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(a BP affiliated company)

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10:10 am, May 18, 2009

Alameda County
Environmental Health

bp

May 15, 2009

Re: Feasibility Study and Corrective Action Plan
Former BP Station #11133
2220 98th Avenue
Oakland, California
ACEH Case #RO0000403

"I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached document are true and correct."

Submitted by:

Paul Supple
Environmental Business Manager

FEASIBILITY STUDY AND CORRECTIVE ACTION PLAN
Former BP Station #11133
2220 98th Avenue
Oakland, California

Prepared for:

Mr. Paul Supple
Environmental Business Manager
Atlantic Richfield Company
P.O. Box 1257
San Ramon, California 94583

Prepared by:

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
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May 15, 2009

Project No. 06-88-656

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BROADBENT & ASSOCIATES, INC
ENVIRONMENTAL, WATER RESOURCES & ENGINEERING

May 15, 2009

Project No. 06-88-656

Atlantic Richfield Company
P.O. Box 1257
San Ramon, CA 94583
Submitted via ENFOS

Attn.: Mr. Paul Supple

Re: Feasibility Study and Corrective Action Plan, Former BP Station #11133
2220 98th Avenue, Oakland, California; ACEH Case #RO0000403

Dear Mr. Supple:

Broadbent & Associates, Inc. (BAI) is pleased to submit this *Feasibility Study and Corrective Action Plan* for Former BP Station #11133 (herein referred to as Station #11133) located at 2220 98th Avenue, Oakland, California (Site). This report was prepared in response to a directive letter from Mr. Paresh Khatri of Alameda County Environmental Health (ACEH) dated January 16, 2009.

Should you have questions or require additional information, please do not hesitate to contact us at (530) 566-1400.

Sincerely,
BROADBENT & ASSOCIATES, INC.

Matthew G. Herrick, P.G., C.HG.
Senior Hydrogeologist

Robert H. Miller, P.G., C.HG.
Principal Hydrogeologist

PROFESSIONAL GEOLOGIST
ROBERT H. MILLER
No. 561
CERTIFIED HYDROGEOLOGIST
STATE OF CALIFORNIA

Enclosures

cc: Mr. Paresh Khatri, Alameda County Environmental Health (Submitted via ACEH ftp site)
Ms. Shelby Lathrop, ConocoPhillips, 76 Broadway, Sacramento, California 95818
Electronic copy uploaded to GeoTracker

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1.0 INTRODUCTION

On behalf of the Atlantic Richfield Company, RM - a BP affiliated company, Broadbent & Associates, Inc. (BAI) has prepared this Feasibility Study and Corrective Action Plan for Former BP Service Station No. 11133, located at 2220 98th Avenue, Oakland, California (Site). This report was prepared in response to the request within the January 16, 2009 directive letter from Alameda County Environmental Health (ACEH). The directive letter specifically requested the preparation of a Feasibility Study and Corrective Action Plan to evaluate possible cleanup alternatives for the Site. A copy of the ACEH letter is provided in Appendix A. This report includes discussions on the site background and previous environmental activities, regional and Site geology and lithology, discussion of various remediation technologies and the recommended alternative, Work Plan for initiation of pilot scale remedial activities, and cleanup levels and goals.

The April 30, 2009 *Addendum Soil and Ground-Water Investigation Work Plan* was submitted to the ACEH. The Work plan proposed for the installation of three soil borings along the south side of Bancroft Avenue and collection of grab ground-water samples to further characterize the potential migration of contaminants. A response from the ACEH has yet to be received.

2.0 BACKGROUND INFORMATION

The Property is currently a vacant lot located at the southeastern corner of 98th Avenue and Bancroft Avenue in Oakland. The land use in the immediate vicinity of the Site is mixed commercial and residential. The property consists of a flat lot covered with gravel, soil, concrete, and low lying vegetation. A site vicinity map is provided in Drawing 1. BP acquired the facility from Mobil Oil Corporation in 1989. In January 1994, BP transferred the property to TOSCO Marketing Company (now known as ConocoPhilips) and has not operated the facility since that time. TOSCO ceased gasoline retail operations at the Site in 1999.

In June 1987, Kaprealian Engineering, Inc. (Kaprealian) removed one 10,000-gallon, one 8,000-gallon, and one 5,000-gallon single walled steel gasoline underground storage tanks (USTs) from the southwestern portion of the Site. Soil samples (A1, A2, B1, B2, and C1) were collected from the base of the tank cavity at depths of approximately 13.5 to 14 feet below ground surface (bgs). A summary of analytical results from this investigation are provided in Appendix B.

In May 1988, three ground-water monitoring wells (MW-1, MW-2, and MW-3) were installed on-site. Well locations, boring and well construction logs, and soil and ground-water analytical data from the installation activities are provided in Appendices B and C.

In January 1990, Alton Geosciences (Alton) oversaw the advancement of eight soil borings to various depths ranging between 16 and 35 feet bgs and the installation of eight temporary wells (TW-1 through TW-8) at the Site. Temporary wells TW-2 and TW-3 were installed off-site. The respective temporary wells were installed as part of a Supplemental Site Investigation to conduct a qualitative ground water survey. Soil samples were not collected for laboratory analysis from the well borings. Well locations and laboratory analytical data from this investigation are provided in Appendix B.

In May and June 1990, Alton oversaw the advancement of five soil borings and the installation of four ground-water monitoring wells (AW-1 through AW-4) and one recovery well (RW-1).

Wells AW-1 and RW-1 were installed on-site and the remaining wells were installed off-site. Boring and well construction logs, well locations and laboratory analytical data are provided in Appendices B and C. In July 1990, pump test and slug test activities were conducted at the Site, during which, approximately 100 gallons of product/water was pumped from recovery well RW-1 to control the migration of free product at the Site and appropriately disposed off-site.

In February and March 1991, as part of a Phase III-Supplemental Site Investigation Study, Alton oversaw the advancement of four soil borings (SBA-5 through SBA-8) which were converted into four ground-water monitoring wells (AW-5 through AW-8). Wells AW-5 and AW-6 were installed on-site while wells AW-7 and AW-8 were installed off-site. Boring and well construction logs and analytical data relating to this study are provided in Appendices B and C.

In March 1992, RESNA oversaw the advancement of three soil borings B-9 through B-11 in which three vapor extraction wells VW-1 through VW-3 were installed, respectively. A total of five soil samples were collected during the well installations. Ground-water samples were not collected from VW-1 through VW-3. Soil analytical data and boring logs from the well installation activities are provided in Appendices B and C.

In April 1992, a vapor extraction test (VET) was conducted on-site using vapor extraction wells VW-1 through VW-3 to evaluate the feasibility of using vapor extraction as a remedial alternative at the Site. Based on the estimated effective radius of influence calculated from the VET, soil vapor extraction was identified as a feasible remedial option for the Site. Soil vapor analytical data is provided in Appendix B. Also in April 1992, RESNA installed a GRS passive floating product removal system in RW-1 and initiated a program to manually remove the product collected by the system on a monthly basis.

In 1994, a SVE and ground-water treatment system was installed on-site and began operating in November 1994. The SVE and treatment system was initially connected to eight vapor extraction wells (VW-1 through VW-3 and VEW-4 through VEW-8) and recovery well RW-1. Vapor extraction wells VEW-4 through VEW-8 were installed in 1994 as part of the remediation system installed on-site. However, the drilling and installation activities associated with VEW-4 through VEW-8 are not on file and it is not known if soil or ground-water samples were collected from the respective borings. Vapor extraction well VEW-9 was installed and connected to the SVE and treatment system in April 1996. Analytical data associated with vapor well VWE-9 is provided in Appendices B.

Based upon available records, the SVE and ground-water treatment systems each operated intermittently until December 1998. Based on available operational data for the SVE system, as of December 27, 1995, a total of approximately 13,495.8 pounds of hydrocarbons had been removed from soils by the system. Based on available operational data for the ground-water treatment system, as of December 14, 1998, a total of approximately 344.4 pounds of hydrocarbons had been removed from on-site ground-water by the system and a total of approximately 166,358 gallons were removed. System analytical and operational data are provided in Appendix B.

In 1994, EMCON collected supplemental soil boring samples at the Site. However, a report documenting the investigation results could not be found on file.

In December 1996, Alisto drilled soil boring AW-9 to further delineate the extent of petroleum hydrocarbon contamination off-site. Soil boring AW-9 was converted to monitoring well AW-9. Soil samples were collected during soil boring installation activities. Well AW-9 was subsequently included in the ongoing ground-water monitoring program. Analytical data and boring and well construction logs from this installation are provided in Appendices B and C.

In October 1998, Gettler-Ryan, Inc. (GR) oversaw the removal of two 10,000-gallon and one 12,000-gallon USTs and associated product piping. No holes or cracks were observed in the tanks following removal. After the removal of the USTs and product piping, four tank-pit sidewall soil samples (SW-1 through SW-4) from approximately 12.0 feet bgs, two tank-pit ground-water samples (Water-1 and Water-2), and eight product piping soil samples (P1 through P8) from approximately 3.5 feet bgs were collected and analyzed. Approximately 655.40 tons of soil was excavated and removed from the Site during UST and product piping removal activities. Sampling locations and analytical data from this investigation are provided in Appendices B and C.

In May 2000, Newfields, Inc. (Newfields) performed a risk-based corrective action (RBCA) evaluation for the Site using Oakland and ASTM RBCA processes. The residual gasoline and diesel constituent concentrations in on-site soils and ground water were initially compared to concentrations presented in the Oakland RBCA Tier 1 and Tier 2 look-up tables, whose values are based on conservative, generic exposure and modeling parameters, resulting in conservative risk-based screening levels. Where Site conditions exceeded Oakland RBCA Tier 1 and Tier 2 levels, those conditions were further assessed under the Oakland RBCA Tier 3 analysis. The Tier 3 analysis replaces some of the conservative, generic assumptions of Tiers 1 and 2 with data that is representative of actual Site conditions, thereby providing a more accurate representation of existing and potential future risks. Accordingly, the results of the Oakland RBCA Tier 3 evaluation indicated that the residual levels of petroleum hydrocarbons in on-site soils and ground water were below City of Oakland and US EPA acceptable cancer risks and non-cancer risk levels. It was thereby concluded that on-site soil and ground-water conditions should not pose a risk to current and future on-site workers or off-site residents.

In December 2000, Newfields submitted a revised RBCA evaluation for the Site to ACEH incorporating agency feedback and further detailing previously provided information. However, the conclusions remained the same as in the May 2000 RBCA for the Site.

In compliance with regulatory requests and feedback on the December 2000 Newfields RBCA evaluation, a supplemental investigation was conducted in October 2001 by Cambria to assess inhalation potential exposure risks from residual subsurface hydrocarbon concentrations particularly to off-site residents. As part of the supplemental investigation, six soil borings (B-1 through B-6) were drilled in the eastern and southeastern property boundaries and soil, soil vapor, and ground-water samples were collected from the respective borings and analyzed. Two soil samples each were collected from borings B-1, B-2, B-3, B-5, and B-6, and four soil samples, including a duplicate, was collected from B-4 at depths ranging between 4.5 to 19.5 feet bgs. Three soil vapor samples were collected from each boring B-1 through B-6 at five foot depth intervals between five and 15 feet bgs. One ground-water sample was collected from each boring B-1 through B-6. Sample locations, analytical data, and boring logs, from this investigation are provided in Appendices B and C.

In May 2002, Montgomery Watson Harza (MWH) performed a revised RBCA evaluation for the Site using Oakland and ASTM Tier 1 through Tier 3 RBCA values. The purpose of the report was to evaluate whether petroleum hydrocarbon constituents detected in soil, soil vapor, and ground water at the Site presented a potential health risk to current and future on-site workers, and off-site residents. This revised RBCA evaluation primarily incorporated the October 2001 supplemental investigation soil, soil vapor, and ground-water analytical results to adequately evaluate potential exposure risks to the residential properties adjacent to the Site. The risks to off-site residents were addressed by the soil vapor data collected adjacent to the off-site residential structures, as soil vapor data is considered more representative of potential off-site residential exposures than soil or ground-water data. The results of the respective RBCA evaluation indicated that the theoretical upper-bound incremental lifetime cancer risks and non-cancer hazard indices associated with levels of Total Petroleum Hydrocarbons (TPH), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl tert-butyl ether (MTBE) in on-site soils and ground water were below acceptable levels. Accordingly, it was concluded that no further action was necessary for the protection of human health at the Site.

In October 2004, URS conducted a one-mile radius well survey for the Site. A review of the State of California Department of Water Resources (DWR) files and Environmental Data Resources, Inc. (EDR) files identified 11 domestic wells, seven irrigation wells, and one industrial well located within a one-mile radius of the Site. Fifteen well logs provided by DWR did not include addresses and therefore, those well locations could not be determined. Nine of the identified domestic wells and four irrigation wells were located approximately 0.75 miles down-gradient from the Site. However, no wells were identified within a 2,000 foot radius of the Site. Two former leaking UST sites with closed regulatory status were identified within 2,000 feet of the Site, but available records did not indicate the presence of monitoring wells in association with the two sites. According to the San Francisco Regional Water Quality Control Board "*East Bay Plain Groundwater Basin Beneficial Use Evaluation Report*", Figures 16 and 17, June 1999, there is one irrigation and one industrial shallow well (less than 100 feet bgs), and one deep irrigation well (greater than 100 feet bgs) located within 0.5 miles of the Site. Based on the sensitive receptor and well survey results, URS concluded that no sensitive receptors including wells were identified within a distance of the Site where the hydrocarbon impacted soil and ground water from the Site could likely pose a threat.

In October 2004, URS conducted an underground utility survey to identify potential migration pathways and conduits in order to assess the probability of petroleum hydrocarbon plume migration. The underground utilities identified during this survey included sanitary sewer lines, storm drains, East Bay Municipal Utility District (EBMUD) water lines, Pacific Gas and Electric (PG&E) lines, and trench lines associated with the former onsite remediation system. Underground utilities of potential concern identified where trenching extending to approximate depths of less than 4-5 feet bgs associated with the former on-site remediation system and sanitary sewer lines running directly beneath the south to southwestern portion and north to northwestern portion of the Site at approximate depths of 4 to 4.5 feet bgs. All other identified underground utilities were off-site and the underground utilities down-gradient of the Site do not extend beyond a maximum depth of approximately 6.5 feet bgs. Historically, the depth to ground water beneath the Site and in the immediate vicinity has ranged from 6.77 to 28.51 feet bgs (between April 1991 and July 2004) and has recently ranged from approximately 7.85 to 22.11 feet bgs (between July 2000 and present), fluctuating seasonally. Accordingly, since the maximum approximate depths of the identified on-site and off-site underground utilities are above the typical average and occasional historic highs of the depth to groundwater at the Site and the immediate vicinity, the identified underground utilities are unlikely to act as significant preferential conduits for dissolved hydrocarbon migration. Additionally, since no wells were identified within 2,000 feet of the Site, the potential for off-site wells acting as preferential conduits for dissolved hydrocarbon plume migration was not of concern.

In July and September 2005, URS conducted a soil and water investigation in order to further delineate the contaminant plume and perform a preferential pathway evaluation. Plume delineation included advancing two soil boring pairs (SB-1 and SB-2), which included one soil boring and one Hydropunch® boring at each location. The boring pair SB-1 was advanced to assess the extent of dissolved or free-phase hydrocarbons and evaluate the potential for off-site contaminant migration to the southeast, in front of the neighboring residence. The boring pair SB-2 was advanced to assess the extent of dissolved hydrocarbons cross-gradient of wells AW-5 and AW-6. The preferential pathway evaluation included the advancement of two soil borings (SB-3 and SB-4) along the sanitary sewer line running beneath the north and northwestern section of the Site at approximately 6.5 to 7 feet bgs to assess the potential of the sanitary sewer line acting as a preferential pathway for contaminant migration. In addition, the three existing down-gradient vapor extraction wells (VEW-4, VEW-5, and VEW-8), which are located in the vicinity of the sanitary sewer line on the Site, were sampled. A ground-water sample could not be collected from well VEW-5 due to dry conditions. A total of 22 soil samples and two ground-water samples were collected from borings SB-1 through SB-4. Results of the investigation indicated LPAPL was not migrating to the east/southeast and northeast beneath the neighboring residences and the sanitary sewer did not appear to be acting as a preferential pathway even during seasons of high ground water. Boring locations, analytical data, a geologic cross-section and boring logs from this investigation are provided in Appendices B, C, and D.

On July 8, 2005, URS submitted the *Nitrate/Sulfate Feasibility Study Work Plan*. The Work Plan was not approved by the ACEH until December 20, 2007. For various reasons documented in past transmittals to the ACEH, nitrate/sulfate addition work activities were never initiated.

Free product has been observed on-site in wells MW-1 and RW-1. Approximately 0.70 gallons of free product has been removed from well MW-1 and free product has not been observed in MW-1 since 1999. Approximately 161.29 gallons of free product has been removed from well RW-1 and free product has not been observed in RW-1 since 2001. Historic free product removal data are provided in Appendix B.

To date, a total of 23 ground-water monitoring and extraction wells have been installed at the Site and in the Site vicinity. These include 13 ground-water monitoring wells, seven of which are on-site (MW-1, MW-2, MW-3, AW-1, AW-5, AW-6, and RW-1) and six off-site (AW-2, AW-3, AW-4, AW-7, AW-8, and AW-9). Well RW-1 was installed as a dual extraction and monitoring well. There are eight on-site vapor extraction wells (VW-1 through VW-3 and VEW-4 through VEW-8) and one off-site extraction well (VEW-9). A quarterly ground-water monitoring program was initiated in April 1991 and is ongoing with a modified sampling schedule. Since the first quarter of 2001, the monitoring program at the Site began operating on a semi-annual basis. Monitoring of off-site wells AW-7, AW-8 and AW-9 was discontinued in 1998. Monitoring of on-site well MW-2 and off-site well AW-3 was discontinued in 2000. Currently, wells MW-1, MW-3, AW-1, AW-2, AW-4, AW-5, AW-6, and RW-1 are monitored semi-annually (first and third quarters). Historic free product removal and ground-water analytical data are provided in Appendix B and Tables 1-4.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

According to the *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report* (California Regional Water Quality Control Board – San Francisco Bay Region/SFRWQCB, June 1999), the Site is located within the Oakland Sub-Area of the East Bay Plain of the San Francisco Basin. The Oakland Sub-Area contains a sequence of alluvial fans. The alluvial fill thickness ranges from 300 to 700 feet deep. There are no well-defined aquitards such as estuarine muds. The largest and deepest wells in this sub-area historically pumped one to two million gallons per day at depths greater than 200 feet. Overall, sustainable yields are low due in part to low recharge potential. The Merritt sand in West Oakland was an important part of the early water supply for the City of Oakland. It is shallow (up to 60 feet), but before the turn of the last century, septic systems contaminated the water supply wells.

Throughout most of the Alameda County portion of the East Bay Plain, from Hayward north to Albany, water level contours show that the general direction of ground-water flow is from east to west or from the Hayward Fault to the San Francisco Bay. Ground-water flow direction generally correlates to topography. Flow direction and velocity are also influenced by buried stream channels that typically are oriented in an east to west direction. In the southern end of the study area however, near the San Lorenzo Sub-Area, the direction of flow may not be this simple. According to information presented in *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report*, the small set of water level measurements available seemed to show that the ground water in the upper aquifers may be flowing south, with the deeper aquifers, the Alameda Formation, moving north.

The Site is approximately two miles east of the San Leandro Bay, which is a small portion of the San Francisco Bay. The nearest surface water drainage is Arroyo Viejo, located approximately one mile north of the Site. Another creek, San Leandro Creek is located approximately 1 ¼ miles south of the Site. Both creeks originate in the East Bay Hills and drain directly into San Leandro Bay.

According to the *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report*, the City of Oakland does not have “any plans to develop local ground-water resources for drinking water purposes, because of existing or potential saltwater intrusion, contamination, or poor or limited quantity.” However, the California Regional Water Quality Control Board – San Francisco Bay Region’s Basin Plan denotes existing beneficial uses of municipal and domestic supply (MUN), industrial process supply (PROC), industrial service supply (IND), and agricultural supply (AGR) for the East Bay Plain ground-water basin.

The Site elevation is approximately 40 feet above mean sea level, where regional topography slopes to the west (USGS Topographic Map, Oakland East Quadrangle – 7.5 Minute Series).

The topography of the surrounding area is characterized by valleys and gentle slopes. The regional surface and ground-water flow is generally to the southwest, towards San Francisco Bay. The historical ground-water flow direction at the Site has been highly variable. However, the flow direction over the past one and a half years has been predominantly west to west-southwest (Table 3). The hydraulic gradient has ranged between 0.006 to 0.01 feet per foot since 2006 (Table 3). Depth-to-water measurements have ranged from 7.85 to 21.07 feet bgs (Table 1).

The Site is typically underlain by clay, silty clay, and clayey silt to depths of approximately 18 to 20 feet bgs. Geologic cross sections (Appendix C) show a silty sand lens at approximately three to four feet bgs and several silty sand and silty gravel lenses from approximately 13 to 17 feet bgs. Sandy clays, sandy silts, and silty sands are encountered at depths of approximately 19 to 40 feet bgs beneath the Site. The silty to clayey sand lens tapers to the south and is not encountered in well AW-4, which consists of silty clays to 35 feet bgs. The lens of sandy clays, sandy silts, and silty sands is underlain by silty clays, which extend to the total explored depth of all borings. Boring logs and Historical geologic cross-sections are presented in Appendices C and D.

Based on a rising head slug test conducted at the Site in July 1990, the transmissivity, hydraulic conductivity, and linear velocity of the aquifer material at the Site were calculated to be 9.0 $feet^2$/day, 0.6 feet/day (2.1×10^{-4} centimeters/second), and 6.0×10^{-3} feet/day, respectively. These values were reported to be representative of low permeability soil encountered at the Site and are within accepted values for clayey to silty sand. The results of an aquifer pump test conducted at the Site in April 1991, on recovery well RW-1 with nine observation wells located between 35 and 135 feet from the pumping well reported storativity and transmissivity values of 0.3493 and 0.1491 $feet^2$/minute, respectively. Assuming an aquifer thickness of 25 feet (based on screen interval for recovery well RW-1), the hydraulic conductivity was calculated to be 8.588 feet/day (3.029×10^{-3} centimeters/second). This hydraulic conductivity value corresponds to typical published values for silty sands (Fetter, 1988).

4.0 RISK ASSESSMENT

4.1 Site Conceptual Exposure Model

The Property is currently a fenced, vacant lot located at the southeastern corner of 98th Avenue and Bancroft Avenue in Oakland. The Site is not open to the public. Authorized environmental professionals performing sampling or other relevant activities are allowed on-site. Review of historical investigation data indicate that the majority of soil and ground-water contamination associated with the Site is present at depths generally greater than eight feet beneath the Site and to the southwest direction off-site beneath Bancroft Avenue. Public and general occupational exposure to these secondary sources of contamination is believed to be remote and/or of short duration.

4.2 Exposure Pathways

Potential exposure pathways associated with this Site include human inhalation, ingestion, and absorption risks by environmental professionals. A remote but unknown potential exposure pathway might be human inhalation by tradesmen in the underground utility installation and maintenance occupation. However, the soil concentrations present would seem unlikely to present a viable exposure pathway of concern. In addition, the absence of buildings on-site suggests that Site visitors would be congregating in open-air areas, greatly reducing the potential for exposure to vapor migration. Soil and ground-water contamination also appears to be present off-site to the southwest beneath Bancroft Avenue. Exposure pathways relating to current Site conditions and property use do not appear to be an issue at this time.

4.3 Risk Assessment Status

As stated above in Section 2.0, RBCA evaluations have been completed at the site. Results of the most recent evaluation (MWH, 2002) indicated that the theoretical upper-bound incremental lifetime cancer risks and non-cancer hazard indices associated with levels of TPH, BTEX, and MTBE in on-site soils and ground water were below acceptable levels. Accordingly, it was concluded that no further action was necessary for the protection of human health at the Site

5.0 FEASIBILITY STUDY

5.1 Screening of Remediation Technologies

Several potential full-scale remediation technologies described within the Remediation Technologies Screening Matrix and Reference Guide, 4th Edition (Federal Remediation Technologies Roundtable, 2002) were evaluated to identify feasible remediation alternatives for the conditions and contamination at the Site. The Federal Remediation Technologies Roundtable is a working group including the Federal Environmental Protection Agency, Department of Defense, Department of Energy, Department of the Air Force, Department of the Interior, Department of the Army, Department of the Navy, and National Aeronautics and Space Administration. Of the approximately 60 remediation technologies described, 11 remediation technologies (and two methods of recovery enhancement) were screened for viability in this section. In addition to the technologies listed, a No-Action option was evaluated. The No-Action option is typically included in feasibility studies to represent the baseline do-nothing action for comparison purposes. The technologies assessed in this initial screening are listed in the matrix below. Also presented is the media each technology would address.

Summary of Remediation Technologies Evaluated

	Media	
Remediation Technology	**Soil**	**Water**
No Action		
Excavation	X	
Bioventing	X	
Soil Vapor Extraction	X	
Dual-Phase Extraction and Treatment	X	X
Chemical Oxidation	X	X
Enhanced Bioremediation	X	X
Air Sparging	(X)	X
In-Well Air Stripping	(X)	X
Bioslurping		X
Ground Water Extraction and Treatment		X

Monitored Natural Attenuation		X
Recovery Enhancements		
Thermal Treatment	X	X
Fracturing/Hydrofracturing	X	X

5.1.1 No Action

Based on the hydrocarbon concentration trends in ground water, the no action option is not expected to be acceptable to ACEH. The no-action option is retained as a baseline for comparison.

5.1.2 Excavation

With excavation, contaminated material is physically removed and transported to permitted off-site treatment and/or disposal facilities. Factors that limit the applicability and effectiveness of the general process include:

- Generation of fugitive emissions may be a problem during operations.
- The distance from the contaminated site to the nearest disposal facility with the required permit(s) will affect cost.
- Depth and composition of the media requiring excavation must be considered.
- Transportation of the soil through populated areas may affect community acceptability.

At this time, minimal deeper soil impacts have been observed at the Site, potentially beyond the reach of conventional excavating equipment. Excavation would not address the concentrations of hydrocarbons in ground water at the Site. Excavation is therefore screened from consideration at this time.

5.1.3 Bioventing

Bioventing is an in-situ biological treatment that stimulates the natural in-situ biodegradation of aerobically degradable compounds in soil by providing oxygen to existing soil microorganisms. It does not directly address contamination in ground water. In contrast to soil vacuum vapor extraction (SVE), bioventing uses low air flow rates to provide just enough oxygen to sustain aerobic microbial activity. Oxygen is most commonly supplied through direct air injection into residual contamination in soil. In addition to degradation of adsorbed fuel residuals, volatile compounds are biodegraded as vapors move slowly through biologically active soil. Regulatory acceptance of this technology has been obtained in 30 states and in all 10 EPA regions. Bioventing is a medium to long-term technology. Cleanup ranges from a few months to several years. However, a critical factor that limits the applicability and effectiveness of this process is the presence of low to moderate permeability soils. Therefore, bioventing alone will not be retained for further consideration and evaluation due to the extensive presence of clays and silts at the Site which would severely reduce bioventing performance, and its inability to directly address ground-water contamination.

5.1.4 Soil Vapor Extraction

Soil Vapor Extraction (SVE) is an in situ unsaturated (vadose) zone soil remediation technology in which a vacuum is applied to the soil to induce the controlled flow of air and remove volatile contaminants from the soil. The gas leaving the soil may be treated to recover or destroy the contaminants, depending on local and state air discharge regulations. Vertical extraction vents are typically used at depths of five feet or greater and have been successfully applied as deep as 300 feet. Horizontal extraction vents (installed in trenches or horizontal borings) can be used as warranted by contaminant zone geometry, drill rig access, or other site-specific factors. For the soil surface, geomembrane covers are often placed over the soil surface to prevent short circuiting and to increase the radius of influence of the wells. Ground-water depression pumps may be used to reduce ground water upwelling induced by the vacuum or to increase the depth of the vadose zone. Air injection is effective for facilitating extraction of deep contamination, contamination in low permeability soils, and contamination in the saturated zone. The duration of operation and maintenance for in situ SVE is typically medium- to long-term.

Factors that may limit the applicability and effectiveness of the process include:

- Soil that has a high percentage of fines and a high degree of saturation will require higher vacuums (increasing costs) and/or hindering the operation of the in situ SVE system.
- Large screened intervals are required in extraction wells for soil with highly variable permeabilities or stratification, which otherwise may result in uneven delivery of gas flow from the contaminated regions.
- Soil that has high organic content or is extremely dry has a high sorption capacity for VOCs, which results in reduced removal rates.
- Exhaust air from in situ SVE system may require treatment to eliminate possible harm to the public and the environment.
- As a result of off-gas treatment, residual liquids may require treatment/disposal. Spent activated carbon will require regeneration or disposal.
- SVE is not effective in the saturated zone. However, lowering the water table can expose more media to SVE (this may address concerns regarding LNAPLs).

SVE has already been used on-site as a successful remedial method. Additionally, current and historic hydrocarbon concentrations within the soils analyzed on-site have been minimal. Therefore, SVE will not be retained for further consideration and evaluation.

5.1.5 Dual-Phase Extraction and Treatment

Dual-Phase Extraction (DPE), also known as multi-phase extraction and vacuum enhanced extraction, is a technology that uses a high vacuum system to remove various combinations of contaminated ground water, separate-phase petroleum hydrocarbons, and hydrocarbon vapor from the subsurface. Extracted liquids and vapors are treated and collected for disposal, or re-injected to the subsurface (where permissible under applicable state laws). In DPE systems for liquid/vapor treatment, a high vacuum system is used to remove liquid and gas from low permeability or heterogeneous formations. The vacuum extraction well includes a screened section in the zone of contaminated soils and ground water. It removes contaminants from above and below the water table. The system lowers the water table around the well, exposing more of the formation.

Contaminants in the newly exposed vadose zone are then accessible to vapor extraction. Once above ground, the extracted vapors or liquid-phase organics and ground water are separated and treated.

Factors that may limit the applicability and effectiveness of the process include:

- Site geology and contaminant characteristics/distribution.
- Combination with complementary technologies (e.g., pump-and-treat) may be required to recover ground water from high yielding aquifers.
- DPE requires both water treatment and vapor treatment.
- Soil type determines permeability, which is the primary cost driver. DPE works best for permeable sand-silt mixtures. Impermeable (clayey) or excessively permeable (gravel/sand) soils are more recalcitrant.

The critical factor that limits the applicability and effectiveness of this process at the Site is the presence of low permeability soils. Additionally, the SVE portion of the DPE technology has already been utilized at the Site and would most likely not be necessary due to the fact that current and historic hydrocarbon concentrations within the soils analyzed on-site have been minimal. Therefore, DPE will not be retained for further consideration and evaluation.

5.1.6 In-Situ Chemical Oxidation

In-situ chemical oxidation encompasses a wide range of technologies, including liquid chemical oxidant injection (e.g., hydrogen peroxide) and injection of air or ozone into the subsurface. The objective is to increase the oxygen content of ground water and enhance the rate of aerobic degradation of organic contaminants by naturally occurring microbes. For best results, factors that must be considered include redox conditions, saturation rates, presence of nutrient trace elements, pH, temperature, and permeability of the subsurface materials. In-situ chemical oxidation is a full-scale technology.

The following general factors may limit the applicability and effectiveness of the process:

- A ground-water circulation system may need to be created so that contaminants do not escape from zones of active biodegradation.
- Where the subsurface is heterogeneous, it is difficult to circulate the oxygenated solution throughout every portion of the contaminated zone. Higher permeability zones are cleaned up much faster because ground water flow rates are greater.
- High iron content in subsurface materials can rapidly reduce concentrations of oxygenated solutions.
- Amended hydrogen peroxide can be consumed very rapidly near the injection well, which can create two significant problems: biological growth can be limited to the region near the injection well, limiting adequate contamination/micro-organism contact throughout the contaminated zone; and biofouling of wells can retard the input of nutrients.
- A surface treatment system, such as air stripping or carbon adsorption, may be required to treat extracted ground water prior to re-injection or disposal.

In-situ chemical oxidation is a potentially effective treatment technology for the Site and will be retained for further evaluation and comparison of viable treatment alternatives.

5.1.7 Enhanced Bioremediation

Enhanced bioremediation is a process in which indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants found in soil and/or ground water, converting them to innocuous end products. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials. In the presence of sufficient oxygen (aerobic conditions), and other nutrient elements, microorganisms will ultimately convert many organic contaminants to carbon dioxide, water, and microbial cell mass.

Enhanced bioremediation typically involves the percolation or injection of ground water or uncontaminated water mixed with nutrients and saturated with dissolved oxygen. Sometimes acclimated microorganisms (bioaugmentation) and/or another oxygen source such as hydrogen peroxide is also added. An infiltration gallery is typically used for shallow contaminated soils, and injection wells are used for deeper contaminated soils and ground water.

In the absence of oxygen (anaerobic conditions), the organic contaminants will be ultimately metabolized to methane, limited amounts of carbon dioxide, and trace amounts of hydrogen gas. Under sulfate-reduction conditions, sulfate is converted to sulfide or elemental sulfur. Under nitrate-reduction conditions, dinitrogen gas is ultimately produced.

Enhanced bioremediation may be classified as a long-term technology which may take several years for cleanup of a plume. However, factors that may limit the applicability and effectiveness of the process include:

- Cleanup goals may not be attained if the soil matrix prohibits contaminant-microorganism contact.
- The circulation of water-based solutions through the soil may increase contaminant mobility and increase contaminant mobility and concentrations of the underlying ground water.
- Preferential colonization by microbes may occur causing clogging of nutrient and water injection wells.
- Preferential flow paths may severely decrease contaminant contact between injected fluids and contaminants through the contaminated zones. System is not optimal for clay, highly layered, or heterogeneous subsurface environments because of oxygen (or other electron acceptor) transfer limitations.
- Concentrations of hydrogen peroxide greater than 100-200 ppm in ground water inhibit the activity of microorganisms.

Enhanced Bioremediation is a potentially effective treatment technology for the Site and will be retained for further evaluation and comparison of viable treatment alternatives.

5.1.8 Air Sparging

Air sparging is an in situ technology in which air is injected through a contaminated aquifer. Injected air traverses horizontally and vertically in channels through the soil column, creating an underground stripper that removes contaminants by volatilization. This injected air helps flush (bubble) the contaminants up into the unsaturated zone where a vapor extraction system is usually implemented in conjunction with air sparging to remove the generated vapor phase contamination. This technology is designed to operated at high flow rates to maintain increased contact between ground water and soil and strip more ground water by sparging. Oxygen added to contaminated ground water and vadose zone soils can also enhance biodegradation of contaminants below and above the water table. Air sparging has a medium to long duration which may last, generally, up to a few years.

Factors that may limit the applicability and effectiveness of the process include:

- Air flow through the saturated zone may not be uniform, which implies that there can be uncontrolled movement of potentially dangerous vapors.
- Depth of contaminants and specific site geology must be considered.
- Air injection wells must be designed for site-specific conditions.
- Soil heterogeneity may cause some zones to be relatively unaffected.

The predominant clay layer from the surface to below ground water at the Site is thought to reduce the likely effectiveness of air sparging at the Site. Although not optimum due to the presence of clays at the Site, air sparging will be retained for further consideration and evaluation.

5.1.9 In-Well Air Stripping

With in-well air stripping technology air is injected into a vertical well that has been screened at two depths. The lower screen is set in the saturated zone, and the upper screen is in the unsaturated (vadose) zone. Pressurized air is injected into the well below the water table, aerating the water. The aerated water rises in the well and flows out of the system at the upper screen. Contaminated ground water is drawn into the system at the lower screen. The VOCs vaporize within the well at the top of the water table, as the air bubbles out of the water. The vapors are drawn off by a soil vapor extraction (SVE) system. The partially treated ground water is never brought to the surface; it is forced into the unsaturated zone, and the process is repeated as water follows a hydraulic circulation pattern or cell that allows continuous cycling of ground water. As ground water circulates through the treatment system in situ, contaminant concentrations are gradually reduced. Modification to the basic in-well stripping process may involve additives injected into the stripping well to enhance biodegradation (e.g., nutrients, electron acceptors, etc.). The duration of in-well air stripping is short- to long-term, depending upon contaminant concentrations, Henry's law constants of the contaminants, the radius of influence, and site hydrogeology.

Circulating wells provide a technique for subsurface remediation by creating a three-dimensional circulation pattern of the ground water. Ground water is drawn into a well through one screened section and is pumped through the well to a second screened section where it is reintroduced to the aquifer. The flow direction through the well can be specified as either upward or downward to accommodate site-specific conditions. Because ground water is not pumped above ground, pumping costs and permitting issues are reduced and eliminated, respectively. Also, the problems associated with storage and discharge are removed. In addition to ground water treatment, circulating well systems can provide simultaneous vadose zone treatment in the form of bioventing or soil vapor extraction.

Circulating well systems can provide treatment inside the well, in the aquifer, or a combination of both. For effective in-well treatment, the contaminants must be adequately soluble and mobile so they can be transported by the circulating ground water. Because circulating well systems provide a wide range of treatment options, they provide some degree of flexibility to a remediation effort.

The following factors may limit the applicability and effectiveness of the process:

- In general, in-well air strippers are more effective at sites containing high concentrations of dissolved contaminants with high Henry's law constants.
- Fouling of the system may occur by infiltrating precipitation containing oxidized constituents.
- Shallow aquifers may limit process effectiveness.
- Effective circulating well installations require a well-defined contaminant plume to prevent the spreading or smearing of contamination. They should not be applied to sites containing non-aqueous phase liquids to prevent the possibility of smearing the contaminants.
- Circulating wells are limited to sites with horizontal conductivities greater than 10^{-5} cm/sec and a ratio of horizontal to vertical conductivities between three and ten. A ratio of less than three indicates short circulation times and a small radius of influence. If the ratio is greater than ten, the circulation time may be unacceptably long.
- Circulating wells should not be utilized at sites that have lenses of low-conductivity deposits.
- In well stripping may not be efficient in sites with strong natural flow patterns.

The generally low permeability soils present at the Site is thought to limit the effectiveness of circulating wells. Therefore, in-well air stripping will not be retained for further evaluation.

5.1.10 <u>Bioslurping</u>

Bioslurping is the adaptation and application of vacuum enhanced dewatering technologies to remediate hydrocarbon-contaminated sites. Bioslurping utilizes elements of both, bioventing and free-product recovery, to address two separate contaminant media. Bioslurping combines elements of both technologies to simultaneously recover free product and bioremediate vadose zone soils. Bioslurping can improve free-product recovery efficiency without extracting large quantities of ground water. In bioslurping, vacuum-enhanced pumping allows light, non-aqueous phase liquids to be lifted off the water table and release from the capillary fringe. This minimizes changes to the water table elevation which minimizes the creation of a smear zone. Bioventing of vadose zone soils is achieved by drawing air into the soil due to withdrawing soil gas via the recovery well. The system is designed to minimize environmental discharge of ground water and soil gas. When free-product removal activities are completed, the bioslurping system is easily converted to a conventional bioventing system to complete the remediation. Operation and maintenance duration for bioslurping varies from a few months to years, depending on specific site conditions.

Factors that may limit the applicability and effectiveness of the bioslurping process include:

- Bioslurping is less effective in tight (low-permeability) soils.
- Low soil moisture content may limit biodegradation and the effectiveness of bioventing which tends to dry out soils.
- Low temperatures slow remediation.

- Frequently, the off-gas from the bioslurper system requires treatment before discharge. However, the treatment of off-gas may only be required shortly after the startup of the system as fuel rates decrease.
- At some sites, bioslurper systems can extract large volumes of water that may need to be treated prior to discharge depending upon the concentration of contaminants in the process water.
- Since the fuel, water and air are removed from the subsurface in one stream, mixing of the phases occurs. These mixtures may require special oil/water separators or treatment before the process water can be discharged.

The critical factor that limits the applicability and effectiveness of this process at the Site is the presence of low permeability soils. Furthermore, free product is not currently present at the Site. Therefore, bioslurping alone will not be retained for further consideration and evaluation.

5.1.11 Ground-Water Extraction and Treatment

In Ground Water Extraction and Treatment (GWET), ground water is pumped through a series of canisters containing activated carbon to which dissolved organic contaminants adsorb. This technology requires periodic replacement or regeneration of saturated carbon. Costs are typically high if used as the primary treatment on waste streams with high contaminant concentration levels. A GWET system operated at the Site from November 1994 through December 1998 removing approximately 344.4 pounds of hydrocarbons from recovery well RW-1. GWET will not be retained for further evaluation based on the fact that this technology has already been employeed a the Site and the general poor cost-effectiveness when compared to other technologies.

5.1.12 Monitored Natural Attenuation

Monitored Natural Attenuation (MNA) is sometimes referred to as Intrinsic Remediation, Bioattenuation, or Intrinsic Bioremediation. Natural subsurface processes such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials are allowed to reduce contaminant concentrations to acceptable levels. MNA is not a “technology” per se, and there is significant debate among technical experts about its use at contaminated sites. Consideration of this option usually requires modeling and evaluation of contaminant degradation rates and pathways and predicting contaminant concentration at down-gradient receptor points. The primary objective of site modeling is to demonstrate that natural processes of contaminant degradation will reduce concentrations below regulatory standards or risk-based levels before potential exposure pathways are completed. In addition, long-term monitoring must be conducted throughout the process to confirm that degradation is proceeding at rates consistent with meeting cleanup objectives.

Monitored natural attenuation is not the same as “no action,” although it is often perceived as such. CERCLA requires the evaluation of a “no action” alternative but does not require evaluation of natural attenuation. MNA is considered on a case-by-case basis, and guidance on its use is still evolving.

