 YR 2.5/1), medium-plastic, 80% clay, 10% silt, 10% fine-grained gravel, subangular, medium dense, dry			
3-8.5					657	CH	(3-8.5') FAT CLAY WITH TRACE OF SAND AND SILT, gray (2.5Y 5/1), high-plastic, 90% clay, 5% fine-grained sand, 5% silt, stiff, dry  -(increasing silt and sand @ 4')		
8.5-13				2	325	CL	(8.5-13') LEAN CLAY WITH SAND, olive (5 Y 5/3), medium-plastic, 70% clay, 20% fine-grained sand, 10% silt, stiff, dry, Iron staining from 12 to 15 feet		
13-14					1011	ML	(13-14') SILT WITH SAND AND GRAVEL, olive (5 Y 5/3), 70% silt, 20% fine to medium-grained sand, 5% clay, 5% gravel, stiff, dry-(13.8 - 14 feet decreased silt increase from fine to medium grained sand)  -(moist at 14')		
14-15				2	3222	ML			

Notes: Continuous Split Spoon from 8 Feet



AECOM Environment  
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www.aecom.com

Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60\* Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-10B

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 15-20 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-18-13 / 08:50

Depth of Boring: 22 FT BGS

Drilling Contractor: ABC

Backfill: grout

Date/Time Finished: 03-18-13 / 09:45

Water Level: 19 FT BGS

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
5	5.0				593	ML	(0-2") ASPHALT		<p>2" Diameter Sched. 40 PVC Concrete Slurry Hydrated Bentonite Chips Monterey No. 3 Sand 0.020" Slotted Screen</p>
						CL	(2"-2') LEAN CLAY WITH SAND AND GRAVEL, reddish brown (5 YR 5/4), low plastic, 70% clay, 20% fine to medium-grained sand, 10% fine-grained gravel (max size 0.25 inches), medium dense, dry		
10	9.0		6, 8, 9, 11	2	255	CH	(5-11.5') FAT CLAY, olive gray (5Y 5/2), medium-plastic, 90% clay, 10% silt, stiff, dry, hydrocarbon odor		
				1.5		CL	, increase in silt, odor decreased at 10 feet to 12 feet		
				1.5		CL	(11.5-13') LEAN CLAY WITH SILT, light yellowish brown (10YR 6/4), mottled at 7 feet, low-plastic, 80% clay, 20% silt, very stiff, dry		
15	15.0		9, 11, 12, 14	2		CL	(13-16') LEAN CLAY WITH SAND, light yellowish brown (10YR 6/4), low plastic, 70% clay, 20% fine to coarse-grained sand, 10% fine-grained gravel, very stiff, dry		
				1.5		ML	(16-16.5') SILT WITH CLAY, brown (10YR 4/3), 80% silt, 15% sand, 5% clay, medium dense, moist		
						SM	(16.5-16.8') SILTY SAND, brown (10YR 4/3), 75% fine-grained sand, 20% silt, 5% clay, medium dense, moist		
						SW	(16.8-17') WELL GRADED SAND, brownish yellow (10YR 6/6), 80% fine to medium-grained sand, 10% silt, 10% fine-grained gravel (max size 0.25 inches), medium dense, moist, odor decreases		
						CL	(17-18.8') LEAN CLAY WITH SILT AND GRAVEL, brownish yellow (10YR 6/6), low-plastic, 70% clay, 10% silt, 10% fine to medium-grained sand, 10% fine-grained gravel, very stiff, dry-(clay, odor decreases 18.5 - 18.8 feet)		
20	20.0		10, 11, 13, 17	2	7.7	SM	(18.8-20') SILTY SAND WITH GRAVEL, dark gray (10YR 4/1), 50% fine to coarse-grained sand, 40% silt, 10% fine-grained gravel (max size 0.25 inches), medium dense, wet-(coarse gravel 19 -20 feet)		

Notes: GW at 19ft, Cont. SS after 8 Ft



AECOM Environment  
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Camarillo, CA 93012  
(805) 388-3775  
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Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60° Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-11A