Compared with other remediation technologies, natural attenuation has the following advantages:

- Less generation or transfer of remediation wastes;

- Less intrusive as few surface structures are required;
- May be applied to all or part of a given site, depending on site conditions and cleanup objectives;
- MNA may be used in conjunction with, or as a follow-up to, other (active) remedial measures;
- Overall cost will likely be lower than active remediation.

Factors that may limit applicability and effectiveness include:

- Data used as input parameters for modeling need to be collected;
- MNA is not appropriate where imminent site risks are present;
- Contaminants may migrate before they are degraded;
- Institutional controls may be required, and the site may not be available for reuse until contaminant levels are reduced;
- If free product exists, it may have to be removed;
- Long-term monitoring and associated costs;
- Longer time frames may be required to achieve remediation objectives, compared to active remediation;
- The hydrologic and geochemical conditions amenable to MNA are likely to change over time and could result in renewed mobility of previously stabilized contaminants and may adversely impact remedial effectiveness; and
- More extensive outreach efforts may be required in order to gain public acceptance of MNA.

Based on the hydrocarbon concentration trends in ground water at the Site, a remediation strategy that employs monitored natural attenuation (MNA) would not be expected to be acceptable to ACEH unless implemented in conjunction with an active form of remediation or unless MNA-specific monitoring indicates that natural attenuation processes are occurring at the Site. MNA is retained for possible combination with other active technologies.

5.1.13 Hydrofracturing

Hydrofracturing is not a remediation treatment technology per se, but a method of enhancing conductivity into a contaminated formation. Hydrofracturing is a pilot-scale technology in which pressurized water is injected to increase the permeability of consolidated material or relatively impermeable unconsolidated material. Fissures created in the process are filled with a porous medium that can facilitate bioremediation and/or improve extraction efficiency. Fractures promote more uniform delivery of treatment fluids and accelerated extraction of mobilized contaminants. Typical applications are linked with soil vapor extraction, insitu bioremediation, and pump-and-treat systems.

The fracturing process begins with the injection of water into a sealed borehole until the pressure of the water exceeds the overburden pressure and a fracture is created. A slurry composed of a coarse-grained sand and guar gum gel or a similar substitute is then injected as the fracture grows away from the well. After pumping, the sand grains hold the fracture open while an enzyme additive breaks down the viscous fluid. The thinned fluid is pumped from the fracture, forming a permeable subsurface channel suitable for delivery or recovery of a vapor or liquid.

The hydraulic fracturing process can be used in conjunction with soil vapor extraction technology to enhance recovery. Hydraulically-induced fractures are used to deliver fluids, substrates, and nutrients for insitu bioremediation applications. The technology has widespread use in the petroleum and water-well construciton industries but is also an innovative method for use at remediating hazardous waste sites.

Factors that may limit the applicability and effectiveness of this process include:

- The technology should not be used in bedrock susceptible to seismic activity.
- Investigation of possible underground utilities, structures, or trapped free product is required.
- The potential exists to open new pathways leading to the unwanted spread of contaminants.
- Pockets of low permeability may still remain after using this technology.
- There is an inability to control the final location or size of the fractures that are created.
- Fractures are anticipated to collapse due to overburden pressure.

Additionally, a number of factors affect the estimated costs of creating hydraulic fractures at a site. These factors include physical site conditions such as site accessibility and degree of soil consolidation, degree of soil saturation, and geographical location which affects availability of services and supplies. The first two factors also affect the effectiveness of hydraulic fracturing. Based on minimal current and historic hydrocarbon concentrations within the soils on-site, this technology does not appear to be appropriate to address the current ground-water contaminant plume. Hydrofracturing is therefore screened from consideration at this time.

5.1.14 <u>Thermal Treatment</u>

Thermal treatment is not a remediation treatment technology per se, but a method of enhancing volatility and or mobility of contaminants within a geologic formation. Thermal treatment is an emerging full-scale technology that uses electrical resistance/electromagnetic/fiber optic/radio frequency heating or hot-air/steam injection to increase the volatility of contaminants and facilitate extraction. The process is typically linked with soil vapor extraction, in-situ bioremediation, and pump-and-treat systems. Due to the presence of low permeability soils and the need to be coupled with additional remediation technologies, which would greatly increase costs, thermal treatment is screened from consideration at this time.

5.2 Alternatives Evaluation and Costs

Based on the initial technology screening above, the following technologies have been retained to assemble the alternatives that will be evaluated:

- Alternative 1: No Action
- Alternative 2: Air Sparging
- Alternative 3: In-Situ Oxidation
- Alternative 4: Enhanced Bioremediation
- Alternative 5: Monitored Natural Attenuation

Using the *Remediation Technologies Screening Matrix and Reference Guide*, each of the alternatives were evaluated against the following screening factors:

- **Relative Costs?** Design, construction, and operation and maintenance (O&M) costs of the core process that defines each technology, exclusive of mobilization, demobilization, and pre- and post-treatment costs. Above average means a low degree of general costs relative to other options. Average means an average degree of general costs relative to other options. Below average means a high degree of general costs relative to the other options.
- **Capital Intensive?** Is the technology capital-intensive, with significant costs for design and construction? Above average means low degree of capital investment. Average means average degree of capital investment. Below average means high degree of capital investment.
- **O&M Intensive?** Is the technology O&M-intensive, with significant costs for labor, operation, maintenance, and repair? Above average means low degree of O&M intensity. Average means average degree of O&M intensity. Below average means high degree of O&M intensity.
- **System Reliability/Maintainability?** The expected range of demonstrated reliability and maintenance relative to other effective technologies. Above average means high reliability and low maintenance. Average means average reliability and average maintenance. Below average means low reliability and high maintenance.
- **Time?** Time required to clean up a “standard” site using the technology. Above average means less than one year for in situ soils and less than three years for ground water. Average means one to three years for in situ soils and three to ten years for ground water. Below average means more than three years for in situ soil and more than ten years for ground water.

The following table presents relative ratings per screening factor for the five alternatives retained from the screening process above. The relative ratings are from the previously referenced *Remediation Technologies Screening Matrix and Reference Guide*.

Technology	Relative Cost	Capital Intensive	O&M Intensive	System Reliability / Maintainability	Time
No Action	Above Average	Below Average	Above Average	Above Average	Below Average
Air Sparging	Above Average	Above Average	Above Average	Above Average	Above Average
In-Situ Chemical Oxidation	Average	Average	Below Average	Average	Above Average
Enhanced Bioremediation	Above Average	Average	Below Average	Average	Unknown
Monitored Natural Attenuation	Above Average	Average	Below Average	Average	Unknown

5.3 Recommended Remedial Alternative

Based on the Site conditions, remedial objectives, the limited petroleum hydrocarbon mass remaining in soil and ground water and review of the remediation technologies screening matrices, enhanced bioremediation appears to be the most cost effective and appropriate remedial alternative for Station #11133. A detailed description of the proposed nitrate/sulfate pilot scale work activities is provided below in Section 6.1.

6.0 CORRECTIVE ACTION PLAN

6.1 Nitrate/Sulfate Pilot Study Work Plan

As mentioned above in Section 2.0, URS submitted the July 8, 2005 *Nitrate/Sulfate Feasibility Study Work Plan*. The Work Plan was approved by the ACEH in their December 20, 2007 Letter; however, for various reasons documented in past transmittals to the ACEH, nitrate/sulfate addition work activities were not initiated.

In conjunction with BP/Atlantic Richfield Company's Remediation and Engineering Technology (RET) Group, BAI has developed this pilot scale work plan to determine if nitrate/sulfate addition is a viable remedial alternative at the Site. It is important to note that this is a stand alone work plan and not an addendum to the existing URS 2005 work plan.

6.1.1 <u>Introduction</u>

Enhancement of hydrocarbon biodegradation rates are typically facilitated by the addition of oxygen, which acts as an electron acceptor. However in highly anaerobic ground-water hydrocarbon plumes, the saturated environment has been oxygen starved for several years. As a result, the total quantity of oxygen needed to overcome the excess subsurface oxygen demand to effectively enhance the hydrocarbon biodegradation rates can be considerable. The addition of other electron acceptors with less of an excess demand, such as nitrate and sulfate, to highly anaerobic hydrocarbon plumes has been shown in several studies to enhance hydrocarbon biodegradation rates (Anderson and Lovley, 2000; Cunningham et al. 2001; Cunningham et al. 2000; Reinhard et al., 1997).

Review of specific biodegradation monitoring parameters provided in Table 4 indicates anaerobic conditions on the Site and within the plume which should be conducive to nitrate/sulfate addition. This ascertation is based on the generally low DO concentrations observed in a majority of the wells, depleted nitrate and sulfate concentrations, and the presence of ferrous iron (Fe^{2+}). Furthermore, the presence of methane, manganese, and carbon dioxide in a majority of the wells suggests the occurrence of anaerobic biodegradation. The negative ORP readings observed indicate reducing conditions and the relatively high total alkalinity measurements suggest the presence of bioactivity.

Hydrogen sulfide gas generation can be a by-product of sulfate addition; however, hydrogen sulfide is typically removed via reaction with iron contained in the soil. The work plan proposed herein includes provisions for monitoring of hydrogen sulfide during the period of sulfate addition to address this concern. To our knowledge, the generation of hydrogen sulfide gas has not become an issue for projects to date that have utilized sulfate addition to enhance biodegradation of petroleum hydrocarbons, even when sulfate quantities significantly greater than that which is proposed herein were employed.

The purpose of this pilot scale work plan is to determine the effectiveness of nitrate/sulfate injections as a remedial approach to further enhance the natural biodegradation of petroleum hydrocarbon constituents in ground water and, if applicable, provide a basis for implementation of long-term nitrate/sulfate remedial activities at Station #11133.

6.1.2 Nitrate/Sulfate Demand Calculations

Using experience with sulfate addition at several other sites in the United States, BP/Atlantic Richfield Company's RET Group was instrumental in helping develop an approach for nitrate/sulfate addition at Station #11133. The first step in determining an approach is the calculation of nitrate/sulfate demand. The demand is calculated by either a mass flux or total impact method. The mass flux calculation is based on an estimated flux of contaminant mass (BTEX) through a cross-sectional area (hydrocarbon plume cross-sectional area) and the nitrate or sulfate required to address it. This is the calculation method used to develop the URS July 8, 2005 *Nitrate/Sulfate Feasibility Study Work Plan*. A second option for calculating the nitrate or sulfate demand is the total impact method. The total impact method is based on the total mass of BTEX estimated in the contaminant plume. Consistent with the URS 2005 calculations, the mass flux method is used herein to determine the nitrate/sulfate demand for this pilot scale work plan.

The mass flux method requires an estimate of the mass flux of BTEX through the treatment zone. The total ground-water volumetric flux through the treatment area, based on a hydraulic conductivity of 8.6 ft/day, a hydraulic gradient of 0.01, and a cross sectional area of 400 ft^2, was calculated to be 257.3 gallons/day. This volumetric flux, along with a maximum total BTEX concentration measured in well AW-1 on January 6, 2009 of 0.754 mg/L and a multiplication factor of 3 to account for the absorbed phase hydrocarbons, results in a BTEX mass flux through the treatment zone of 2203.3 mg/day.

Using a factor of 0.21 for mass BTEX degraded per mass of nitrate, the total mass of nitrate required to degrade the 2203.3 mg/day mass flux of BTEX through the treatment zone is approximately 10,492 mg nitrate/day. Likewise, using a factor of 0.22 for mass BTEX degraded per mass of sulfate, the total mass of sulfate required to degrade the 2203.3 mg/day mass flux of BTEX through the treatment zone is approximately 10,015 mg sulfate/day. Due to assumptions made in the demand calculations as well as varying subsurface conditions, these mass flux values should be considered estimates. Detailed nitrate and sulfate demand calculations including information on the basis for calculation input parameters are provided in Tables 5 and 6, respectively. Also presented in Tables 5 and 6 are calculations used to develop the proposed nitrate/sulfate addition approach presented below.

6.1.3 Nitrate/Sulfate Solution Addition

It is proposed that nitrate and sulfate solution be added to proposed (i.e., yet to be installed) injection well IW-1 located approximately eight feet to the northeast of well AW-1. Details regarding installation of proposed injection well IW-1 are included below in Section 6.2. The location of injection well IW-1 was chosen due to its general upgradient location (over the last 5 monitoring events) relative to AW-1. Well AW-1 currently contains the highest concentrations of petroleum hydrocarbons in ground water at the Site.

Calculations indicate that an injection event should include approximately 831 gallons of 50 mg/L nitrate solution and approximately 159 gallons of 250 mg/L sulfate solution into injection well IW-1 every 15 days. It is proposed that six injection events be completed over a time period of approximately 3 months. Calculations for solution injection are presented in Tables 1 and 2.

It is proposed that the nitrate solution be prepared using a fast release water soluble fertilizer purchased at a local hardware store. In addition to nitrogen, the fertilizer will also include phosphorus and potassium which should further stimulate the degradation of the BTEX compounds. It is proposed that the sulfate solution be prepared using magnesium sulfate (Epson Salt, $MgSO_4 \cdot 7H_2O$) which can be purchased at a drug store as a food grade product. RET has used Epsom Salt for injection at other sulfate addition projects with no adverse effects.

In a recent email correspondence dated February 23, 2009, the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) stated that they do not issue permits for pilot scale nitrate/sulfate addition work activities. However, they do require a detailed work plan (included herein) that covers all the testing, monitoring, and reporting for the project is submitted to the local oversight agency. A copy of this email correspondence is included in Attachment A. Accordingly, it is our understanding that once the ACEH approves this work plan, nitrate/sulfate addition pilot scale work activities can be initiated at Station #11133 without the need of a permit.

Details regarding actual injection process are currently being explored. However, it is likely that a stationary mixing tank will be utilized and injection will be performed using a pump and hose system. The solution injection will be gravity fed or pressure injected[1] into the well.

6.1.4 <u>Tracer Test</u>

As part of the pilot scale nitrate/sulfate addition work activities, it is proposed that a tracer test be performed. The tracer test will involve injection of a potassium bromide solution to help evaluate if injection well (IW-1) is hydraulically connected with other wells at the Site and to determine dilution effects in the aquifer. Accordingly, the first injection event in IW-1 will include approximately 200 mg/L potassium bromide in solution applied to the ground water. Wells AW-1, VEW-4, and RW-1 will be analyzed for bromide monthly to determine aquifer hydraulic connectivity and aquifer dilution factor(s). See below for additional details regarding frequency and analysis of bromide samples.

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[1] If pressure injection is required, it is anticipated that injections will be performed at approximately 10 pounds per square inch (psi). Injection pressure could vary depending on actual conditions in the injection well.

6.1.5 Ground-Water Monitoring/Sampling Plan

In addition to the current semi-annual (1st and 3rd quarter) ground-water monitoring/sampling plan, monthly ground-water monitoring/sampling events will be completed during and after nitrate/sulfate addition events to help determine the viability of nitrate/sulfate addition as a remedial alternative at the Site. As stated above, six nitrate/sulfate addition events are proposed over a period of three months with approximately 15 days between each event. Three monthly ground-water monitoring/sampling events are proposed during the addition period with the first event being completed approximately one week after the second addition event. The second monthly ground-water monitoring/sampling event will be completed approximately one week after the fourth addition event and the last monthly ground-water monitoring/sampling event will be completed approximately one week after the six and last addition event.

The attached Table 7 summarizes proposed monthly ground-water monitoring/sampling plan including the sampling of biodegradation indicator parameters. It is also proposed that wells AW-3 and AW-8, located to the northeast and general upgradient direction, be included in the analysis of biodegradation indicator parameters in future semi-annual ground-water monitoring/sampling events. Data from these two wells should provide a comparison of biodegradation parameter concentrations outside the plume relative to concentrations within the plume. As wells AW-3 and AW-8 have not been sampled since March 2005, the first sampling event will also include analysis for GRO, BTXE, TAME, TBA, DIPE, EDB, 1,2-DCA, Ethanol, ETBE, and MTBE to confirm that the wells are still located outside the petroleum hydrocarbon plume.

6.2 Injection Well Installation

It is proposed that one boring be installed on-site a short distance (approximately eight feet) to the northeast of well AW-1 using a hollow stem auger drilling technique and be completed as injection well IW-1. The location of the proposed well is depicted in Drawing 3. This well will be needed in order to properly facilitate the nitrate/sulfate addition pilot study. Depth to static ground water is expected to be between 12 and 26 feet bgs. The proposed well design calls for a total well depth of 40 feet, with 30 feet of well screen from total depth to 10 feet bgs. Well IW-1 will be constructed using six-inch diameter schedule 40 PVC well casing. The well will use factory slotted well screen (0.02 inch slots) with flush threaded water tight connections. The casing will be surrounded by silica sand compatible with 0.02 inch slots in the annular space from total depth to three feet above top of screen. A sanitary seal will be installed consisting of approximately three feet of bentonite well-seal overlain by neat cement grout to the surface. The well head will be completed with a lockable water-tight plug and traffic rated monitor well vault.

Appropriate changes, if necessary, will be made to the total well depth and screen interval based on conditions encountered in the borehole during drilling activities.

Upon completion of well construction, the well will be developed by surging/bailing or pumping water until relatively silt free water is removed from the well. Ground water will be removed until water quality parameters have stabilized. After development, the well will be left to hydraulically equilibrate prior to water level measurement and sampling. When equilibrated, depth to water and presence of free-phase product will be measured in the well.

Injection well IW-1 will be sampled before commencement of nitrate/sulfate addition activities to provide a base line for hydrocarbon and biodegradation indicator parameter concentrations. Prior to water sample collection, a minimum of three casing volumes of water will be purged from the wells. Purge water will be transported and disposed at an approved Atlantic Richfield Company disposal facility. Ground-water samples will be collected with factory decontaminated disposable bailers and placed in laboratory prepared containers. Samples will be labeled and chilled prior to transport under chain-of-custody protocol to a California State-certified analytical laboratory and analyzed for the following:

- GRO and BTEX via EPA Method 8260B; and
- Fuel additives MTBE, TBA, ETBE, TAME, DIPE, 1,2-DCA, EDB, and ethanol via EPA Method 8260B.

A California-licensed Professional Land Surveyor will be scheduled to survey the well head and other relevant structures and land features. All elevations will be surveyed with respect to mean sea level. The survey information will be used to generate an accurate site map and ground water gradient map. Well survey information will be uploaded to GeoTracker.

6.3 Cleanup Levels and Goals

It is proposed that the Environmental Screening Levels (ESLs) prepared by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) be utilized as targeted cleanup levels for the Site. The following table depicts concentrations of the constituents of concern (COCs) along with their respective ESLs.

COC	Soil		Ground Water	
	Concentration (a)	ESL (b)	Concentration (c)	ESL (b)
	mg/kg	mg/kg	µg/L	µg/L
GRO	420	400	5,000	500
Benzene	23	0.18	670	46
Toluene	42	9.3	54	130
Ethylbenzene	4.5	32	84	290
Total Xylenes	30	11	110	100

Notes:

(a) Soil concentrations based on highest observed values from tank excavation activities in June 1987.
(b) Applicable ESLs are from Table D, Deep Soils where ground water is not a current or potential drinking water source. Soil ESLs are for residential land use.
(c) Ground-water concentrations based on highest observed values from First Quarter 2009 sampling event.
mg/kg = milligrams per kilogram
µg/L = micrograms per liter

It should be noted that the soil concentrations utilized for the above table were collected in 1987, prior to the operation of the SVE remediation system on-site. These concentrations have likely decreased to levels below the ESLs following SVE activities conducted within the source area (former UST complex). Concentrations of tert-Butyl alcohol (TBA) and Methyl tert-butyl ether (MTBE) in ground water are currently below the ESLs of 18,000 µg/L and 1,800 µg/L, respectively. An ESL is not currently available for tert-Amyl methyl ether (TAME), which has been observed at low concentrations within ground-water samples collected at the Site.

6.4 Closure Requirements

After completion of ground-water remediation (i.e. affected ground water is found to be consistently below the ESL goals or concentrations of dissolved constituents have stabilized at asymptotic levels), ground-water monitoring and sampling will be conducted for one year in order to insure the success of remedial efforts at the Site. Following the one year of monitoring and sampling, assuming concentrations observed at the Site remain consistent, the Site should be evaluated for case closure.

7.0 CLOSURE

The findings presented in this document are based upon: observations of field personnel from previous consultants, the points investigated, and results of analytical tests performed by various laboratories. Our services were performed in accordance with the generally accepted standard of practice at the time this document was written. No other warranty, expressed or implied was made. This report has been prepared for the exclusive use of BP. It is possible that variations in soil or ground-water conditions could exist beyond points explored in this investigation. Also changes in site conditions could occur in the future due to variations in rainfall, temperature, regional water usage, or other factors.

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Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

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Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-1															
4/5/1991	--	38.11	25.44	--	12.67	4,100	1,500	69	100	83	--	--	SUP	--	
4/1/1992	--	38.11	23.22	--	14.89	--	--	--	--	--	--	--	--	--	
4/2/1992	--	38.11	--	--	--	11,000	1,800	210	210	490	--	--	APP	--	
7/6/1992	--	38.11	24.89	--	13.22	6,500	4,000	40	290	530	--	--	ANA	--	
10/7/1992	--	38.11	--	--	--	2,900	1,200	25	37	210	--	--	ANA	--	e
10/7/1992	--	38.11	26.55	--	11.56	4,700	1,500	41	47	300	--	--	ANA	--	
1/14/1993	--	38.11	--	--	--	4,100	1,700	28	130	230	--	--	PACE	--	m, e
1/14/1993	--	38.11	23.73	--	14.38	2,800	830	31	140	240	--	--	PACE	--	m
4/22/1993	--	38.11	--	--	--	39,000	14,000	530	1,800	6,100	987	--	PACE	--	c, m
7/15/1993	--	38.11	22.50	--	15.61	6,200	2,200	28	210	540	838	--	PACE	--	c, m
10/21/1993	--	38.11	24.32	--	13.79	2,400	820	13	55	120	832	--	PACE	--	c, m
1/27/1994	--	38.11	23.72	--	14.39	3,500	1,400	26	130	220	650	--	PACE	--	c, n
4/21/1994	--	38.11	22.48	--	15.63	40,000	12,000	1,900	1,600	5,000	1,119	1.4	PACE	--	m
9/9/1994	--	38.11	--	--	--	3,900	1,900	5.5	190	240	--	--	PACE	--	e
9/9/1994	--	38.11	23.04	--	15.07	3,500	1,600	5	200	250	--	2.1	PACE	--	m
12/21/1994	--	38.11	21.70	--	16.41	7,600	3,100	36	370	320	855	1.6	PACE	--	m
1/30/1995	--	38.11	17.71	--	20.40	35,000	23,000	650	3,200	4,100	--	1.7	ATI	--	
4/10/1995	--	38.11	20.04	--	18.07	60,000	18,000	2,000	4,300	11,000	--	7.9	ATI	--	
4/10/1995	--	38.11	--	--	--	56,000	17,000	2,000	3,900	10,000	--	--	ATI	--	e
6/29/1995	--	38.11	--	--	--	86,000	12,000	8,400	4,800	18,000	--	--	ATI	--	e
6/29/1995	--	38.11	20.60	--	17.51	72,000	10,000	7,300	4,200	15,000	--	6.2	ATI	--	
9/18/1995	--	38.11	21.87	--	16.24	--	--	--	--	--	--	--	--	--	
9/19/1995	--	38.11	--	--	--	65,000	12,000	3,100	4,400	14,000	1,000	8.5	ATI	--	
12/7/1995	--	38.11	22.06	--	16.05	25,000	8,700	<50	2,500	1,300	1,100	2.9	ATI	--	
3/28/1996	--	38.11	16.91	--	21.20	24,000	11,000	<100	3,200	3,390	<1000	6.6	SPL	--	
6/20/1996	--	38.11	20.82	--	17.29	38,000	6,900	1,100	3,200	7,300	<100	6.4	SPL	--	
10/11/1996	--	38.11	23.20	--	14.91	33,000	8,500	69	3,300	4,230	580	6.3	SPL	--	
1/2/1997	--	38.11	20.41	--	17.70	32,000	8,000	<50	3,100	2,300	700	6.7	SPL	--	
4/14/1997	--	38.11	21.61	--	16.50	--	--	--	--	--	--	--	--	--	
4/15/1997	--	38.11	--	--	--	31,000	5,000	160	2,400	4,540	340	5.4	SPL	--	
7/2/1997	--	38.11	21.17	--	16.94	26,000	5,800	<100	2,600	2,200	<1000	6.2	SPL	--	

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AW-1 Cont.															
9/30/1997	--	38.11	21.48	--	16.63	29,000	9,200	17	1,400	130	560	6.9	SPL	--	
1/21/1998	--	38.11	20.02	--	18.09	50,000	6,900	450	3,200	4,450	720	5.8	SPL	--	
4/9/1998	--	38.11	13.37	--	24.74	--	--	--	--	--	--	--	--	--	
4/10/1998	--	38.11	--	--	--	46,000	5,800	1,900	3,000	7,400	1,000	4.3	SPL	--	
6/19/1998	--	38.11	--	--	--	43,000	6,800	260	3,100	3,490	620	--	SPL	--	e
6/19/1998	--	38.11	19.12	--	18.99	42,000	6,600	200	3,000	3,350	660	4.9	SPL	--	
11/30/1998	--	38.11	21.13	--	16.98	23,000	6,700	<25	3,100	130	710/820	--	SPL	--	g
1/21/1999	--	38.11	20.77	--	17.34	25,000	4,800	54	2,800	780	1,000	--	SPL	--	
4/30/1999	--	38.11	20.80	--	17.31	21,000	5,300	67	2,800	750	1,500	--	SPL	--	
7/9/1999	--	38.11	20.41	--	17.70	11,000	3,000	<10	760	180	1,300	--	SPL	--	
11/3/1999	--	38.11	20.82	--	17.29	--	--	--	--	--	--	--	--	--	
1/12/2000	--	38.11	19.99	--	18.12	330,000	5,300	10	2,900	560	2,200	--	PACE	--	
4/13/2000	--	38.11	20.14	--	17.97	--	--	--	--	--	--	--	--	--	
5/24/2000	--	38.11	20.17	--	17.94	--	--	--	--	--	--	--	--	--	
6/1/2000	--	38.11	23.05	--	15.06	--	--	--	--	--	--	--	--	--	
6/8/2000	--	38.11	17.08	--	21.03	--	--	--	--	--	--	--	--	--	
6/15/2000	--	38.11	16.93	--	21.18	--	--	--	--	--	--	--	--	--	
7/26/2000	--	38.11	20.07	--	18.04	15,000	290	98	77	220	37,000	--	PACE	--	
10/24/2000	--	38.11	20.10	--	18.01	--	--	--	--	--	--	--	--	--	
1/19/2001	--	38.11	19.82	--	18.29	7,600	2,220	10.9	415	58.4	1,630	--	PACE	--	
7/24/2001	--	38.11	19.86	--	18.25	9,600	2,140	6.34	281	43	1,440	--	PACE	--	
1/18/2002	--	38.11	15.60	--	22.51	20,000	2,170	75.2	1,800	2,080	1,250	--	PACE	--	
8/1/2002	--	38.11	19.55	--	18.56	14,000	2,150	<12.5	197	42.4	1,120	--	PACE	--	
1/16/2003	--	38.11	16.32	--	21.79	15,000	2,300	75	1,600	1,800	1,100	--	SEQ	--	p
7/7/2003	--	38.11	19.80	--	18.31	9,700	1,600	<25	540	110	1,100	--	SEQ	--	q, u
02/05/2004	--	38.11	18.75	--	19.36	12,000	2,000	<50	820	590	930	--	SEQM	6.7	
07/01/2004	P	38.11	19.72	--	18.39	9,900	2,600	<25	300	<25	1,100	--	SEQM	6.5	
03/16/2005	P	38.11	18.78	--	19.33	10,000	1,100	30	630	560	720	0.8	SEQM	6.7	
07/22/2005	P	38.11	15.53	--	22.58	8,000	770	5.4	520	50	510	--	SEQM	6.5	
01/25/2006	P	38.11	18.10	--	20.01	6,400	1,200	10	490	290	490	--	SEQM	7.0	
7/6/2006	P	38.11	17.44	--	20.67	6,200	1,300	70	570	180	270	--	TAMC	6.8	

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AW-1 Cont.															
1/8/2007	P	38.11	16.74	--	21.37	3700	690	19	110	30	380	2.53	TAMC	6.77	
7/10/2007	P	38.11	17.30	--	20.81	4,200	560	12	93	40	220	1.79	TAMC	6.90	
1/15/2008	P	38.11	15.96	--	22.15	5,000	670	<10	490	200	230	0.92	TAMC	6.91	
7/15/2008	P	38.11	18.63	--	19.48	3,400	340	4.5	27	17	<0.50	1.80	CEL	6.79	
10/21/2008	P	38.11	19.96	--	18.15	1,900	160	<5.0	15	<5.0	120	2.40	CEL	7.01	
1/6/2009	**P**	**38.11**	**19.13**	**--**	**18.98**	**5,000**	**670**	**<5.0**	**84**	**<5.0**	**170**	**1.37**	**CEL**	**6.09**	
AW-2															
4/5/1991	--	36.83	22.36	--	14.47	<50	<0.3	<0.3	<0.3	<0.3	--	--	SUP	--	
4/1/1992	--	36.83	20.81	--	16.02	--	--	--	--	--	--	--	--	--	
4/2/1992	--	36.83	--	--	--	130	25	2.3	0.7	2.1	--	--	APP	--	
7/6/1992	--	36.83	23.57	--	13.26	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	36.83	25.24	--	11.59	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
1/14/1993	--	36.83	20.82	--	16.01	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	36.83	19.37	--	17.46	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
7/15/1993	--	36.83	21.29	--	15.54	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--	PACE	--	m
10/21/1993	--	36.83	23.14	--	13.69	<50	1.3	1.1	0.9	2.1	<5.0	--	PACE	--	m
1/27/1994	--	36.83	22.34	--	14.49	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/21/1994	--	36.83	21.15	--	15.68	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.0	PACE	--	m
9/9/1994	--	36.83	22.09	--	14.74	<50	<0.5	<0.5	<0.5	<0.5	--	4.1	PACE	--	m
12/21/1994	--	36.83	20.12	--	16.71	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.0	PACE	--	m
1/30/1995	--	36.83	16.65	--	20.18	<50	<0.50	<0.50	<0.50	<1.0	--	2.5	ATI	--	
4/10/1995	--	36.83	16.22	--	20.61	<50	<0.50	<0.50	<0.50	<1.0	--	4.4	ATI	--	
6/29/1995	--	36.83	17.55	--	19.28	<50	<0.50	<0.50	<0.50	<1.0	--	7.8	ATI	--	
9/18/1995	--	36.83	19.87	--	16.96	--	--	--	--	--	--	--	--	--	
9/19/1995	--	36.83	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	4.5	ATI	--	
9/19/1995	--	36.83	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	--	ATI	--	e
12/7/1995	--	36.83	21.31	--	15.52	<50	<0.50	<0.50	<0.50	<1.0	<5.0	4.9	ATI	--	
3/28/1996	--	36.83	15.61	--	21.22	<50	<0.5	<1	<1	<1	<10	4.1	SPL	--	
6/20/1996	--	36.83	16.30	--	20.53	<50	<0.5	<1	<1	<1	<10	5.2	SPL	--	
10/11/1996	--	36.83	19.60	--	17.23	<50	<0.5	<1.0	<1.0	<1.0	<10	6.0	SPL	--	

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						GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE				
AW-2 Cont.															
1/2/1997	--	36.83	15.97	--	20.86	<50	<0.5	<1.0	<1.0	<1.0	<10	6.1	SPL	--	
4/14/1997	--	36.83	17.19	--	19.64	<50	<0.5	<1.0	<1.0	<1.0	<10	5.3	SPL	--	
7/2/1997	--	36.83	18.11	--	18.72	<50	<0.5	<1.0	<1.0	<1.0	<10	5.7	SPL	--	
9/30/1997	--	36.83	18.52	--	18.31	<50	<0.5	<1.0	<1.0	<1.0	860	5.4	SPL	--	
1/21/1998	--	36.83	14.46	--	22.37	160	13	<1.0	<1.0	<1.0	110	4.9	SPL	--	
4/9/1998	--	36.83	12.85	--	23.98	--	--	--	--	--	--	--	--	--	
4/10/1998	--	36.83	--	--	--	<50	<0.5	<1.0	<1.0	<1.0	<10	3.9	SPL	--	
6/19/1998	--	36.83	14.37	--	22.46	60	<0.5	<1.0	<1.0	<1.0	<10	3.6	SPL	--	
11/30/1998	--	36.83	16.90	--	19.93	--	--	--	--	--	--	--	--	--	
1/21/1999	--	36.83	16.87	--	19.96	<50	<1.0	<1.0	<1.0	<1.0	<1.0	--	SPL	--	
4/30/1999	--	36.83	17.01	--	19.82	--	--	--	--	--	--	--	--	--	
7/9/1999	--	36.83	17.83	--	19.00	--	--	--	--	--	--	--	--	--	
11/3/1999	--	36.83	19.74	--	17.09	--	--	--	--	--	--	--	--	--	
1/12/2000	--	36.83	19.90	--	16.93	<50	<0.5	<0.5	<0.5	<0.5	<0.5	--	PACE	--	
4/13/2000	--	36.83	19.75	--	17.08	--	--	--	--	--	--	--	--	--	
7/26/2000	--	36.83	19.86	--	16.97	--	--	--	--	--	--	--	--	--	
10/24/2000	--	36.83	18.77	--	18.06	--	--	--	--	--	--	--	--	--	
1/19/2001	--	36.83	--	--	--	--	--	--	--	--	--	--	--	--	f
7/24/2001	--	36.83	--	--	--	--	--	--	--	--	--	--	--	--	f
1/18/2002	--	36.83	15.17	--	21.66	<50	<0.5	<0.5	<0.5	<1.0	<0.5	--	PACE	--	
8/1/2002	--	36.83	17.17	--	19.66	--	--	--	--	--	--	--	--	--	
1/16/2003	--	36.83	14.81	--	22.02	<50	<0.50	<0.50	<0.50	<0.50	<2.5	--	SEQ	--	p
7/7/2003	--	36.83	16.65	--	20.18	--	--	--	--	--	--	--	--	--	
02/05/2004	--	36.83	15.37	--	21.46	<50	3.0	<0.50	<0.50	<0.50	5.1	--	SEQM	6.6	
07/01/2004	--	36.83	17.55	--	19.28	--	--	--	--	--	--	--	--	--	
03/16/2005	P	36.83	14.58	--	22.25	<50	0.75	<0.50	1.1	1.1	<0.50	1.7	SEQM	6.7	
07/22/2005	--	36.83	15.41	--	21.42	--	--	--	--	--	--	--	--	--	
01/25/2006	P	36.83	14.17	--	22.66	280	110	<1.0	3.9	8.7	12	--	SEQM	7.1	
7/6/2006	--	36.83	14.00	--	22.83	--	--	--	--	--	--	--	--	--	
1/8/2007	P	36.83	15.85	--	20.98	1900	550	160	58	180	40	2.09	TAMC	7.2	
7/10/2007	--	36.83	17.25	--	19.58	--	--	--	--	--	--	--	--	--	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
AW-2 Cont.															
1/15/2008	P	36.83	15.75	--	21.08	2,300	900	87	100	140	48	0.83	TAMC	6.79	
7/15/2008	P	36.83	17.99	--	18.84	6,400	1,700	550	340	940	<50	2.14	CEL	7.05	
10/21/2008	P	36.83	19.19	--	17.64	2,600	580	96	110	180	16	1.65	CEL	7.33	
1/6/2009	**P**	**36.83**	**18.45**	**--**	**18.38**	**2,100**	**440**	**54**	**67**	**110**	**11**	**0.84**	**CEL**	**6.94**	
AW-3															
4/5/1991	--	39.13	23.90	--	15.23	5,200	980	450	95	310	--	--	SUP	--	
4/1/1992	--	39.13	22.50	--	16.63	4,700	890	47	43	110	--	--	APP	--	
7/6/1992	--	39.13	23.26	--	15.87	3,900	3,100	30	80	99	--	--	ANA	--	
10/7/1992	--	39.13	24.75	--	14.38	5,000	2,600	<0.5	<0.5	59	--	--	ANA	--	
1/14/1993	--	39.13	23.59	--	15.54	350	250	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	39.13	19.42	--	19.71	240	71	2.4	0.6	4	--	--	PACE	--	m
7/15/1993	--	39.13	20.09	--	19.04	650	71	2.8	1.5	1.1	37.3	--	PACE	--	c, m
10/21/1993	--	39.13	21.88	--	17.25	160	4.8	1.7	1.6	3.6	8.95	--	PACE	--	m
10/21/1993	--	39.13	--	--	--	170	6.1	2	1.7	4.4	--	--	PACE	--	e
1/27/1994	--	39.13	22.33	--	16.80	92	2.1	<0.5	<0.5	<0.5	7.37	--	PACE	--	m
1/27/1994	--	39.13	--	--	--	90	2.9	0.5	<0.5	<0.5	--	--	PACE	--	e
4/21/1994	--	39.13	20.96	--	18.17	150	3.6	0.8	0.9	2.5	9.36	1.3	PACE	--	m
9/9/1994	--	39.13	21.60	--	17.53	53	<0.5	<0.5	<0.5	<0.5	--	1.9	PACE	--	m
12/21/1994	--	39.13	--	--	--	--	--	--	--	--	--	--	--	--	f
1/30/1995	--	39.13	--	--	--	--	--	--	--	--	--	--	--	--	f
4/10/1995	--	39.13	--	--	--	--	--	--	--	--	--	--	--	--	f
6/29/1995	--	39.13	15.41	--	23.72	<50	<0.50	<0.50	<0.50	<1.0	--	8.0	ATI	--	
9/18/1995	--	39.13	17.83	--	21.30	--	--	--	--	--	--	--	--	--	
9/19/1995	--	39.13	--	--	--	61,000	11,000	2,900	4,100	13,000	790	7.4	ATI	--	
12/7/1995	--	39.13	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	--	ATI	--	e
12/7/1995	--	39.13	19.27	--	19.86	<50	<0.50	<0.50	<0.50	<1.0	<5.0	3.4	ATI	--	
3/28/1996	--	39.13	13.85	--	25.28	<50	<0.5	<1	<1	<1	<10	4.1	SPL	--	
3/28/1996	--	39.13	--	--	--	<50	<0.5	<1	<1	<1	<10	--	SPL	--	e
6/20/1996	--	39.13	--	--	--	<50	<0.5	<1	<1	<1	<10	--	SPL	--	e
6/20/1996	--	39.13	14.47	--	24.66	<50	<0.5	<1	<1	<1	<10	4.2	SPL	--	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
AW-3 Cont.															
10/11/1996	--	39.13	17.97	--	21.16	<50	<0.5	<1.0	<1.0	<1.0	<10	4.7	SPL	--	
10/11/1996	--	39.13	--	--	--	<50	<0.5	<1.0	<1.0	<1.0	<10	--	SPL	--	e
1/2/1997	--	39.13	13.00	--	26.13	<50	<0.5	<1.0	<1.0	<1.0	<10	5.6	SPL	--	
4/14/1997	--	39.13	14.36	--	24.77	<50	<0.5	<1.0	<1.0	<1.0	<10	5.0	SPL	--	
4/15/1997	--	39.13	--	--	--	<50	<0.5	<1.0	<1.0	<1.0	<10	--	SPL	--	e
7/2/1997	--	39.13	15.87	--	23.26	<50	<0.5	<1.0	<1.0	<1.0	<10	5.4	SPL	--	
9/30/1997	--	39.13	17.50	--	21.63	<250	<2.5	<5.0	<5.0	<5.0	810	5.7	SPL	--	
1/21/1998	--	39.13	11.98	--	27.15	140	<0.5	<1.0	<1.0	<1.0	99	4.6	SPL	--	
1/21/1998	--	39.13	--	--	--	150	<0.5	<1.0	<1.0	1.2	110	--	SPL	--	e
4/9/1998	--	39.13	9.45	--	29.68	--	--	--	--	--	--	--	--	--	
4/10/1998	--	39.13	--	--	--	<50	<0.5	<1.0	<1.0	1.6	<10	4.5	SPL	--	
4/10/1998	--	39.13	--	--	--	<50	<0.5	<1.0	1.4	1.7	<10	--	SPL	--	e
6/19/1998	--	39.13	12.13	--	27.00	<50	<0.5	<1.0	<1.0	<1.0	<10	4.4	SPL	--	
11/30/1998	--	39.13	15.91	--	23.22	--	--	--	--	--	--	--	--	--	
1/21/1999	--	39.13	15.93	--	23.20	<50	<1.0	<1.0	<1.0	<1.0	<1.0	--	SPL	--	
4/30/1999	--	39.13	15.98	--	23.15	--	--	--	--	--	--	--	--	--	
7/9/1999	--	39.13	14.58	--	24.55	--	--	--	--	--	--	--	--	--	
11/3/1999	--	39.13	17.43	--	21.70	--	--	--	--	--	--	--	--	--	
1/12/2000	--	39.13	18.30	--	20.83	<50	<0.5	<0.5	<0.5	<0.5	<0.5	--	PACE	--	
4/13/2000	--	39.13	18.89	--	20.24	--	--	--	--	--	--	--	--	--	
7/26/2000	--	39.13	18.67	--	20.46	--	--	--	--	--	--	--	--	--	
10/24/2000	--	39.13	18.98	--	20.15	--	--	--	--	--	--	--	--	--	
1/19/2001	--	39.13	16.74	--	22.39	--	--	--	--	--	--	--	--	--	
7/24/2001	--	39.13	18.55	--	20.58	--	--	--	--	--	--	--	--	--	
1/18/2002	--	39.13	14.49	--	24.64	--	--	--	--	--	--	--	--	--	
8/1/2002	--	39.13	14.27	--	24.86	--	--	--	--	--	--	--	--	--	
1/16/2003	--	39.13	14.25	--	24.88	--	--	--	--	--	--	--	--	--	
7/7/2003	--	39.13	14.70	--	24.43	--	--	--	--	--	--	--	--	--	
02/05/2004	--	39.13	14.61	--	24.52	--	--	--	--	--	--	--	--	--	
07/01/2004	--	39.13	15.62	--	23.51	--	--	--	--	--	--	--	--	--	
03/16/2005	P	39.13	12.70	--	26.43	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	SEQM	7.3	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE				
AW-3 Cont.															
07/22/2005	--	39.13	13.44	--	25.69	--	--	--	--	--	--	--	--	--	
01/25/2006	--	39.13	13.56	--	25.57	--	--	--	--	--	--	--	--	--	
7/6/2006	--	39.13	11.60	--	27.53	--	--	--	--	--	--	--	--	--	
1/8/2007	--	39.13	14.97	--	24.16	--	--	--	--	--	--	--	--	--	
7/10/2007	--	39.13	15.81	--	23.32	--	--	--	--	--	--	--	--	--	
1/15/2008	--	39.13	15.97	--	23.16	--	--	--	--	--	--	--	--	--	
7/15/2008	--	39.13	16.70	--	22.43	--	--	--	--	--	--	--	--	--	
10/21/2008	--	39.13	18.16	--	20.97	--	--	--	--	--	--	--	--	--	
1/6/2009	--	**39.13**	**18.35**	--	**20.78**	--	--	--	--	--	--	--	--	--	
AW-4															
4/5/1991	--	39.08	25.12	--	13.96	110,000	40,000	13,000	2,000	5,500	--	--	SUP	--	
4/1/1992	--	39.08	23.56	--	15.52	230,000	57,000	31,000	2,900	7,600	--	--	APP	--	
4/1/1992	--	39.08	--	--	--	210,000	55,000	23,000	2,900	7,000	--	--	APP	--	e
7/6/1992	--	39.08	25.87	--	13.21	38,000	16,000	5,400	2,000	6,100	--	--	ANA	--	
10/7/1992	--	39.08	27.53	--	11.55	120,000	41,000	26,000	4,700	13,000	--	--	ANA	--	
1/14/1993	--	39.08	24.12	--	14.96	62,000	18,000	14,000	2,700	7,700	1,400	--	PACE	--	c, m
4/22/1993	--	39.08	21.47	--	17.61	18,000	1,100	2,100	320	3,500	--	--	PACE	--	m
7/15/1993	--	39.08	23.30	--	15.78	21,000	820	2,300	590	3,800	1,978	--	PACE	--	c, m
10/21/1993	--	39.08	25.08	--	14.00	11,000	570	83	630	2,300	4,600	--	PACE	--	c, m
1/27/1994	--	39.08	24.61	--	14.47	12,000	420	460	600	2,200	6,400	--	PACE	--	c, m
4/21/1994	--	39.08	22.96	--	16.12	12,000	110	250	150	1,900	16,010	1.5	PACE	--	c, m
4/21/1994	--	39.08	--	--	--	14,000	71	160	29	1,200	13,000	--	PACE	--	c, e
9/9/1994	--	39.08	23.85	--	15.23	9,700	75	64	280	2,000	--	2.1	PACE	--	m
12/21/1994	--	39.08	--	--	--	--	--	--	--	--	--	--	--	--	f
1/30/1995	--	39.08	--	--	--	--	--	--	--	--	--	--	--	--	f
4/10/1995	--	39.08	18.07	--	21.01	3,700	69	8.7	44	130	--	8.5	ATI	--	
6/29/1995	--	39.08	19.25	--	19.83	8,000	62	190	190	1,100	--	7.5	ATI	--	
9/18/1995	--	39.08	20.73	--	18.35	--	--	--	--	--	--	--	--	--	
9/19/1995	--	39.08	--	--	--	12,000	660	1,600	200	1,900	7,100	8.3	ATI	--	
12/7/1995	--	39.08	22.49	--	16.59	41,000	8,400	7,200	710	6,300	5,200	3.6	ATI	--	

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AW-4 Cont.															
3/28/1996	--	39.08	16.49	--	22.59	--	--	--	--	--	--	--	--	--	f
6/20/1996	--	39.08	16.00	--	23.08	<50	<0.5	<1	<1	<1	12	--	SPL	--	
10/11/1996	--	39.08	19.52	--	19.56	36,000	12,000	5,500	<25	3,800	880/1000	6.2	SPL	--	g
1/2/1997	--	39.08	--	--	--	<50	61	3.8	3.5	8.1	110	--	SPL	--	e
1/2/1997	--	39.08	15.80	--	23.28	<50	<0.5	<1.0	<1.0	<1.0	22	6.4	SPL	--	
4/14/1997	--	39.08	17.01	--	22.07	--	--	--	--	--	--	--	--	--	
4/15/1997	--	39.08	--	--	--	<50	<0.5	<1.0	<1.0	<1.0	<10	5.4	SPL	--	
7/2/1997	--	39.08	19.68	--	19.40	<50	21	<1.0	<1.0	<1.0	41	4.1	SPL	--	
9/30/1997	--	39.08	22.71	--	16.37	--	--	--	--	--	--	--	--	--	f
1/21/1998	--	39.08	15.89	--	23.19	13,000	2,900	<10	230	314	3,100	3.9	SPL	--	
4/9/1998	--	39.08	13.50	--	25.58	--	--	--	--	--	--	--	--	--	
4/10/1998	--	39.08	--	--	--	890	<0.5	<1	<1	<1	730	4.9	SPL	--	
6/19/1998	--	39.08	14.75	--	24.33	60	<0.5	<1.0	<1.0	<1.0	34	4.3	SPL	--	
11/30/1998	--	39.08	19.25	--	19.83	--	--	--	--	--	--	--	--	--	
1/21/1999	--	39.08	18.94	--	20.14	3,700	830	93	200	360	30	--	--	--	
4/30/1999	--	39.08	19.10	--	19.98	--	--	--	--	--	--	--	--	--	
7/9/1999	--	39.08	18.93	--	20.15	76,000	12,000	6,600	2,000	8,700	320	--	SPL	--	
11/3/1999	--	39.08	20.65	--	18.43	--	--	--	--	--	--	--	--	--	
1/12/2000	--	39.08	21.21	--	17.87	67,000	12,000	3,500	2,900	15,000	280	--	PACE	--	
4/13/2000	--	39.08	21.33	--	17.75	--	--	--	--	--	--	--	--	--	
5/24/2000	--	39.08	19.84	--	19.24	--	--	--	--	--	--	--	--	--	
6/1/2000	--	39.08	19.04	--	20.04	--	--	--	--	--	--	--	--	--	
6/8/2000	--	39.08	18.32	--	20.76	--	--	--	--	--	--	--	--	--	
6/15/2000	--	39.08	16.70	--	22.38	--	--	--	--	--	--	--	--	--	
7/26/2000	--	39.08	21.50	--	17.58	910	<0.5	<0.5	<0.5	<0.5	3,500	--	PACE	--	
10/24/2000	--	39.08	22.00	--	17.08	--	--	--	--	--	--	--	--	--	
1/19/2001	--	39.08	18.97	--	20.11	6,600	2,460	24	497	534	267	--	PACE	--	
7/24/2001	--	39.08	18.55	--	20.53	5,100	1,080	143	409	827	115	--	PACE	--	
1/18/2002	--	39.08	17.22	--	21.86	3,900	442	241	157	681	85.3	--	PACE	--	
8/1/2002	--	39.08	--	--	--	--	--	--	--	--	--	--	--	--	f
1/16/2003	--	39.08	16.85	--	22.23	2,900	260	160	120	590	<120	--	SEQ	--	p

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						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-4 Cont.															
7/7/2003	--	39.08	17.94	--	21.14	600	90	7.9	18	36	56	--	SEQ	--	q
02/05/2004	--	39.08	16.94	--	22.14	420	40	3.1	15	27	40	--	SEQM	6.8	
07/01/2004	P	39.08	18.24	--	20.84	6,000	970	200	310	1,500	64	--	SEQM	6.7	
03/16/2005	P	39.08	16.16	--	22.92	3,600	71	31	200	870	23	0.6	SEQM	6.5	
07/22/2005	P	39.08	15.89	--	23.19	4,800	750	48	300	840	59	--	SEQM	6.7	
01/25/2006	P	39.08	15.48	--	23.60	<500	13	<5.0	14	62	12	--	SEQM	7.0	
7/6/2006	P	39.08	14.87	--	24.21	2,800	430	21	230	680	39	--	TAMC	6.7	
1/8/2007	P	39.08	16.48	--	22.60	190	6.6	<0.50	4.1	14	38	3.00	TAMC	6.80	
7/10/2007	P	39.08	17.95	--	21.13	160	2.7	<0.50	0.90	1.0	27	2.54	TAMC	7.19	
1/15/2008	P	39.08	17.70	--	21.38	150	<0.50	<0.50	0.71	<0.50	17	1.30	TAMC	6.75	
7/15/2008	P	39.08	18.74	--	20.34	250	44	1.1	44	78	25	2.64	CEL	6.91	
10/21/2008	P	39.08	20.07	--	19.01	270	1.6	<1.0	<1.0	<1.0	18	1.54	CEL	7.25	
1/6/2009	**P**	**39.08**	**19.45**	**--**	**19.63**	**230**	**0.88**	**<0.50**	**<0.50**	**<0.50**	**8.3**	**0.70**	**CEL**	**6.31**	
AW-5															
4/5/1991	--	38.51	25.48	--	13.03	420	31	7.5	20	68	--	--	SUP	--	
4/1/1992	--	38.51	23.95	--	14.56	--	--	--	--	--	--	--	--	--	
4/2/1992	--	38.51	--	--	--	4,000	270	63	190	290	--	--	APP	--	
7/6/1992	--	38.51	26.48	--	12.03	1,400	160	<2.5	250	58	--	--	ANA	--	
10/7/1992	--	38.51	28.18	--	10.33	360	12	0.6	8.7	5	--	--	ANA	--	
1/14/1993	--	38.51	24.15	--	14.36	1,700	270	7.5	130	62	--	--	PACE	--	m
4/22/1993	--	38.51	22.43	--	16.08	2,700	780	30	220	180	--	--	PACE	--	m
4/22/1993	--	38.51	--	--	--	3,500	780	29	240	210	--	--	PACE	--	m, e
7/15/1993	--	38.51	--	--	--	1,300	68	8.3	64	99	<50	--	PACE	--	m, e
7/15/1993	--	38.51	24.31	--	14.20	1,300	69	16	67	120	<50	--	PACE	--	m
10/21/1993	--	38.51	26.05	--	12.46	510	9.6	1.5	17	45	75	--	PACE	--	c, m
1/27/1994	--	38.51	26.42	--	12.09	420	3.3	<0.5	1	0.9	48.9	--	PACE	--	m
4/21/1994	--	38.51	24.36	--	14.15	1,000	110	25	56	27	75	1.3	PACE	--	c, m
9/9/1994	--	38.51	24.55	--	13.96	210	<0.5	<0.5	0.5	0.9	--	2.7	PACE	--	m
12/21/1994	--	38.51	22.30	--	16.21	410	<0.5	20	4.3	1.4	114	1.1	PACE	--	m
12/21/1994	--	38.51	--	--	--	340	<0.5	15	3.3	1.4	104	--	PACE	--	m, e

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-5 Cont.															
1/30/1995	--	38.51	18.88	--	19.63	210	0.6	11	8.8	2	--	1.5	ATI	--	
4/10/1995	--	38.51	18.44	--	20.07	500	1.4	0.59	6.5	4.3	--	8.3	ATI	--	
6/29/1995	--	38.51	19.92	--	18.59	490	1.2	0.58	7.3	2.2	--	6.9	ATI	--	d
9/18/1995	--	38.51	22.15	--	16.36	--	--	--	--	--	--	--	--	--	
9/19/1995	--	38.51	--	--	--	260	0.62	<0.50	3.1	1.1	110	8.2	ATI	--	
12/7/1995	--	38.51	23.75	--	14.76	60	<0.50	<0.50	<0.50	<1.0	210	4.3	ATI	--	
3/28/1996	--	38.51	17.76	--	20.75	<50	<0.5	<1	<1	<1	63	3.0	SPL	--	
6/20/1996	--	38.51	18.46	--	20.05	<50	<0.5	<1	<1	<1	<10	3.6	SPL	--	
10/11/1996	--	38.51	21.84	--	16.67	<50	<0.5	<1.0	<1.0	<1.0	<10	4.5	SPL	--	
1/2/1997	--	38.51	18.01	--	20.50	<50	<0.5	<1.0	<1.0	<1.0	<10	4.6	SPL	--	
4/14/1997	--	38.51	19.35	--	19.16	<50	<0.5	<1.0	<1.0	<1.0	<10	5.1	SPL	--	
7/2/1997	--	38.51	20.29	--	18.22	<50	<0.5	<1.0	<1.0	<1.0	<10	4.0	SPL	--	
9/30/1997	--	38.51	23.15	--	15.36	<250	<2.5	<5.0	<5.0	<5.0	1,300	6.3	SPL	--	
1/21/1998	--	38.51	17.33	--	21.18	6,100	<0.5	2.1	<1.0	<1.0	3,700	4.5	SPL	--	
4/9/1998	--	38.51	15.25	--	23.26	--	--	--	--	--	--	--	--	--	
4/10/1998	--	38.51	--	--	--	3,500	<0.5	<1.0	<1.0	<1.0	3,000	5.4	SPL	--	
6/19/1998	--	38.51	17.39	--	21.12	3,300	<0.5	<1.0	<1.0	<1.0	2,500	5.2	SPL	--	
11/30/1998	--	38.51	--	--	--	--	--	--	--	--	--	--	--	--	f
1/21/1999	--	38.51	21.22	--	17.29	2,800	<1.0	<1.0	<1.0	<1.0	1,800	--	SPL	--	
4/30/1999	--	38.51	21.50	--	17.01	--	--	--	--	--	--	--	--	--	
7/9/1999	--	38.51	20.15	--	18.36	4,000	<1.0	<1.0	<1.0	<1.0	3400/3500	--	SPL	--	g
11/3/1999	--	38.51	22.04	--	16.47	--	--	--	--	--	--	--	--	--	
1/12/2000	--	38.51	22.59	--	15.92	1,000	7.3	30	6.7	40	4,600	--	PACE	--	j (TPH-g/GRO)
4/13/2000	--	38.51	23.11	--	15.40	--	--	--	--	--	--	--	--	--	
7/26/2000	--	38.51	22.72	--	15.79	1,800	94	35	5.9	27	16,000	--	PACE	--	
10/24/2000	--	38.51	20.15	--	18.36	--	--	--	--	--	--	--	--	--	
1/19/2001	--	38.51	19.79	--	18.72	2,600	<0.5	<0.5	<0.5	<0.5	4,580	--	PACE	--	
7/24/2001	--	38.51	20.17	--	18.34	5,400	18.4	17.2	<12.5	40.8	5,170	--	PACE	--	
1/18/2002	--	38.51	17.34	--	21.17	3,800	343	0.738	<0.5	<1.0	3,750	--	PACE	--	
8/1/2002	--	38.51	19.49	--	19.02	5,300	<12.5	<12.5	<12.5	<25	3,470	--	PACE	--	
1/16/2003	--	38.51	17.30	--	21.21	1,400	140	<10	<10	<10	1,600	--	SEQ	--	p

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
AW-5 Cont.															
7/7/2003	--	38.51	18.43	--	20.08	1,400	<10	<10	<10	<10	980	--	SEQ	--	q
02/05/2004	--	38.51	17.24	--	21.27	1,800	<10	<10	<10	<10	810	--	SEQM	6.7	
07/01/2004	P	38.51	19.43	--	19.08	1,100	<5.0	<5.0	<5.0	<5.0	550	--	SEQM	6.6	
03/16/2005	P	38.51	15.30	--	23.21	<5,000	<50	<50	<50	130	890	2.1	SEQM	6.7	
07/22/2005	P	38.51	17.22	--	21.29	<500	5.2	<5.0	<5.0	6.9	390	--	SEQM	6.6	
01/25/2006	P	38.51	15.28	--	23.23	<500	<5.0	<5.0	<5.0	<5.0	26	--	SEQM	7.0	
7/6/2006	P	38.51	15.93	--	22.58	220	<5.0	<5.0	<5.0	<5.0	170	--	TAMC	6.5	
1/8/2007	P	38.51	17.90	--	20.61	170	<2.5	<2.5	<2.5	<2.5	220	5.22	TAMC	6.84	
7/10/2007	P	38.51	19.00	--	19.51	350	<2.5	<2.5	<2.5	<2.5	360	1.96	TAMC	7.02	
1/15/2008	P	38.51	18.16	--	20.35	130	0.54	<0.50	<0.50	<0.50	85	0.90	TAMC	6.82	w
7/15/2008	P	38.51	19.88	--	18.63	100	<0.50	<0.50	<0.50	<0.50	11	2.13	CEL	6.85	
10/21/2008	P	38.51	20.88	--	17.63	86	<0.50	<0.50	<0.50	<0.50	63	1.01	CEL	7.10	
1/6/2009	**P**	**38.51**	**20.28**	**--**	**18.23**	**150**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**26**	**0.70**	**CEL**	**6.22**	
AW-6															
4/5/1991	--	37.08	22.48	--	14.60	1,100	80	19	1.4	230	--	--	SUP	--	
4/1/1992	--	37.08	22.50	--	14.58	--	--	--	--	--	--	--	--	--	
4/2/1992	--	37.08	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	APP	--	
7/6/1992	--	37.08	22.74	--	14.34	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	37.08	24.64	--	12.44	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
1/14/1993	--	37.08	22.36	--	14.72	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	37.08	22.82	--	14.26	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
7/15/1993	--	37.08	20.49	--	16.59	<50	<0.5	<0.5	<0.5	0.8	<5.0	--	PACE	--	m
10/21/1993	--	37.08	22.84	--	14.24	<50	0.5	0.6	<0.5	0.7	<5.0	--	PACE	--	m
1/27/1994	--	37.08	22.33	--	14.75	<50	<0.5	0.9	3.1	12	<5.0	--	PACE	--	m
4/21/1994	--	37.08	20.66	--	16.42	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.7	PACE	--	m
9/9/1994	--	37.08	21.57	--	15.51	<50	0.9	<0.5	<0.5	0.5	--	2.9	PACE	--	m
12/21/1994	--	37.08	19.40	--	17.68	<50	1.8	0.8	0.8	3.2	5.19	1.1	PACE	--	m
1/30/1995	--	37.08	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	--	--	ATI	--	e
1/30/1995	--	37.08	16.74	--	20.34	<50	<0.50	<0.50	<0.50	<1.0	--	2.2	ATI	--	
4/10/1995	--	37.08	16.01	--	21.07	<50	<0.50	<0.50	<0.50	<1.0	--	8.6	ATI	--	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (μg/L) GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
AW-6 Cont.															
6/29/1995	--	37.08	17.54	--	19.54	<50	<0.50	<0.50	<0.50	<1.0	--	6.3	ATI	--	
9/18/1995	--	37.08	19.65	--	17.43	--	--	--	--	--	--	--	--	--	
9/19/1995	--	37.08	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	25	8.3	ATI	--	
12/7/1995	--	37.08	20.35	--	16.73	<50	<0.50	<0.50	<0.50	<1.0	16	4.7	ATI	--	
3/28/1996	--	37.08	14.99	--	22.09	<50	<0.5	<1	<1	<1	<10	4.0	SPL	--	
6/20/1996	--	37.08	15.59	--	21.49	<50	<0.5	<1	<1	<1	<10	4.6	SPL	--	
10/11/1996	--	37.08	19.09	--	17.99	<50	<0.5	<1.0	<1.0	<1.0	<10	5.3	SPL	--	
1/2/1997	--	37.08	15.11	--	21.97	<50	<0.5	<1.0	<1.0	<1.0	<10	5.5	SPL	--	
4/14/1997	--	37.08	16.25	--	20.83	<50	<0.5	<1.0	<1.0	<1.0	<10	3.9	SPL	--	
7/2/1997	--	37.08	17.99	--	19.09	<50	<0.5	<1.0	<1.0	<1.0	<10	5.2	SPL	--	
9/30/1997	--	37.08	20.50	--	16.58	<50	<0.5	<1.0	<1.0	<1.0	<10	6.0	SPL	--	
1/21/1998	--	37.08	15.72	--	21.36	160	<0.5	<1.0	<1.0	<1.0	110	5.0	SPL	--	
4/9/1998	--	37.08	13.31	--	23.77	--	--	--	--	--	--	--	--	--	
4/10/1998	--	37.08	--	--	--	370	<0.5	<1.0	<1.0	<1.0	300	4.3	SPL	--	
6/19/1998	--	37.08	15.18	--	21.90	830	2	<1.0	<1.0	<1.0	690	4.0	SPL	--	
11/30/1998	--	37.08	--	--	--	--	--	--	--	--	--	--	--	--	f
1/21/1999	--	37.08	15.78	--	21.30	2,300	<1.0	<1.0	<1.0	<1.0	1,900	--	SPL	--	
4/30/1999	--	37.08	16.01	--	21.07	--	--	--	--	--	--	--	--	--	
7/9/1999	--	37.08	17.63	--	19.45	--	--	--	--	--	--	--	--	--	
11/3/1999	--	37.08	18.42	--	18.66	--	--	--	--	--	--	--	--	--	
1/12/2000	--	37.08	19.92	--	17.16	<50	<0.5	<0.5	<0.5	<0.5	2,700	--	PACE	--	
4/13/2000	--	37.08	19.87	--	17.21	--	--	--	--	--	--	--	--	--	
7/26/2000	--	37.08	19.99	--	17.09	--	--	--	--	--	--	--	--	--	
10/24/2000	--	37.08	18.12	--	18.96	--	--	--	--	--	--	--	--	--	
1/19/2001	--	37.08	17.04	--	20.04	2,700	<0.5	<0.5	<0.5	<0.5	4,850	--	PACE	--	
7/24/2001	--	37.08	17.83	--	19.25	--	--	--	--	--	--	--	--	--	
1/18/2002	--	37.08	15.54	--	21.54	5,500	614	<0.5	<0.5	<1.0	5,390	--	PACE	--	
8/1/2002	--	37.08	16.98	--	20.10	--	--	--	--	--	--	--	--	--	
1/16/2003	--	37.08	15.05	--	22.03	2,900	<20	<20	<20	63	2,500	--	SEQ	--	p
7/7/2003	--	37.08	16.58	--	20.50	--	--	--	--	--	--	--	--	--	
02/05/2004	--	37.08	15.84	--	21.24	7,000	<50	<50	<50	<50	5,400	--	SEQM	6.7	

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Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-6 Cont.															
07/01/2004	P	37.08	17.91	--	19.17	9,600	<50	<50	<50	<50	4,600	--	SEQM	6.5	
03/16/2005	P	37.08	16.04	--	21.04	6,700	<25	<25	<25	<25	4,400	3.0	SEQM	6.8	
07/22/2005	P	37.08	14.20	--	22.88	<5,000	<50	<50	<50	<50	5,500	--	SEQM	6.7	
01/25/2006	P	37.08	14.17	--	22.91	<5,000	<50	<50	<50	<50	3,000	--	SEQM	7.0	
7/6/2006	P	37.08	14.82	--	22.26	3,100	<50	<50	<50	<50	2,800	--	TAMC	6.5	
1/8/2007	P	37.08	15.72	--	21.36	5100	<50	<50	<50	<50	7400	3.18	TAMC	6.78	
7/10/2007	P	37.08	16.99	--	20.09	3,700	<100	<100	<100	<100	3,900	2.09	TAMC	6.83	w
1/15/2008	P	37.08	15.55	--	21.53	120	1.1	<1.0	<1.0	<1.0	150	0.58	TAMC	6.80	w
7/15/2008	P	37.08	17.84	--	19.24	130	<0.50	<0.50	<0.50	<0.50	270	2.12	CEL	6.87	
10/21/2008	P	37.08	18.92	--	18.16	81	<5.0	<5.0	<5.0	<5.0	160	1.01	CEL	7.19	
1/6/2009	**P**	**37.08**	**18.37**	**--**	**18.71**	**76**	**<5.0**	**<5.0**	**<5.0**	**<5.0**	**97**	**0.94**	**CEL**	**6.23**	
AW-7															
4/5/1991	--	37.60	23.38	--	14.22	<50	0.4	0.7	<0.3	<0.3	--	--	SUP	--	
4/1/1992	--	37.60	21.92	--	15.68	--	--	--	--	--	--	--	--	--	
4/2/1992	--	37.60	--	--	--	<50	<0.5	3.2	1	5.4	--	--	APP	--	
7/6/1992	--	37.60	24.50	--	13.10	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	37.60	26.18	--	11.42	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
1/14/1993	--	37.60	22.03	--	15.57	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	37.60	21.18	--	16.42	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
7/15/1993	--	37.60	22.09	--	15.51	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--	PACE	--	m
10/21/1993	--	37.60	24.05	--	13.55	51	5	4.2	3.5	8.2	<5.0	--	PACE	--	m
1/27/1994	--	37.60	23.40	--	14.20	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--	PACE	--	m
4/21/1994	--	37.60	22.24	--	15.36	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.5	PACE	--	m
9/9/1994	--	37.60	22.94	--	14.66	<50	<0.5	<0.5	<0.5	0.5	--	4.3	PACE	--	m
12/21/1994	--	37.60	20.86	--	16.74	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.2	PACE	--	m
1/30/1995	--	37.60	17.51	--	20.09	<50	<0.50	<0.50	<0.50	<1.0	--	2.7	ATI	--	
4/10/1995	--	37.60	16.69	--	20.91	<50	<0.50	<0.50	<0.50	<1.0	--	4.8	ATI	--	
6/29/1995	--	37.60	18.33	--	19.27	<50	<0.50	<0.50	<0.50	<1.0	--	7.6	ATI	--	
9/18/1995	--	37.60	20.68	--	16.92	--	--	--	--	--	--	--	--	--	
9/19/1995	--	37.60	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	5.1	ATI	--	

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						GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE				
AW-7 Cont.															
12/7/1995	--	37.60	22.15	--	15.45	<50	<0.50	<0.50	<0.50	<1.0	<5.0	5.2	ATI	--	
3/28/1996	--	37.60	16.38	--	21.22	<50	<0.5	<1	<1	<1	<10	3.9	SPL	--	
6/20/1996	--	37.60	17.02	--	20.58	<50	<0.5	<1	<1	<1	<10	5.0	SPL	--	
10/11/1996	--	37.60	20.47	--	17.13	<50	<0.5	<1.0	<1.0	<1.0	<10	6.3	SPL	--	
1/2/1997	--	37.60	16.70	--	20.90	<50	<0.5	<1.0	<1.0	<1.0	<10	6.2	SPL	--	
4/14/1997	--	37.60	17.96	--	19.64	<50	<0.5	<1.0	<1.0	<1.0	<10	5.0	SPL	--	
7/2/1997	--	37.60	19.11	--	18.49	<50	<0.5	<1.0	<1.0	<1.0	<10	5.4	SPL	--	
9/30/1997	--	37.60	22.97	--	14.63	<250	<2.5	<5.0	<5.0	<5.0	1,100	6.5	SPL	--	
1/21/1998	--	37.60	16.50	--	21.10	<50	<0.5	<1.0	<1.0	<1.0	<10	4.9	SPL	--	
4/9/1998	--	37.60	13.56	--	24.04	<50	<0.5	<1.0	<1.0	<1.0	<10	4.9	SPL	--	
6/19/1998	--	37.60	15.41	--	22.19	<50	<0.5	<1.0	<1.0	<1.0	<10	4.4	SPL	--	
11/30/1998	--	37.60	18.90	--	18.70	--	--	--	--	--	--	--	--	--	
1/21/1999	--	37.60	18.39	--	19.21	--	--	--	--	--	--	--	--	--	
4/30/1999	--	37.60	18.54	--	19.06	--	--	--	--	--	--	--	--	--	
7/9/1999	--	37.60	17.98	--	19.62	--	--	--	--	--	--	--	--	--	
11/3/1999	--	37.60	20.22	--	17.38	--	--	--	--	--	--	--	--	--	
1/12/2000	--	37.60	19.46	--	18.14	--	--	--	--	--	--	--	--	--	
4/13/2000	--	37.60	19.59	--	18.01	--	--	--	--	--	--	--	--	--	
7/26/2000	--	37.60	19.69	--	17.91	--	--	--	--	--	--	--	--	--	
10/24/2000	--	37.60	18.78	--	18.82	--	--	--	--	--	--	--	--	--	
1/19/2001	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	f
7/25/2001	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	f
1/18/2002	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
8/1/2002	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
1/16/2003	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
7/7/2003	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
02/05/2004	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
07/01/2004	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
03/16/2005	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
07/22/2005	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o
01/25/2006	--	37.60	--	--	--	--	--	--	--	--	--	--	--	--	o

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-7															
AW-8															
4/5/1991	--	40.86	26.68	--	14.18	80	1.9	2.2	0.5	1.3	--	--	SUP	--	
4/1/1992	--	40.86	25.11	--	15.75	73	<0.5	0.7	<0.5	0.6	--	--	APP	--	
7/6/1992	--	40.86	26.43	--	14.43	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	40.86	28.59	--	12.27	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
1/14/1993	--	40.86	25.55	--	15.31	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	40.86	22.29	--	18.57	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
7/15/1993	--	40.86	23.42	--	17.44	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--	PACE	--	m
10/21/1993	--	40.86	25.15	--	15.71	<50	1.9	1.8	1.3	3.3	<5.0	--	PACE	--	m
1/27/1994	--	40.86	25.42	--	15.44	<50	<0.5	0.5	0.6	8.5	<5.0	--	PACE	--	m
4/21/1994	--	40.86	24.14	--	16.72	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.5	PACE	--	m
9/9/1994	--	40.86	24.55	--	16.31	<50	<0.5	<0.5	<0.5	<0.5	--	2.4	PACE	--	m
12/21/1994	--	40.86	22.72	--	18.14	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.1	PACE	--	m
1/30/1995	--	40.86	19.75	--	21.11	<50	<0.50	1	<0.50	1	--	0.8	ATI	--	
4/10/1995	--	40.86	17.78	--	23.08	<50	<0.50	<0.50	<0.50	<1.0	--	8.3	ATI	--	
6/29/1995	--	40.86	18.18	--	22.68	<50	<0.50	<0.50	<0.50	<1.0	--	8.3	ATI	--	
9/18/1995	--	40.86	20.20	--	20.66	--	--	--	--	--	--	--	--	--	
9/19/1995	--	40.86	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	7.7	ATI	--	
12/7/1995	--	40.86	21.54	--	19.32	<50	<0.50	<0.50	<0.50	<1.0	<5.0	4.4	ATI	--	
3/28/1996	--	40.86	15.77	--	25.09	<50	<0.5	<1	<1	<1	<10	3.8	SPL	--	
6/20/1996	--	40.86	16.41	--	24.45	<50	<0.5	<1	<1	<1	<10	3.6	SPL	--	
10/11/1996	--	40.86	19.90	--	20.96	<50	<0.5	<1.0	<1.0	<1.0	<10	6.4	SPL	--	
1/2/1997	--	40.86	15.89	--	24.97	<50	<0.5	<1.0	<1.0	<1.0	<10	5.9	SPL	--	
4/14/1997	--	40.86	17.07	--	23.79	<50	<0.5	<1.0	<1.0	<1.0	<10	4.6	SPL	--	
7/2/1997	--	40.86	18.67	--	22.19	<50	<0.5	<1.0	<1.0	<1.0	<10	5.6	SPL	--	
9/30/1997	--	40.86	22.52	--	18.34	<50	<5	<10	<10	<10	820	6.7	SPL	--	
1/21/1998	--	40.86	16.01	--	24.85	<50	<0.5	<1.0	<1.0	<1.0	<10	5.2	SPL	--	
4/9/1998	--	40.86	11.18	--	29.68	<50	<0.5	<1.0	<1.0	<1.0	<10	4.4	SPL	--	
6/19/1998	--	40.86	13.01	--	27.85	<50	<0.5	<1.0	<1.0	<1.0	<10	4.1	SPL	--	
11/30/1998	--	40.86	17.46	--	23.40	--	--	--	--	--	--	--	--	--	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
AW-8 Cont.															
1/21/1999	--	40.86	17.47	--	23.39	--	--	--	--	--	--	--	--	--	
4/30/1999	--	40.86	17.60	--	23.26	--	--	--	--	--	--	--	--	--	
7/9/1999	--	40.86	16.50	--	24.36	--	--	--	--	--	--	--	--	--	
11/3/1999	--	40.86	19.29	--	21.57	--	--	--	--	--	--	--	--	--	
1/12/2000	--	40.86	21.49	--	19.37	--	--	--	--	--	--	--	--	--	
4/13/2000	--	40.86	21.60	--	19.26	--	--	--	--	--	--	--	--	--	
7/26/2000	--	40.86	21.53	--	19.33	--	--	--	--	--	--	--	--	--	
10/24/2000	--	40.86	19.37	--	21.49	--	--	--	--	--	--	--	--	--	
1/19/2001	--	40.86	18.60	--	22.26	--	--	--	--	--	--	--	--	--	
7/24/2001	--	40.86	18.22	--	22.64	--	--	--	--	--	--	--	--	--	
1/18/2002	--	40.86	16.29	--	24.57	--	--	--	--	--	--	--	--	--	
8/1/2002	--	40.86	17.25	--	23.61	--	--	--	--	--	--	--	--	--	
1/16/2003	--	40.86	15.82	--	25.04	--	--	--	--	--	--	--	--	--	
7/7/2003	--	40.86	18.55	--	22.31	--	--	--	--	--	--	--	--	--	
02/05/2004	--	40.86	--	--	--	--	--	--	--	--	--	--	--	--	t
07/01/2004	--	40.86	18.25	--	22.61	--	--	--	--	--	--	--	--	--	t
03/16/2005	P	40.86	15.20	--	25.66	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.5	SEQM	7.3	
07/22/2005	--	40.86	--	--	--	--	--	--	--	--	--	--	--	--	f
01/25/2006	--	40.86	--	--	--	--	--	--	--	--	--	--	--	--	f
7/6/2006	--	40.86	13.05	--	27.81	--	--	--	--	--	--	--	--	--	
1/8/2007	--	40.86	16.57	--	24.29	--	--	--	--	--	--	--	--	--	
7/10/2007	--	40.86	17.73	--	23.13	--	--	--	--	--	--	--	--	--	
1/15/2008	--	40.86	17.88	--	22.98	--	--	--	--	--	--	--	--	--	
7/15/2008	--	40.86	18.57	--	22.29	--	--	--	--	--	--	--	--	--	
10/21/2008	--	40.86	20.09	--	20.77	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**40.86**	**20.20**	**--**	**20.66**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
AW-9															
1/2/1997	--	37.78	10.00	--	27.78	<50	<0.5	<1.0	<1.0	<1.0	<10	6.7	SPL	--	
4/14/1997	--	37.78	--	--	--	--	--	--	--	--	--	--	--	--	f
7/2/1997	--	37.78	12.71	--	25.07	<50	<0.5	<1.0	<1.0	<1.0	<10	6.0	SPL	--	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
AW-9 Cont.															
9/30/1997	--	37.78	21.22	--	16.56	<50	<0.5	<1.0	<1.0	<1.0	<10	6.8	SPL	--	
1/21/1998	--	37.78	10.26	--	27.52	<50	<0.5	<1.0	<1.0	<1.0	<10	5.3	SPL	--	
4/9/1998	--	37.78	6.77	--	31.01	<50	<0.5	<1.0	<1.0	<1.0	<10	5.6	SPL	--	
6/19/1998	--	37.78	8.96	--	28.82	<50	<0.5	<1.0	<1.0	<1.0	<10	4.8	SPL	--	
1/8/2007	--	37.78	17.35	--	20.43	--	--	--	--	--	--	--	--	--	
7/10/2007	--	37.78	18.65	--	19.13	--	--	--	--	--	--	--	--	--	
1/15/2008	--	37.78	18.51	--	19.27	--	--	--	--	--	--	--	--	--	
7/15/2008	--	37.78	19.56	--	18.22	--	--	--	--	--	--	--	--	--	
10/21/2008	--	37.78	21.07	--	16.71	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**37.78**	**21.00**	**--**	**16.78**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-1															
4/5/1991	--	34.46	--	--	--	--	--	--	--	--	--	--	--	--	
4/1/1992	--	34.46	11.25	--	23.21	--	--	--	--	--	--	--	--	--	
7/6/1992	--	34.46	13.61	--	20.85	--	--	--	--	--	--	--	--	--	
10/7/1992	--	34.46	15.15	--	19.31	--	--	--	--	--	--	--	--	--	
1/14/1993	--	34.46	10.73	--	23.73	--	--	--	--	--	--	--	--	--	
4/22/1993	--	34.46	11.64	--	22.82	--	--	--	--	--	--	--	--	--	
7/15/1993	--	34.46	13.50	--	20.96	--	--	--	--	--	--	--	--	--	
10/21/1993	--	34.46	15.21	--	19.25	--	--	--	--	--	--	--	--	--	
1/27/1994	--	34.46	17.48	--	16.98	--	--	--	--	--	--	--	--	--	
4/21/1994	--	34.46	10.94	--	23.52	110,000	1,400	9,100	3,400	30,000	11,000	1.6	PACE	--	c
9/9/1994	--	34.46	13.80	--	20.66	--	--	--	--	--	--	--	--	--	
12/21/1994	--	34.46	12.60	--	21.86	--	--	--	--	--	--	--	--	--	
1/30/1995	--	34.46	--	--	--	--	--	--	--	--	--	--	--	--	
4/10/1995	--	34.46	10.62	--	23.84	--	--	--	--	--	--	--	--	--	
6/29/1995	--	34.46	18.72	--	15.74	--	--	--	--	--	--	--	--	--	
9/18/1995	--	34.46	12.92	--	21.54	--	--	--	--	--	--	--	--	--	
12/7/1995	--	34.46	13.82	--	20.64	--	--	--	--	--	--	--	--	--	
3/28/1996	--	34.46	10.03	--	24.43	--	--	--	--	--	--	--	--	--	
6/20/1996	--	34.46	11.29	--	23.17	--	--	--	--	--	--	--	--	--	

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MW-1 Cont.															
10/11/1996	--	34.46	14.86	--	19.60	--	--	--	--	--	--	--	--	--	
1/2/1997	--	34.46	11.03	--	23.43	--	--	--	--	--	--	--	--	--	
4/14/1997	--	34.46	12.25	--	22.21	--	--	--	--	--	--	--	--	--	
4/15/1997	--	34.46	--	--	--	35,000	130	650	1,700	8,200	4,800	--	SPL	--	
7/2/1997	--	34.46	14.11	--	20.35	42,000	<250	<500	2,000	9,600	<5000	5.5	SPL	--	
9/30/1997	--	34.46	14.40	--	20.06	61,000	130	1,100	2,700	14,600	2,000	6.7	SPL	--	
1/21/1998	--	34.46	7.99	--	26.47	14,000	11	60	310	1,790	1,300	4.5	SPL	--	
4/9/1998	--	34.46	7.89	--	26.57	--	--	--	--	--	--	--	--	--	
4/10/1998	--	34.46	--	--	--	45,000	380	520	2,100	6,800	9,300	5.3	SPL	--	
6/19/1998	--	34.46	10.31	--	24.15	35,000	170	100	1,100	3,590	5,000	4.9	SPL	--	
11/30/1998	--	34.46	11.16	--	23.30	10,000	100	24	350	1,040	1800/2800	--	SPL	--	g
1/21/1999	--	34.46	10.76	--	23.70	18,000	120	37	590	1,800	2,700	--	SPL	--	
4/30/1999	--	34.46	10.78	--	23.68	17,000	240	89	1,100	1,900	1,600	--	SPL	--	
7/9/1999	--	34.46	12.62	--	21.84	58,000	140	100	1,800	6,900	1,200	--	SPL	--	
11/3/1999	--	34.46	14.00	--	20.46	20,000	62	42	620	2,100	630	--	PACE	--	
1/12/2000	--	34.46	15.25	--	19.21	72,000	110	120	2,400	8,200	630	--	PACE	--	
4/13/2000	--	34.46	15.57	--	18.89	37,000	300	32	1,000	1,700	810	--	PACE	--	
5/24/2000	--	34.46	11.75	--	22.71	--	--	--	--	--	--	--	--	--	
6/1/2000	--	34.46	11.41	--	23.05	--	--	--	--	--	--	--	--	--	
6/8/2000	--	34.46	11.68	--	22.78	--	--	--	--	--	--	--	--	--	
6/15/2000	--	34.46	11.85	--	22.61	--	--	--	--	--	--	--	--	--	
7/26/2000	--	34.46	16.19	--	18.27	10,000	480	210	470	710	1,100	--	PACE	--	
10/24/2000	--	34.46	13.89	--	20.57	9,900	31	7.2	550	1,200	4,400	--	PACE	--	
1/19/2001	--	34.46	12.90	--	21.56	57,000	199	7.66	1,170	3,260	514	--	PACE	--	
7/24/2001	--	34.46	13.55	--	20.91	27,000	96.7	<5.0	548	1,460	285	--	PACE	--	
1/18/2002	--	34.46	10.91	--	23.55	25,000	150	31.5	597	1,040	138	--	PACE	--	
8/1/2002	--	34.46	12.97	--	21.49	25,000	80.2	17.7	714	1,280	489	--	PACE	--	
1/16/2003	--	34.46	10.45	--	24.01	22,000	170	110	630	670	<500	--	SEQ	--	p
7/7/2003	--	34.46	12.40	--	22.06	9,900	42	<5.0	160	150	24	--	SEQ	--	q, u
02/05/2004	--	34.46	10.26	--	24.20	6,200	56	11	250	210	9.2	--	SEQM	6.9	
07/01/2004	--	34.46	13.20	--	21.26	18,000	<50	<50	210	300	<50	--	SEQM	--	u