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 10-15 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-19-13 / 10:15

Depth of Boring: 15 FT BGS

Drilling Contractor: ABC / Kenny

Backfill: grout

Date/Time Finished: 03-19-13 / 10:35

Water Level: Not Encountered

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
								(0-10") ASPHALT AND BASE	
						ML		(10"-10') SILT WITH SAND AND GRAVEL, dark yellowish brown (10YR 4/6), low-plastic, 60% silt, 20% fine to medium-grained sand, 10% clay, 10% fine to coarse-grained gravel (max size 3 inches), medium dense, dry, Hydrocarbon odor-(large cobbles at 2-2.5 feet)	
5	5.0				1380			-(gray staining at 4.5 feet)	
			6 8 10, 14						2" Diameter Sched. 40 PVC
									Concrete Slurry
10	9.0			2	4557				Hydrated Bentonite Chips
			6 8 10	1.5		CL		(10-11.5') LEAN CLAY, dark yellowish brown (10YR 4/6), medium-plastic, 70% clay, 15% silt, 10% fine-grained sand, 5% fine-grained subangular gravel, very stiff, dry	Monterey No. 3 Sand
						SM		(11.5-12.5') SILTY SAND, olive (5Y 5/3), 60% fine to coarse-grained sand, 30% silt, 10% fine-grained gravel, medium dense, wet, Hydrocarbon odor	
			4 6 13	1.5	2530	CH		(12.5-15') FAT CLAY, dark reddish gray (5YR 4/2)/ olive yellow (5Y 6/6), mottled, high-plastic, 80% clay, 20% silt, 20% fine-grained sand, very stiff, dry, odor decreases, (Fe and Mn staining and nodules)	0.020" Slotted Screen
15	14		6 8 8, 13	2	116				

Notes: Continuous Split Spoon from 8 Feet



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Client: Chevron Environmental Management Company

Project Number: 60287515

Site Description/Location: 351645 Oakland, Oakland, California

Coordinates: Not Surveyed Elevation: Datum:

Drilling Equipment/Method: /Hollow Stem Auger Weather: 60° Clear

Sample Type(s): Split Spoon Boring Diameter: 8 IN.

Boring No. MW-11B

Ambient PID Reading: 0.0

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 15-20 ft.

Approved By:

Logged By: J.Harms

Date/Time Started: 03-19-13 / 08:05

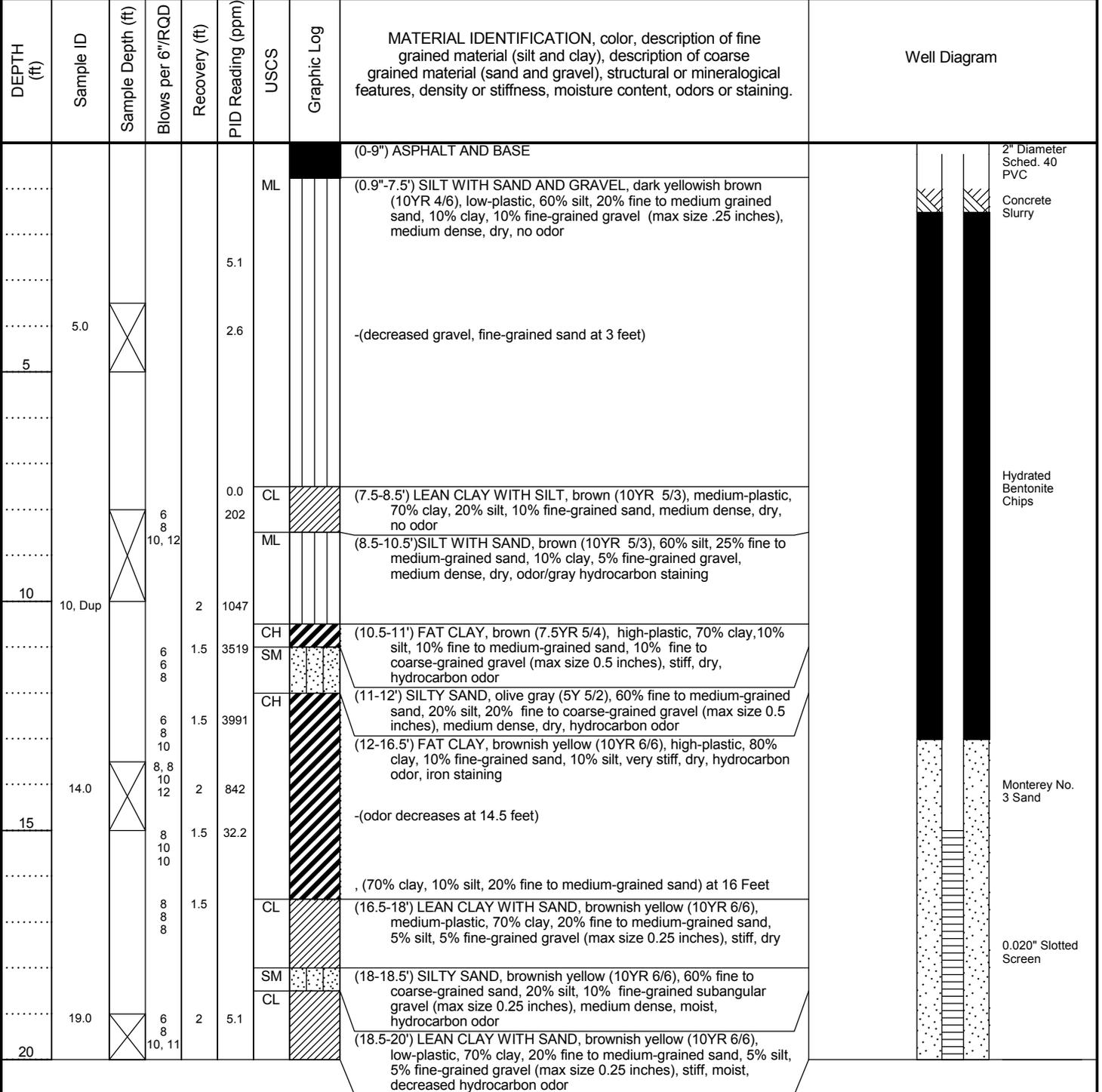
Depth of Boring: 20 FT BGS

Drilling Contractor: ABC / Kenny

Backfill: grout

Date/Time Finished: 03-19-13 / 09:00

Water Level: Not Encountered



Notes: Continuous Split Spoon from 8 Feet



1220 Avenida Acaso  
Camarillo, CA 93012  
(805) 388-3775  
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Client: Chevron EMC

Project Number: 60314377

Site Description/Location: 4276 MacArthur Blvd, Oakland, California

Coordinates: See Survey Elevation: Datum:

Drilling Equipment/Method: DPT Combo Rig/HSA Weather:

Sample Type(s): Direct Push Boring Diameter: 10 IN.

Boring No. MW-10S

Ambient PID Reading: NS

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 6.5-10 ft.

Approved By:

Logged By: J. Harms

Date/Time Started: 06-12-14 / 10:15

Depth of Boring: 10 FT BGS

Drilling Contractor: Penecore

Backfill: NA

Date/Time Finished: 06-12-14 / 10:45

Water Level: dry FT BGS

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
								3 INCH ASPHALT	
					0.4	ML		LEAN CLAY WITH SAND AND GRAVEL, brown (5YR 5/4), 70% low-plastic clay, 20% fine-to medium-grained sand, 10% fine-grained gravel (max size 0.25"), subangular, medium dense, dry, HC odor	Concrete
	MW-10S-2			1	2.6	CH		FAT CLAY, olive gray (5Y5/2) with orange mottling, 90% medium-plastic clay, 10% silt, stiff, dry, HC odor	Bentonite Chips
					0.7				
					4.1	CL		LEAN CLAY, olive gray (5Y5/2), 80% low-plastic clay, 10% fine-to medium-grained sand, 10% silt, stiff, dry, HC odor	
5	MW-10S-5			1	8.1	ML		SILT WITH SAND, olive gray and brown mottled (5Y 5/2 and 5YR 5/4), 60% silt, 20% low-plastic clay, 20% fine-to coarse-grained sand, dense, dry, odor decreases, gravel at 5.5' to 5.7'	Sand - Monterey #3
					0.4				
	MW-10S-7			1	28.1	CH		FAT CLAY, brown (10 YR 6/4) with grey staining, 90% medium-plastic clay, 10% silt, stiff, dry, HC odor and staining	
	MW-10S-8			1	2.9				0.020 Slot size
					24				
10	MW-10S-10			1	3.5			, 85% medium-plastic clay, 10% silt, 5% gravel	