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MW-1 Cont.															
03/16/2005	P	34.46	9.62	--	24.84	7,600	33	5.4	200	130	<5.0	0.9	SEQM	6.9	
07/22/2005	P	34.46	11.23	--	23.23	15,000	<10	<10	110	130	<10	--	SEQM	6.8	u
01/25/2006	P	34.46	8.75	--	25.71	8,300	8.4	4.8	130	120	<2.5	--	SEQM	7.3	u
7/6/2006	P	34.46	10.36	--	24.10	5,100	<2.5	<2.5	16	12	<2.5	--	TAMC	6.9	
1/8/2007	P	34.46	11.55	--	22.91	2700	4.6	0.66	35	27	2.1	1.83	TAMC	6.92	
7/10/2007	P	34.46	13.01	SHEEN	21.45	1,800	1.9	<0.50	13	4.8	2.4	2.16	TAMC	7.04	
1/15/2008	P	34.46	10.96	--	23.50	2,900	8.0	4.0	84	87	1.2	0.94	TAMC	7.13	
7/15/2008	P	34.46	13.82	--	20.64	3,200	<0.50	<0.50	8.5	4.8	<0.50	1.20	CEL	7.06	
10/21/2008	P	34.46	14.70	--	19.76	2,300	2.6	<0.50	5.4	2.4	<0.50	1.99	CEL	7.30	
1/6/2009	**P**	**34.46**	**13.67**	**--**	**20.79**	**2,600**	**15**	**1.8**	**13**	**3.4**	**<0.50**	**0.67**	**CEL**	**6.90**	
MW-2															
4/5/1991	--	35.50	16.62	--	18.88	<50	0.6	0.9	<0.3	<0.3	--	--	SUP	--	
4/1/1992	--	35.50	11.25	--	24.25	--	--	--	--	--	--	--	--	--	
4/2/1992	--	35.50	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	APP	--	
7/6/1992	--	35.50	12.72	--	22.78	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	35.50	15.08	--	20.42	<50	<0.5	1.8	<0.5	2.3	--	--	ANA	--	
1/14/1993	--	35.50	9.69	--	25.81	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	m
4/22/1993	--	35.50	10.46	--	25.04	<50	<0.5	<0.5	<0.5	<0.5	30	--	PACE	--	c
7/15/1993	--	35.50	12.02	--	23.48	<50	<0.5	<0.5	<0.5	<0.5	21.7	--	PACE	--	c, m
10/21/1993	--	35.50	13.12	--	22.38	<50	0.7	0.9	<0.5	0.9	14.9	--	PACE	--	m
1/27/1994	--	35.50	12.01	--	23.49	<50	0.6	<0.5	<0.5	<0.5	11.5	--	PACE	--	m
4/21/1994	--	35.50	10.60	--	24.90	<50	<0.5	<0.5	<0.5	<0.5	11.4	1.1	PACE	--	m
9/9/1994	--	35.50	12.42	--	23.08	<50	<0.5	<0.5	<0.5	0.6	--	2.2	PACE	--	m
12/21/1994	--	35.50	10.85	--	24.65	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.2	PACE	--	m
1/30/1995	--	35.50	8.38	--	27.12	<50	<0.50	<0.50	<0.50	<1.0	--	1.7	ATI	--	
4/10/1995	--	35.50	9.00	--	26.50	<50	<0.50	<0.50	<0.50	<1.0	--	7.8	ATI	--	
6/29/1995	--	35.50	9.91	--	25.59	<50	<0.50	<0.50	<0.50	<1.0	--	9.1	ATI	--	
9/18/1995	--	35.50	10.98	--	24.52	--	--	--	--	--	--	--	--	--	
9/19/1995	--	35.50	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	7.2	ATI	--	
12/7/1995	--	35.50	12.30	--	23.20	<50	<0.50	<0.50	<0.50	<1.0	<5.0	2.4	ATI	--	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
MW-2 Cont.															
3/28/1996	--	35.50	8.57	--	26.93	<50	<0.5	<1	<1	<1	<10	3.2	SPL	--	
6/20/1996	--	35.50	9.77	--	25.73	<50	<0.5	<1	<1	<1	<10	4.2	SPL	--	
10/11/1996	--	35.50	13.32	--	22.18	<50	<0.5	<1.0	<1.0	<1.0	<10	6.3	SPL	--	
1/2/1997	--	35.50	9.60	--	25.90	<50	<0.5	<1.0	<1.0	<1.0	<10	6.7	SPL	--	
4/14/1997	--	35.50	10.93	--	24.57	<50	<0.5	<1.0	<1.0	<1.0	<10	5.7	SPL	--	
7/2/1997	--	35.50	12.57	--	22.93	<50	<0.5	<1.0	<1.0	<1.0	<10	5.9	SPL	--	
9/30/1997	--	35.50	12.91	--	22.59	<50	<0.5	<1.0	<1.0	<1.0	<10	6.3	SPL	--	
1/21/1998	--	35.50	10.12	--	25.38	160	<0.5	<1.0	<1.0	<1.0	100	5.4	SPL	--	
4/9/1998	--	35.50	6.82	--	28.68	--	--	--	--	--	--	--	--	--	
4/10/1998	--	35.50	--	--	--	<50	1	<1.0	<1.0	<1.0	23	5.0	SPL	--	
6/19/1998	--	35.50	9.00	--	26.50	<50	<0.5	<1.0	<1.0	<1.0	<10	4.9	SPL	--	
11/30/1998	--	35.50	9.44	--	26.06	--	--	--	--	--	--	--	--	--	
1/21/1999	--	35.50	8.96	--	26.54	<50	<1.0	<1.0	<1.0	<1.0	1.9	--	SPL	--	
4/30/1999	--	35.50	9.15	--	26.35	--	--	--	--	--	--	--	--	--	
7/9/1999	--	35.50	10.82	--	24.68	--	--	--	--	--	--	--	--	--	
11/3/1999	--	35.50	11.86	--	23.64	--	--	--	--	--	--	--	--	--	
1/12/2000	--	35.50	12.35	--	23.15	<50	<0.5	<0.5	<0.5	<0.5	<0.5	--	PACE	--	
4/13/2000	--	35.50	13.01	--	22.49	--	--	--	--	--	--	--	--	--	
7/26/2000	--	35.50	13.01	--	22.49	--	--	--	--	--	--	--	--	--	
10/24/2000	--	35.50	11.57	--	23.93	--	--	--	--	--	--	--	--	--	
1/19/2001	--	35.50	10.52	--	24.98	--	--	--	--	--	--	--	--	--	
7/24/2001	--	35.50	11.13	--	24.37	--	--	--	--	--	--	--	--	--	
1/18/2002	--	35.50	8.85	--	26.65	--	--	--	--	--	--	--	--	--	
8/1/2002	--	35.50	10.47	--	25.03	--	--	--	--	--	--	--	--	--	
1/14/2003	--	35.50	8.49	--	27.01	--	--	--	--	--	--	--	--	--	
7/7/2003	--	35.50	9.63	--	25.87	--	--	--	--	--	--	--	--	--	
02/05/2004	--	35.50	8.40	--	27.10	--	--	--	--	--	--	--	--	--	
07/01/2004	NP	35.50	9.94	--	25.56	--	--	--	--	--	--	--	--	--	
03/16/2005	P	35.50	8.39	--	27.11	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.3	SEQM	7.1	
07/22/2005	--	35.50	8.80	--	26.70	--	--	--	--	--	--	--	--	--	
01/25/2006	--	35.50	7.85	--	27.65	--	--	--	--	--	--	--	--	--	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE				
MW-2 Cont.															
7/6/2006	--	35.50	8.33	--	27.17	--	--	--	--	--	--	--	--	--	
1/8/2007	--	35.50	9.35	--	26.15	--	--	--	--	--	--	--	--	--	
7/10/2007	--	35.50	10.45	--	25.05	--	--	--	--	--	--	--	--	--	
1/15/2008	--	35.50	18.83	--	16.67	--	--	--	--	--	--	--	--	--	
7/15/2008	--	35.50	11.07	--	24.43	--	--	--	--	--	--	--	--	--	
10/21/2008	--	35.50	11.30	--	24.20	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**35.50**	**11.00**	**--**	**24.50**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-3															
4/5/1991	--	36.53	17.84	--	18.69	<50	<0.3	<0.3	<0.3	<0.3	--	--	SUP	--	
4/1/1992	--	36.53	15.64	--	20.89	--	--	--	--	--	--	--	--	--	
4/2/1992	--	36.53	--	--	--	<50	1.4	<0.5	<0.5	<0.5	--	--	APP	--	
7/6/1992	--	36.53	19.03	--	17.50	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
10/7/1992	--	36.53	21.83	--	14.70	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	
1/14/1993	--	36.53	15.96	--	20.57	350	<0.5	<0.5	<0.5	<0.5	714	--	PACE	--	c, m
4/22/1993	--	36.53	16.20	--	20.33	2,800	<0.5	<0.5	<0.5	<0.5	3,600	--	PACE	--	c, m
7/15/1993	--	36.53	16.82	--	19.71	1,400	1.2	<0.5	2	3.5	2,204	--	PACE	--	c, m
10/21/1993	--	36.53	18.84	--	17.69	370	2.1	2.3	2.3	6	847	--	PACE	--	c, m
1/27/1994	--	36.53	18.00	--	18.53	1,300	6.3	<0.5	<0.5	<0.5	3,892	--	PACE	--	c, m
4/21/1994	--	36.53	16.62	--	19.91	2,000	<0.5	<0.5	<0.5	<0.5	3,864	1.4	PACE	--	c, m
9/9/1994	--	36.53	18.38	--	18.15	1,300	<0.5	<0.5	0.5	1.2	--	3.0	PACE	--	m
12/21/1994	--	36.53	15.28	--	21.25	420	16	0.7	3.5	5.9	800	1.9	PACE	--	m
1/30/1995	--	36.53	12.62	--	23.91	<50	<0.50	<0.50	<0.50	<1.0	--	2.5	ATI	--	
4/10/1995	--	36.53	12.41	--	24.12	150	<0.50	<0.50	<0.50	<1.0	--	6.9	ATI	--	
6/29/1995	--	36.53	14.95	--	21.58	100	<0.50	<0.50	<0.50	<1.0	--	6.4	ATI	--	d (TPH-g)
9/18/1995	--	36.53	15.82	--	20.71	--	--	--	--	--	--	--	--	--	
9/19/1995	--	36.53	--	--	--	82	<0.50	<0.50	<0.50	<1.0	260	7.0	ATI	--	
12/7/1995	--	36.53	17.09	--	19.44	<50	<0.50	<0.50	<0.50	<1.0	91	4.5	ATI	--	
3/28/1996	--	36.53	11.90	--	24.63	<50	<0.5	<1	<1	<1	230	4.2	SPL	--	
6/20/1996	--	36.53	12.66	--	23.87	260	<0.5	<1	<1	<1	370	4.4	SPL	--	
10/11/1996	--	36.53	16.23	--	20.30	330	<0.5	<1.0	<1.0	<1.0	440	5.8	SPL	--	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
MW-3 Cont.															
1/2/1997	--	36.53	12.17	--	24.36	<50	<0.5	<1.0	<1.0	<1.0	140	6.0	SPL	--	
4/14/1997	--	36.53	13.45	--	23.08	--	--	--	--	--	--	--	--	--	
4/15/1997	--	36.53	--	--	--	1,500	<0.5	<1.0	<1.0	<1.0	1,800	5.6	SPL	--	
7/2/1997	--	36.53	15.60	--	20.93	880	<0.5	<1.0	<1.0	<1.0	940	5.3	SPL	--	
9/30/1997	--	36.53	17.16	--	19.37	40,000	13,000	2,400	870	3,100	510	6.6	SPL	--	
1/21/1998	--	36.53	11.77	--	24.76	120	<0.5	<1.0	<1.0	<1.0	98	4.7	SPL	--	
4/9/1998	--	36.53	9.42	--	27.11	950	<0.5	<1.0	<1.0	<1.0	890	5.7	SPL	--	
6/19/1998	--	36.53	15.28	--	21.25	1,800	<0.5	<1.0	<1.0	<1.0	1,900	4.7	SPL	--	
6/19/1998	--	36.53	12.09	--	24.44	1,800	<0.5	<1.0	<1.0	<1.0	1,900	4.7	SPL	--	
1/21/1999	--	36.53	14.67	--	21.86	1,100	<1.0	<1.0	<1.0	<1.0	1,200	--	SPL	--	
4/30/1999	--	36.53	16.00	--	20.53	--	--	--	--	--	--	--	--	--	
7/9/1999	--	36.53	14.64	--	21.89	470	<1.0	<1.0	<1.0	<1.0	460/470	--	SPL	--	g
11/3/1999	--	36.53	16.39	--	20.14	--	--	--	--	--	--	--	--	--	
1/12/2000	--	36.53	16.80	--	19.73	<50	<0.5	<0.5	<0.5	<0.5	34	--	PACE	--	
4/13/2000	--	36.53	16.43	--	20.10	--	--	--	--	--	--	--	--	--	
7/26/2000	--	36.53	16.93	--	19.60	<50	<0.5	<0.5	<0.5	<0.5	<0.5	--	PACE	--	
10/24/2000	--	36.53	15.69	--	20.84	--	--	--	--	--	--	--	--	--	
1/19/2001	--	36.53	14.84	--	21.69	<50	<0.5	<0.5	<0.5	1	25.9	--	PACE	--	
7/23/2001	--	36.53	15.11	--	21.42	62	<0.5	<0.5	<0.5	<1.5	28.7	--	PACE	--	
1/18/2002	--	36.53	12.37	--	24.16	<50	<0.5	<0.5	<0.5	<1.0	17.8	--	PACE	--	
8/1/2002	--	36.53	14.44	--	22.09	66	<0.5	<0.5	<0.5	<1.0	<0.5	--	PACE	--	
1/16/2003	--	36.53	12.07	--	24.46	<50	<0.50	<0.50	<0.50	<0.50	20	--	SEQ	--	p
7/7/2003	--	36.53	13.90	--	22.63	<50	<0.50	<0.50	<0.50	<0.50	8.8	--	SEQ	--	q
02/05/2004	--	36.53	12.60	--	23.93	<50	<0.50	<0.50	<0.50	<0.50	4.6	--	SEQM	7.0	
07/01/2004	--	36.53	14.57	--	21.96	<50	<0.50	<0.50	<0.50	<0.50	3.3	--	SEQM	--	
03/16/2005	P	36.53	11.03	--	25.50	<50	<0.50	<0.50	<0.50	<0.50	4.4	1.5	SEQM	6.8	
07/22/2005	P	36.53	12.68	--	23.85	<50	<0.50	<0.50	<0.50	<0.50	4.1	--	SEQM	6.8	
01/25/2006	P	36.53	11.35	--	25.18	81	<0.50	<0.50	<0.50	<0.50	3.0	--	SEQM	6.9	
7/6/2006	P	36.53	11.47	--	25.06	<50	<0.50	<0.50	<0.50	<0.50	3.0	--	TAMC	6.9	
1/8/2007	P	36.53	12.92	--	23.61	<50	<0.50	<0.50	<0.50	<0.50	3.2	2.87	TAMC	7.12	
7/10/2007	P	36.53	14.46	--	22.07	<50	<0.50	<0.50	<0.50	<0.50	2.8	2.87	TAMC	7.25	

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MW-3 Cont.															
1/15/2008	P	36.53	12.99	--	23.54	<50	<0.50	<0.50	<0.50	<0.50	0.88	1.04	TAMC	7.10	
7/15/2008	P	36.53	15.30	--	21.23	<50	<0.50	<0.50	<0.50	<0.50	1.3	1.60	CEL	7.06	
10/21/2008	P	36.53	16.30	--	20.23	<50	<0.50	<0.50	<0.50	<0.50	0.94	2.21	CEL	7.28	
1/6/2009	**P**	**36.53**	**15.45**	**--**	**21.08**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**1.02**	**CEL**	**6.43**	
QC-2															
10/7/1992	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	ANA	--	i
1/14/1993	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i, m
4/22/1993	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i, m
7/15/1993	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<5.0	--	PACE	--	i, m
10/21/1993	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i
1/27/1994	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i
4/21/1994	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i
9/9/1994	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i
12/21/1994	--	37.73	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	PACE	--	i
1/30/1995	--	37.73	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	--	--	ATI	--	i
4/10/1995	--	37.73	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	--	--	ATI	--	i
6/27/1995	--	37.73	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	--	--	ATI	--	i
9/19/1995	--	37.73	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	--	ATI	--	i
12/7/1995	--	37.73	--	--	--	<50	<0.50	<0.50	<0.50	<1.0	<5.0	--	ATI	--	i
3/28/1996	--	37.73	--	--	--	<50	<0.5	<1	<1	<1	<10	--	SPL	--	i
6/20/1996	--	37.73	--	--	--	<50	<0.5	<1	<1	<1	<10	--	SPL	--	i
RW-1															
4/5/1991	--	37.73	--	--	--	--	--	--	--	--	--	--	--	--	
4/1/1992	--	37.73	22.81	--	14.92	--	--	--	--	--	--	--	--	--	
7/6/1992	--	37.73	26.92	--	10.81	--	--	--	--	--	--	--	--	--	
10/7/1992	--	37.73	28.51	--	9.22	--	--	--	--	--	--	--	--	--	
1/14/1993	--	37.73	23.75	--	13.98	--	--	--	--	--	--	--	--	--	
4/22/1993	--	37.73	22.70	--	15.03	--	--	--	--	--	--	--	--	--	
7/15/1993	--	37.73	26.10	--	11.63	--	--	--	--	--	--	--	--	--	

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Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
RW-1 Cont.															
10/21/1993	--	37.73	25.40	--	12.33	--	--	--	--	--	--	--	--	--	
1/27/1994	--	37.73	28.02	--	9.71	--	--	--	--	--	--	--	--	--	
4/21/1994	--	37.73	23.10	--	14.63	--	--	--	--	--	--	--	--	--	
9/9/1994	--	37.73	24.39	--	13.34	--	--	--	--	--	--	--	--	--	
12/21/1994	--	37.73	--	--	--	--	--	--	--	--	--	--	--	--	h
12/7/1995	--	37.73	25.71	--	12.02	150,000	34,000	35,000	4,300	21,000	2,700	--	ATI	--	
3/28/1996	--	37.73	16.75	--	20.98	--	--	--	--	--	--	--	--	--	
6/20/1996	--	37.73	25.10	--	12.63	--	--	--	--	--	--	--	--	--	h
10/11/1996	--	37.73	25.51	--	12.22	130,000	20,000	32,000	2,800	20,700	1400/1200	7.4	SPL	--	g
1/2/1997	--	37.73	24.49	--	13.24	--	--	--	--	--	--	--	--	--	
4/14/1997	--	37.73	23.99	--	13.74	--	--	--	--	--	--	--	--	--	
4/15/1997	--	37.73	--	--	--	1,800,000	38,000	190,000	48,000	281,000	<25000	--	SPL	--	
7/2/1997	--	37.73	16.40	--	21.33	140,000	19,000	55,000	4,400	32,400	<10000	5.7	SPL	--	
7/2/1997	--	37.73	--	--	--	130,000	19,000	54,000	4,700	33,400	<10000	--	SPL	--	e
9/30/1997	--	37.73	27.97	--	9.76	110,000	13,000	22,000	2,000	12,500	1,100	7.0	SPL	--	
9/30/1997	--	37.73	--	--	--	140,000	17,000	29,000	2,500	15,900	1,200	--	SPL	--	e
1/21/1998	--	37.73	14.14	--	23.59	270,000	21,000	48,000	3,500	25,000	1,100	4.8	SPL	--	
4/9/1998	--	37.73	25.01	--	12.72	--	--	--	--	--	--	--	--	--	
4/10/1998	--	37.73	--	--	--	220,000	26,000	46,000	4,400	24,500	<2500	5.1	SPL	--	
6/19/1998	--	37.73	11.43	--	26.30	180,000	19,000	32,000	3,000	17,400	<2500	4.6	SPL	--	
11/30/1998	--	37.73	7.87	--	29.86	--	--	--	--	--	--	--	--	--	
1/21/1999	--	37.73	18.90	--	18.83	260,000	24,000	46,000	5,100	30,000	1,700	--	SPL	--	
7/9/1999	--	37.73	18.58	--	19.15	--	--	--	--	--	--	--	--	--	
11/3/1999	--	37.73	20.85	--	16.88	160,000	19,000	37,000	3,800	25,000	1,500	--	PACE	--	
1/12/2000	--	37.73	21.20	--	16.53	240,000	18,000	46,000	5,800	26,000	2,100	--	PACE	--	
4/13/2000	--	37.73	21.71	--	16.02	120,000	2,100	33,000	2,800	28,000	1,500	--	PACE	--	
5/24/2000	--	37.73	21.89	--	15.84	--	--	--	--	--	--	--	--	--	
6/1/2000	--	37.73	16.30	--	21.43	--	--	--	--	--	--	--	--	--	
6/8/2000	--	37.73	17.88	--	19.85	--	--	--	--	--	--	--	--	--	
6/15/2000	--	37.73	16.72	--	21.01	--	--	--	--	--	--	--	--	--	
6/20/2000	--	37.73	21.04	--	16.69	--	--	--	--	--	--	--	--	--	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (μg/L) GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
RW-1 Cont.															
7/7/2000	--	37.73	17.21	--	20.52	--	--	--	--	--	--	--	--	--	
7/20/2000	--	37.73	21.87	--	15.86	--	--	--	--	--	--	--	--	--	
7/26/2000	--	37.73	21.45	--	16.28	67,000	160	5,300	2,100	18,000	1,100	--	PACE	--	
7/31/2000	--	37.73	22.11	--	15.62	--	--	--	--	--	--	--	--	--	
8/8/2000	--	37.73	17.80	--	19.93	--	--	--	--	--	--	--	--	--	
8/16/2000	--	37.73	17.92	--	19.81	--	--	--	--	--	--	--	--	--	
8/23/2000	--	37.73	18.11	--	19.62	--	--	--	--	--	--	--	--	--	
10/24/2000	--	37.73	18.93	--	18.80	--	--	--	--	--	--	--	--	--	
10/25/2000	--	37.73	19.04	--	18.69	360,000	18,000	78,000	34,000	180,000	2,100	--	PACE	--	k
1/19/2001	--	37.73	18.19	--	19.54	110,000	9,450	19,600	3,510	21,100	1,270	--	PACE	--	
7/24/2001	--	37.73	17.93	--	19.80	--	--	--	--	--	--	--	--	--	l
1/18/2002	--	37.73	14.87	--	22.86	63,000	2,060	4,370	1,770	13,900	491	--	PACE	--	
8/1/2002	--	37.73	16.84	--	20.89	60,000	1,210	2,200	1,520	10,600	390	--	PACE	--	
1/16/2003	--	37.73	14.42	--	23.31	34,000	2,500	2,700	780	5,300	680	--	SEQ	--	p
7/7/2003	--	37.73	16.11	--	21.62	50,000	640	280	1,600	10,000	<250	--	SEQ	--	q, u
07/01/2004	P	37.73	16.75	--	20.98	47,000	320	87	1,900	7,500	72	--	SEQM	6.7	
03/16/2005	P	37.73	12.48	--	25.25	17,000	28	23	350	590	53	1.0	SEQM	6.8	
07/22/2005	P	37.73	14.40	--	23.33	5,900	50	35	120	220	51	--	SEQM	6.7	u
01/25/2006	P	37.73	12.00	--	25.73	7,000	22	5.9	190	--	34	--	SEQM	7.1	
7/6/2006	P	37.73	13.01	--	24.72	16,000	37	14	470	230	64	--	TAMC	6.8	
1/8/2007	P	37.73	14.75	--	22.98	2400	16	10	56	54	22	3.61	TAMC	6.86	
7/10/2007	P	37.73	16.21	--	21.52	3,800	4.4	2.8	72	22	21	2.65	TAMC	6.98	
1/15/2008	P	37.73	14.63	--	23.10	1,700	21	1.6	45	10	14	1.31	TAMC	6.82	
7/15/2008	P	37.73	17.04	--	20.69	1,600	<0.50	0.66	4.4	3.0	12	1.32	CEL	6.95	
10/21/2008	P	37.73	18.44	--	19.29	3,600	<0.50	1.3	19	10	12	0.79	CEL	7.17	
1/6/2009	**P**	**37.73**	**17.50**	**--**	**20.23**	**1,300**	**<0.50**	**<0.50**	**1.6**	**2.7**	**7.0**	**1.02**	**CEL**	**6.43**	
VEW-4															
07/22/2005	P	--	14.04	--	--	680	41	24	20	67	<0.50	--	SEQM	6.8	
1/15/2008	P	--	15.05	--	--	350	19	1.1	5.0	3.3	<0.50	0.54	TAMC	6.99	
7/15/2008	P	--	17.24	--	--	53	<0.50	<0.50	<0.50	<0.50	<0.50	0.59	CEL	6.95	

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L)						DO (mg/L)	Lab	pH	Comments
						GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE				
VEW-4 Cont.															
10/21/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
1/6/2009	**--**	**--**	**18.00**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
VEW-5															
07/22/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
1/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
7/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
10/21/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
1/6/2009	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**v**
VEW-6															
1/15/2008	--	--	11.83	--	--	--	--	--	--	--	--	--	--	--	
7/15/2008	--	--	14.81	--	--	--	--	--	--	--	--	--	--	--	
10/21/2008	--	--	16.02	--	--	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**--**	**14.70**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
VEW-7															
1/15/2008	--	--	13.24	--	--	--	--	--	--	--	--	--	--	--	
7/15/2008	--	--	15.91	--	--	--	--	--	--	--	--	--	--	--	
10/21/2008	--	--	16.89	--	--	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**--**	**16.00**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
VEW-8															
07/22/2005	P	--	14.24	--	--	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	SEQM	6.8	
1/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
7/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
10/21/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
1/6/2009	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**v**
VEW-9															
1/15/2008	--	--	5.31	--	--	--	--	--	--	--	--	--	--	--	
7/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
10/21/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v

Table 1. Summary of Ground-Water Monitoring Data: Relative Water Elevations and Laboratory Analyses

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	P/NP	TOC Elevation (feet msl)	Depth to Water (feet bgs)	Product Thickness (feet)	Water Level Elevation (feet msl)	Concentrations in (µg/L) GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE	DO (mg/L)	Lab	pH	Comments
VEW-9 Cont.															
1/6/2009	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**f**
VW-1															
1/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
7/15/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
10/21/2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	v
1/6/2009	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**v**
VW-2															
1/15/2008	--	--	0.25	--	--	--	--	--	--	--	--	--	--	--	
7/15/2008	--	--	0.65	--	--	--	--	--	--	--	--	--	--	--	
10/21/2008	--	--	0.68	--	--	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**--**	**0.45**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
VW-3															
1/15/2008	--	--	2.08	--	--	--	--	--	--	--	--	--	--	--	
7/15/2008	--	--	4.10	--	--	--	--	--	--	--	--	--	--	--	
10/21/2008	--	--	4.95	--	--	--	--	--	--	--	--	--	--	--	
1/6/2009	**--**	**--**	**5.40**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	

ABBREVIATIONS & SYMBOLS:
-- = Not analyzed/applicable/measured/available
< = Not detected at or above specified laboratory reporting limit
DO = Dissolved oxygen
DTW = Depth to water in ft bgs
ft bgs = Feet below ground surface
ft MSL = Feet above mean sea level
GRO = Gasoline range organics
GWE = Groundwater elevation in ft MSL
mg/L = Milligrams per liter
MTBE = Methyl tert-butyl ether
NP = Well not purged prior to sampling
P = Well purged prior to sampling
TOC = Top of casing in ft MSL
TPH-g = Total petroleum hydrocarbons as gasoline
μg/L = Micrograms per liter
ANA = Anametrix, Inc.
PACE = Pace, Inc.
ATI = Analytical Technologies, Inc.
CEI = Ceimic Corporation
SPL = Southern Petroleum Laboratories
SEQ/SEQM= Sequoia Analytical/Sequoia Analytical Morgan Hill Laboratories
CEL = CalScience Environmental Laboratories, Inc.

FOOTNOTES:
c = A copy of the documentation for this data is included in Appendix C of Alistoreport 10-025-13-003.
d = MTBE peak. See documentation in Appendix C of Alisto report 10-025-13-003.
e = Blind duplicate.
f = Well inaccessible.
g = EPA Methods 8020/8260 used.
h = Well not monitored and/or sampled due to vapor extraction system.
i = Travel blank.
j = This gasoline does not include MTBE.
k = Well was sampled on a different date from the other wells due to lack of proper equipment.
l = Unable to sample due to nature of product.
m = A copy of the documentation for this data is included in Blaine Tech Services, Inc., Report 010724-B-2. The data for sampling events January 14, 1993 and April 22, 1993 has been destroyed. No chromatograms could be located for samples AW-2 on January 27, 1994, and for samples AW-1, AW-2, AW-3, AW-4, AW-5, AW-6, AW-7, AW-8, MW-2 and MW-3 on September 9, 1994.
n = On June 1, 2001, after reviewing chromatograms, Sequoia reported the value as <5.0.
o = Unable to locate well.
p = TPH-g data analyzed by EPA Method 8015B modified; BTEX and MTBE by EPA Method 8021B
q = TPH-g, BTEX, and MTBE analyzed by EPA method 8260B beginning on the third quarter 2003 sampling event 07/07/03.
r = Discrete peak at C5.
t = Well was not gauged during the quarter due to an oversite by the technician.
u = Sheen in well.
v = Well was dry.
w = Hydrocarbon result partly due to individ. peak(s) in quant. range.

NOTES:
Beginning in the fourth quarter 2003, the laboratory modified the reported analyte list. TPH-g was changed to GRO. The resulting data may be impacted by the potential of non-TPH-g analytes within the requested fuel range resulting in a higher concentration being reported.

Beginning in the second quarter 2004, the carbon range for GRO was changed from C6-C10 to C4-C12.

Values for DO and pH were obtained through field measurements.

GWEs adjusted assuming a specific gravity of 0.75 for free product

GRO analysis was completed by EPA method 8260B (C4-C12) for samples collected from the time period April 2006 through February 4, 2008. The analysis for GRO was changed to EPA method 8015B (C6-C12) for samples collected from the time period February 5, 2008 through the present.

Note: The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information.

Table 2. Summary of Fuel Additives Analytical Data

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	Concentrations in (µg/L)								Comments
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
AW-1									
7/7/2003	<5,000	<1,000	1,100	<25	<25	190	--	--	
02/05/2004	<10,000	<2,000	930	<50	<50	160	<50	<50	
07/01/2004	<5,000	<1,000	1,100	<25	<25	170	<25	<25	
03/16/2005	<5,000	<1,000	720	<25	<25	130	<25	<25	
07/22/2005	<1,000	<200	510	<5.0	<5.0	93	31	<5.0	
01/25/2006	<6,000	<400	490	<10	<10	94	21	<10	
7/6/2006	<6,000	<400	270	<10	<10	49	<10	<10	
1/8/2007	<3000	240	380	<5.0	<5.0	64	<5.0	--	
7/10/2007	<6,000	<400	220	<10	<10	36	<10	<10	
1/15/2008	<6,000	<400	230	<10	<10	45	<10	<10	
7/15/2008	<300	<10	<0.50	<0.50	<0.50	15	<0.50	<0.50	
10/21/2008	<3,000	390	120	<5.0	<5.0	22	<5.0	<5.0	
1/6/2009	**<3,000**	**190**	**170**	**<5.0**	**<5.0**	**28**	**<5.0**	**<5.0**	
AW-2									
02/05/2004	<100	<20	5.1	<0.50	<0.50	<0.50	<0.50	<0.50	
03/16/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
01/25/2006	<600	<40	12	<1.0	<1.0	1.0	<1.0	<1.0	
1/8/2007	<3000	<200	40	<5.0	<5.0	<5.0	<5.0	--	
1/15/2008	<6,000	<400	48	<10	<10	<10	<10	<10	
7/15/2008	<30,000	<1,000	<50	<50	<50	<50	<50	<50	
10/21/2008	<7,500	<250	16	<12	<12	<12	<12	<12	
1/6/2009	**<6,000**	**<200**	**11**	**<10**	**<10**	**<10**	**<10**	**<10**	
AW-3									
03/16/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
AW-4									
7/7/2003	<1,000	<200	56	<5.0	<5.0	<5.0	--	--	
02/05/2004	<200	<40	40	<1.0	<1.0	3.7	<1.0	<1.0	
07/01/2004	<1,000	<200	64	<5.0	<5.0	9.6	<5.0	<5.0	
03/16/2005	<500	<100	23	<2.5	<2.5	<2.5	<2.5	<2.5	
07/22/2005	<2,000	<400	59	<10	<10	<10	<10	<10	

Table 2. Summary of Fuel Additives Analytical Data

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	Concentrations in (µg/L)								Comments
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
AW-4 Cont.									
01/25/2006	<3,000	<200	12	<5.0	<5.0	<5.0	<5.0	<5.0	
7/6/2006	<3,000	<5.0	39	<5.0	<5.0	<5.0	<5.0	<5.0	
1/8/2007	<300	<20	38	<0.50	<0.50	6.2	<0.50	--	
7/10/2007	<300	<20	27	<0.50	<0.50	4.2	<0.50	<0.50	
1/15/2008	<300	<20	17	<0.50	<0.50	2.3	<0.50	<0.50	
7/15/2008	<300	<10	25	<0.50	<0.50	3.4	<0.50	<0.50	
10/21/2008	<600	<20	18	<1.0	<1.0	1.9	<1.0	<1.0	
1/6/2009	**<300**	**<10**	**8.3**	**<0.50**	**<0.50**	**0.81**	**<0.50**	**<0.50**	
AW-5									
7/7/2003	<2,000	1,200	980	<10	<10	210	--	--	
02/05/2004	<2,000	1,200	810	<10	<10	160	<10	<10	
07/01/2004	<1,000	1,600	550	<5.0	<5.0	94	<5.0	<5.0	
03/16/2005	<10,000	2,100	890	<50	<50	190	<50	<50	
07/22/2005	<1,000	370	390	<5.0	<5.0	78	<5.0	<5.0	
01/25/2006	<3,000	580	26	<5.0	<5.0	5.2	<5.0	<5.0	
7/6/2006	<3,000	240	170	<5.0	<5.0	37	<5.0	<5.0	
1/8/2007	<1500	240	220	<2.5	<2.5	51	<2.5	--	
7/10/2007	<1,500	110	360	<2.5	<2.5	92	<2.5	<2.5	
1/15/2008	<300	200	85	<0.50	<0.50	21	<0.50	<0.50	
7/15/2008	<300	100	11	<0.50	<0.50	2.4	<0.50	<0.50	
10/21/2008	<300	130	63	<0.50	<0.50	16	<0.50	<0.50	
1/6/2009	**<600**	**150**	**26**	**<1.0**	**<1.0**	**5.0**	**<1.0**	**<1.0**	
AW-6									
02/05/2004	<10,000	<2,000	5,400	<50	<50	1,800	<50	<50	
07/01/2004	<10,000	<2,000	4,600	<50	<50	1,600	<50	<50	
03/16/2005	<5,000	<1,000	4,400	<25	<25	1,400	<25	<25	
07/22/2005	<10,000	<2,000	5,500	<50	<50	1,400	<50	<50	
01/25/2006	<30,000	<2,000	3,000	<50	<50	940	<50	<50	
7/6/2006	<30,000	<2,000	2,800	<50	<50	780	<50	<50	
1/8/2007	<30000	<2000	7400	<50	<50	1900	<50	--	

Table 2. Summary of Fuel Additives Analytical Data

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	Concentrations in (µg/L)								Comments
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
AW-6 Cont.									
7/10/2007	<60,000	<4,000	3,900	<100	<100	890	<100	<100	
1/15/2008	<600	<40	150	<1.0	<1.0	42	<1.0	<1.0	
7/15/2008	<300	20	270	<0.50	<0.50	66	<0.50	<0.50	
10/21/2008	<3,000	<100	160	<5.0	<5.0	37	<5.0	<5.0	
1/6/2009	**<3,000**	**<100**	**97**	**<5.0**	**<5.0**	**23**	**<5.0**	**<5.0**	
AW-7									
AW-8									
03/16/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	a
MW-1									
7/7/2003	<1,000	<200	24	<5.0	<5.0	<5.0	--	--	
02/05/2004	<1,000	<200	9.2	<5.0	<5.0	<5.0	<5.0	<5.0	
07/01/2004	<10,000	<2,000	<50	<50	<50	<50	<50	<50	
03/16/2005	<1,000	<200	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	
07/22/2005	<2,000	<400	<10	<10	<10	<10	<10	<10	
01/25/2006	<1,500	<100	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
7/6/2006	<1,500	<100	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
1/8/2007	<300	<20	2.1	<0.50	<0.50	<0.50	<0.50	--	
7/10/2007	<300	<20	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	
1/15/2008	<300	<20	1.2	<0.50	<0.50	<0.50	<0.50	<0.50	
7/15/2008	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
10/21/2008	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
1/6/2009	**<300**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-2									
03/16/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-3									
7/7/2003	<100	<20	8.8	<0.50	<0.50	0.65	--	--	
02/05/2004	<100	<20	4.6	<0.50	<0.50	<0.50	<0.50	<0.50	
07/01/2004	<100	<20	3.3	<0.50	<0.50	<0.50	<0.50	<0.50	
03/16/2005	<100	<20	4.4	<0.50	<0.50	<0.50	<0.50	<0.50	

Table 2. Summary of Fuel Additives Analytical Data

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	Concentrations in (µg/L)								Comments
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-3 Cont.									
07/22/2005	<100	<20	4.1	<0.50	<0.50	<0.50	<0.50	<0.50	
01/25/2006	<300	<20	3.0	<0.50	<0.50	<0.50	<0.50	<0.50	
7/6/2006	<300	<50	3.0	<0.50	<0.50	<0.50	<0.50	<0.50	
1/8/2007	<300	<20	3.2	<0.50	<0.50	<0.50	<0.50	--	
7/10/2007	<300	<20	2.8	<0.50	<0.50	<0.50	<0.50	<0.50	
1/15/2008	<300	<20	0.88	<0.50	<0.50	<0.50	<0.50	<0.50	
7/15/2008	<300	<10	1.3	<0.50	<0.50	<0.50	<0.50	<0.50	
10/21/2008	<300	<10	0.94	<0.50	<0.50	<0.50	<0.50	<0.50	
1/6/2009	**<300**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
RW-1									
7/7/2003	<50,000	<10,000	<250	<250	<250	<250	--	--	
07/01/2004	<10,000	<2,000	72	<50	<50	<50	<50	<50	
03/16/2005	<2,000	<400	53	<10	<10	<10	<10	<10	
07/22/2005	<500	<100	51	<2.5	<2.5	5.6	<2.5	<2.5	
01/25/2006	<3,000	<200	34	<5.0	<5.0	<5.0	<5.0	<5.0	
7/6/2006	<6,000	<400	64	<10	<10	<10	<10	<10	
1/8/2007	<6000	<400	22	<10	<10	<10	<10	--	
7/10/2007	<600	<40	21	<1.0	<1.0	<1.0	<1.0	<1.0	
1/15/2008	<600	<40	14	<1.0	<1.0	1.3	<1.0	<1.0	
7/15/2008	<300	<10	12	<0.50	<0.50	1.0	<0.50	<0.50	
10/21/2008	<300	17	12	<0.50	<0.50	<0.50	<0.50	<0.50	
1/6/2009	**<300**	**14**	**7.0**	**<0.50**	**<0.50**	**0.63**	**<0.50**	**<0.50**	
VEW-4									
07/22/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
1/15/2008	<300	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
7/15/2008	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
VEW-5									
VEW-8									
07/22/2005	<100	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

ABBREVIATIONS & SYMBOLS:
-- = Not analyzed/applicable/measured/available
< = Not detected at or above specified laboratory reporting limit
1,2-DCA = 1,2-Dichloroethane
DIPE = Di-isopropyl ether
EDB = 1,2-Dibromoethane
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether
TAME = tert-Amyl methyl ether
TBA = tert-Butyl alcohol
μg/L = Micrograms per Liter

FOOTNOTES:
a = Calibration verification for ethanol is within method limits but outside contractual limits.

NOTES:
All volatile organic compounds analyzed using EPA Method 8260B.

Note: The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information.

Table 3. Historical Ground-Water Flow Direction and Gradient

Station #11133, 2220 98th Ave., Oakland, CA

Date Sampled	Approximate Flow Direction	Approximate Hydraulic Gradient
1/25/2006	Variable: East to Southwest	0.03 to 0.09
7/6/2006	Variable: East to W towards Center	0.04 to 0.05
1/8/2007	Variable: East to W towards Center	0.03 to 0.05
7/10/2007	West	0.01
1/15/2008	West-Southwest	0.006
7/15/2008	West-Southwest	0.01
10/21/2008	West-Southwest	0.01
1/6/2009	**West**	**0.009**

Note: The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information.

Table 4. Bio-Degradation Parameters

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	pH	ORP (mV)	Total Alkalinity (µg/L)	DO (mg/L)	Nitrate NO3 (µg/L)	Sulfate SO4 (µg/L)	Soluble Sulfide (µg/L)	CO2 (µg/L)	Methane (µg/L)	Manganese (µg/L)	Ferrous Iron (mg/L)	Comments
AW-1												
3/16/2005	6.7	-10	420,000	0.8	<500	580	<1,000	81,400	3,290	6,500	3.4	
1/15/2008	6.91	-58	410,000	0.92	<500	1,900	<1,000	190,000	3,200	6,400	3.2	a, b
7/15/2008	6.79	-96.5	488,000	6.0	<100	<1,000	<1,000	400,000	2,090	7,200	6.0	
10/21/2008	7.01	-130.1	498,000	2.40	<100	2,500	<50	178,000	381	8,080	2.0	b, c
1/6/2009	**6.09**	**-128**	**446,000**	**1.39**	**<100**	**1,400**	**<50**	**190,000**	**593**	**7,810**	**3.0**	
AW-2												
1/15/2008	6.79	-88	190,000	0.83	4,400	21,000	<1,000	52,000	210	1,100	<0.5	a
7/15/2008	7.05	-190.1	168,000	2.14	440	38,000	<50	100,000	7.42	1,570	0.5	
10/21/2008	7.33	-47.2	176,000	1.65	890	36,000	<50	24,200	111	1,130	0.5	c, d
1/6/2009	**6.94**	**129**	**168,000**	**0.84**	**390**	**22,000**	**<50**	**28,100**	**50.4**	**996**	**0.6**	
AW-4												
3/16/2005	6.5	10	310,000	0.6	<500	71,000	<1,000	54,200	585	5,600	1.4	
1/15/2008	6.75	-91	390,000	1.30	<500	82,000	<1,000	120,000	610	5,000	1.5	a, b
7/15/2008	6.91	-90.0	598,000	2.64	<100	47,000	<50	354,000	777	7,110	6.0	
10/21/2008	7.25	-123.3	510,000	1.54	<100	61,000	<50	101,000	75.3	8,440	3.0	c, d
1/6/2009	**6.31**	**-29**	**400,000**	**0.70**	**<100**	**78,000**	**<50**	**76,400**	**148**	**6,330**	**0.5**	
AW-5												
1/15/2008	6.82	-101	230,000	0.90	<500	12,000	<1,000	79,000	120	2,300	1.4	a
7/15/2008	6.85	-97.9	238,000	2.13	<100	12,000	<50	161,000	9.29	2,560	0.5	
10/21/2008	7.10	-84.9	216,000	1.01	<100	14,000	<50	57,800	59.8	1,680	0.5	c, d
1/6/2009	**6.22**	**-79**	**224,000**	**0.70**	**<100**	**13,000**	**<50**	**52,400**	**106**	**2,920**	**0.5**	
AW-6												
1/15/2008	6.80	-94	150,000	0.58	<500	21,000	<1,000	41,000	50	1,200	<0.1	a
7/15/2008	6.87	-40.8	160,000	2.12	<100	23,000	<50	163,000	1.27	1,370	0.0	
10/21/2008	7.19	-33.9	152,000	1.01	<100	20,000	<50	39,400	104	1,290	0.5	c, d
1/6/2009	**6.23**	**-25**	**156,000**	**0.94**	**<100**	**21,000**	**<50**	**37,500**	**69.1**	**1,360**	**0.5**	
MW-1												
3/16/2005	6.9	-175	310,000	0.9	<500	13,000	<1,000	49,900	4,550	7,700	2.7	

Table 4. Bio-Degradation Parameters

Station #11133, 2220 98th Ave., Oakland, CA

Well and Sample Date	pH	ORP (mV)	Total Alkalinity (µg/L)	DO (mg/L)	Nitrate NO3 (µg/L)	Sulfate SO4 (µg/L)	Soluble Sulfide (µg/L)	CO2 (µg/L)	Methane (µg/L)	Manganese (µg/L)	Ferrous Iron (mg/L)	Comments
MW-1 Cont.												
1/15/2008	7.13	-150	320,000	0.94	<500	51,000	<1,000	67,000	2,900	8,100	1.3	a
7/15/2008	7.06	-174.7	326,000	1.20	<100	50,000	<50	29,200	1,090	8,390	0.5	
10/21/2008	7.30	-200.0	360,000	1.99	<100	27,000	<50	18,700	303	8,050	4.0	c
1/6/2009	**6.90**	**225**	**368,000**	**0.69**	**<100**	**59,000**	**<50**	**21,300**	**277**	**10,100**	**1.6**	
MW-2												
3/16/2005	7.1	30	85,000	1.3	5,300	38,000	<1,000	7,370	<1.0	2,200	0.7	
MW-3												
1/15/2008	7.10	-128	130,000	1.04	2,500	44,000	<1,000	29,000	<1.0	120	<0.1	a
7/15/2008	7.06	-47.6	112,000	1.60	820	78,000	<50	29,000	<1.0	61.8	0.5	
10/21/2008	7.28	-120.6	92,000	2.21	640	52,000	<50	15,400	<1.0	19.3	0.5	c
1/6/2009	**6.43**	**-22**	**94,000**	**1.02**	**420**	**38,000**	**<50**	**14,000**	**<1.0**	**25.5**	**0.0**	
RW-1												
1/15/2008	6.82	-143	350,000	1.31	<500	5,000	<1,000	110,000	1,100	6,100	1.8	a
7/15/2008	6.95	-239.9	358,000	1.32	<100	21,000	<50	212,000	212	7,030	0.5	
10/21/2008	7.17	-188.4	352,000	0.79	<100	10,000	<50	73,500	1,350	6,840	1.0	b, c
1/6/2009	**6.43**	**-279**	**322,000**	**0.30**	**<100**	**13,000**	**<50**	**64,700**	**279**	**6,410**	**1.0**	
VEW-4												
1/15/2008	6.99	-36	210,000	0.54	3,000	31,000	<1,000	50,000	840	880	<0.5	a
7/15/2008	6.95	-29	254,000	0.59	<100	22,000	<50	90,900	174	2,150	2.0	

ABBREVIATIONS AND SYMBOLS:

< = Not detected at or above specified laboratory reporting limit
ORP = Oxygen reduction potential
DO = Dissolved oxygen
CO2 = Carbon dioxide
mV = Millivolts
µg/L = Micrograms per liter
mg/L = Milligrams per liter

FOOTNOTES:

a = Sample received after holding time expired for soluble sulfide and ferrous iron analyses
b = Sample analyzed after holding time expired for nitrate analysis
c = Sample received after holding time expired for dissolved sulfide analysis
d = Sample received after holding time expired for nitrate analysis

Note: The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information.

Table 5. Nitrate Injection Calculations Based on Mass Flux Approach, Station 11133, Oakland, CA

Site Information	Value		Comments/Conversions
Hydraulic Conductivity Estimate (K)	8.6	ft/d	April 1991 Aquifer Test RW-1
Thickness of impacted saturated zone (T)	20	ft	Estimated based on length of screened interval of wells in zone
Hydraulic gradient (I)	0.01	ft/ft	Average value over the time period 1/8/2007 through 1/6/2009
Porosity (n)	0.3	(-)	Based on literature value for soil type at the site
Width of GW plume being addressed	20	ft	Lateral extend of proposed treatment
Maximum BTEX concentration (C)	0.754	mg/L	Maximum total BTEX in AW-1 on 1/6/2009
Through flow of GW, Contamination, and Degradation Capacity based on mass flux			
Ground-water Seepage Velocity (V)	0.287	ft/d	V = K*I/n
Total ground-water volumetric flux (Q)	34.4	ft^3/d	Q = K*I*A
Total ground-water volumetric flux (Q in gal/d))	257.3	gal/d	1 ft^3 = 7.48 gal
Total ground-water volumetric flux (Q in L/d)	974.0	L/d	1 gal = 3.7854 L
Mass flux of dissolved BTEX through Treatment Zone (M_d)	734.4	mg BTEX/d (does not include adsorbed phase)	M_d = C*Q
	3.0	(multiply by 2, 3, or 4 to account for absorbed phase)	
Mass flux of BTEX (including adsorbed phase)	2203.3	mg BTEX/d	Safety factor of 2 or more includes adsorbed phase
Mass BTEX degraded/mass of nitrate	0.21	mg/mg	Based on stoichiometry for BTEX and nitrate
Stoichiometric Nitrate Demand	10492	mg nitrate/d	= M_d/0.21
Details for Liquid Nitrate Addition			
Fast release water soluble fertilizer which include nitrogen, phosphorus, and potassium			
Nitrate Solution Concentration	50	mg/L	Based on drinking water standard of 50 mg/L for Nitrate measured as NO_3
Injection frequency (time between slug injection events)	15	days	
Total Nitrate injection events	6		
Required Slug Addition Rate	831	gal/event	

Table 6. Sulfate Injection Calculations Based on Mass Flux Approach, Station 11133, Oakland, CA

Site Information	Value		Comments/Conversions
Hydraulic Conductivity Estimate (K)	8.6	ft/d	April 1991 Aquifer Test RW-1
Thickness of impacted saturated zone (T)	20	ft	Estimated based on length of screened interval of wells in zone
Hydraulic gradient (I)	0.01	ft/ft	Average value over the time period 1/8/2007 through 1/6/2009
Porosity (n)	0.3	(-)	Based on literature value for soil type at the site
Width of GW plume being addressed	20	ft	Lateral extend of proposed treatment
Maximum BTEX concentration (C)	0.754	mg/L	Maximum total BTEX in AW-1 on 1/6/2009
Through flow of GW, Contamination, and Degradation Capacity based on mass flux			
Ground-water Seepage Velocity (V)	0.287	ft/d	V = K*I/n
Total ground-water volumetric flux (Q)	34.4	ft^3/d	Q = K*I*A
Total ground-water volumetric flux (Q in gal/d))	257.3	gal/d	1 ft^3 = 7.48 gal
Total ground-water volumetric flux (Q in L/d)	974.0	L/d	1 gal = 3.7854 L
Mass flux of dissolved BTEX through Treatment Zone (M_d)	734.4	mg BTEX/d (does not include adsorbed phase)	M_d = C*Q
	3.0	(multiply by 2, 3, or 4 to account for absorbed phase)	
Mass flux of BTEX (including adsorbed phase)	2203.3	mg BTEX/d	Safety factor of 2 or more includes adsorbed phase
Mass BTEX degraded/mass of sulfate	0.22	mg/mg	Based on stoichiometry for BTEX and sulfate
Stoichiometric Sulfate Demand	10015	mg sulfate/d	= M_d/0.21
Details for Liquid Sulfate Addition			
Sulfate source: $MgSO_4$- $7H_2O$ (Epsom Salt)- magnesium sulfate heptahydrate			
Sulfate Solution Concentration	250	mg/L	Based on Secondary Drinking Water Standard of 250 mg/L for Sulfate
Injection frequency (time between slug injection events)	15	days	
Total Sulfate injection events	6		
Required Slug Addition Rate	159	gal/event	

Table 7. Monthly Ground-Water Monitoring/Sampling Plan for Nitrate/Sulfate Addition, Station 11133, Oakland, CA

Well ID	Gauging Depth to Water	Analysis	Purge Method	pH/ temp/ cond/ Fe^{2+}	Pre- & Post DO	Pre- & Post ORP
MW-1	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
MW-3	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
AW-1	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
AW-5	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
RW-1	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
VW-1	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
VW-4	Y	GBOE-BIO-TRACER	MP	Y	Y	Y
IW-1	Y	GBOE-BIO-TRACER	NP	Y	Y	Y

Analysis:

GBOE = GRO by 8015M; BTEX/5 FO +EDB, 1,2-DCA, Ethanol by 8260B

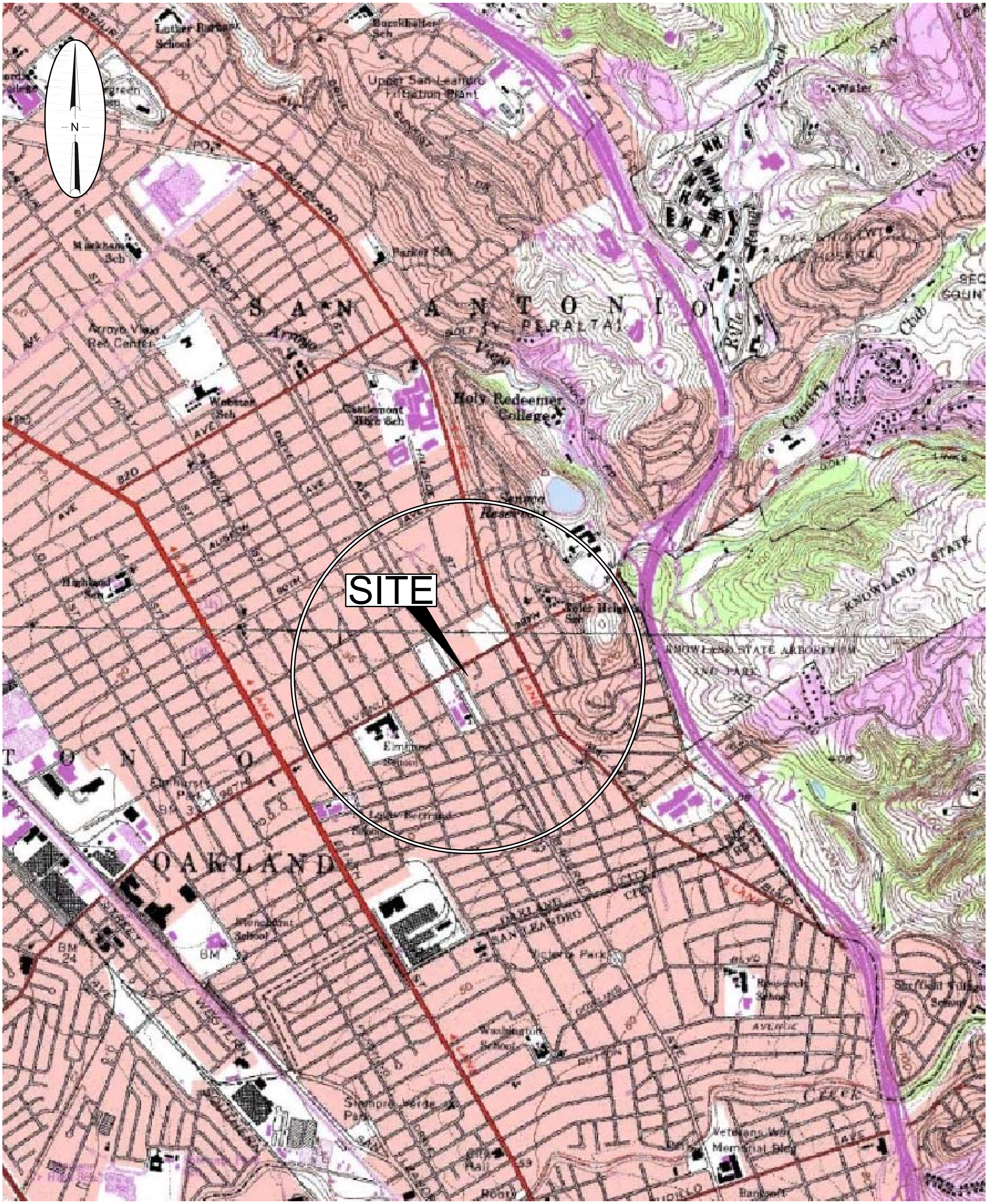
BIO = Nitrate and Sulfate (EPA 300), Manganese (EPA 200.7), Dissolved Sulfide (SM 4500 S2-D), Methane and Carbon Dioxide (RS Kerr 175), Alkalinity (SM2320B), and Hydrogen Sulfide (HACH Model HS-C)

TRACER = Bromide (EPA Method 300.0)

Purge Method:

NP = No Purge

MP = Micropurge aka millipurge/low-flow purge per API#4658A

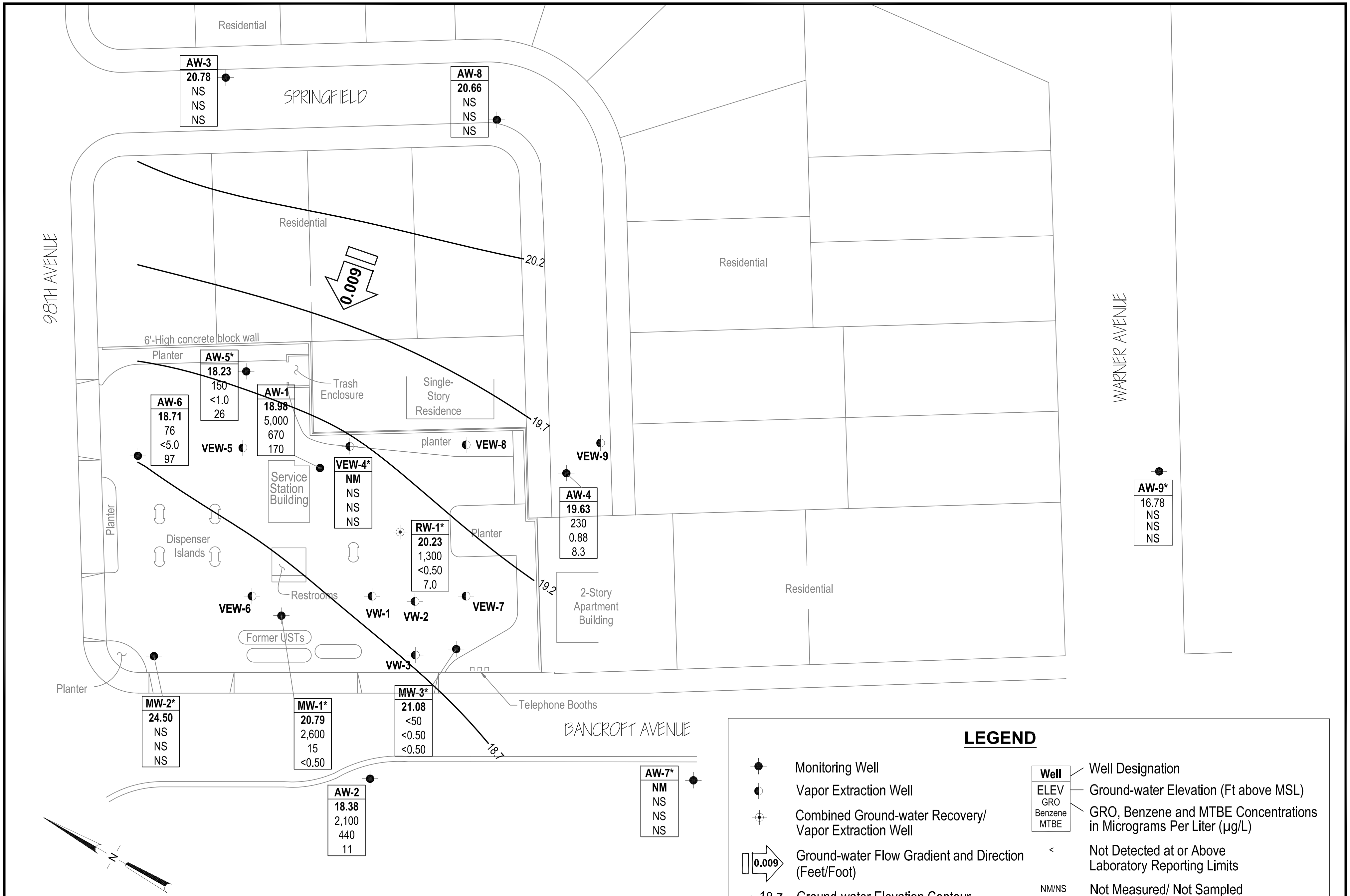


Half-Mile Radius

0 2,000 4,000

SCALE (feet)

BROADBENT & ASSOCIATES, INC. ENGINEERING, WATER RESOURCES & ENVIRONMENTAL 1324 Mangrove Ave. Suite 212, Chico, California Project No.: 06-88-656 Date: 5/14/09	Former BP Service Station #11133 2220 98th Avenue Oakland, California	Site Vicinity Map	Drawing 1



NOTES: WELL AW-7 COULD NOT BE SAMPLED DUE TO INACCESSIBILITY.
SITE MAP ADAPTED FROM CAMBRIA ENVIRONMENTAL FIGURES.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

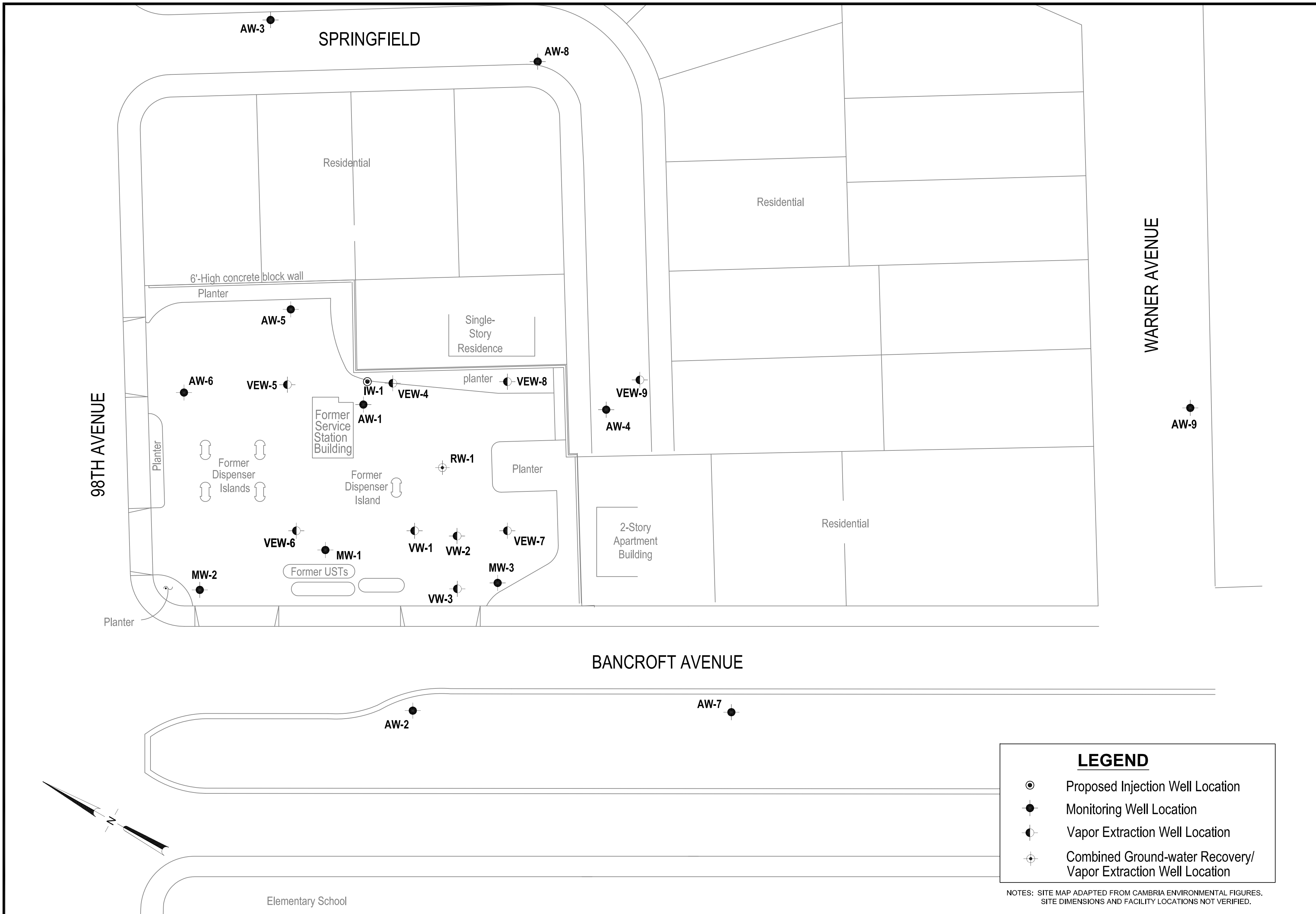
0 60 120
SCALE (ft)

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
1324 Mangrove Ave. Suite 212, Chico, California 95926
Project No.: 06-88-656 Date: 2/13/09

Former BP Service Station #11133
2220 98th Avenue
Oakland, California

Ground-Water Elevation Contour
and Analytical Summary Map
6 January 2009

Drawing
2



NOTES: SITE MAP ADAPTED FROM CAMBRIA ENVIRONMENTAL FIGURES. SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
1324 Mangrove Ave. Suite 212, Chico, California 95926
Project No.: 06-88-656 Date: 5/8/09

Former BP Service Station #11133
2220 98th Avenue
Oakland, California

Site Map with Proposed Injection Well Location

Drawing
3

APPENDIX A

Recent Regulatory Correspondence

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

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

RECEIVED
JAN 24 2009
BY:

January 16, 2009

Paul Supple
Atlantic Richfield Company
(A BP Affiliated Company)
P.O. Box 1257
San Ramon, CA 94583

Terry Grayson
ConoccoPhillips
76 Broadway
Sacramento, CA 95818

Keith Marks
Suncor Holdings COP II, LLC.
11601 Wilshire Blvd., Ste 700
Los Angeles, CA 90025-0315

Subject: Fuel Leak Case No. RO0000403 and GeoTracker Global ID T0600100210, BP #11133, 2220 98th Avenue, Oakland, CA 94603

Dear Messrs. Supple, Grayson, Marks:

Alameda County Environmental Health (ACEH) staff has reviewed the case file for the above-referenced site including the recently submitted document entitled, "Second Quarter 2008 Status Report"," dated July 18, 2008, which was prepared by Broadbent & Associates, Inc. (BAI) for the subject site. According to BAI, nitrate/sulfate injection was to be performed during the third quarter of 2008 as a pilot study. Although nitrate/sulfate injection was accepted by ACEH in our October 9, 2007 directive letter, a Corrective Action Plan that evaluated at least three viable alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release(s) besides "no action" and "monitored natural attenuation" remedial alternatives was also requested in our directive letter.

ACEH requests that you address the following technical comments and send us the technical work plan and reports requested below.

TECHNICAL COMMENTS

1. **Soil and Groundwater Characterization** – Although an SVE system operated at the site from November 1994 to approximately December 1998, which reported removed approximately 13,495 pounds of hydrocarbons, elevated concentrations of TPH-g and benzene still remain in groundwater samples collected at the site. Specifically, TPH-g and benzene were detected at concentrations of 6,400 µg/L and 1,700 µg/L, respectively, in a groundwater sample collected from down-gradient monitoring well AW-2 on July 15, 2008. Based on the analytical data, there appears to be an increasing concentration of contaminants detected in this well and the extent of the groundwater contaminant plume appears undefined in the down-gradient direction. Please justify that the groundwater contaminant plume is defined or prepare a scope of work to address the above-mentioned concerns and submit a work plan due by the date specified below.

2. **Feasibility Study/Corrective Action Plan (FS/CAP)** – A CAP was first requested in our May 11, 2005 correspondence and again requested in our October 9, 2007 correspondence. To date, a CAP has not been received. At this time, please prepare a Feasibility Study/Corrective Action Plan (FS/CAP), in accordance with Title 23, California Code of Regulations, Section 2725 to evaluate possible cleanup alternatives for the site. The FS/CAP must include a concise background of soil and groundwater investigations performed in connection with this case and an assessment of the residual impacts of the chemicals of concern (COCs) for the site and the surrounding area where the unauthorized release has migrated or may migrate. The FS/CAP should also include, but not limited to, a detailed description of site lithology, including soil permeability, and most importantly, contamination cleanup levels and cleanup goals and time to achieve both, in accordance with the San Francisco Regional Water Quality Control Board Basin Plan and appropriate ESL guidance for all COCs and for the appropriate groundwater designation. Please note that soil cleanup levels should ultimately (within a reasonable timeframe) achieve water quality objectives (cleanup goals) for groundwater in accordance with San Francisco Regional Water Quality Control Board Basin Plan. Please propose appropriate cleanup levels and cleanup goals in accordance with 23 CCR Section 2725, 2726, and 2727 in the FS/CAP.

   The FS/CAP must evaluate at least three viable alternatives for remedying or mitigating the actual or potential adverse effects of the unauthorized release(s) besides the "no action" and "monitored natural attenuation" remedial alternatives. Each alternative shall be evaluated for cost-effectiveness and the Responsible Party must propose the most cost-effective corrective action. Please submit the FS/CAP no later than the date specified below.

REQUEST FOR INFORMATION

ACEH's case file for the subject site contains the following electronic reports as listed on our website (http://www.acgov.org/aceh/lop/ust.htm). You are requested to submit copies of all other reports related to environmental investigations for this property (including the July 2, 1987 Tank Removal Report [KEI-J87-064]) by **February 16, 2009**.

NOTIFICATION OF FIELDWORK ACTIVITIES

Please schedule and complete the fieldwork activities by the date specified below and provide ACEH with at least three (3) business days notification prior to conducting the fieldwork.

TECHNICAL REPORT REQUEST

Please submit technical reports to ACEH (Attention: Paresh Khatri), according to the following schedule:

- **March 17, 2009** – Soil and Water Investigation Work Plan
- **April 16, 2009** – FS/CAP
- **April 30, 2009** – Semi-annual Monitoring Report (1st Quarter 2009)

- **October 30, 2009** – Semi-annual Monitoring Report (3rd Quarter 2009)

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.swrcb.ca.gov/ust/electronic_submittal/report_rqmts.shtml.

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.

If you have any questions, please call me at (510) 777-2478 or send me an electronic mail message at paresh.khatri@acgov.org.

Sincerely,

Paresh C. Khatri
Hazardous Materials Specialist

Donna L. Drogos, PE
Supervising Hazardous Materials Specialist

Enclosure: ACEH Electronic Report Upload (ftp) Instructions

cc: Tom Venus, Broadbent & Associates, Inc., 1324 Mangrove Ave., Ste 212, Chico, CA 95926
Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa Plaza, Ste. 3341, Oakland, CA 94612-2032
Donna Drogos, ACEH
Paresh Khatri, ACEH
File

Matt Herrick

From: Matt Herrick [mherrick@broadbentinc.com]
Sent: Thursday, April 09, 2009 2:56 PM
To: 'Khatri, Paresh, Env. Health'
Cc: 'Rob Miller'; 'paul.supple@bp.com'; 'Jason Duda'; 'Drogos, Donna, Env. Health'
Subject: RE: Extension Request FS/CAP - Station 11133 (ACEH Case #RO000403)

Paresh,

Thank you for approving our request for an extension on submittal of the FS/CAP. To further clarify the timeline of events over the last couple of years at this site I have provided the below summary:

ACEH May 11, 2005 Letter: Asks for submittal of a feasibility study work plan and a CAP 90 days after FS approval.
URS July 8, 2005 Nitrate/Sulfate Feasibility Study Work Plan:
ACEH December 20, 2007 Letter: Approves the above URS 2005 Work Plan and asks for results of the pilot testing nitrate/sulfate addition work be included in a CAP
ACEH January 16, 2009 Letter: Asks for submittal of a SWI Work Plan and FS/CAP.

Based on the above transmittals, it has been our understanding that pilot scale nitrate/sulfate addition work activities would be completed prior to submittal of a CAP. Although a CAP was originally requested in 2005, the ACEH did not approve the pilot scale nitrate/sulfate addition work plan until December 2007. For various reasons, and as documented in past transmittals with the ACEH, pilot scale work was not implemented in 2008. As stated below, efforts up until just recently have been focused on initiating pilot scale testing and not completion of a CAP.

In light of the above information, it is our opinion that there is shared responsibility in delays on this project and specifically submittal of a FS/CAP.

Thanks

Matt

From: Khatri, Paresh, Env. Health [mailto:paresh.khatri@acgov.org]
Sent: Thursday, April 09, 2009 9:32 AM
To: 'Matt Herrick'
Cc: 'Rob Miller'; paul.supple@bp.com; 'Jason Duda'; Drogos, Donna, Env. Health
Subject: RE: Extension Request FS/CAP - Station 11133 (ACEH Case #RO000403)

Matt,

Your request for an extension to submit the FS/CAP by May 15, 2009 is acceptable. However, the submittal will be received past the LOP's most recent assigned due date of April 16, 2009 and well past the initial due date of July 11, 2005, (which was stipulated in our May 11, 2005 correspondence). Please note that in the event enforcement actions are pursued by this Agency for any of the BP/ARCO LUFT cases, delinquent submittal trends may be considered.

Sincerely,

Paresh C. Khatri
Hazardous Materials Specialist
Alameda County Environmental Health
Local Oversight Program
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

Phone: (510) 777-2478

Fax: (510) 337-9335

E-mail: Paresh.Khatri@acgov.org

http://www.acgov.org/aceh/lop/lop.htm

From: Matt Herrick [mailto:mherrick@broadbentinc.com]
Sent: Wednesday, April 08, 2009 8:56 AM
To: Khatri, Paresh, Env. Health
Cc: 'Rob Miller'; paul.supple@bp.com; 'Jason Duda'
Subject: Extension Request FS/CAP - Station 11133 (ACEH Case #RO000403)

Paresh,

The ACEH January 16, 2009 letter requested submittal of a FS/CAP by April 16, 2009 for Former BP Station #11133 located at 2220 98th Avenue, Oakland, California. Per our recent conversation, we were anticipating that pilot scale nitrate/sulfate addition remedial activities would be completed prior to submittal of a FS/CAP. As a result, efforts up until just recently have been focused on initiating pilot scale testing. However, it is now our understanding that the ACEH would like a FS/CAP completed prior to initiation of any pilot scale remedial activities.

Additional time beyond the current deadline of April 16, 2009 is needed to complete a FS/CAP. It is therefore requested that the deadline for submittal of the FS/CAP be revised to May 15, 2009.

Please provide a response to this email and our request for an extension. If you should have questions or require additional information, please do not hesitate to contact me directly.

Thanks

Matt Herrick, PG, CHG, CEM
Senior Hydrogeologist
Broadbent & Associates, Inc.
(775) 322-7969

Matt Herrick

From: Mary Rose Cassa [MCassa@waterboards.ca.gov]
Sent: Monday, February 23, 2009 8:58 AM
To: Matt Herrick
Cc: paresh.khatri@acgov.org; Cherie MCcaulou
Subject: Re: Nitrate/Sulfate Addition

Matt,

This Water Board does not issue permits for activities such as you propose. We do, however, require a detailed workplan (in this case, submitted to the local oversight agency) that covers all the testing, monitoring, and reporting for the project.

The workplan for the County should address the substantive requirements of a WDR. Mainly make sure you know what you're doing; make sure the injectant doesn't go somewhere it shouldn't and that it would not react adversely (e.g., transform metals); and include adequate monitoring for the appropriate constituents/conditions.

If you demonstrate that you understand the process and you can adequately monitor it, then it can be approved. A bench scale test might prove helpful. The workplan should make it clear that you understand the site well enough that you would not cause the plume to migrate in a way that might require additional containment action in the future. You should consider a contingency plan to pump it out if things go wrong

It's appropriate to test to verify that site conditions and the plume will not worsen with injection and that existing conditions (lithology, chemistry, microbes, etc) are amenable to the technology.

The physical parameters of the site need to be well understood so that the pathways for the injectant and contaminants are clear. This might include additional assessment of subsurface conditions to evaluate if the proposed technology is appropriate for the site.

This could include the following:

1) Conduct a 48-hour aquifer test to evaluate the parameters of the aquifer, including monitoring of the water levels, dissolved concentrations, and other chemical and physical parameters before, during, and after the aquifer test.

2) Describe why this technology is appropriate to use at this site based on the site parameters.

3) Prepare engineered plans and verification that the materials used (well screen, tubing, etc) are compatible with the chemicals used.

4) Perform field injection pilot tests to determine the effectiveness of the technology by characterizing the rate of breakdown and potential for plume migration. Since direct injection into a monitoring well renders the well useless for future monitoring, dedicated injection well(s) should be installed for this purpose. The injection well(s) should also be surrounded by observation wells, located in between the injection point(s) and other potential areas of concern (subsurface utilities, buildings, etc). Monitoring and observation wells should be evaluated for key parameters before, during and after each injection. Depending on site conditions, fugitive vapors should be evaluated and a recovery plan implemented to prevent plume expansion.

5) Hazardous Materials Business Plan may be required for any reportable quantity of hazardous materials used and stored on site or proof that the material used is non-hazardous (Health and Safety Code Ch. 6.95) by providing MSDS sheets and quantity. Contingency plan for spill prevention/containment.

6) Notify current property owners/occupants and surrounding property owners/occupants.

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The above is not an exhaustive list of requirements, but should help you develop a pilot test workplan/interim remedial action plan that can be approved.

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Regards,

Mary Rose

- Mary Rose Cassa, PG Senior Engineering Geologist Toxics Cleanup Division San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612
510-622-2447

>>> "Matt Herrick" <mherrick@broadbentinc.com> 2/19/2009 3:09 PM >>>
Mary Rose,

We exchanged voice mails earlier today regarding permit requirements for implementation of pilot scale nitrate/sulfate addition at a former retail gas station in Oakland. The property is Former BP Station #11133 located at 2220 98th Avenue, Oakland, CA. The LOP is the Alameda County Environmental Health (ACEH Case #RO0000403)

A Work Plan has been approved by the ACEH to initiate pilot scale nitrate/sulfate injection remedial activities. We do have a contact record from a phone conversation last year in which you stated that a permit was not necessary for pilot scale work activities. However, I wanted to follow up with you to receive written confirmation that this is still the case. I also wanted to ask if there were any limitations on solution concentrations of nitrate and sulfate that could be injected into wells to enhance biodegradation of petroleum hydrocarbons.

Thanks

Matt Herrick

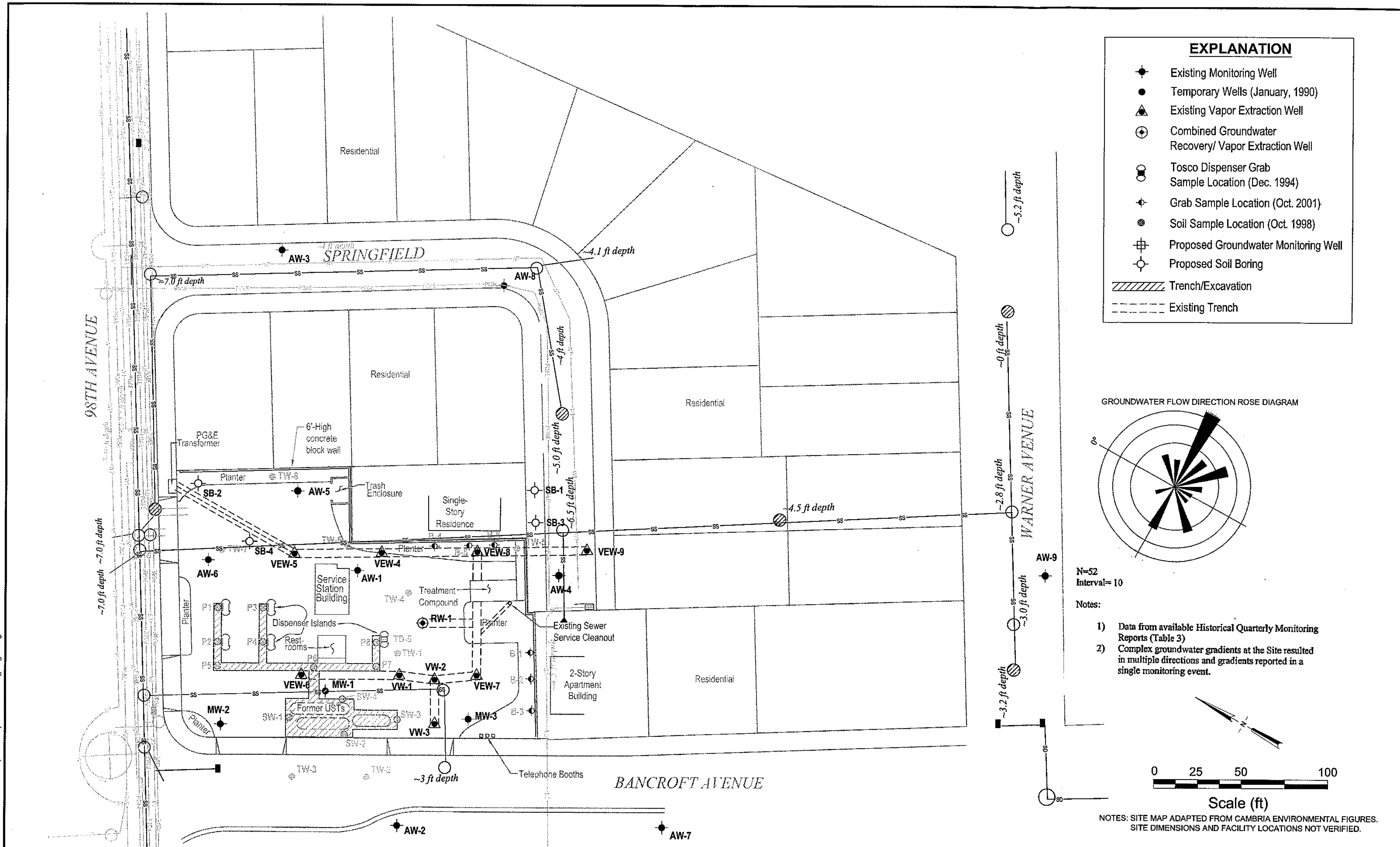
Senior Hydrogeologist

Broadbent & Associates, Inc.