Notes:



1220 Avenida Acaso  
Camarillo, CA 93012  
(805) 388-3775  
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Client: Chevron EMC

Project Number: 60314377

Site Description/Location: 4276 MacArthur Blvd, Oakland, California

Coordinates: See Survey

Elevation:

Datum:

Drilling Equipment/Method: DPT Combo Rig/HSA

Weather:

Sample Type(s): Direct Push

Boring Diameter: 10 IN.

Boring No. MW-11S

Ambient PID Reading: NS

Sheet: 1 of 1

Monitoring Well Installed: Yes

Screened Interval: 6.5-10 ft.

Approved By:

Logged By: J. Harms

Date/Time Started: 06-11-14 / 13:40

Depth of Boring: 10 FT BGS

Drilling Contractor: Penecore

Backfill: NA

Date/Time Finished: 06-11-14 / 13:40

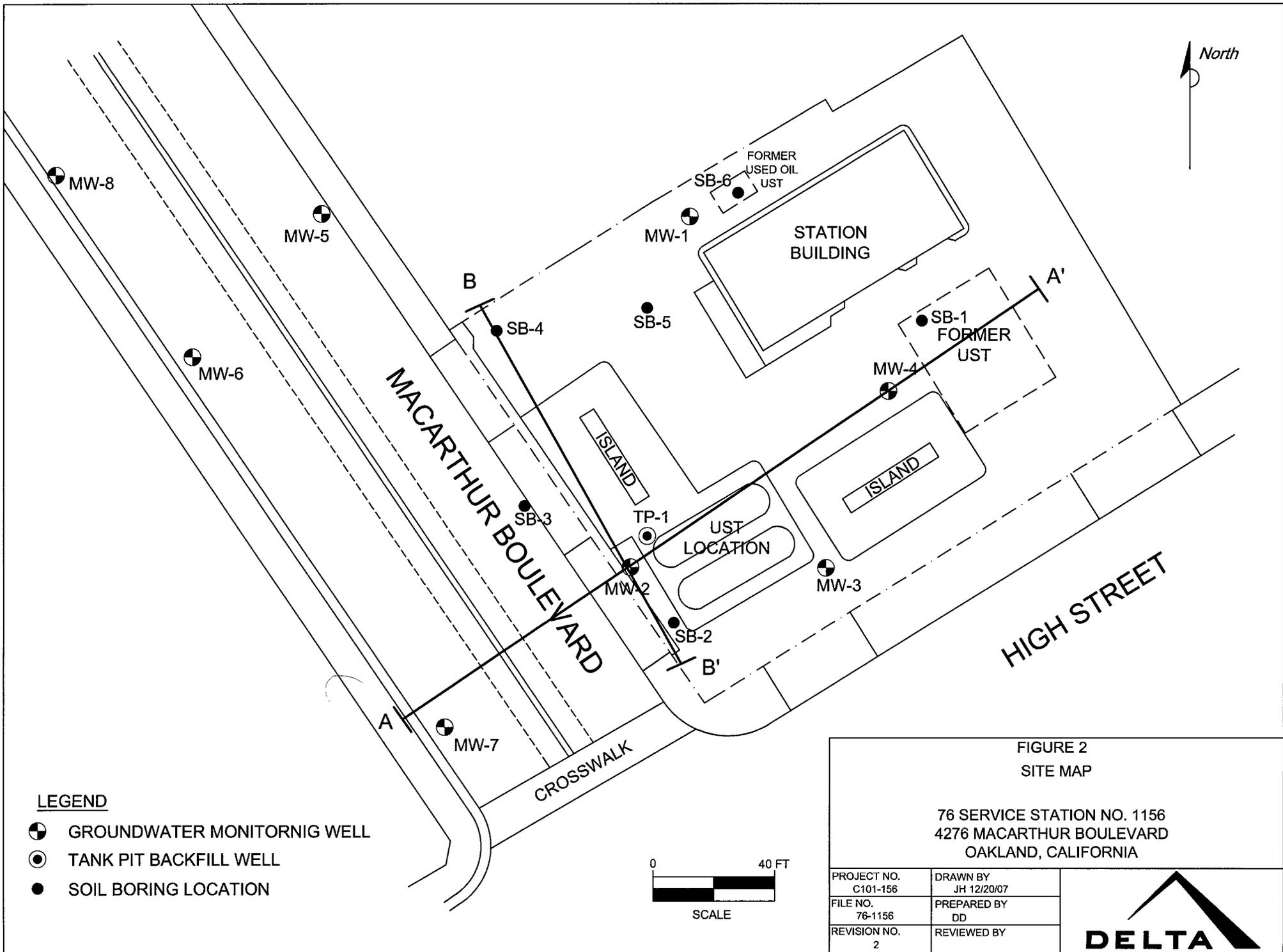
Water Level: 8.68 FT BGS

DEPTH (ft)	Sample ID	Sample Depth (ft)	Blows per 6"/RQD	Recovery (ft)	PID Reading (ppm)	USCS	Graphic Log	MATERIAL IDENTIFICATION, color, description of fine grained material (silt and clay), description of coarse grained material (sand and gravel), structural or mineralogical features, density or stiffness, moisture content, odors or staining.	Well Diagram
								6 INCH ASPHALT	