(775) 322-7969

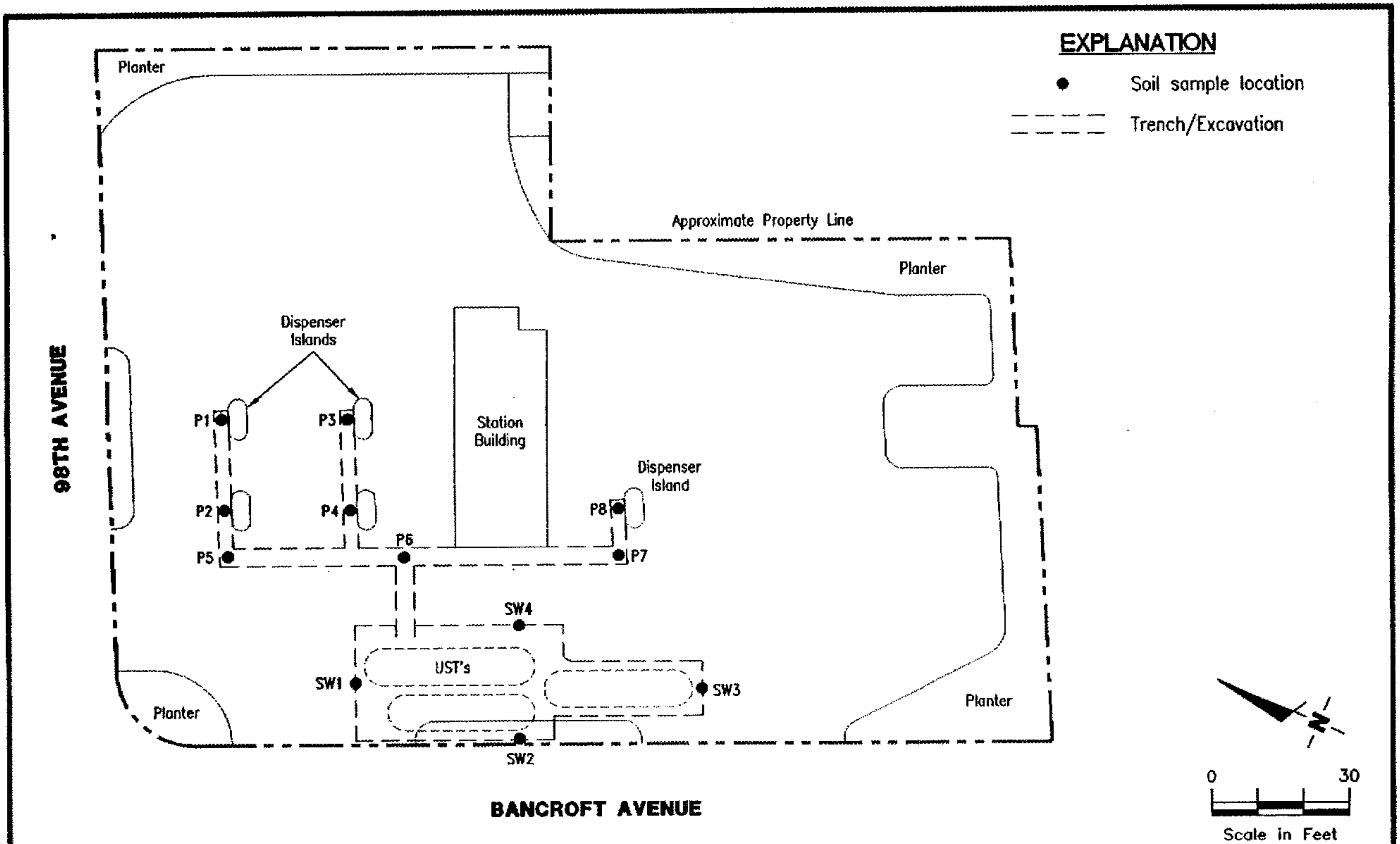
APPENDIX B

Historical Soil and Ground-Water Data



ltonish0 Apr 26, 2005 - 2:45pm
X:\x_env_waste\BP GEM\Sites\LNiles Sites\11133\Reports\Workplan-SW1\Drawings\Figs 2.dwg

URS	Project No. 38487259 Former BP Service Station #11133 2220 98th Avenue Oakland, California	SITE MAP WITH SAMPLE LOCATIONS	FIGURE 2



Source: KEI Location Plan dated June 4, 1988

Gettler - Ryan Inc.
6747 Sierra Ct., Suite J (925) 551-7555
Dublin, CA 94568

SITE PLAN/SOIL SAMPLE LOCATION MAP
Former Tosco BP Branded Facility #11133
2220 98th Avenue
Oakland, California

FIGURE **2**

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
140214.02		October, 1998	

TABLE 1
RESULTS OF ANALYSES OF SOIL SAMPLES FROM TANK EXCAVATION
BP Oil Company Service Station No. 11133
2220 - 98th Avenue
Oakland, California

Sample Number	Sample Depth	TPHg	Benzene	Toluene	Total Xylenes
June 17, 1987					
A1	13.5	420	15	42	30
A2	13.5	16	2.3	2.2	0.95
B1	13.5	400	23	41	22
B2	14.0	150	4.6	11	12
C1	13.5	12	0.74	0.46	0.65

Results in parts per million (ppm)
< = less than detection limits
TPHg = Total petroleum hydrocarbons as gasoline

TABLE - 1

Results of Soil Analyses - Parts Per Million

Sample Number	Depth (feet)	TPH	Benzene	Toluene	Xylene	Ethylbenzene
MW-1	10	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW-1	15	210	7.1	20	23	4.5
MW-1	20	2	1.24	0.07	0.021	0.0035
MW-2	10	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW-2	15	<0.05	0.0007	0.0008	<0.0005	<0.0005
MW-2	20	<0.05	0.0008	<0.0005	<0.0005	<0.0005
MW-2	25	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW-3	10	<0.05	0.00081	0.0018	<0.0005	0.0012
MW-3	15	<0.05	0.0007	0.0007	<0.0005	<0.0005
MW-3	20	<0.05	0.0016	0.0035	<0.0005	<0.0005
MW-3	25	<0.05	0.00076	0.0014	<0.0005	<0.0005

Results of Water Analyses - parts per billion

Sample Number	Depth (feet)	TPH	Benzene	Toluene	Xylene	Ethylbenzene
MW-1	16.583	76,000	29,000	23,000	12,000	2600
MW-2	23.833	ND	0.55	0.66	0.58	ND
MW-3	23.667	ND	ND	ND	ND	ND

* TPH = Total Petroleum Hydrocarbon
ND = Not Detected

RESNA
Working To Restore Nature

TABLE 2
RESULTS OF ANALYSES OF SOIL SAMPLES FROM BORINGS
BP Oil Company Service Station No. 11133
2220 - 98th Avenue, Oakland, California
(page 1 of 2)

Boring Number	Sample Depth	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
June 1990						
AW-1	5.0	ND	ND	ND	ND	ND
AW-1	10.0	ND	0.011	ND	ND	ND
AW-1	15.0	ND	0.007	ND	ND	ND
AW-1	20.0	1.2	0.470	ND	ND	ND
AW-1	25.0	ND	0.013	ND	ND	ND
AW-1	30.0	ND	ND	ND	ND	ND
AW-2	21.0	ND	ND	ND	ND	ND
AW-2	26.0	ND	ND	ND	ND	ND
AW-3	21.0	ND	0.074	0.027	0.010	0.049
AW-3	26.0	ND	0.083	0.010	0.004	0.018
AW-4	11.0	ND	ND	ND	ND	ND
AW-4	16.0	ND	0.170	0.010	0.024	0.045
AW-4	21.0	1.0	0.150	0.013	0.040	0.090
RW-1	5.0	ND	ND	ND	ND	ND
RW-1	10.0	ND	0.006	ND	ND	ND
RW-1	15.0	ND	0.031	ND	ND	ND
RW-1	20.0	ND	0.230	0.088	0.010	0.040
RW-1	25.0	33.0	1.000	0.710	ND	2.300
April 1991						
SBA-5	10.5-11.0	<1	0.016	<0.003	<0.003	<0.003
(AW-5)	20.5-21.0	<1	0.020	<0.003	0.007	0.008
	25.5-26.0	<1	0.0077	<0.003	0.003	0.011
SBA-6	10.5-11.0	<1	0.091	0.022	0.008	0.040
(AW-6)	20.5-21.0	<1	<0.003	<0.003	<0.003	<0.003
	25.5-26.0	<1	0.005	0.010	<0.003	0.0066

Results in parts per million (ppm)
< = less than detection limits
TPHg = Total petroleum hydrocarbons as gasoline

TABLE 2
RESULTS OF ANALYSES OF SOIL SAMPLES FROM BORINGS
BP Oil Company Service Station No. 11133
2220 - 98th Avenue, Oakland, California
(page 2 of 2)

Boring Number	Sample Depth	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
April 1991						
SBA-7	10.5-11.0	<1	<0.003	<0.003	<0.003	<0.003
(AW-7)	20.5-21.0	<1	<0.003	<0.003	<0.003	<0.003
	25.5-26.0	<1	<0.003	<0.003	<0.003	<0.003
SBA-8	10.5-11.0	<1	<0.003	<0.003	<0.003	<0.003
(AW-8)	20.5-21.0	<1	<0.003	<0.003	<0.003	<0.003
March 1992						
S-B9-16.0	9	<1	0.008	0.011	0.018	0.0064
S-B10-6.5	10	<1	<0.005	<0.005	<0.005	<0.005
S-B10-11.5	10	<1	<0.005	<0.005	<0.005	<0.005
S-B10-16.0	10	<1	<0.005	<0.005	<0.005	<0.005
S-B11-16.5	11	320	0.074	0.25	3.2	11

Results in parts per million (ppm)
< = less than detection limits
TPHg = Total petroleum hydrocarbons as gasoline

TABLE 1 - SUMMARY OF RESULTS OF SOIL SAMPLING
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

BORI ID	SAMPLE DEPTH (feet)	DATE OF SAMPLING	TPH-G (mg/kg)	B (mg/kg)	T (mg/kg)	E (mg/kg)	X (mg/kg)	MTBE (mg/kg)	LAB
AW-9	16.5-17	12/03/96	ND<0.1	ND<0.001	ND<0.002	ND<0.002	ND<0.002	ND<0.1	SPL
AW-9	19-19.5	12/03/96	ND<0.1	ND<0.001	ND<0.002	ND<0.002	ND<0.002	ND<0.1	SPL

ABBREVIATIONS:

TPH-G Total petroleum hydrocarbons as gasoline
B Benzene
T Toluene
E Ethylbenzene
X Total xylenes
MTBE Methyl tert butyl ether
mg/kg Milligrams per kilograms
SPL Southern Petroleum Laboratories

F:\0\10-025\SOIL.WQ2

Table 1 - Chemical Analytical Data

Former Tosco BP Branded Facility No. 11133
2220 98th Avenue
Oakland, California

Sample ID	Date Collected	Sample Depth (feet)	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	Lead (ppm)
GASOLINE UST PIT (SOIL)									
SW1	10/1/98	12	ND	ND	ND	ND	ND	ND	NR
SW2	10/1/98	12	ND	ND	ND	ND	ND	0.43	NR
SW3	10/1/98	12	ND	ND	ND	ND	ND	0.099	NR
SW4	10/1/98	12	ND	ND	ND	ND	ND	ND	NR
PRODUCT LINES (SOIL)									
P1	10/1/98	3.5	ND	ND	ND	ND	0.029	ND	NR
P2	10/1/98	3.5	ND	ND	ND	ND	ND	4.0	NR
P3	10/1/98	3.5	ND	ND	ND	ND	ND	ND	NR
P4	10/1/98	3.5	ND	ND	ND	ND	ND	ND	NR
P5	10/1/98	3.5	ND	0.0085	0.047	0.0071	0.057	0.74	NR
P6	10/1/98	3.5	ND	ND	ND	ND	ND	ND	NR
P7	10/1/98	3.5	1.2[1]	0.067	0.090	ND	0.042	2.0	NR
P8	10/1/98	3.5	ND	ND	ND	ND	ND	ND	NR
STOCKPILES									
Comp A	10/1/98	NA	ND	ND	ND	ND	ND	ND	5.0
Comp B	10/1/98	NA	ND	ND	ND	ND	0.026	ND	1.4
Comp C	10/1/98	NA	ND	ND	ND	ND	ND	ND	2.4
Comp D	10/1/98	NA	ND	ND	ND	ND	ND	ND	2.0
Comp E	10/1/98	NA	ND	ND	ND	ND	ND	ND	ND
Comp F	10/1/98	NA	ND	ND	ND	ND	0.0091	ND	1.2

Table
Soil Analytical Data
BP Site No. 11133
2220 98th Avenue, Oakland, California

Sample ID	Date Sampled	Sample Depth (feet bgs)	TPH-g (mg/kg)	TPH-d (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	MTBE (mg/kg)	Total Lead (mg/kg)
VEW-9	May-96	16.5	<0.1	NA	<0.001	<0.002	<0.002	<0.002	<0.1	NA
VEW-9	May-96	Composite	<0.1	NA	<0.001	<0.002	<0.002	<0.002	<0.1	4.0
TD-5-0.5	Dec-94	0.5	ND	**3,900**	ND	ND	ND	ND	NA	NA

Source: MWH 2002, "Risk-based Corrective Action (RBCA) Evaluation for BP Oil Facility No. 11133. March.

Abbreviations and Notes:

mg/kg = Milligrams per kilogram
MTBE = Methyl tert-butyl ether
TPH-g = Total petroleum hydrocarbons as gasoline
TPH-d = Total petroleum hydrocarbons as diesel
<n = Below detection limit of n mg/kg
NA = Not analyzed
ND = Not detected

CAMBRIA

Table 1. **Soil Analytical Data** - BP Site No. 11133, 2220 98th Avenue, Oakland, California

Sample ID (Depth in feet)	Date Sampled	TPHg (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	MTBE (mg/kg)	Total Lead (mg/kg)
	Analytical Method:	8015m	8021	8021	8021	8021	8021	6010
B-1-4.5	10/22/01	**0.49**	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-1-13.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-2-5	10/22/01	**1.6**	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-2-13.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-3-4.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-3-13.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-4-4.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-4-13.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
DUP	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-4-19.5	10/22/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-5-5.5	10/23/01	**0.084**	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-5-19.5	10/23/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
B-6-5.5	10/23/01	<0.250	<0.005	<0.005	<0.005	**0.013**	<0.005	-
B-6-19.5	10/23/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	-
Composite	10/23/01	<0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<4.72

Abbreviations and Notes:

mg/kg = Milligrams per kilogram
MTBE = Methyl tert-butyl ether
TPHg = Total petroleum hydrocarbons as gasoline
<n = Below detection limit of n mg/kg
--- = Not analyzed

CAMBRIA

Table 2. **Soil-Vapor Analytical Data - BP Site No. 11133, 2220 98th Avenue, Oakland, California**

Sample ID (Depth in feet)	Date Sampled	TPHg (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethyl-benzene (ppmv)	Xylenes (ppmv)	MTBE (ppmv)	Oxygen (%)	Total Methane (%)	Carbon Dioxide (%)
Analytical Method:		TO-3	TO-3	TO-3	TO-3	TO-3	TO-3	D-1946	D-1946	D-1946
B-1-V1 (5')	10/22/01	6.6	0.0073	0.0062	<0.0020	0.0049	0.0038	-	-	-
B-1-V2 (10')	10/22/01	9.9	<0.0027	0.0033	<0.0027	0.0031	<0.0027	-	-	-
B-1-V3 (15')	10/22/01	1.8	0.0033	0.0096	<0.0025	0.0067	0.0050	-	-	-
B-2-V1 (5')	10/22/01	2.4	0.0080	0.0070	<0.0026	0.0038	<0.0026	22	<0.0026	0.28
B-2-V2 (10')	10/22/01	11	0.0062 a	0.0063	<0.0026	<0.0026	<0.0026	21	<0.0026	0.33
B-2-V3 (15')	10/22/01	4.5	0.0072	0.0072	<0.0025	0.0035	<0.0025	20	<0.0025	0.33
B-3-V1 (5')	10/22/01	7.0	0.026	0.019	<0.0025	0.0098	0.0047	-	-	-
B-3-V2 (10')	10/22/01	2.2	0.0079	0.0055	<0.0036	0.0039	<0.0036	-	-	-
B-3-V3 (15')	10/22/01	1.6	0.0064	0.0074	0.0027	0.0063	0.0040	-	-	-
B-4-V1 (5')	10/22/01	1.3	0.010 a	0.0082	<0.0029	0.0043	<0.0029	20	<0.0029	0.066
B-4-V2 (10')	10/22/01	1.3	0.0042 a	0.0060	<0.0026	0.0051	<0.0026	20	<0.0026	0.070
B-4-V3 (15')	10/22/01	2.1	0.013	0.011	0.0040 a	0.0090	0.0042	20	<0.0025	0.092
B-5-V1 (5')	10/23/01	6.2	0.023 a	0.020	<0.0040	0.012	0.0070	-	-	-
B-5-V2 (10')	10/23/01	2.0	0.0058	0.0094	<0.0024	0.0084	0.0033	-	-	-
B-5-V3 (15')	10/23/01	1.7	<0.0042 b	0.0055	<0.0042 b	<0.0042 b	<0.0042 b	-	-	-
B-6-V1 (5')	10/23/01	4.2	0.030 a	0.017	0.0078	0.11	0.0062	-	-	-
B-6-V2 (10')	10/23/01	2.3	0.029	0.060	0.0070	0.025	0.0061	-	-	-
B-6-V3 (15')	10/23/01	2.4	0.34	0.23	0.15	0.59	0.062	-	-	-

Abbreviations and Notes:

ppmv = Parts per million by volume
MTBE = Methyl tert-butyl ether
TPHg = Total petroleum hydrocarbons as gasoline
<n = Below detection limit of n ppmv or %
- = Not analyzed
a = Reported value may be biased due to apparent matrix interferences.
b = Elevated reporting limits due to high residual canister vacuum.

Environmental Laboratories **RESNA** Working To Restore Nature

3164 Gold Camp Drive, Suite 200
Rancho Cordova, CA 95670
Phone: (916) 852-6699
Fax: (916) 852-6688

ANALYSIS REPORT

1020lab.frm

Attention: Greg Gurss
RESNA Industries
3164 Gold Camp Drive, #200
Rancho Cordova, CA 95670

Project: 32006.01

Date Sampled: 4-08-92
Date Received: 4-09-92
BTEX Analyzed: 4-09-92
TPHg Analyzed: 4-09-92
Matrix: Air

	Benzene mg/m³	Toluene mg/m³	Ethyl-benzene mg/m³	Total Xylenes mg/m³	TPHg mg/m³
Reporting Limit:	0.05	0.05	0.05	0.05	5.0
SAMPLE Laboratory Identification					
A-0408-VW2INF A3204003	250	5.5	20	49	9500
A-0408-VW3INF A3204004	1.0	2.0	1.7	6.1	9.0
A-0408-VW1INF1 A3204005	120	8.3	24	21	5100
A-0408-VW1INF2 A3204006	0.7	0.6	1.1	3.0	15

mg/m^3 = milligrams per cubic meter
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by a modified TO-14/8020 and 602 methods which utilize a purge and trap,and a gas chromatograph (GC) equipped with a photoionization detector (PID).
TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by a modified EPA Method 8015 and TO-14, which utilize a Purge and Trap and a GC equipped with a FID.

Laboratory Representative

4-10-92
Date Reported

APPLIED ANALYTICAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. E773)

Environmental Laboratories

RESNA
Working To Restore Nature

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Rancho Cordova, CA 95670
Phone: (916) 852-6699
Fax: (916) 852-6688

ANALYSIS REPORT

1020lab.frm

Attention:	Greg Gurss	Date Sampled:	4-08-92
	RESNA Industries	Date Received:	4-09-92
	3164 Gold Camp Drive, #200	BTEX Analyzed:	4-09-92
	Rancho Cordova, CA 95670	TPHg Analyzed:	4-09-92
Project:	32006.01	Matrix:	Air

	Benzene mg/m^3	Toluene mg/m^3	Ethyl-benzene mg/m^3	Total Xylenes mg/m^3	TPHg mg/m^3
Reporting Limit:	0.05	0.05	0.05	0.05	5.0
SAMPLE Laboratory Identification					
A-0408-VW1INF3 A3204007	240	12	9.5	13	6900
A-0408-VW1INF4 A3204008	2.0	0.3	1.1	2.4	53
A-0408-VW1EFF A3204009	1.5	1.4	1.4	5.8	16

mg/m^3 = milligrams per cubic meter
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by a modified TO-14/8020 and 602 methods which utilize a purge and trap,and a gas chromatograph (GC) equipped with a photoionization detector (PID).
TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by a modified EPA Method 8015 and TO-14, which utilize a Purge and Trap and a GC equipped with a FID.

Laboratory Representative

4-10-92
Date Reported

APPLIED ANALYTICAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. E773)

Table 3

Soil Analytical Data
Former BP #11133
2220 98th Ave., Oakland, CA

Soil Sample ID	Sample Depth (feet bgs)	Date Sampled	GRO (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	TBA (mg/kg)	TAME (mg/kg)	MTBE (mg/kg)	Lead (mg/kg)
SB-1 (5-5.5')	5	07/22/05	ND<0.091	ND<0.0046	ND<0.0046	ND<0.0046	ND<0.0046	ND<0.018	ND<0.0046	ND<0.0046	NA
SB-1 (9.5-10')	9.5	07/22/05	ND<0.096	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.019	ND<0.0048	ND<0.0048	NA
SB-1 (14.5-15')	14.5	07/22/05	ND<0.099	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-1 (19.5-20')	19.5	07/22/05	ND<0.095	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.019	ND<0.0048	ND<0.0048	NA
SB-1 (21.5-22')	21.5	07/22/05	ND<0.096	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.019	ND<0.0048	ND<0.0048	NA
SB-1 (25-25.5')	25	07/22/05	**64**	ND<0.050	ND<0.050	**0.20**	ND<0.050	ND<5.0	ND<0.050	ND<0.050	ND<5.0
SB-1 (27.5-28')	27.5	07/22/05	**0.39**	ND<0.050	ND<0.050	ND<0.050	ND<0.050	ND<0.020	ND<0.050	ND<0.050	NA
SB-1 (31.5-32')	31.5	07/22/05	**7.0**	ND<0.024	ND<0.024	ND<0.024	ND<0.024	ND<0.098	ND<0.024	ND<0.024	NA
SB-1 (34.5-35')	34.5	07/22/05	**0.19**	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.019	ND<0.0048	ND<0.0048	NA
SB-1 (37.5-38')	37.5	07/22/05	ND<0.094	ND<0.0047	ND<0.0047	ND<0.0047	ND<0.0047	ND<0.019	ND<0.0047	**0.0097**	NA
SB-1 (41.5-42')	41.5	07/22/05	ND<0.096	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.0048	ND<0.019	ND<0.0048	ND<0.0048	NA
SB-2 @5'	5	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-2 @ 10'	10	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-2 @ 15'	15	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-2 @ 20'	20	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-2 @ 22'	22	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-2 @ 25'	25	09/16/05	ND<0.20	ND<0.010	ND<0.010	ND<0.010	ND<0.010	ND<0.040	**0.017**	**0.068**	NA
SB-2 @ 30'	30	09/16/05	ND<0.20	ND<0.010	ND<0.010	ND<0.010	ND<0.010	ND<0.040	**0.015**	**0.062**	NA
SB-4 @ 3'	3	09/16/05	ND<0.088	ND<0.0044	ND<0.0044	ND<0.0044	ND<0.0044	ND<0.018	ND<0.0044	ND<0.0044	NA
SB-4 @ 6'	6	09/16/05	ND<0.088	ND<0.0044	ND<0.0044	ND<0.0044	ND<0.0044	ND<0.018	ND<0.0044	ND<0.0044	NA
SB-4 @ 9'	9	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA
SB-4 @ 12'	12	09/16/05	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	NA

Table 3

Soil Analytical Data
Former BP #11133
2220 98th Ave., Oakland, CA

Notes: All Samples analyzed by EPA Method 8260B. Di-isopropyl ether, 1,2-dibromoethane, 1,2-dichloroethane, ethyl tertiary butyl ether, and ethanol were not detected at or above their respective laboratory reporting limit.
Total lead analyzed by EPA Method 6000/7000 series for soil disposal purposes.

bgs = below ground surface
GRO = Gasoline range organics
TBA = tert-butyl alcohol
TAME = tert-amyl methyl ether
MTBE = Methyl tert-butyl ether
mg/kg = milligrams per kilogram
ND< = Not detected at or above stated laboratory reporting limit
NA = Not analyzed

TABLE 1 - SUMMARY OF RESULTS OF VAPOR EXTRACTION TREATMENT SYSTEM OPERATION
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Monitoring Point	Date of Monitoring	Hydrocarbons Detected (ppmv)	Influent Flow Rate (scfm)	Exhaust Temperature (degrees F)	Effluent Flow Rate (acfm)	Destruction Efficiency (%)	Hydrocarbon Discharge (lbs/day)	Period Hydrocarbons Processed (lbs)	Total Hydrocarbons Removed (lbs)	Additional Analytical Data TPH-G (ppm)	B (ppm)	T (ppm)	E (ppm)	X (ppm)	LAB/ FIELD EQUIPMENT
I-1	12/21/94	162	400	194	503	---	---	NC	NC	121	13	14.0	2.4	12.0	ATox
I-1	12/29/94	180	450	190	563	---	---	241.7	241.7	---	---	---	---	---	HORIBA
I-1	01/03/95	80	450	190	563	---	---	67.1	308.8	---	---	---	---	---	HORIBA
I-1	01/12/95	60	425	256	585	---	---	85.6	394.4	---	---	---	---	---	HORIBA
I-1	01/26/95	10	550	196	694	---	---	28.7	423.2	---	---	---	---	---	HORIBA
I-1	01/30/95	10	525	200	666	---	---	7.8	431.0	---	---	---	---	---	HORIBA
I-1	02/16/95	460	550	200	698	---	---	1604.3	2035.3	---	---	---	---	---	HORIBA
I-1	03/02/95	ND<10	650	200	825	---	---	NC	2035.3	---	---	---	---	---	HORIBA
I-1	03/27/95	360	525	254	721	---	---	1762.4	3797.7	---	---	---	---	---	HORIBA
I-1	04/03/95	30	450	221	589	---	---	35.2	3832.9	---	---	---	---	---	HORIBA
I-1	05/04/95	ND<10	475	185	589	---	---	NC	3832.9	---	---	---	---	---	HORIBA
I-1	05/23/95	110	525	176	642	---	---	409.3	4242.2	---	---	---	---	---	HORIBA
I-1	06/01/95	20	425	172	517	---	---	28.5	4270.8	---	---	---	---	---	HORIBA
I-1	06/28/95	80	500	285	716	---	---	402.8	4673.6	---	---	---	---	---	HORIBA
I-1	07/31/95	90	500	189	624	---	---	553.9	5227.5	---	---	---	---	---	HORIBA
I-1	08/23/95	9.8	425	186	528	---	---	35.7	5263.2	---	---	---	---	---	MINIRAE
I-1	09/28/95	86.8	530	183	655	---	---	617.7	5881.0	---	---	---	---	---	MINIRAE
I-1	10/31/95	93.5	450	186	559	---	---	517.9	6398.9	---	---	---	---	---	MINIRAE
I-1	11/14/95	86.6	450	201	572	---	---	203.5	6602.4	---	---	---	---	---	MINIRAE
I-1	12/05/95	198.0	475	209	611	---	---	738.9	7341.3	---	---	---	---	---	MINIRAE
I-1	12/27/95	2000.0	375	200	476	---	---	6154.5	13495.8	---	---	---	---	---	MINIRAE
E-1	12/21/94	4	400	194	503	97.53%	0.8	---	---	4	0.028	0.032	0.004	0.026	ATox
E-1	12/29/94	10	450	190	563	94.44%	2.1	---	---	---	---	---	---	---	HORIBA
E-1	01/03/95	ND<10	450	190	563	>87.50%	<2.1	---	---	---	---	---	---	---	HORIBA
E-1	01/12/95	ND<10	425	256	585	>83.33%	<2.2	---	---	---	---	---	---	---	HORIBA
E-1	01/26/95	ND<10	550	196	694	---	<2.6	---	---	---	---	---	---	---	HORIBA
E-1	01/30/95	ND<10	525	200	666	---	<2.5	---	---	---	---	---	---	---	HORIBA
E-1	02/16/95	60	550	200	698	86.96%	15.6	---	---	---	---	---	---	---	HORIBA
E-1	03/02/95	ND<10	650	200	825	---	<3.1	---	---	---	---	---	---	---	HORIBA
E-1	03/27/95	10	525	254	721	97.22%	2.7	---	---	---	---	---	---	---	HORIBA
E-1	04/03/95	ND<10	450	221	589	>66.67%	<2.2	---	---	---	---	---	---	---	HORIBA
E-1	05/04/95	ND<10	475	185	589	---	<2.2	---	---	---	---	---	---	---	HORIBA
E-1	05/23/95	20	525	176	642	81.82%	4.8	---	---	---	---	---	---	---	HORIBA
E-1	06/01/95	ND<10	425	172	517	>50.00%	<1.9	---	---	---	---	---	---	---	HORIBA
E-1	06/28/95	ND<10	500	285	716	>87.50%	<2.7	---	---	---	---	---	---	---	HORIBA
E-1	07/31/95	ND<10	500	189	624	>88.89%	<2.3	---	---	---	---	---	---	---	HORIBA
E-1	08/23/95	1.6	425	186	528	83.67%	<2.0	---	---	---	---	---	---	---	MINIRAE
E-1	09/28/95	3.6	530	183	655	95.85%	<2.4	---	---	---	---	---	---	---	MINIRAE
E-1	10/31/95	8.8	450	186	559	90.60%	<2.1	---	---	---	---	---	---	---	MINIRAE
E-1	11/14/95	7.1	450	201	572	91.80%	<2.1	---	---	---	---	---	---	---	MINIRAE
E-1	12/05/95	8.8	475	209	611	95.50%	<2.3	---	---	---	---	---	---	---	MINIRAE
E-1	12/27/95	1.4	375	200	476	99.93%	<1.8	---	---	---	---	---	---	---	MINIRAE

TABLE 1 - SUMMARY OF RESULTS OF VAPOR EXTRACTION TREATMENT SYSTEM OPERATION
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Monitoring Point	Date of Monitoring	Hydrocarbons Detected (ppmv)	Influent Flow Rate (scfm)	Exhaust Temperature (degrees F)	Effluent Flow Rate (acfm)	Destruction Efficiency (%)	Hydrocarbon Discharge (lbs/day)	Period Hydrocarbons Processed (lbs)	Total Hydrocarbons Removed (lbs)	Additional Analytical Data					LAB/ FIELD EQUIPMENT
										TPH-G (ppm)	B (ppm)	T (ppm)	E (ppm)	X (ppm)	

ABBREVIATIONS:

ppmv	Parts per million volume	B	Benzene
scfm	Standard cubic feet per minute	T	Toluene
acfm	Actual cubic feet per minute	E	Ethylbenzene
ppm	Parts per million	X	Total xylenes
I-1	System influent	---	Not analyzed/applicable
E-1	System effluent	ATox	Air Toxics, Ltd.
ND	Not detected above reported detection limit	HORIBA	HORIBA Meter
NC	Not calculated	MINIRAE	MINIRAE PID Meter
TPH-G	Total petroleum hydrocarbons as gasoline		

TABLE 1

MONITORING AND SURVEY DATA

Well	Depth to Water (Feet)	Product Thickness (Feet)	TOC Elevation (Feet)	Ground Water Elevation (Feet)
		January 24, 1990		
MW-1	18.07	0.2	40.00	21.93
MW-2	25.65	---	39.96	14.31
MW-3	24.16	---	38.97	14.81

TOC = Top of Casing

*A 0.8 conversion factor is used to determine water table depression due to the presence of free-floating product interpreted from Levorson, 1967.

TABLE 2

RESULTS OF ANALYSIS
GROUND WATER SAMPLES

Well	TPH (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)
MW-1	FP	---	---	---	---
MW-2	ND <50	ND <0.5	ND <0.5	ND <0.5	ND <0.5
MW-3	ND <50	ND <0.5	ND <0.5	ND <0.5	ND <0.5
TW-1	77,000	6,600	5,500	2,900	1,500
TW-2	ND <50	1.4	1.4	0.6	5.0
TW-3	72,000	0.80	2.3	1.4	11
TW-4	FP	---	---	---	---
TW-5	66,000	19,000	15,000	1,800	8,600
TW-6	170,000	32,000	41,000	4,500	24,000
TW-7	470,000	11,000	29,000	9,700	48,000
TW-8	720,000	4,200	38,000	12,000	71,000

ND = Nondetectable
FP = Free Product
ppb = parts per billion
MW = Monitoring Well
TW = Temporary Well

TABLE 1

SURVEY AND WATER LEVEL MONITORING DATA
July 1990

Well Number	Well Elevation (feet)*	Depth to Water (feet)	Free Product Thickness (feet)	Ground Water Elevation (feet)*
MW-1	97.33	13.31	0.22	84.02**
MW-2	96.36	23.15	----	73.21
MW-3	97.40	23.06	----	74.34
AW-1	98.99	26.87	----	72.12
AW-2	97.69	24.88	----	72.81
AW-3	100.00	24.75	----	75.25
AW-4	99.96	27.29	----	72.67
RW-1	98.60	27.93	1.21	70.67***

Note:

* Elevation in feet relative to a common datum (AW-3) with an assumed elevation of 100 feet above mean sea level, as measured on July 5, 1990 by Alton Geoscience.

** Elevation adjusted assuming 0.75 specific gravity of free product.

*** Not an accurate elevation due to the presence of over 0.25 foot of free product.

TABLE 3

RESULTS OF LABORATORY ANALYSIS OF GROUND WATER SAMPLES June 1990

Monitoring Well	TPH-G	B	T	E	X
	(concentrations in parts per billion)				
MW-1	--	--	--	--	--
MW-2	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND
AW-1	66	1.0	ND	ND	ND
AW-2	ND	ND	ND	ND	ND
AW-3	88	1.9	ND	ND	42.0
AW-4	38,000	18,000	2,300	1,500	2,000
RW-1	--	--	--	--	--

Notes:

TPH-G = Total Petroleum Hydrocarbons as Gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
ND = Not Detected at method detection limit (refer to Appendix E, Official Laboratory Reports)
-- = No sample collected due to the presence of free-floating product

TABLE
PRODUCT REMOVAL STATUS

Former BP 11133
2220 98th Avenue
Oakland, CA

WELL ID	DATE OF MONITORING	PRODUCT REMOVED (Gallons)	PRODUCT REMOVED CUMULATIVE (Gallons)
RW-1	10/6/1993	1.00	1.00
	10/14/1994	1.00	2.00
	10/20/1994	18.00	20.00
	10/26/1994	3.00	23.00
	11/2/1993	5.00	28.00
	11/10/1994	6.00	34.00
	11/16/1994	2.50	36.50
	11/23/1994	5.00	41.50
	11/30/1993	2.00	43.50
	12/7/1993	4.00	47.50
	12/17/1993	1.50	49.00
	1/4/1994	5.00	54.00
	1/12/1994	3.50	57.50
	1/20/1994	2.50	60.00
	2/11/1994	4.00	64.00
	2/18/1993	3.50	67.50
	2/25/1994	3.00	70.50
	3/4/1994	3.50	74.00
	3/18/1994	5.50	79.50
	3/30/1994	4.00	83.50
	4/13/1994	4.60	88.10
	4/21/1994	4.20	92.30
	4/29/1994	4.50	96.80
	5/6/1994	5.50	102.30
	5/13/1994	3.50	105.80
	5/20/1994	3.50	109.30
	5/26/1994	4.50	113.80
	6/2/1994	3.50	117.30
	6/9/1994	2.50	119.80
	6/16/1994	3.50	123.30
	6/23/1994	4.00	127.30
	6/29/1994	2.50	129.80
	7/7/1994	2.00	131.80
	7/12/1994	3.00	134.80
	7/20/1994	1.50	136.30
	7/29/1994	3.50	139.80
	8/5/1994	1.50	141.30
	8/12/1994	2.00	143.30
	8/18/1994	2.50	145.80
	9/9/1994	3.50	149.30
	9/16/1994	4.00	153.30

TABLE
PRODUCT REMOVAL STATUS

Former BP 11133
2220 98th Avenue
Oakland, CA

WELL ID	DATE OF MONITORING	PRODUCT REMOVED (Gallons)	PRODUCT REMOVED CUMULATIVE (Gallons)
RW-1 (cont'd)	9/23/1994	2.00	155.30
	12/7/1995	0.00	155.30
	3/28/1996	0.01	155.31
	06/20/96	0.00	155.31
	4/14/1997	<0.05	155.31
	7/2/1997	0.25	155.56
	9/30/1997	<0.01	155.56
	1/21/1998	0.5	156.06
	4/10/1998	0.09	156.15
	6/19/1998	<0.01	156.15
	11/30/1998	0.00	156.15
	1/21/1999	0.00	156.15
	4/30/1999	0.11	156.26
	7/9/1999	0.00	156.26
	11/3/1999	1.06	157.32
	1/12/2000	0.53	157.85
	4/13/2000	0.26	158.11
	5/24/2000	0.53	158.64
	6/1/2000	0.00	158.64
	6/8/2000	0.26	158.90
	6/15/2000	0.13	159.03
	6/20/2000	0.53	159.56
	7/7/2000	0.01	159.57
	7/20/2000	0.11	159.68
	7/26/2000	0.13	159.81
	7/31/2000	0.00	159.81
	8/8/2000	0.01	159.82
	8/16/2000	0.00	159.82
	8/23/2000	0.13	159.95
	8/31/2000	0.40	160.35
	9/8/2000	0.53	160.88
	9/25/2000	0.01	160.89
	10/24/2000	0.00	160.89
	2/14/2000	0.01	160.90
	3/20/2000	0.13	161.03
	4/26/2000	0.00	161.03
	5/17/2000	0.00	161.03
	6/28/2000	0.00	161.03
	1/19/2001	0.11	161.14
	2/14/2001	0.01	161.15
	3/20/2001	0.13	161.28
	4/26/2001	0.00	161.28

TABLE
PRODUCT REMOVAL STATUS

Former BP 11133
2220 98th Avenue
Oakland, CA

WELL ID	DATE OF MONITORING	PRODUCT REMOVED (Gallons)	PRODUCT REMOVED CUMULATIVE (Gallons)
RW-1	5/17/2001	0.00	161.28
(cont'd)	6/28/2001	0.00	161.28
	7/24/2001	0.00	161.28
	9/21/2001	0.01	161.29
	10/23/2001	0.00	161.29
	11/30/2001	0.00	161.29
	1/18/2002	0.00	161.29
	2/7/2002	0.00	161.29
MW-1	10/20/1993	0.10	0.10
	11/10/1993	0.10	0.20
	9/9/1994	SHEEN	0.20
	10/26/1994	SHEEN	0.20
	11/16/1994	SHEEN	0.20
	12/21/1994	0.25	0.45
	2/8/1995	0.00	0.45
	4/10/1995	0.25	0.70
	6/29/1995	SHEEN	0.70
	9/18/1995	SHEEN	0.70
	12/7/1995	SHEEN	0.70
	3/28/1996	<.001	0.70
	06/20/96	0.002	0.70
	10/11/1996	<0.001	0.70
	1/2/1997	<0.01	0.70
	4/14/1997	<0.01	0.70
	7/2/1997	<0.01	0.70
	1/21/1998	<0.01	0.70
	6/19/1998	<0.01	0.70
	11/30/1998	0.00	0.70
	1/21/1999	SHEEN	0.70
	4/30/1999	SHEEN	0.70
	7/9/1999	SHEEN	0.70
	11/3/1999	0.00	0.70
	1/12/2000	0.00	0.70
	4/13/2000	0.00	0.70
	5/24/2000	0.00	0.70
	6/1/2000	0.00	0.70
	6/8/2000	0.00	0.70
	6/15/2000	0.00	0.70

NOTE: Groundwater and soil vapor extraction equipment installed in RW-1 in October 1994.

Table 1 - Chemical Analytical Data

Former Tosco BP Branded Facility No. 11133
2220 98th Avenue
Oakland, California

Sample ID	Date Collected	Depth to Water (feet)	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-Benzene (ppb)	Xylenes (ppb)	MTBE (ppb)	Lead (ppm)
GASOLINE UST PIT (WATER)									
Water-1	10/1/98	12.5	430	46	20	0.65	89	1,200	NR
Water-2	10/1/98	12.5	3,700	98	450	56	360	4,100	NR

EXPLANATION:
ND = none detected
NA = not applicable
ppm = parts per million
ppb = parts per billion
NR = analysis not requested

ANALYTICAL LABORATORY:
Sequoia Analytical (ELAP # 1271)

NOTES:
[1] = Laboratory report indicates unidentified hydrocarbons C6-C12

ANALYTICAL METHODS:
TPHg = Total petroleum hydrocarbons as gasoline according to EPA Method 8015 Modified.
BTEX = Benzene, toluene, ethylbenzene, and xylenes according to EPA Method 8020.
MTBE = Methyl tert-butyl ether according to EPA Method 8020.

CAMBRIA

Table 3. **Water Analytical Data** - BP Oil Site No. 11133,
2220 98th Avenue, Oakland, California

Well ID (Sample ID)	Date Sampled	TPHg (ug/l)	Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)
Analytical Method:		8015m	8260	8260	8260	8260	8260
B-1-W1	10/22/01	<50	<2.0	2.29	<2.0	<2.0	71.6
B-2-W1	10/22/01	15,000	3,610	1,120	383	1,330	1,500
B-3-W1	10/22/01	4,600	1,410	171	1,010	1,290	1,420
B-4-W1	10/23/01	71,000	7,300	10,800	7,060	36,600	177
DUP	10/23/01	52,000	7,600	9,650	4,230	21,600	<200
B-5-W1	10/23/01	100,000	16,800	42,100	6,720	33,300	244
B-6-W1	10/23/01	110,000	30,600	36,800	5,410	26,900	1,010

Abbreviations and Notes:

ug/l = micrograms per liter
TPHg = Total petroleum hydrocarbons as gasoline
MTBE = Methyl tert-butyl ether
<n = Below detection limit of n ug/L

Table 4

Soil Boring Groundwater Analytical Data
Former BP #11133
2220 98th Ave., Oakland, CA

Soil Sample ID	Sample Depth (feet bgs)	Date Sampled	GRO (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	TBA (ug/L)	TAME (ug/L)	MTBE (ug/L)
SB-1 (24'-27')	24-27	09/16/05	**2,000**	**2.6**	ND<1.0	**52**	**1.3**	ND<40	ND<1.0	**6.5**
SB-2 (21'-24')	21-24	09/16/05	**260**	ND<0.50	ND<0.50	**2.3**	**0.69**	ND<20	**15**	**61**

Notes: All Samples analyzed by EPA Method 8260B. Di-isopropyl ether, 1,2-dibromoethane, 1,2-dichloroethane, ethyl tertiary butyl ether, and ethanol were not detected at or above their respective laboratory reporting limit.
Total lead analyzed by EPA Method 6000/7000 series for soil disposal purposes.

bgs = below ground surface
GRO = Gasoline range organics
TBA = tert-butyl alcohol
TAME = tert-amyl methyl ether
MTBE = Methyl tert-butyl ether
ug/L = micrograms per liter
ND< = Not detected at or above stated laboratory reporting limit
NA = Not analyzed

Table
Historical Groundwater Flow Direction and Gradient
Former BP Site 11133
2220 98th Ave., Oakland, CA

Date Measured	Flow Direction	Hydraulic Gradient (Feet/foot)
07/06/92	South	0.04
07/06/92	Northwest	0.04
07/06/92	East	0.04
10/07/92	Southeast	0.13
01/14/93	East-northeast	0.20
01/14/93	East	0.30
04/22/93	Northeast	0.20
04/22/93	Southeast	0.20
07/15/93	East	0.10
07/15/93	Southeast	0.20
10/21/93	Northeast	0.13
10/21/93	Southeast	0.15
01/27/94	East-southeast	0.13
01/27/94	East	0.20
04/21/94	East-southeast	0.14
09/09/94	Southeast	0.10
12/21/94	East	0.07
01/30/95	South-southeast	0.06
04/10/95	East	0.07
06/29/95	South-southeast	0.14
09/18/95	Southeast	0.07
12/07/95	Southeast	0.11
03/28/96	East	0.05
06/20/96	East	0.07
06/20/96	West	0.04
10/11/96	East	0.06
01/02/97	East	0.15
04/14/97	East	0.08
07/02/97	East-northeast	0.05
01/21/98	Southwest	0.04
01/12/00	East	0.07
01/12/00	West	0.07
04/13/00	East	0.05
04/13/00	Southwest	0.05
07/26/00	Southwest	0.03
10/24/00	Southeast	0.04
01/19/01	East-southeast	0.04
07/24/01	East	0.08
07/24/01	West	0.03
01/18/02	West	0.04
08/01/02	East	0.05
08/01/02	South-southwest	0.04
01/16/03	East-southeast	0.06
01/16/03	West	0.02
03/14/03	East	0.06
03/14/03	West	0.02
02/05/04	Southwest	0.03
02/05/04	Northeast	0.06
07/07/03	Southwest	0.03
07/07/03	East	0.08
07/01/04	Southwest	0.03
07/01/04	East	0.08

TABLE 1 - FLOW DATA FOR GROUNDWATER REMEDIATION SYSTEM
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Date		Flow Meter Reading (gallons)	Effluent Discharged (gallons)	Total Effluent Discharged (gallons)	Average Flow Rate (gpd)	Average Flow Rate (gpm)	Influent TPH-G Concentration (ug/l)	Period Hydrocarbons Removed (lb)	Cumulative Hydrocarbons Removed (lb)
03/21/95		0	0	0	---	---	299,100	NC	NC
03/27/95		3,069	3,069	3,069	512	0.71	350,600	9.0	9.0
05/02/95		4,280	1,211	4,280	34	0.05	245,400	2.5	11.5
06/01/95		5,390	1,110	5,390	37	0.05	460,600	4.3	15.7
06/28/95		7,634	2,244	7,634	83	0.12	301,300	5.6	21.4
07/31/95		9,480	1,846	9,480	56	0.08	301,300	4.6	26.0
08/30/95		11,869	2,389	11,869	80	0.11	276,700	5.5	31.5
09/28/95		19,572	7,703	19,572	266	0.37	322,800	20.7	52.3
10/18/95		21,266	1,694	21,266	85	0.12	396,200	5.6	57.9
11/14/95		28,880	7,614	28,880	282	0.39	238,100	15.1	73.0
12/27/95		39,395	10,515	39,395	245	0.34	165,100	14.5	87.5
01/22/96		42,994	3,599	42,994	138	0.19	236,400	7.1	94.6
02/27/96		53,058	10,064	53,058	280	0.39	380,000	31.9	126.5
03/01/96		55,609	2,551	55,609	850	1.18	380,000	8.1	134.6
03/25/96		59,409	3,800	59,409	158	0.22	266,300	8.4	143.0
04/30/96		65,132	5,723	65,132	159	0.22	189,000	9.0	152.1
05/30/96		82,551	17,419	82,551	581	0.81	276,200	40.1	192.2
07/01/96	(a)	83,210	659	83,210	21	0.03	151,000	0.8	193.0
07/31/96	(b)	84,444	1,234	84,444	41	0.06	151,000	1.6	194.6
08/27/96		98,824	14,380	98,824	533	0.74	124,500	14.9	209.5
09/30/96		107,482	8,658	107,482	255	0.35	306,100	22.1	231.6
10/29/96		114,368	6,886	114,368	237	0.33	1,930	0.1	231.7
11/25/96		122,583	8,215	122,583	304	0.42	154,500	10.6	242.3
12/31/96	(a)	131,256	8,673	131,256	241	0.33	59,740	4.3	246.7
02/24/97	(b)	132,257	1,001	132,257	250	0.35	308,300	2.6	249.2
03/25/97		138,149	5,892	138,149	1,403	1.95	340,400	16.7	266.0
04/14/97	(a)	138,290	141	138,290	30	0.04	278,500	0.3	266.3
05/20/97	(c)	138,372	82	138,372	36	0.05	465,600	0.3	266.6
05/26/98	(b)	138,967	595	138,967	259	0.36	294,400	1.5	268.1
06/25/98		143,256	4,289	143,256	143	0.20	287,300	10.3	278.4
07/07/98	(d)	149,459	6,203	149,459	517	0.72	287,300	14.9	293.2
09/26/98	(b)	150,311	852	150,311	11	0.01	230,200	1.6	294.9
09/30/98		151,021	710	151,021	178	0.25	230,200	1.4	296.2
10/26/98		160,715	9,694	160,715	348	0.48	441,300	35.7	331.9
11/24/98		162,237	1,522	162,237	55	0.08	441,300	5.6	337.5
12/14/98	(e)	166,358	4,121	166,358	206	0.29	198,300	6.9	344.4

TABLE 1 - FLOW DATA FOR GROUNDWATER REMEDIATION SYSTEM
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Date	Flow Meter Reading (gallons)	Effluent Discharged (gallons)	Total Effluent Discharged (gallons)	Average Flow Rate (gpd)	Average Flow Rate (gpm)	Influent TPH-G Concentration (ug/l)	Period Hydrocarbons Removed (lb)	Cumulative Hydrocarbons Removed (lb)

ABBREVIATIONS:

TPH-G	Total petroleum hydrocarbons as gasoline	ug/l	Micrograms per liter
gpd	Gallons per day	lb	Pounds
gpm	Gallons per minute	NC	Not calculated

NOTES:

* Hydrocarbon removal is calculated by: Effluent discharged (gallons) x TPH-G concentration (ug/l) x 3.785 (liters/gallon) x 1 (lb) / 453.6E6 (ug).
(a) System shut down due to equipment failure.
(b) Operation of system resumed.
(c) System shut down pending approval from East Bay Municipal Utility District to resume operation.
(d) System shut down for carbon changeout.
(e) System shut down at the request of BP Oil.

TABLE 2 - SUMMARY OF RESULTS OF GROUNDWATER REMEDIATION SYSTEM SAMPLE ANALYSIS
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Sample ID	Date	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)	MTBE (ug/l)	DCA (ug/l)	Lead (mg/l)	Lab
I-1	03/21/95	180,000	32,000	55,000	5,100	27,000	---	---	---	ATI
I-1	04/03/95	210,000	31,000	68,000	6,600	35,000	---	---	---	ATI
I-1	05/23/95	160,000	17,000	38,000	4,400	26,000	---	---	0.008	ATI
I-1	06/20/95	330,000	27,000	55,000	7,600	41,000	---	---	---	ATI
QC-1	06/20/95	200,000	21,000	45,000	5,300	30,000	---	---	---	ATI
I-1	08/29/95	160,000	34,000	54,000	4,700	24,000	7,600	ND<500	---	ATI
I-1	09/19/95	230,000	28,000	40,000	3,800	21,000	---	440	---	ATI
I-1	10/18/95	280,000	38,000	51,000	4,200	23,000	3,000	580	---	ATI
I-1	11/14/95	150,000	32,000	33,000	4,100	19,000	---	560	---	ATI
I-1	12/11/95	99,000	24,000	26,000	2,100	14,000	1,000	420	---	ATI
I-1	01/09/96	150,000	28,000	37,000	3,400	18,000	2,000	720	---	ATI
I-1	02/21/96	230,000	22,000	57,000	10,000	61,000	---	ND<5	---	SPL
I-1	03/13/96	180,000	29,000	35,000	3,300	19,000	---	ND<5	---	SPL
I-1	04/18/96	95,000	37,000	34,000	4,000	19,000	---	ND<5	---	SPL
I-1	05/14/96	170,000	28,000	43,000	5,200	30,000	---	ND<5	---	SPL
I-1	06/13/96	96,000	16,000	23,000	2,200	13,800	ND<10,000	---	---	SPL
I-1	08/08/96	75,000	23,000	13,000	2,500	11,000	2,300	---	---	SPL
I-1	09/17/96	210,000	23,000	33,000	5,100	35,000	ND<10,000	---	---	SPL
I-1	10/24/96	1,600	140	190	ND<1.0	ND<1.0	160	---	---	SPL
I-1	11/14/96	100,000	23,000	20,000	2,600	8,900	ND<2,500	---	---	SPL
I-1	12/11/96	39,000	6,800	8,300	740	4,900	ND<2,500	---	---	SPL
I-1	02/24/97	220,000	27,000	34,000	4,400	22,900	ND<10,000	---	---	SPL
I-1	03/12/97	230,000	24,000	48,000	5,400	33,000	ND<10,000	---	---	SPL
I-1	04/08/97	150,000	26,000	61,000	6,500	35,000	ND<25,000	---	---	SPL
I-1	05/15/97	330,000	24,000	54,000	7,600	50,000	ND<10,000	---	---	SPL
I-1	05/22/98	210,000	20,000	36,000	3,600	24,800	ND<2,500	---	---	SPL
I-1	06/17/98	230,000	6,000	26,000	2,300	23,000	ND<250	---	---	SPL
I-1	09/26/98	150,000	20,000	35,000	3,900	21,300	1,200	---	---	SPL
I-1	10/28/98	320,000	30,000	47,000	6,800	38,000	2,400	---	---	SPL
I-1	12/07/98	130,000	19,000	26,000	3,200	20,100	1,500	---	---	SPL
PS-1	03/21/95	47,000	690	4,200	1,400	8,400	---	---	---	ATI
PS-1	04/03/95	150,000	26,000	42,000	3,500	18,000	---	---	---	ATI
PS-1	05/23/95	35,000	1,400	4,900	1,100	6,800	---	---	---	ATI
PS-1	06/20/95	60,000	5,200	11,000	1,400	9,000	---	---	---	ATI
PS-1	08/29/95	25,000	150	1,000	500	3,300	ND<250	---	---	ATI
PS-1	09/19/95	55,000	---	---	---	---	---	---	---	ATI
PS-1	10/18/95	12,000	86	660	190	1,400	---	ND<10		ATI
PS-1	11/14/95	630	9	11	3	20	---	ND<1	---	ATI

TABLE 2 - SUMMARY OF RESULTS OF GROUNDWATER REMEDIATION SYSTEM SAMPLE ANALYSIS
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Sample ID	Date	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)	MTBE (ug/l)	DCA (ug/l)	Lead (mg/l)	Lab
PS-1	12/11/95	470	34	52	8	81	---	ND<1	---	ATI
PS-1	01/09/96	110	ND<1	ND<2	ND<1	1	---	ND<1	---	ATI
PS-1	02/21/96	75,000	4,100	12,000	3,000	20,000	---	ND<5	---	SPL
PS-1	03/13/96	71,000	1,200	5,700	2,300	14,000	---	ND<5	---	SPL
PS-1	04/18/96	190	ND<5	ND<5	ND<5	5	---	ND<5	---	SPL
PS-1	05/14/96	15,000	11	360	600	3,700	---	ND<5	---	SPL
PS-1	06/13/96	18,000	2,000	3,300	460	3,060	---	ND<5	---	SPL
PS-1	08/08/96	180	3.2	6.6	1.6	21.2	ND<1,000	---	---	SPL
PS-1	09/17/96	600	5.8	7.7	1.9	18.7	37	---	---	SPL
PS-1	10/24/96	35,000	3,900	4,700	ND<50	ND<50	39	---	---	SPL
PS-1	11/14/96	12,000	2,300	2,200	270	1,100	570	---	---	SPL
PS-1	12/11/96	17,000	2,900	3,200	330	1,400	420	---	---	SPL
PS-1	02/24/97	280,000	12,000	29,000	6,000	37,000	640	---	---	SPL
PS-1	03/12/97	93,000	4,900	11,000	1,600	16,000	ND<10,000	---	---	SPL
PS-1	04/08/97	130,000	10,000	31,000	5,900	30,800	ND<5,000	---	---	SPL
PS-1	05/15/97	230,000	11,000	35,000	6,900	46,000	ND<25,000	---	---	SPL
PS-1	05/22/98	58,000	5,400	11,000	1,200	7,200	ND<5,000	---	---	SPL
PS-1	06/17/98	96,000	4,200	14,000	2,200	13,900	ND<500	---	---	SPL
PS-1	09/26/98	79,000	11,000	19,000	1,900	11,800	330	---	---	SPL
PS-1	10/28/98	120,000	13,000	15,000	1,700	15,100	ND<1,000	---	---	SPL
PS-1	12/07/98	27,000	4,100	3,000	290	4,700	ND<2,500	---	---	SPL
							750	---	---	SPL
A-1	03/21/95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	---	ATI
A-1	04/03/95	ND<50	ND<0.50	0.50	ND<0.50	ND<1.0	---	---	---	ATI
A-1	05/23/95	1,200	ND<1.0	2.2	3.4	22	---	---	---	ATI
A-1	06/20/95	88	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	---	ATI
A-1	08/29/95	340	7.1	68	5.3	92	5.2	---	---	ATI
A-1	09/19/95	ND<500	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
A-1	10/16/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
A-1	11/14/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
A-1	12/11/95	1,200	4	5	3	82	---	ND<1	---	ATI
A-1	01/09/96	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
A-1	02/21/96	4,100	20	90	87	580	---	ND<5	---	SPL
A-1	03/13/96	11,000	50	860	650	4,100	---	ND<5	---	SPL
A-1	04/18/96	60	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	SPL
A-1	05/14/96	60	ND<5	ND<5	ND<5	10	---	ND<5	---	SPL
A-1	06/13/96	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<10	---	---	SPL
A-1	08/08/96	60	16	12	1.8	10.9	61	---	---	SPL
A-1	09/17/96	140	1.4	1.6	ND<1.0	7.5	ND<10	---	---	SPL

TABLE 2 - SUMMARY OF RESULTS OF GROUNDWATER REMEDIATION SYSTEM SAMPLE ANALYSIS
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Sample ID	Date	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)	MTBE (ug/l)	DCA (ug/l)	Lead (mg/l)	Lab
A-1	10/24/96	80	24	15	1.0	8.1	37	---	---	SPL
A-1	11/14/96	370	83	51	5.3	21	92	---	---	SPL
A-1	12/11/96	2,400	490	410	39	249	320	---	---	SPL
A-1	02/24/97	350	1.4	8.4	5.7	55	ND<10	---	---	SPL
A-1	03/12/97	90	0.53	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
A-1	04/08/97	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
A-1	05/15/97	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
A-1	05/22/98	120	ND<0.5	ND<1.0	ND<1.0	1.8	ND<10	---	---	SPL
A-1	06/17/98	1,400	ND<0.5	7.7	24	132	ND<10	---	---	SPL
A-1	09/26/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
A-1	10/28/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
A-1	12/07/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	03/21/95	88	ND<0.50	2	ND<0.50	2	---	---	---	ATI
B-1	04/03/95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	---	ATI
B-1	05/23/95	240	ND<0.50	0.68	0.93	7.2	---	---	---	ATI
B-1	06/20/95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	---	ATI
B-1	08/29/95	37,000	54	420	600	3500	260	---	---	ATI
B-1	09/19/95	550	ND<1	ND<2	ND<1	9	---	ND<1	---	ATI
B-1	10/18/95	---	---	---	---	---	---	---	---	ATI
B-1	11/14/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
B-1	12/11/95	270	ND<1	ND<2	ND<1	1	---	ND<1	---	ATI
B-1	01/09/96	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
B-1	02/21/96	ND<50	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	SPL
B-1	03/13/96	ND<50	ND<5	ND<5	ND<5	14	---	ND<5	---	SPL
B-1	04/18/96	ND<50	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	SPL
B-1	05/14/96	ND<50	ND<5	8	ND<5	11	---	ND<5	---	SPL
B-1	06/13/96	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<10	---	---	SPL
B-1	08/08/96	ND<50	2.3	1.2	ND<1.0	1.3	48	---	---	SPL
B-1	09/17/96	52	0.78	1.6	ND<1.0	ND<1.0	14	---	---	SPL
B-1	10/24/96	70	1.4	ND<1.0	ND<1.0	ND<1.0	13	---	---	SPL
B-1	11/14/96	100	19	9.3	1.1	3.9	24	---	---	SPL
B-1	12/11/96	80	26	7.1	ND<1.0	2.6	110	---	---	SPL
B-1	02/24/97	600	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	03/12/97	730	5.3	8.1	2.5	51	17	---	---	SPL
B-1	04/08/97	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	05/15/97	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	05/22/98	230	2.4	2.7	2.2	15.8	ND<10	---	---	SPL
B-1	06/17/98	1,000	0.85	10	15	90	ND<10	---	---	SPL

TABLE 2 - SUMMARY OF RESULTS OF GROUNDWATER REMEDIATION SYSTEM SAMPLE ANALYSIS
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Sample ID	Date	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)	MTBE (ug/l)	DCA (ug/l)	Lead (mg/l)	Lab
B-1	09/28/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	10/28/98	ND<50	0.8	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
B-1	12/07/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	03/21/95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	ND<0.002	ATI
E-1	04/03/95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	---	---	0.007	ATI
E-1	05/23/95	140	ND<0.50	ND<0.50	ND<0.50	2.3	---	---	---	ATI
QC-1	05/23/95	250	ND<0.50	ND<0.50	1.0	7.5	---	---	---	ATI
E-1	06/20/95	ND<50	ND<0.50	ND<0.50	ND<0.50	1.1	---	---	---	ATI
E-1	08/29/95	200	ND<1	ND<2	ND<1	ND<1	ND<5	---	---	ATI
E-1	09/19/95	ND<500	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
QC-1	09/19/95	ND<500	---	---	---	---	---	---	---	ATI
E-1	10/18/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
QC-1	10/18/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
E-1	11/14/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
QC-1	11/14/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
E-1	12/11/95	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
E-1	01/09/96	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
QC-1	01/09/96	ND<50	ND<1	ND<2	ND<1	ND<1	---	ND<1	---	ATI
E-1	02/21/96	ND<50	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	ATI
E-1	03/13/96	2,600	ND<5	19	49	320	---	ND<5	---	SPL
E-1	04/18/96	ND<50	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	SPL
E-1	05/14/96	ND<50	ND<5	ND<5	ND<5	ND<5	---	ND<5	---	SPL
E-1	06/13/96	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<10	---	---	SPL
E-1	08/08/96	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	55	---	---	SPL
E-1	09/17/96	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	10/24/96	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	11/14/96	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	12/11/96	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	02/24/97	ND<50	0.76	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	03/12/97	1,800	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	---	---	SPL
E-1	04/08/97	ND<50	ND<1.0	ND<1.0	ND<1.0	1.3	ND<1.0	---	---	SPL
E-1	05/15/97	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	05/22/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	06/17/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	09/28/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	10/28/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL
E-1	12/07/98	ND<50	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<10	---	---	SPL

TABLE 2 - SUMMARY OF RESULTS OF GROUNDWATER REMEDIATION SYSTEM SAMPLE ANALYSIS
BP OIL COMPANY SERVICE STATION NO. 11133
2220 98TH AVENUE, OAKLAND, CALIFORNIA

ALISTO PROJECT NO. 10-025

Sample ID	Date	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)	MTBE (ug/l)	DCA (ug/l)	Lead (mg/l)	Lab

ABBREVIATIONS:

TPH-G	Total petroleum hydrocarbons as gasoline
B	Benzene
T	Toluene
E	Ethylbenzene
X	Total xylenes
MTBE	Methyl tert butyl ether
DCA	1,2-Dichloroethane
ug/l	Micrograms per liter
mg/l	Milligrams per liter
I-1	Sample collected from influent sampling port
PS-1	Sample collected from post air stripper sampling port
A-1	Sample collected from intermediate sampling port
B-1	Sample collected from intermediate sampling port
E-1	Sample collected from effluent sampling port
QC-1	Blind duplicate sample
ND	Not detected above reported detection limit
---	Not analyzed
ATI	Analytical Technologies, Inc.
SPL	Southern Petroleum Laboratories

APPENDIX C

Soil Boring and Well Construction Logs

Exploratory Boring Log

Project No.	Boring & Casing Diameter	Logged By
KEI-P87-064A-I	8 in. 2 in. csg.	JS
Project Name	Casing Elevation	Date Drilled
Mobil #10-MGV		5-6-88
Boring No.	Hollow-stem Flight Auger	Depth to Groundwater
MW-1		20.5 ft.

Penetration blows/ft	G. W. level	Depth (ft) Samples	Lithography USCS	Description
		0		ASPHALT & BASEROCK
			CH	CLAY: dark greyish brown 10YR 3/2 to black N2/, highly plastic, stiff, dry
		5		
31		10		
			CL	SANDY CLAY: dark greenish grey 5GY 4/1 moderately to highly plastic, very fine grained sand, well sorted Faint odor at 15 ft.
15		15		
		20		

Exploratory Boring Log

Project No. KEI-P87-064A-1	Boring & Casing Diameter	Logged By
Project Name Mobil #10-MGV	Casing Elevation	Date Drilled 5-6-88
Boring No. MW-1	Hollow-stem Flight Auger	Depth to Groundwater

Penetration blows/ft	G. W. level	Depth (ft) Samples	Litho-graphy USCS	Description
25	▼	20		SANDY CLAY: as above
		25		
			CH	CLAY: moderately plastic, dry
		30		TOTAL DEPTH 29 FEET
		35		
		40		

WELL DETAILS

PROJECT NAME: Mobil #10-MGV 2220 98th Ave. Oakland, CA

BORING/WELL NO. MW-1

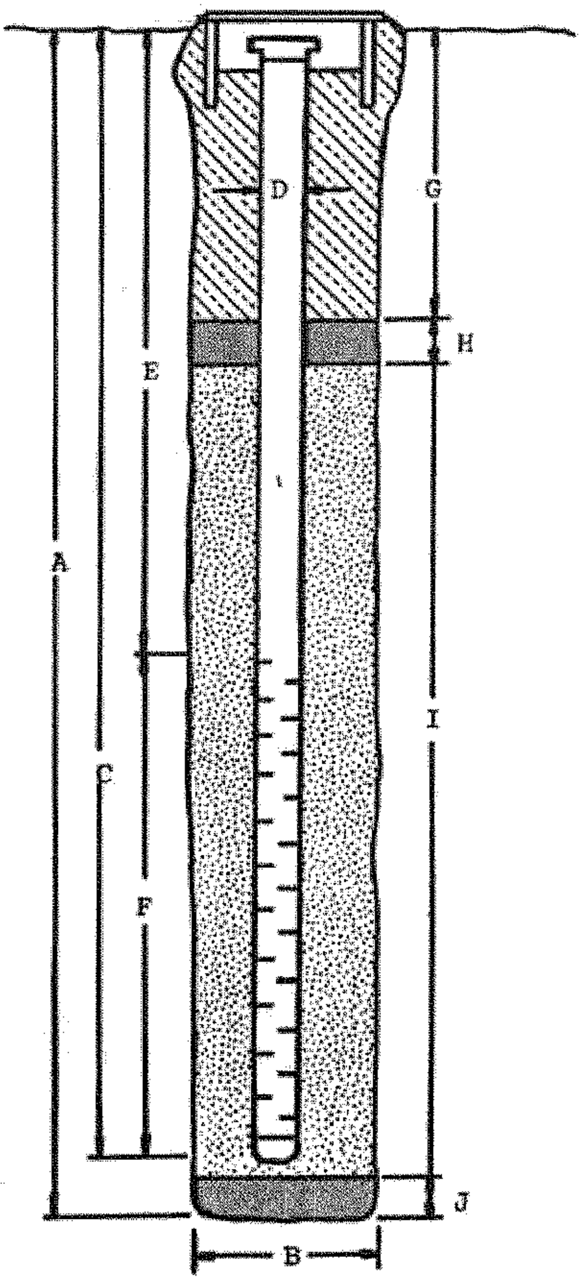
PROJECT NUMBER: KEI-P87-064A-1

CASING ELEVATION:

WELL PERMIT NO.: 88-156 Alameda Co. Flood Control

SURFACE ELEVATION:

G-5 Vault Box



A. Total Depth: 29 ft.

B. Boring Diameter: 8 in.

Drilling method: Hollow stem

C. Casing Length: 29 ft.

Material: Schedule 40 PVC

D. Casing Diameter: 2 in.

E. Depth to Perforations: 10 ft.

F. Perforated Length: 19 ft.

Perforated Interval: 29 to 10 ft.

Perforation Type: slot

Perforation Size: 0.02 in.

G. Surface Seal: 8 to 0 ft.

Seal Material: concrete

H. Seal: 9 to 8 ft.

Seal Material: bentonite

I. Gravel Pack: 29 to 9 ft.

Pack Material: Monterey sand

Size: No. 3

J. Bottom Seal: none

Seal Material:

Exploratory Boring Log

Project No.	Boring & Casing Diameter	Logged By
KEI-P87-064A-1	8 in. 2 in. csg.	JS
Project Name	**Casing Elevation**	**Date Drilled**
Mobil #10-MGV		5-6-88
Boring No.	Hollow-stem Flight Auger	**Depth to Groundwater**
MW-2		24 ft.

Penetration blows/ft	G. W. level	Depth (ft) Samples	Lithography USCS	Description
		0		ASPHALT & BASEROCK FILL
			CH	CLAY: very dark greyish brown 10YR 3/2 highly plastic, stiff, dry
		5		
			CL	SANDY CLAY: very dark greyigh brown 10YR 3/2, very fine grained sand highly plastic clay, 5% fine gravel
27		10		
19		15		brown 10YR 5/3
21		20		

Exploratory Boring Log

Project No. KEI-P87-064A-1	Boring & Casing Diameter	Logged By
Project Name Mobil #10-MGV	Casing Elevation	Date Drilled 5-6-88
Boring No. MW-2	Hollow-stem Flight Auger	Depth to Groundwater

Penetration blows/ft	G. W. level	Depth (ft) Samples	Litho-graphy USCS	Description
		20		SANDY CLAY: as above moist
	▼	25	SC	CLAYEY SAND: yellowish brown 10YR 5/4 fine grained well sorted sand, low plastic fines
		30	CH	CLAY: dark brown 10YR 4/3, stiff to hard, plastic, dry
				TOTAL DEPTH 32 FEET
		35		
		40		

WELL DETAILS

PROJECT NAME: Mobil #10-MGV 2220 98th Ave. Oakland, CA

BORING/WELL NO. MW-2

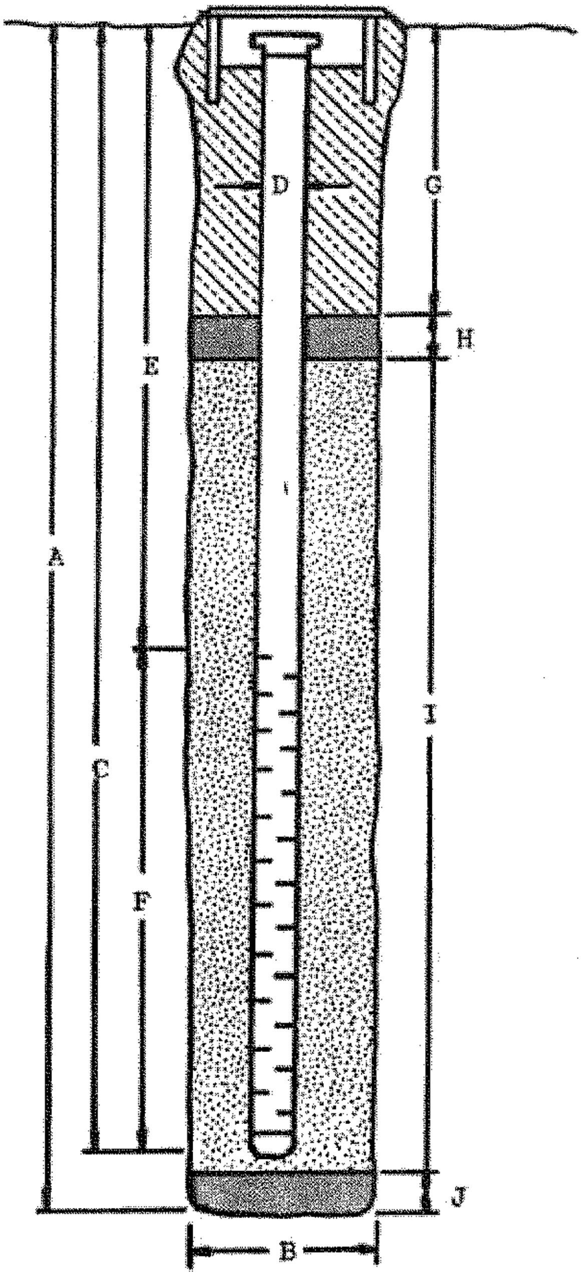
PROJECT NUMBER: KEI-P87-064A-1

CASING ELEVATION:

WELL PERMIT NO.: 88-156 Alameda Co. Flood Control

SURFACE ELEVATION:

G-5 Vault Box



A. Total Depth: 32 ft.

B. Boring Diameter: 8 in.

Drilling method: Hollow stem

C. Casing Length: 32 ft.

Material: Schedule 40 PVC

D. Casing Diameter: 2 in.

E. Depth to Perforations: 12 ft.

F. Perforated Length: 20 ft.

Perforated Interval: 32 to 12 ft.

Perforation Type: slot

Perforation Size: 0.02 in.

G. Surface Seal: 9 to 0 ft.

Seal Material: concrete

H. Seal: 10 to 9 ft.

Seal Material: bentonite

I. Gravel Pack: 32 to 10 ft.

Pack Material: Monterey sand

Size: NO. 3

J. Bottom Seal: none

Seal Material:

Exploratory Boring Log

Project No. KEI-P87-064A-1	Boring & Casing Diameter 8 in. 2 in. csg.	Logged By JS
Project Name Mobil #10-MGV	Casing Elevation	Date Drilled 5-6-88
Boring No. MW-3	Hollow-stem Flight Auger	Depth to Groundwater 29.5 ft.

Penetration blows/ft	G. W. level	Depth (ft) Samples	Lithography USCS	Description
		0		ASPHALT & BASEROCK FILL
			CL	SANDY CLAY: brown 10YR 4/3, very fine grained sand, well sorted, low plasticity clay
		5		
33		10	ML	SILTY CLAY: brown 10YR 4/3, very well sorted, moderatley plastic, stiff, dry
13		15	SC	CLAYEY SAND: dark yellowish brown very fine grained well sorted sand, low to mod. plastic fines, soft, damp coarser sand with depth gravel lens 18 to 19 ft.
		20		

Exploratory Boring Log

Project No. KEI-P87-064A-1	Boring & Casing Diameter	Logged By
Project Name Mobil #10-MGV	Casing Elevation	Date Drilled 5-6-88
Boring No. MW-3	Hollow-stem Flight Auger	Depth to Groundwater

Penetration blows/ft	G. W. level	Depth (ft) Samples	Lithography USCS	Description
22		20		CLAYEY SAND: as above
12		25		very fine grained sand, damp
	▼	30		
			CL	SANDY CLAY: brown 10YR 4/3, hard, dry, fine grained sand and mod. plastic clay
		35		TOTAL DEPTH 34 FEET
		40		

WELL DETAILS

PROJECT NAME: Mobil #10-MGV 2220 98th AVe. Oakland, CA

BORING/WELL NO. MW-3

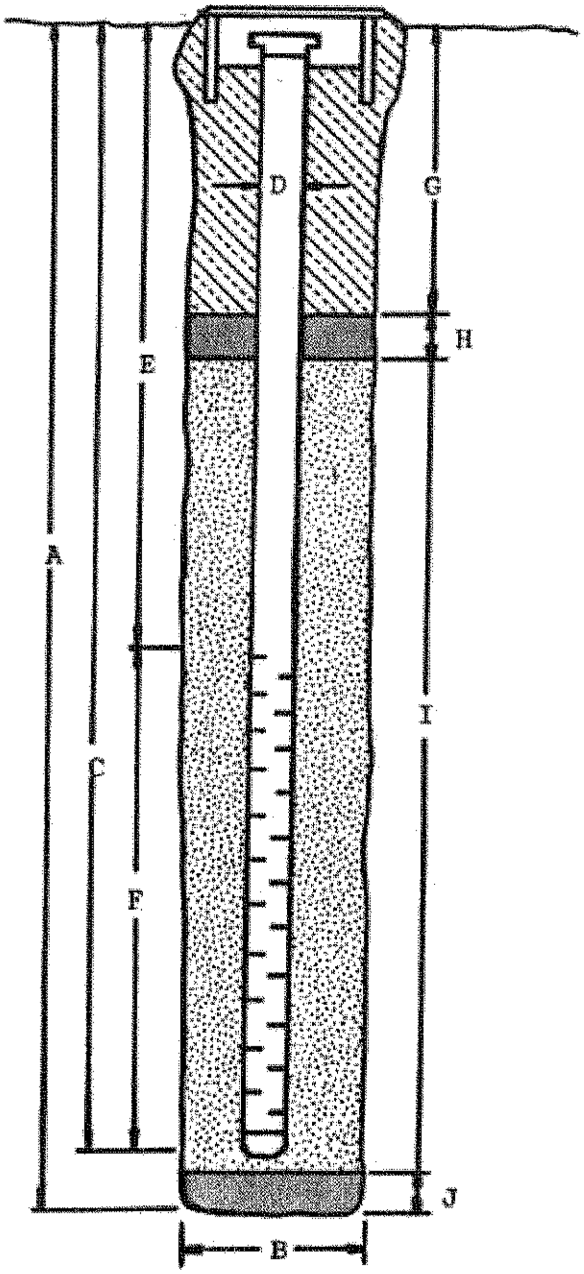
PROJECT NUMBER: KEI-P87-064A-1

CASING ELEVATION:

WELL PERMIT NO.: 88-156 Alameda Co. Flood Control

SURFACE ELEVATION:

G-5 Vault Box



A. Total Depth: 34 ft.

B. Boring Diameter: 8 in.

Drilling method: Hollow stem

C. Casing Length: 34 ft.

Material: Schedule 40 PVC

D. Casing Diameter: 2 in.

E. Depth to Perforations: 14 ft.

F. Perforated Length: 20 ft.

Perforated Interval: 34 to 14 ft.

Perforation Type: slot

Perforation Size: 0.02 in.

G. Surface Seal: 10.5 to 0 ft.

Seal Material: concrete

H. Seal: 11.5 to 10.5 ft.

Seal Material: bentonite

I. Gravel Pack: 34 to 11.5 ft.

Pack Material: Monterey sand

Size: No. 3

J. Bottom Seal: none

Seal Material:

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90
CLIENT BP OIL COMPANY
LOCATION 2201 98TH AVENUE, OAKLAND, CA
LOGGED BY M. TAYLOR APPROVED BY ______

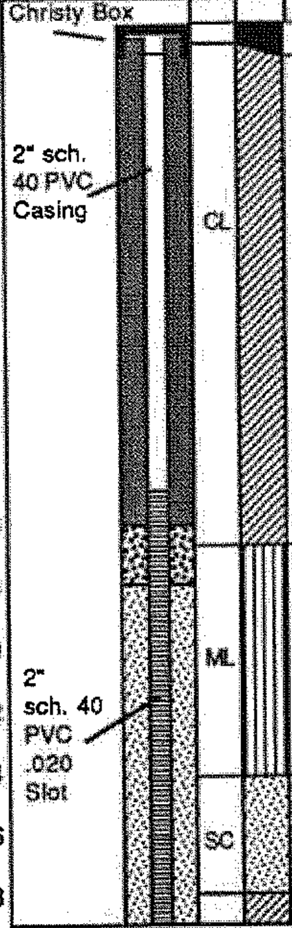
BORING NO.
WELL NO. AW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 98.99

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch
SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL
CASING DATA ______
DRILLER WEST HAZMAT

WATER LEVEL: 26.87
DATE: JULY, 1990
TIME:



BLOWS PER FOOT (ft)	CGI (PPM)	DEPTH	USCS	DESCRIPTION
		0		ASPHALT
		2	CL	SILTY CLAY; moderately stiff, damp, light gray
5,12,20		4–6	CL	SILTY CLAY; moderately stiff, damp, brown, some organic material
7,17,31		8	CL	As above
8,23,45		10	CL	As above
8,21,29		12	CL	SILTY CLAY; brown, damp
11,17,28		14	CL	As above, increasing sand
8,12,30	75	18	ML	CLAYEY SILT; moderately stiff, damp
8,13,24	ND	20	ML	
4,6,11	25	22	ML	As above, softer, very moist
4,6,10		24–26	SC	CLAYEY SAND; very fine grained, saturated, moderately loose, tan
15,20,34		28		SILTY CLAY; w/ sand, saturated, moderately stiff, brown w/ gray motlling
		30		

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 5/17/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY ________

BORING NO.

WELL NO. AW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION ________

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 INCH

SAMPLER TYPE ________

CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL

DATE

TIME

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
11,23, 35			30				
			32		SC		CLAYEY SAND; very fine grained, very moist, moderately dense, tan to light brown
8,25, 33			34				As above, some coarse sand
			36	End Cap			BOREHOLE TERMINATED AT 35 FEET
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Portland Cement

Sand #3 Lonestar

Bentonite Pellets

Sample

Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY

BORING NO.

WELL NO. AW-2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 97.69

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL

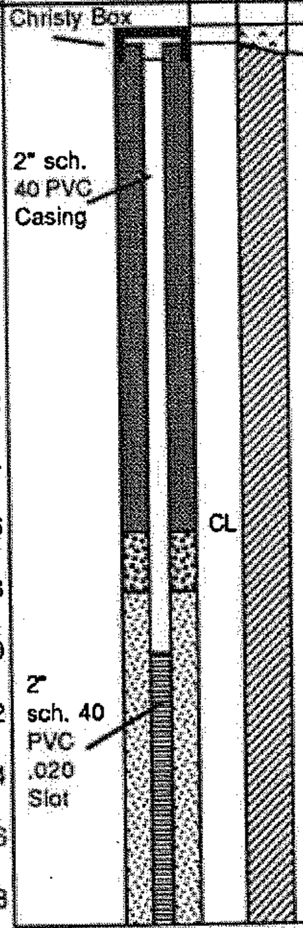
CASING DATA

DRILLER WEST HAZMAT

WATER LEVEL: 24.88

DATE : JULY, 1990

TIME:



BLOWS PER FOOT(ft)	CGI (PPM)	SAMPLE	DEPTH	USCS	DESCRIPTION
			0		Native soil
			2		SILTY CLAY; dark brown, damp, medium plasticity
16, 20, 26			6		SILTY CLAY; brown, dry to damp, medium plasticity, hard
7, 7, 8			10		SILTY CLAY; w/ fine sand, reddish brown, damp, medium platicity, stiff
7, 10, 21			16	CL	SILTY CLAY; w/ slight gravels, brown, damp, high platicity, very stiff
9, 15, 23			20		SILTY CLAY; brown, damp, low platicity, hard
7, 10 20			24–26		SILTY CLAY; sandy brown, moist, medium plasticity, very stiff
			28		
			30		

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ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY

BORING NO.

WELL NO. AW-2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE SEE MONITORING WELL CONSTRUCTION DETAIL

CASING DATA

DRILLER WEST HAZMAT

WATER LEVEL

DATE

TIME

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
9, 17, 25			30		SC		SILTY SAND; brown, saturated, hard
			32				
17, 23 50/5			34	2" sch. 40 PVC .020 Slot	CL		SILTY CLAY; w/ fine sand, brown, dry to damp, low plasticity, hard
			36				
27, 39, 50/5			38				SILTY CLAY; brown, damp, low plasticity, hard
			40	End Cap			BOREHOLE TERMINATED AT 35 FEET
			42				
			44				
			46				
			48				
			50				

Portland Cement

Sand #3 Lonestar

Bentonite Pellets

Sample

Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY

BORING NO.

WELL NO. AW-3

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 100.00

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE

CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL: 24.75

DATE : JULY, 1990

TIME:

BLOWS PER FOOT(ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
			2				
9, 9, 12			4	2" sch. 40 PVC Casing			
			6				SILTY CLAY; brown, damp, medium plastictity
			8				
11, 15, 21			10				SILTY CLAY; brown, damp, low plasticity, very stiff
			12				
			14				
9, 17, 32			16		CL		SILTY CLAY; brown, damp, low to medium plasticity, hard
			18				
27, 50/5			20				SILTY CLAY; gravelly, medium size gravel, moist, hard
			22	2" sch. 40 PVC .020 Slot			
			24				
21, 29, 39			26				SILTY CLAY; gravelly, reddish brown, saturated, hard
			28				
			30				

CONTINUED ON NEXT PAGE

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY

BORING NO.