					0.0	SM		FILL, SILTY GRAVEL, brownish yellow (10YR 6/6), 60% fine-to coarse-grained gravel (max size 2"), 30% silt, 10% fine-grained sand, subangular, dry, no odor	Concrete
	MW-11S-2			1	0.0			, 60% fine-to coarse-grained gravel (max size 1.5"), 20% silt, 10% fine-grained sand, 10% clay	Bentonite Chips
					0.0	ML		LEAN CLAY WITH SILT, brown (10YR 5/3), 70% low-plastic clay, 20% silt, 10% fine-grained sand, medium dense, dry	
	MW-11S-4			1	0.4			, slight HC odor	
5					4.6			, moist at 5'-5.5'	Sand - Monterey #3
	MW-11S-6			1	16.0	CL		LEAN CLAY WITH SILT AND TRACE GRAVEL, gray HC stained, 60% low-plastic clay, 25% fine-to medium-grained sand, 10% silt, 5% fine-grained gravel (max size 0.25"), medium dense, dry, HC odor	
					15.8	ML		LEAN CLAY WITH SILT, gray HC stained, 55% low-plastic clay, 35% fine-to medium-grained sand, 10% silt, medium dense, dry, HC odor	
	MW-11S-8			1	47.5	ML		SILT WITH SAND, brown (7.5YR 5/4), 60% silt, 30% fine-to medium-grained sand, 5% non-plastic clay, 5% fine-grained gravel (max size 0.25"), medium dense, dry, HC odor	0.020 Slot size
					325				
10	MW-11S-10			1	361				

Notes:

# **Appendix D**

## **Historical Cross Sections**

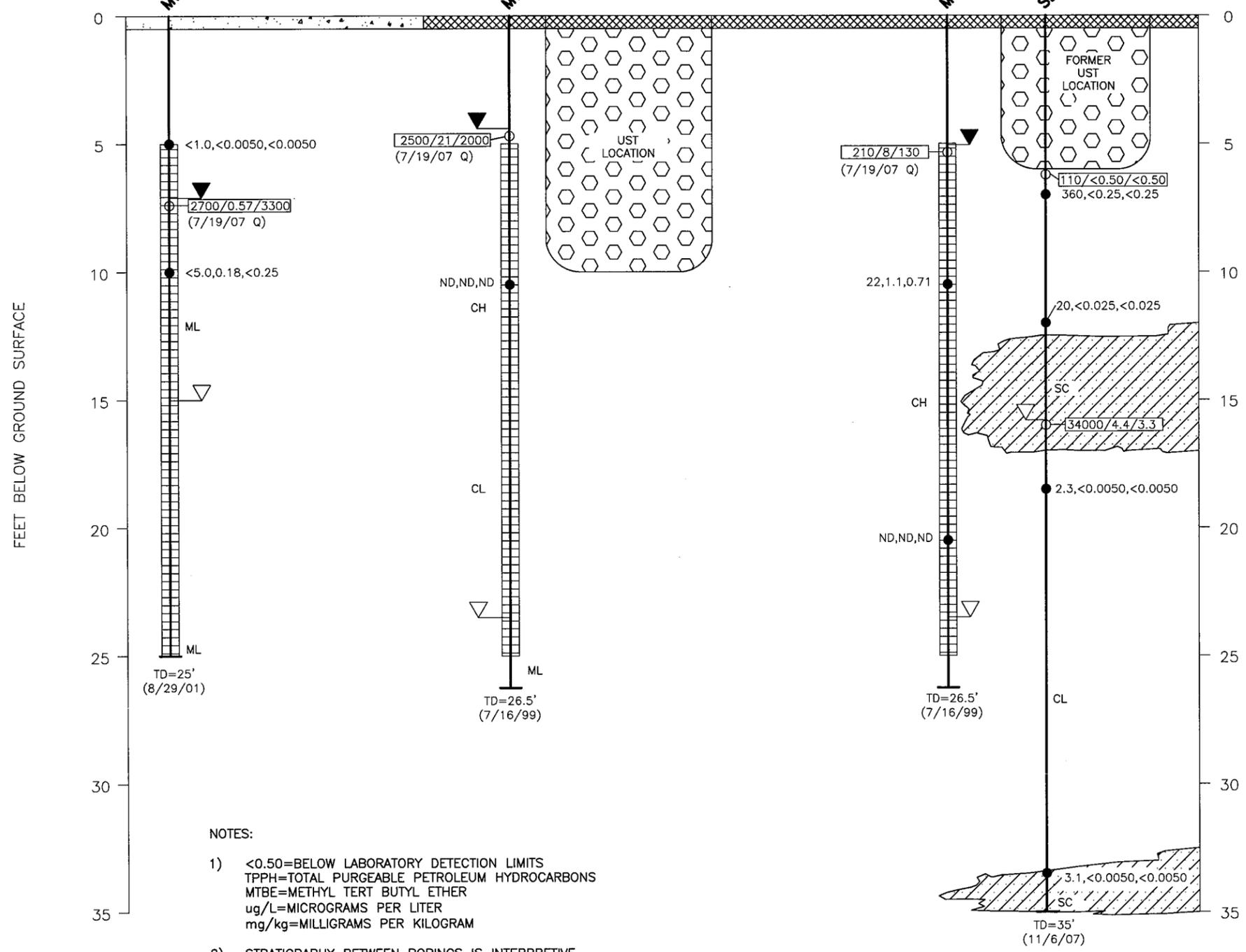


SOUTHWEST

NORTH

A

A'



LEGEND

- MONITORING WELL/SOIL BORING
- WELL CASING/EXPLORATORY BORING
- WELL SCREEN
- TOTAL DEPTH (DRILLING DATE)
- DEPTH TO FIRST WATER
- DEPTH TO GROUNDWATER (STATIC)
- SOIL SAMPLE LOCATION WITH ANALYTICAL DATA: TPPH, BENZENE, MTBE (mg/kg)
- GROUNDWATER SAMPLE LOCATION WITH ANALYTICAL DATA: TPPH, BENZENE, MTBE (ug/L)
- MONITORING WELL GROUNDWATER SAMPLE DATE Q=QUARTERLY SAMPLE
- ASPHALT
- CONCRETE
- CLAY AND/OR SILT (CH, CL, ML)
- SAND WITH CLAY (SC)
- UST FILL MATERIAL
- APPROXIMATE STRATIGRAPHIC BOUNDARY

NOTES:

- 1) <0.50=BELOW LABORATORY DETECTION LIMITS  
TPPH=TOTAL PURGEABLE PETROLEUM HYDROCARBONS  
MTBE=METHYL TERT BUTYL ETHER  
ug/L=MICROGRAMS PER LITER  
mg/kg=MILLIGRAMS PER KILOGRAM
- 2) STRATIGRAPHY BETWEEN BORINGS IS INTERPRETIVE.
- 3) GROUNDWATER SAMPLES FROM BORINGS WERE COLLECTED ON THE DRILLING DATE.
- 4) DEPTH TO FIRST WATER IN WELLS WAS MEASURED ON THE DRILLING DATE. DEPTH TO STATIC WATER IN WELLS MEASURED DURING MOST RECENT QUARTERLY SAMPLING EVENT.

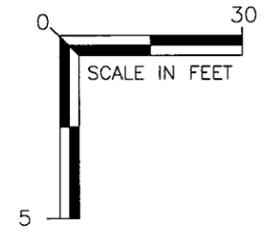


FIGURE 3  
GEOLOGIC CROSS SECTION A-A'

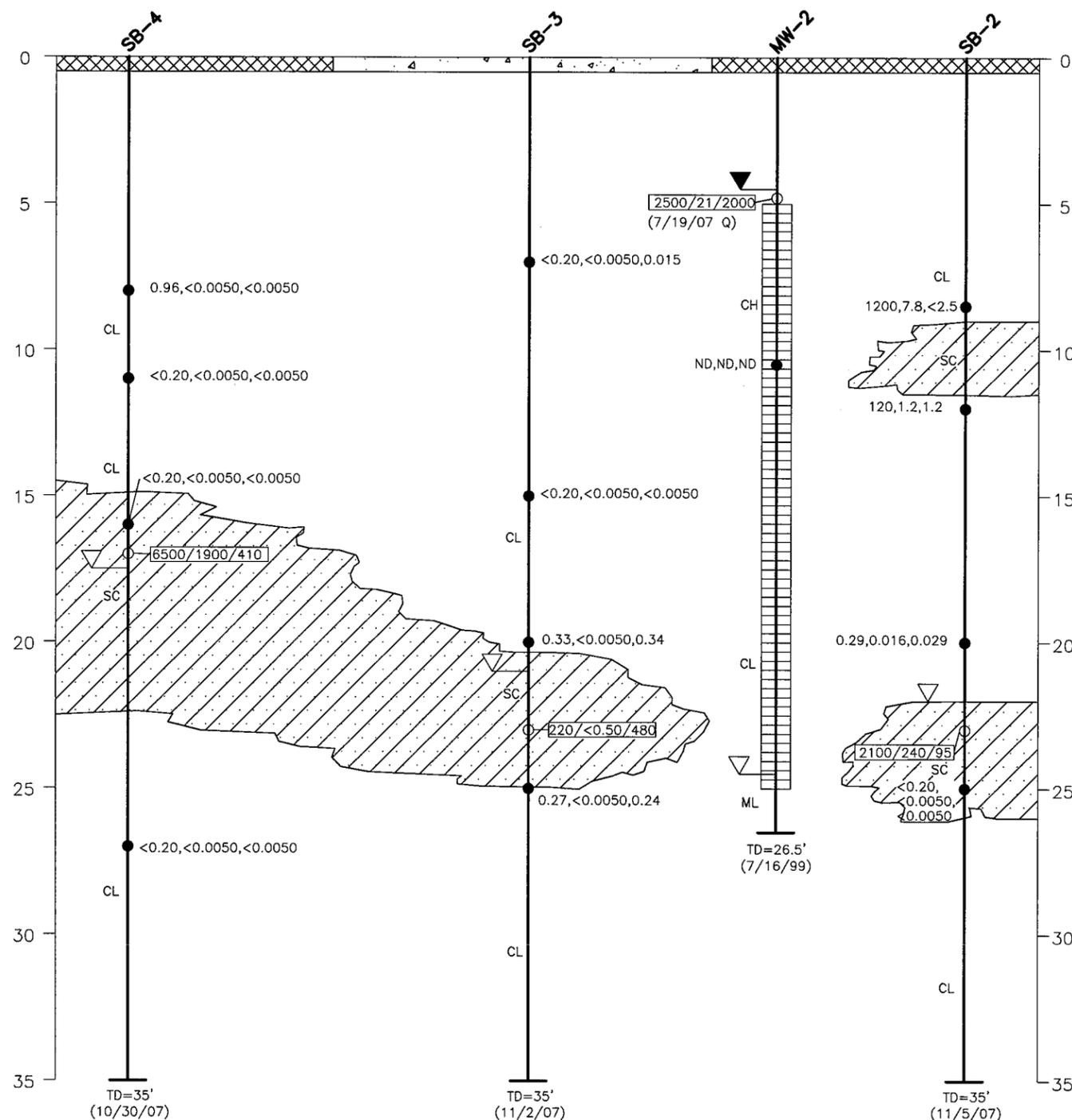
76 SERVICE STATION 1156  
4276 MACARTHUR BOULEVARD  
OAKLAND, CALIFORNIA

PROJECT NO. C101156	PREPARED BY MH	DRAWN BY JH	
DATE 12/26/07	REVIEWED BY	FILE NAME 1156-CrosA	

NORTHWEST  
B

SOUTHEAST  
B'

FEET BELOW GROUND SURFACE

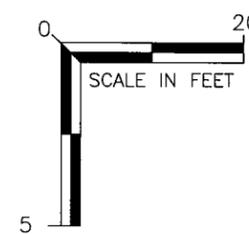


LEGEND

- MONITORING WELL/SOIL BORING
- WELL CASING/EXPLORATORY BORING
- WELL SCREEN
- TOTAL DEPTH (DRILLING DATE)
- DEPTH TO FIRST WATER
- DEPTH TO GROUNDWATER (STATIC)
- SOIL SAMPLE LOCATION WITH ANALYTICAL DATA: TPPH, BENZENE, MTBE (mg/kg)
- GROUNDWATER SAMPLE LOCATION WITH ANALYTICAL DATA: TPPH, BENZENE, MTBE (ug/L)
- MONITORING WELL GROUNDWATER SAMPLE DATE Q=QUARTERLY SAMPLE
- ASPHALT
- CONCRETE
- CLAY AND/OR SILT (CH,CL,ML)
- SAND WITH CLAY (SC)
- APPROXIMATE STRATIGRAPHIC BOUNDARY

NOTES:

- 1) <0.50=BELOW LABORATORY REPORTING LIMITS  
TPPH=TOTAL PURGEABLE PETROLEUM HYDROCARBONS  
MTBE=METHYL TERT BUTYL ETHER  
ug/L=MICROGRAMS PER LITER  
mg/kg=MILLIGRAMS PER KILOGRAM
- 2) STRATIGRAPHY BETWEEN BORINGS IS INTERPRETIVE.
- 3) GROUNDWATER SAMPLES FROM BORINGS WERE COLLECTED ON THE DRILLING DATE.
- 4) DEPTH TO FIRST WATER IN WELLS WAS MEASURED ON THE DRILLING DATE. DEPTH TO STATIC WATER IN WELLS MEASURED DURING MOST RECENT QUARTERLY SAMPLING EVENT.



**FIGURE 4**  
**GEOLOGIC CROSS SECTION B-B'**

**76 SERVICE STATION 1156**  
**4276 MACARTHUR BOULEVARD**  
**OAKLAND, CALIFORNIA**

PROJECT NO. C101156	PREPARED BY MH	DRAWN BY JH	
DATE 12/26/07	REVIEWED BY	FILE NAME 1156-CrosB	