WELL NO. AW-3

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE

CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL

DATE

TIME

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
21, 25, 37			30				SILTY CLAY; greyish brown, damp, medium plasticity, hard
			32		CL		
21, 37, 41			34				SILTY CLAY; brown, damp, medium to high plasticity, "very tight"
			36	End Cap			BOREHOLE TERMINATED AT 35 FEET.
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Portland Cement

Sand #3 Lonestar

Bentonite Pellets

Sample

Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY

BORING NO.

WELL NO. AW-4

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 99.96

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE

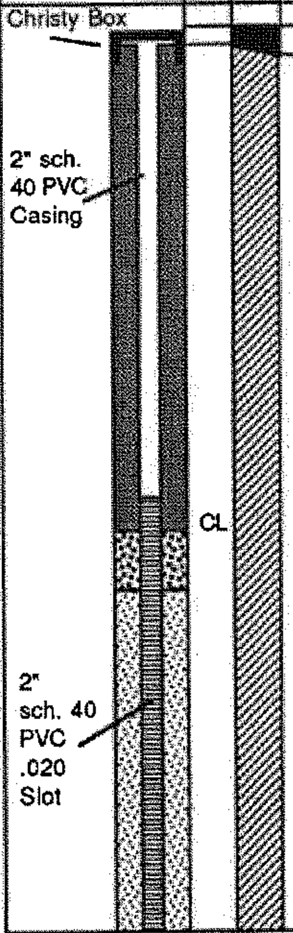
CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL: 27.29

DATE : JULY, 1990

TIME:



BLOWS PER FOOT (N)	CGI (PPM)	SAMPLE	DEPTH	USCS	DESCRIPTION
			0		ASPHALT
			4		CLAY w/ roots, dark brown, organic, damp, high plasticity
8, 12, 16			6		SILTY clay w/ root fragments, greyish brown, damp, medium plastictity, no odor,very stiff
23, 50/5			10		SILTY CLAY; brown, damp, medium plasticity,no odor, hard
28, 36, 41			16	CL	SILTY CLAY; brown, moist, medium to high plasticity, no odor, hard
9, 17, 32			20		SILTY CLAY; brown, moist, low to medium plasticity, gas odor, hard
11, 15, 22			26		SILTY CLAY; brown, moist, medium plasticity, gas odor, hard

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ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/6/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY ______

BORING NO.

WELL NO. AW-4

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION ______

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch

SAMPLER TYPE ______

CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL

DATE

TIME

BLOWS PER FOOT (ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
15, 19, 23			30				SILTY CLAY; brown, moist, low plasticity, gas odor, hard
			32		CL		
16,23,31			34				SILTY CLAY; brown, damp, high platicity, no odor, hard
			36	End Cap			BOREHOLE TERMINATED AT 35 FEET
			38				
			40				
			42				
			44				
			46				
			48				
			50				

Legend:

- Portland Cement
- Sand #3 Lonestar
- Bentonite Pellets
- sample
- Driven interval

ALTON GEOSCIENCE, Inc. LOG OF EXPLORATORY BORING	PROJECT NO. 30-080 DATE DRILLED 6/5/90 CLIENT BP OIL COMPANY LOCATION 2201 98TH AVENUE, OAKLAND, CA LOGGED BY M. TAYLOR APPROVED BY	BORING NO. WELL NO. RW-1
FIELD SKETCH OF BORING LOCATION TOP OF CASING ELEVATION 98.60	DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 inch SAMPLER TYPE CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL DRILLER WEST HAZMAT	

WATER LEVEL: 27.93
DATE : JULY, 1990
TIME:

BLOWS PER FOOT (ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			ASPHALT
			2		CL		
			4	6" sch. 40 PVC Casing			
4,6,11	ND		6				SILTY CLAY; w/ sand, damp, moderately stiff, tan w/ grey mottling
			8				
11, 23, 31	ND		10		ML		CLAYEY SILT; w/ slight sand, damp, moderately stiff,tan
			12				
			14				
7,11, 24	ND		16				As above, sand grains larger
			18	6" sch. 40 PVC .020 Slot			
7,16, 21	ND		20		SC		CLAYEY SAND; moderately dense, very moist, fine grained
			22				
			24				As above, less clayey , i.e., sand w/ slight clay
7, 11, 25	>500		26				
			28		SC		SANDY CLAY; stiff, damp tan to light brown, sand clasts to 3 mm, some dark organic matter
7, 13, 29			30				

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ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080 DATE DRILLED 6/5/90

CLIENT BP OIL COMPANY

LOCATION 2201 98TH AVENUE, OAKLAND, CA

LOGGED BY M. TAYLOR APPROVED BY ________

BORING NO.

WELL NO. RW-1

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION ________

DRILLING METHOD HOLLOW-STEM AUGER HOLE DIAM. 10 INCH

SAMPLER TYPE ________

CASING DATA SEE MONITORING WELL CONSTRUCTION DETAIL

DRILLER WEST HAZMAT

WATER LEVEL

DATE

TIME

BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
7, 13, 29			30				
			32				
			34	6" sch. 40 PVC .020 Slot	CL		
7, 11, 23			36				As above, more sand, strong TPH odor
			38				
5, 11, 26			40	End Cap			As above, some coarse sand
							BOREHOLE TERMINATED AT 40 FEET
			42				
			44				
			46				
			48				
			50				

Legend:

- Portland Cement
- Sand #3 Lonestar
- Bentonite Pellets
- Sample
- Driven interval

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO.	30-080-01
DATE DRILLED	2-27-91
CLIENT	BP Oil Company
LOCATION	2201 98th Ave, Oakland
LOGGED BY	M. Taylor
APPROVED BY	M. Hopwood
BORING NO.	SBA-5
WELL NO.	AW-5

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 39.35'

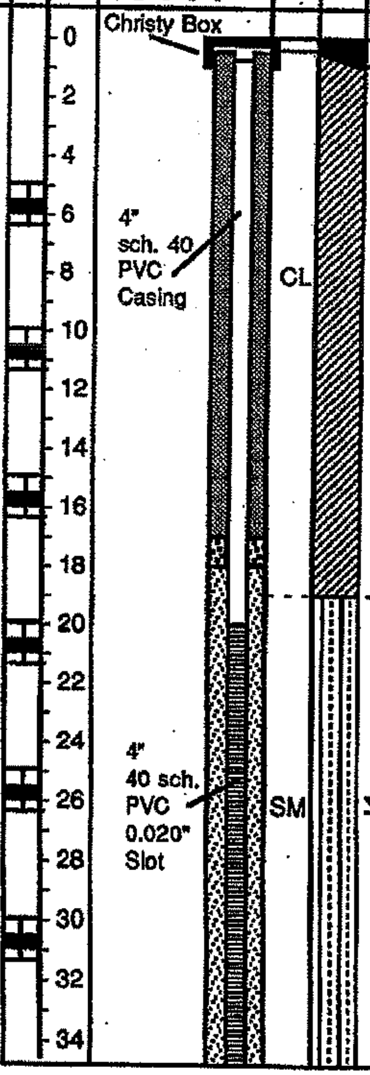
DRILLING METHOD Hollow stem auger HOLE DIAM. 10"

SAMPLER TYPE Modified split spoon

CASING DATA See well construction details

DRILLER Soils Exploration Services , Inc.

WATER LEVEL	26.00'	25.48'	
DATE	2/27/91	4/5/91	
TIME	2:00 pm	1:00 pm	



BLOWS PER FOOT(N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			1" Asphalt
3,5,9			6	4" sch. 40 PVC Casing	CL		SILTY CLAY: brown, damp, stiff, medium plasticity
4,10, 15			10				Same, becomes very stiff
3,4,6			16				Same, becomes moist, stiff
2,2,4			20				SILTY SAND: black to brownish green, moist, firm, low plasticity
3,5,5			26	4" 40 sch. PVC 0.020" Slot	SM		Same, becomes brownish green, wet, stiff ▽ 26'
3,8,11			30				Same, becomes very stiff, low to medium plasticity
			34				

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2/27/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-5
WELL NO. AW-5

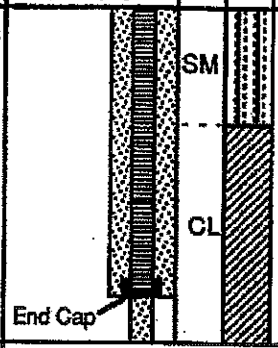
FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 39.35'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	26.00'	25.48'	
DATE	2/27/91	4/5/91	
TIME	2:00 pm	1:00 pm	

BLOWS PER FOOT(#)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
4,7,12		Sample	36		SM		SILTY SAND: brown, wet, very stiff, medium plasticity
			38				
3,4,8		Sample	40–42		CL		SILTY CLAY: light brown, wet to moist, stiff, medium to high plasticity
			44				
4,7,9		Sample	46	End Cap			Same, becomes moist, very stiff
			48				BORING TERMINATED AT 46.5 FEET BELOW GRADE
			50				
			52				
			54				
			56				
			58				
			60				



Legend:
- Portland Cement
- Sand #3 Lonestar
- Bentonite Pellets
- Sample
- Driven Interval
- Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2-28-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-6
WELL NO. AW-6
Page 1 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 37.95'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services , Inc.

WATER LEVEL	25.00'	22.48'
DATE	2/28/91	4/5/91
TIME	10:00 am	1:10 pm

BLOWS PER FOOT(ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
			0	Christy Box			2" Asphalt
			2				
			4				
3,3,5		X	6		CL		SILTY CLAY: brown, damp, firm, low to medium plasticity
			8				
3,6,10		X	10	4" sch. 40 PVC Casing			Same, becomes stiff medium plasticity
			12				
			14				
2,3,6		X	16				SANDY SILT: brown, moist, stiff, medium plasticity
			18				
3,9,10		X	20		SM		SILTY SAND: brown, moist, very stiff, medium plasticity
			22				
			24				▽ 25'
3,5,8		X	26	4" sch. 40 PVC 0.020" Slot			Same, becomes wet, stiff
			28				
4,7,11		X	30		CL		SILTY CLAY: brown, wet, very stiff, medium plasticity, with sand
			32				
			34	End Cap			

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2/28/91
CLIENT BP Oil Company
LOCATION 2201 98th Ave., Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

BORING NO. SBA-6
WELL NO. AW-6
Page 2 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 37.95'

DRILLING METHOD Hollow stem auger HOLE DIAM. 10"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	25.00'	22.48'
DATE	2/28/91	4/5/91
TIME	10:00 am	1:10 pm

BLOWS PER FOOT(ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
4,7,12			36		CL		SILTY CLAY: brown, wet, very stiff, medium plasticity, with some sand
			38				BORING TERMINATED AT 36.5 FEET BELOW GRADE
			40				
			42				
			44				
			46				
			48				
			50				
			52				
			54				
			56				
			58				
			60				

Portland Cement
Sand #3 Lonestar
Bentonite Pellets
Sample
Driven interval
Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 3-1-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwood

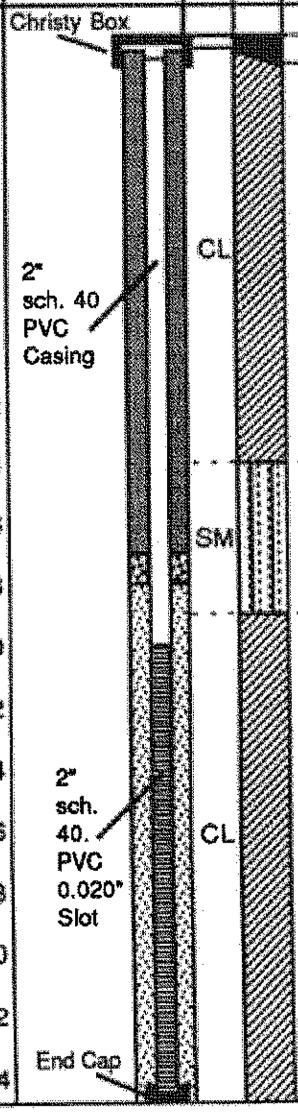
BORING NO. SBA-7
WELL NO. AW-7
Page 1 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 38.17'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services , Inc.

WATER LEVEL	28.00'	23.38'
DATE	3/1/91	4/5/91
TIME	11:00 am	1:20 pm



BLOWS PER FOOT (ft)	CGI (PPM)	SAMPLE	DEPTH	USCS	DESCRIPTION
			0		Grass (Top Soil) Median
3,9,13		X	6	CL	SILTY CLAY: brown, damp, very stiff, low to medium plasticity
6,15,19		X	10	CL	Same, becomes hard, low plasticity, with gravel
6,10,11		X	16	SM	SANDY SILT: brown, moist, very stiff, low plasticity, with gravel
6,12,16		X	20	CL	SILTY CLAY: light brown, moist, very stiff, low plasticity, with fine sand
4,6,8		X	26	CL	Same, becomes brown, moist to wet, stiff, medium plasticity
			28		▽ 28'
2,4,5		X	30	CL	Same, becomes saturated, stiff, low to medium plasticity, with sand
			34		

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01	DATE DRILLED 3/1/91
CLIENT BP Oil Company	
LOCATION 2201 98th Ave., Oakland	
LOGGED BY M. Taylor	APPROVED BY M. Hopwood

BORING NO. SBA-7
WELL NO. AW-7
Page 2 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 38.17'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	28.00'	23.38'	
DATE	3/1/91	4/5/91	
TIME	11:00 am	1:20 pm	

BLOWS PER FOOT (ft)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
2,4,6			36		CL		SILTY CLAY: brown, saturated, stiff, medium plasticity, with some sand
			38				BORING TERMINATED AT 36.5 FEET BELOW GRADE
			40				
			42				
			44				
			46				
			48				
			50				
			52				
			54				
			56				
			58				
			60				

Legend:
- Portland Cement
- Sand #3 Lonestar
- Bentonite Pellets
- Sample
- Driven interval
- Water level encountered during drilling

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01 DATE DRILLED 2-28-91
CLIENT BP Oil Company
LOCATION 2201 98th Ave, Oakland
LOGGED BY M. Taylor APPROVED BY M. Hopwwod

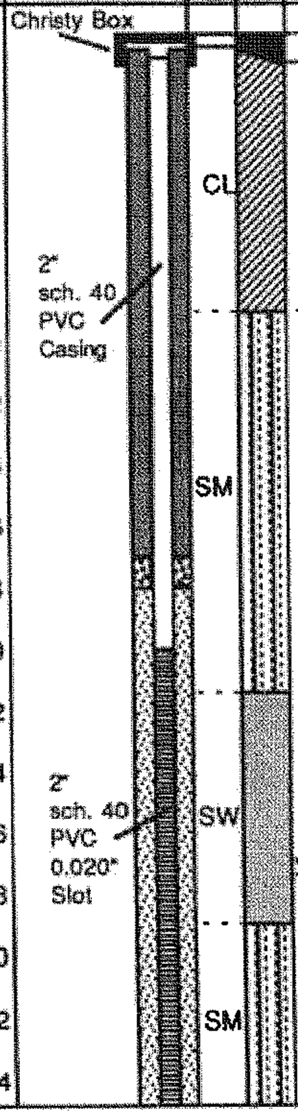
BORING NO. SBA-8
WELL NO. AW-8
Page 1 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 41.74'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction details
DRILLER Soils Exploration Services , Inc.

WATER LEVEL	27.00'	26.68'
DATE	2/28/91	4/5/91
TIME	3:00 pm	1:30 pm



BLOWS PER FOOT (ft)	CGI (PPM)	SAMPLE	DEPTH	USCS	DESCRIPTION
			0		2" Asphalt(Street)
5,8,12		X	6	CL	SILTY CLAY: brown, damp, very stiff, medium plasticity
5,9,12		X	10	SM	SILTY SAND: light brown, damp, very stiff, medium plasticity, with some gravel
3,7,12		X	16	SM	Same, becomes moist, no gravel
5,8,11		X	20	SM	Same, becomes brown, moist to wet
7,13,18		X	26	SW	SAND: brown, moist to wet, very stiff, fine to medium grain
			27		▽ 27'
3,6,10		X	30	SM	SILTY SAND: brown, wet, very stiff, low plasticity
			34		

ALTON GEOSCIENCE, Inc.
LOG OF EXPLORATORY BORING

PROJECT NO. 30-080-01	DATE DRILLED 2/28/91
CLIENT BP Oil Company	
LOCATION 2201 98th Ave., Oakland	
LOGGED BY M. Taylor	APPROVED BY M. Hopwood

BORING NO. SBA-8
WELL NO. AW-8
Page 2 of 2

FIELD SKETCH OF BORING LOCATION

TOP OF CASING ELEVATION 41.74'

DRILLING METHOD Hollow stem auger HOLE DIAM. 8"
SAMPLER TYPE Modified split spoon
CASING DATA See well construction detail
DRILLER Soils Explorations Services, Inc.

WATER LEVEL	27.00'	26.68'	
DATE	2/28/91	4/5/91	
TIME	3:00 pm	1:30 pm	

BLOWS PER FOOT (N)	CGI (PPM)	SAMPLE	DEPTH	WELL CONSTRUCTION OR BORING CLOSURE	USCS	PROFILE	DESCRIPTION
5,8,11			36				SILTY CLAY: brown, wet, very stiff, medium plasticity
			38		CL		
4,8,9			40	End Cap			Same, becomes saturated, low plasticity, with some fine sand
			42				BORING TERMINATED AT 41.5 FEET BELOW GRADE
			44				
			46				
			48				
			50				
			52				
			54				
			56				
			58				
			60				

Legend:
- Portland Cement
- Sand #3 Lonestar
- Bentonite Pellets
- Sample
- Driven interval
- Water level encountered during drilling

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BORING/WELL LOG

CLIENT NAME	BP Oil Company	**BORING/WELL NAME**	B-1
JOB/SITE NAME	BP-11133	**DRILLING STARTED**	22-Oct-01
LOCATION	2220 98th Avenue, Oakland, California	**DRILLING COMPLETED**	23-Oct-01
PROJECT NUMBER	852-1692	**WELL DEVELOPMENT DATE (YIELD)**	22-Oct-01 (0.87 gal purge volume)
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	2"	**SCREENED INTERVAL**	18 to 28 ft bgs
LOGGED BY	S. Dwight	**DEPTH TO WATER (First Encountered)**	19.5 ft (22-Oct-01) ▽
REVIEWED BY	K. Rahman, RG	**DEPTH TO WATER (Static)**	18.5 ft (22-Oct-01) ▼

REMARKS Hand augered to 5 feet. Located on southern property boundary adjacent to apartment complex.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	DEPTH (ft bgs)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
				0–8	ML	SILT (ML); brown; dry; 90% silt, 10% fine grained sand; no plasticity; moderate to high estimated permeability.		
0.4	6.6	0.49	B-1-4.5 B-1-V1	5	ML	@4': very stiff; 10% clay, 85% silt, 5% fine grained sand; low plasticity; low estimated permeability.	8.0	3/4" diam., Schedule 40 PVC
				8–10	ML	SANDY SILT (ML); brown; dry; medium stiff; 5% clay, 80% silt, 15% fine grained sand; no plasticity; low to moderate estimated permeability.	10.0	Open Borehole
0.4	9.9		B-1-9.5 B-1-V2	10	ML	SILT (ML); brown; dry; very stiff; 10% clay, 85% silt, 5% fine grained sand; no plasticity; low estimated permeability; some roots.	12.0	
0.4	1.8	<0.050	B-1-13.5 B-1-V3	15	ML	CLAYEY SILT (ML); brown; dry; soft; 15% clay, 75% silt, 10% fine grained sand; low to medium plasticity; low to moderate estimated permeability.	17.0	
0.4				17–19	ML	SANDY SILT (ML); brown; damp; 15% clay, 65% silt, 20% fine grained sand; low to medium plasticity; low to moderate estimated permeability. ▼	19.0	
			B-1-19.5	20	SM	SILTY SAND (SM); brown; wet; 20% silt, 60% fine to coarse grained sand, 20% fine gravel; no plasticity; high estimated permeability. ▽	23.0	Monterey Sand #2/12
			B-1-23.5	25	SP	GRAVELLY SAND (SP); brown; wet; 15% silt, 45% medium to coarse grained sand, 40% fine gravel; no plasticity; high estimated permeability.	28.0	3/4"-diam., 0.010" Slotted Schedule 40 PVC
						Total depth = 28'. Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.		Bottom of Boring @ 28 ft

WELL LOG (PID/VP/SOIL) H:\BRITIS~1\11133~1\BP-11133.GPJ DEFAULT.GDT 2/19/02

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BORING/WELL LOG

CLIENT NAME	BP Oil Company	**BORING/WELL NAME**	B-2
JOB/SITE NAME	BP-11133	**DRILLING STARTED**	22-Oct-01
LOCATION	2220 98th Avenue, Oakland, California	**DRILLING COMPLETED**	23-Oct-01
PROJECT NUMBER	852-1692	**WELL DEVELOPMENT DATE (YIELD)**	22-Oct-01 (0.93 gal purge volume)
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	2"	**SCREENED INTERVAL**	18 to 28 ft bgs
LOGGED BY	S. Dwight	**DEPTH TO WATER (First Encountered)**	18.0 ft (22-Oct-01) ▽
REVIEWED BY	K. Rahman, RG	**DEPTH TO WATER (Static)**	18.0 ft (22-Oct-01) ▼

REMARKS Hand augered to 5 feet. Located on southern property boundary adjacent to apartment complex.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	EXTENT	DEPTH (ft bgs)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
						ML		SANDY SILT (ML); dark brown; dry; 5% clay, 80% silt, 15% fine grained sand; no plasticity; low estimated permeability.	4.0	
7.0	2.4	1.6	B-2-V 1, B-2-5		5	ML		SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine grained sand; no plasticity; low estimated permeability.	8.0	3/4" diam., Schedule 40 PVC
			B-2-9.5			ML		SANDY SILT (ML); dark brown; dry; 5% clay, 80% silt, 15% fine grained sand; no plasticity; low to moderate estimated permeability, some roots.	10.0	Open Borehole
20	11		B-2-V 2		10	ML		SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine grained sand; no plasticity; low estimated permeability.	12.0	
6.0	4.5	<0.050	B-2-1 3.5, B-2-V 3		15	ML		SANDY SILT (ML); brown; dry; medium stiff; 10% clay, 70% silt, 20% fine grained sand; no plasticity; low estimated permeability. @16': damp; 15% clay, 60% silt, 25% fine grained sand; low to medium plasticity; low to moderate estimated permeability. ▼	18.0	
						SP		GRAVELLY SAND (SP); brown; wet; 10% silt, 50% medium to coarse grained sand; 40% fine to coarse gravel; no plasticity; high estimated permeability.	19.0	
6.0			B-2-1 9.5		20	SM		SILTY SAND (SM); brown; wet; 15% silt, 85% fine grained sand; no plasticity; high estimated permeability.	20.0	Monterey Sand #2/12
						ML		SANDY SILT (ML); brown; wet; 15% clay, 60% silt, 25% fine grained sand; low to medium plasticity; moderate estimated permeability.	21.0	
						SM		SILTY SAND (SM); brown; wet; 15% silt, 85% fine grained sand; no plasticity; high estimated permeability.	22.0	
			B-2-2 3.5			SP		GRAVELLY SAND (SP); brown; wet; 10% silt, 50% medium to coarse grained sand; 40% fine to coarse gravel; no plasticity; high estimated permeability.	24.0	3/4"-diam., 0.010" Slotted Schedule 40 PVC
					25	SM		SILTY SAND (SM); brown; wet; 15% silt, 85% fine grained sand; no plasticity; high estimated permeability.	25.0	
5.0						SP		GRAVELLY SAND (SP); brown; wet; 10% silt, 50% medium to coarse grained sand; 40% fine to coarse gravel; no plasticity; high estimated permeability.	27.0	
			B-2-2 7.5			ML		CLAYEY SILT (ML); brown; damp; 15% clay, 75% silt, 10% fine grained sand; low to medium plasticity; low to moderate estimated permeability.	28.0	Bottom of Boring @ 28 ft

Total depth = 28'.
Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.

WELL LOG (PID/VP/SOIL) H:\BRITIS~1\11133~1\BP-11133.GPJ DEFAULT.GDT 2/19/02

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BORING/WELL LOG

CLIENT NAME	BP Oil Company	**BORING/WELL NAME**	B-3
JOB/SITE NAME	BP-11133	**DRILLING STARTED**	22-Oct-01
LOCATION	2220 98th Avenue, Oakland, California	**DRILLING COMPLETED**	23-Oct-01
PROJECT NUMBER	852-1692	**WELL DEVELOPMENT DATE (YIELD)**	22-Oct-01 (0.58 gal purge volume)
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	2"	**SCREENED INTERVAL**	20 to 30 ft bgs
LOGGED BY	S. Dwight	**DEPTH TO WATER (First Encountered)**	21.0 ft (22-Oct-01) ▽
REVIEWED BY	K. Rahman, RG	**DEPTH TO WATER (Static)**	21.0 ft (22-Oct-01) ▼

REMARKS Hand augered to 5 feet. Located on southern property boundary adjacent to apartment complex.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	DEPTH (ft bgs)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
				0–4	ML	SANDY SILT (ML); brown; dry; 70% silt, 30% fine to coarse grained sand; no plasticity; high estimated permeability.	4.0	
6.0	7.0	<0.050	B-3-4.5 B-3-V 1	5	ML	SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine grained sand; no plasticity; low estimated permeability.		3/4" diam., Schedule 40 PVC
4.0	2.2		B-3-9.5 B-3-V 2	10			12.0	Open Borehole
5.0		<0.050	B-3-13.5		ML	SANDY SILT (ML); brown; dry; stiff; 10% clay, 75% silt, 15% fine grained sand; low plasticity; low estimated permeability.	15.0	
	1.6		B-3-V 3	15	ML	SILT (ML); brown; dry; 10% clay, 80% silt, 10% fine grained sand; low plasticity; low estimated permeability.	17.0	
4.0			B-3-19.5	20	ML	SANDY SILT (ML); brown; damp; 15% clay, 65% silt, 20% fine grained sand; low to medium plasticity; low estimated permeability. ▼	21.0	
					SM	SILTY SAND (SM); brown; wet; 25% silt, 75% fine grained sand; no plasticity; high estimated permeability.	23.0	Monterey Sand #2/12
3.0			B-3-23.5		ML	CLAYEY SILT (ML); brown; damp; stiff; 20% clay, 75% silt, 5% fine grained sand; medium plasticity; low to moderate estimated permeability.	25.0	3/4"-diam., 0.010" Slotted Schedule 40 PVC
				25	SM	SILTY SAND (SM); brown; wet; 25% silt, 75% fine grained sand; no plasticity; high estimated permeability.	26.0	
3.0			B-3-27.5		ML	CLAYEY SILT (ML); brown; wet; 20% clay, 70% silt, 5% fine grained sand, 5% fine gravel; medium plasticity; low to moderate estimated permeability. @27': 30% clay, 65% silt, 5% fine grained sand.	30.0	
				30		Total depth = 30'. Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.		Bottom of Boring @ 30 ft

WELL LOG (PID/VP/SOIL) H:\BRITIS~1\11133~1\BP-11133.GPJ DEFAULT.GDT 2/19/02

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BORING/WELL LOG

CLIENT NAME BP Oil Company
JOB/SITE NAME BP-11133
LOCATION 2220 98th Avenue, Oakland, California
PROJECT NUMBER 852-1692
DRILLER Gregg Drilling
DRILLING METHOD Hydraulic push
BORING DIAMETER 2"
LOGGED BY S. Dwight
REVIEWED BY K. Rahman, RG

BORING/WELL NAME B-4
DRILLING STARTED 22-Oct-01
DRILLING COMPLETED 23-Oct-01
WELL DEVELOPMENT DATE (YIELD) 23-Oct-01 (0.66 gal purge volume)
GROUND SURFACE ELEVATION
TOP OF CASING ELEVATION NA
SCREENED INTERVAL 18 to 28 ft bgs
DEPTH TO WATER (First Encountered) 21.0 ft (22-Oct-01) ∇
DEPTH TO WATER (Static) 21.0 ft (23-Oct-01) ▼

REMARKS Hand augered to 5 feet. Located on eastern property boundary adjacent to single story residence.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	DEPTH (ft bgs)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
					ML	SANDY SILT (ML); brown; dry; 75% silt, 25% fine grained sand; no plasticity; moderate estimated permeability.	4.0	
4.0	1.3	<0.050	B-4-4.5 B-4-V 1	5	ML	SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine grained sand; no plasticity; low estimated permeability.		3/4" diam., Schedule 40 PVC Open Borehole
5.0	1.3		B-4-9.5 B-4-V 2	10		@10': 10% clay, 80% silt; low plasticity.	12.0	
5.0		<0.050 <0.050	DUP B-4-13.5		ML	SANDY SILT (ML); brown; dry; medium stiff; 5% clay, 80% silt, 15% fine grained sand; no plasticity; low estimated permeability.		
	2.1		B-4-V 3	15			16.0	
					ML	SILT (ML); brown; dry; 5% clay, 85% silt, 10% fine grained sand; low plasticity; low estimated permeability.		
3.0		<0.050	B-4-19.5	20			20.0	Monterey Sand #2/12
					ML	CLAYEY SILT (ML); brown; damp; 15% clay, 75% silt, 10% fine grained sand; low to medium plasticity; low to moderate estimated permeability. ▼	21.0	
1162					SM	SILTY SAND (SM); brown with grey; wet; 15% silt, 55% medium to coarse grained sand, 30% fine gravel; no plasticity; high estimated permeability.		3/4"-diam., 0.010" Slotted Schedule 40 PVC
			B-4-23.5			@23': 25% silt, 75% fine grained sand.		
1730				25		@24': 45% medium to coarse grained sand, 30% fine gravel. @25': 25% silt, 75% fine grained sand.	26.0	
					ML	CLAYEY SILT (ML); brown; damp; 15% clay, 75% silt, 10% fine grained sand; low to medium plasticity; low to moderate estimated permeability.		
			B-4-27.5			Total depth = 28'. Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.	28.0	Bottom of Boring @ 28 ft

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BORING/WELL LOG

CLIENT NAME	BP Oil Company	BORING/WELL NAME	B-5
JOB/SITE NAME	BP-11133	DRILLING STARTED	23-Oct-01
LOCATION	2220 98th Avenue, Oakland, California	DRILLING COMPLETED	23-Oct-01
PROJECT NUMBER	852-1692	WELL DEVELOPMENT DATE (YIELD)	23-Oct-01 (0.44 gal purge volume)
DRILLER	Gregg Drilling	GROUND SURFACE ELEVATION	
DRILLING METHOD	Hydraulic push	TOP OF CASING ELEVATION	NA
BORING DIAMETER	2"	SCREENED INTERVAL	15 to 25 ft bgs
LOGGED BY	S. Dwight	DEPTH TO WATER (First Encountered)	24.0 ft (23-Oct-01) ∇
REVIEWED BY	K. Rahman, RG	DEPTH TO WATER (Static)	18.0 ft (23-Oct-01) ▼

REMARKS: Hand augered to 5 feet. Located on eastern property boundary adjacent to single story residence.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	DEPTH (ft bgs)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
				0	ML	SANDY SILT (ML); dark brown; dry; 70% silt, 15% medium to coarse grained sand; 15% fine gravel; no plasticity; moderate estimated permeability.		
0	6.2	0.084	B-5-V 1 B-5-5 .5	5	ML	@5': brown; hard; 80% silt, 20% medium grained sand; low estimated permeability.		3/4" diam., Schedule 40 PVC Open Borehole
						@8': very stiff; 5% clay, 75% silt, 15% medium grained sand, 5% fine gravel; low plasticity.		
0.5	2.0		B-5-9 .5 B-5-V 2	10		@10': 65% silt, 25% medium grained sand, 10% fine gravel; no plasticity.	12.0	
0.5					SM	SILTY SAND (SM); brown; dry; 40% silt, 60% fine to medium grained sand; no plasticity; moderate estimated pearmeability.	13.0	
	1.7		B-5-1 3.5 B-5-V 3	15	ML	SANDY SILT (ML); brown; dry; 5% clay, 55% silt, 40% fine grained sand; low plasticity; low estimated permeability.	16.0	
					ML	SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine grained sand; low plasticity; low estimated permeability.	17.0	Monterey Sand #2/12
					ML	CLAYEY SILT (ML); brown; damp; stiff; 20% clay, 70% silt, 10% fine grained sand; low plasticity; low estimated permeability. (▼ static water 18.0 ft)	19.0	
5.0		<0.050	B-5-1 9.5	20	ML	SANDY SILT (ML); brown; damp; 5% clay, 65% silt, 25% fine grained sand; low plasticity; low to moderate estimated permeablity. @20': medium stiff; 15% clay, 55% silt, 30% fine grained sand; low to medium plasticity. @22': stiff; 65% silt, 20% fine grained sand.	23.0	3/4"-diam., 0.010" Slotted Schedule 40 PVC
3.5			B-5-2 3.5	25	SM	SILTY SAND (SM); brown; wet; 30% silt, 50% fine to coarse grained sand, 20% fine gravel; no plasticity; high estimated permeability. (∇ first water 24.0 ft) @24': 5% clay, 30% silt, 65% fine grained sand; low plasticity. @26': 20% silt, 60% fine to coarse grained sand, 20% fine gravel; no plasticity; moderate estimated permeability.	27.0	
2.5			B-5-2 7.5		ML	SANDY SILT (ML); brown; wet; medium stiff; 20% clay, 65% silt, 15% fine grained sand; moderate plasticity; low estimated permeability.	30.0	Slough
				30		Total depth = 30'. Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.		Bottom of Boring @ 30 ft

WELL LOG (PID/VP/SOIL) H:\BRITIS~1\11133~1\BP-11133.GPJ DEFAULT.GDT 2/19/02

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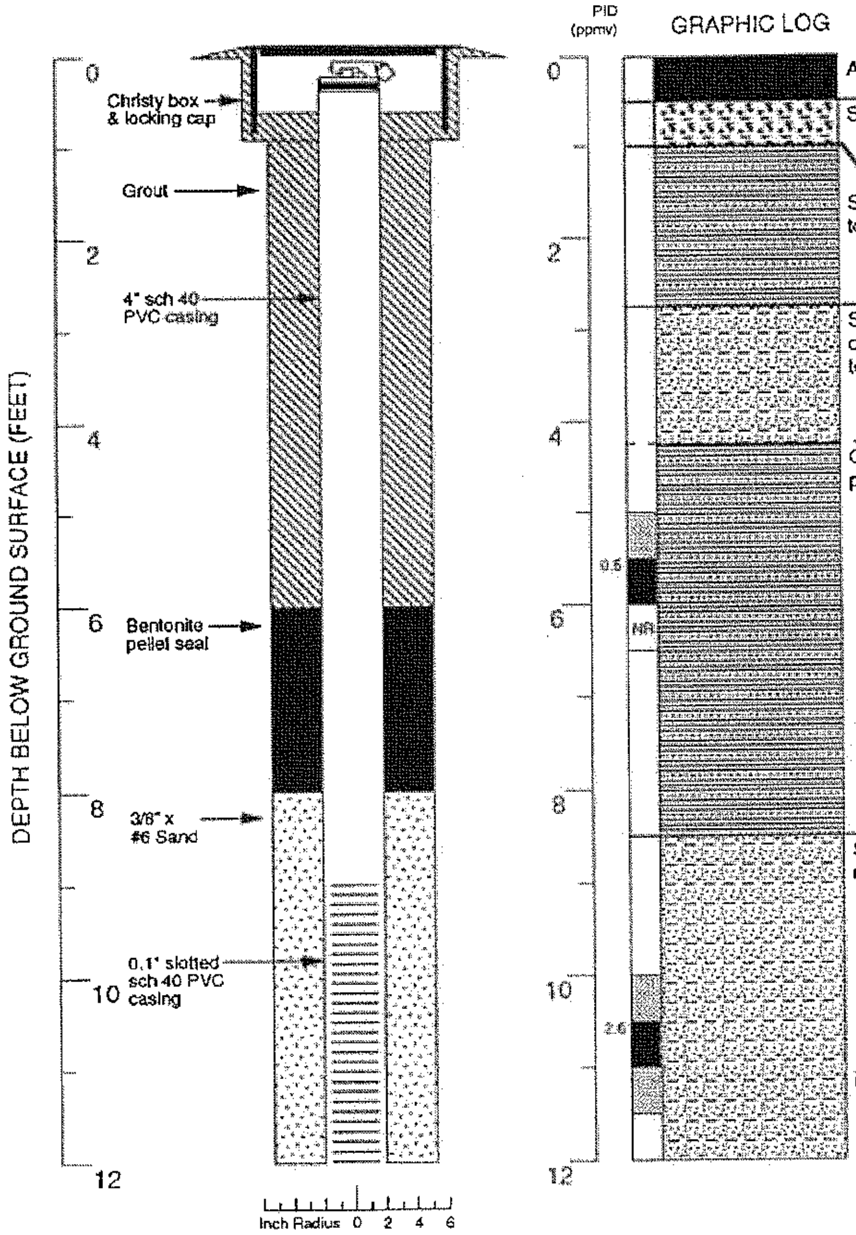
BORING/WELL LOG

CLIENT NAME	BP Oil Company	**BORING/WELL NAME**	B-6
JOB/SITE NAME	BP-11133	**DRILLING STARTED**	23-Oct-01
LOCATION	2220 98th Avenue, Oakland, California	**DRILLING COMPLETED**	23-Oct-01
PROJECT NUMBER	852-1692	**WELL DEVELOPMENT DATE (YIELD)**	23-Oct-01 (0.38 gal purge volume)
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	2"	**SCREENED INTERVAL**	20 to 30 ft bgs
LOGGED BY	S. Dwight	**DEPTH TO WATER (First Encountered)**	23.0 ft (23-Oct-01) ∇
REVIEWED BY	K. Rahman, RG	**DEPTH TO WATER (Static)**	24.0 ft (23-Oct-01) ▼

REMARKS Hand augered to 5 feet. Located on eastern property boundary adjacent to single story residence.

PID (ppm)	Vapor THC (ppmv)	Soil TPHg (ppm)	SAMPLE ID	EXTENT	DEPTH (ft bgs)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	BORING BACKFILL
						ML		GRAVELLY SILT (ML); dark brown; dry; 70% silt, 15% medium to coarse grained sand, 15% fine gravel; no plasticity; moderate estimated permeability.	5.0	
5	4.2	<0.250	B-6-V 1 B-6-5 .5		5	ML		SILT (ML); brown; dry; very stiff; 5% clay, 85% silt, 10% fine to medium grained sand; no plasticity; low estimated permeability.	9.0	3/4" diam., Schedule 40 PVC
3.7	2.3		B-6-9 .5 B-6-V 2 B-6-1 3.5		10	ML		SANDY SILT (ML); brown; dry; 5% clay, 80% silt, 15% fine to coarse grained sand; no plasticity; low to moderate estimated permeability. @10': brown mottled with white; 65% silt, 35% fine to medium grained sand; moderate estimated permeability. @12': 60% silt, 5% fine gravel.	15.0	Open Borehole
	2.4		B-6-V 3		15	ML		SILT (ML); brown; dry; 5% clay, 85% silt, 10% fine grained sand; low plasticity; low estimated permeability.	18.0	
		<0.050	B-6-1 9.5			ML		SANDY SILT (ML); brown; dry; 5% clay, 80% silt, 15% fine grained sand; low plasticity; low to moderate estimated permeability.	20.0	
					20	ML		CLAYEY SILT (ML); brown; damp; 30% clay, 60% silt, 10% fine grained sand; moderate plasticity; low to moderate estimated permeability.	22.0	
			B-6-2 3.5		25	ML		SANDY SILT (ML); brown; wet; 20% clay, 50% silt, 30% fine grained sand; moderate plasticity; moderate estimated permeability. ∇ ▼	26.0	Monterey Sand #2/12; 3/4"-diam., 0.010" Slotted Schedule 40 PVC
						SM		SILTY SAND (SM); brown with grey; wet; 10% clay, 25% silt; 65% fine grained sand; low plasticity; high estimated permeability.	27.0	
			B-6-2 7.5		30	ML		SILT (ML); brown; damp; 10% clay, 80% silt, 10% fine grained sand; low plasticity; low to moderate estimated permeability.	30.0	
								Total depth = 30'. Temporary well casing installed. Well purged and grab water sample collected using bailer. Casing removed and sealed with grout after sampling.		Bottom of Boring @ 30 ft



DESCRIPTION

Asphalt

Sandy GRAVEL (GM); brown; loose; damp; 10-15% fines; 20-30 % fine to coarse sand; fine to coarse gravel; high est K

Sandy CLAY (CL); black; very stiff; damp; 5-15% fine to coarse sand; 0-5% fine gravel; low est K

Silty SAND (SM); brown with gray mottling; medium dense; damp/dry; 10-20% fines; fine to medium sand; low to moderate est K

CLAY (CL); brown; very stiff; dry/damp; moderately plastic; 0-5% fine to coarse sand; low est K

SILT (ML); red with gray mottling; hard; damp; moderately plastic; 0-5% fine sand; low est K; odor

increasing plasticity and moisture

Continues

Logged by:	Justin Power	Drilling Company:	Kvilhaug	Well Head Completion:	Christy box & locking cap
Project Mgr:	Keith Romstad	Drilling Method:	11" Hollow stem auger	Type of Sampler:	2.5" split barrel
Dates Drilled:	3/26/92	Driller:	Rod	TD (Total Depth):	16.6 ft.

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary

NR — No recovery

All symbols and definitions may not be applicable

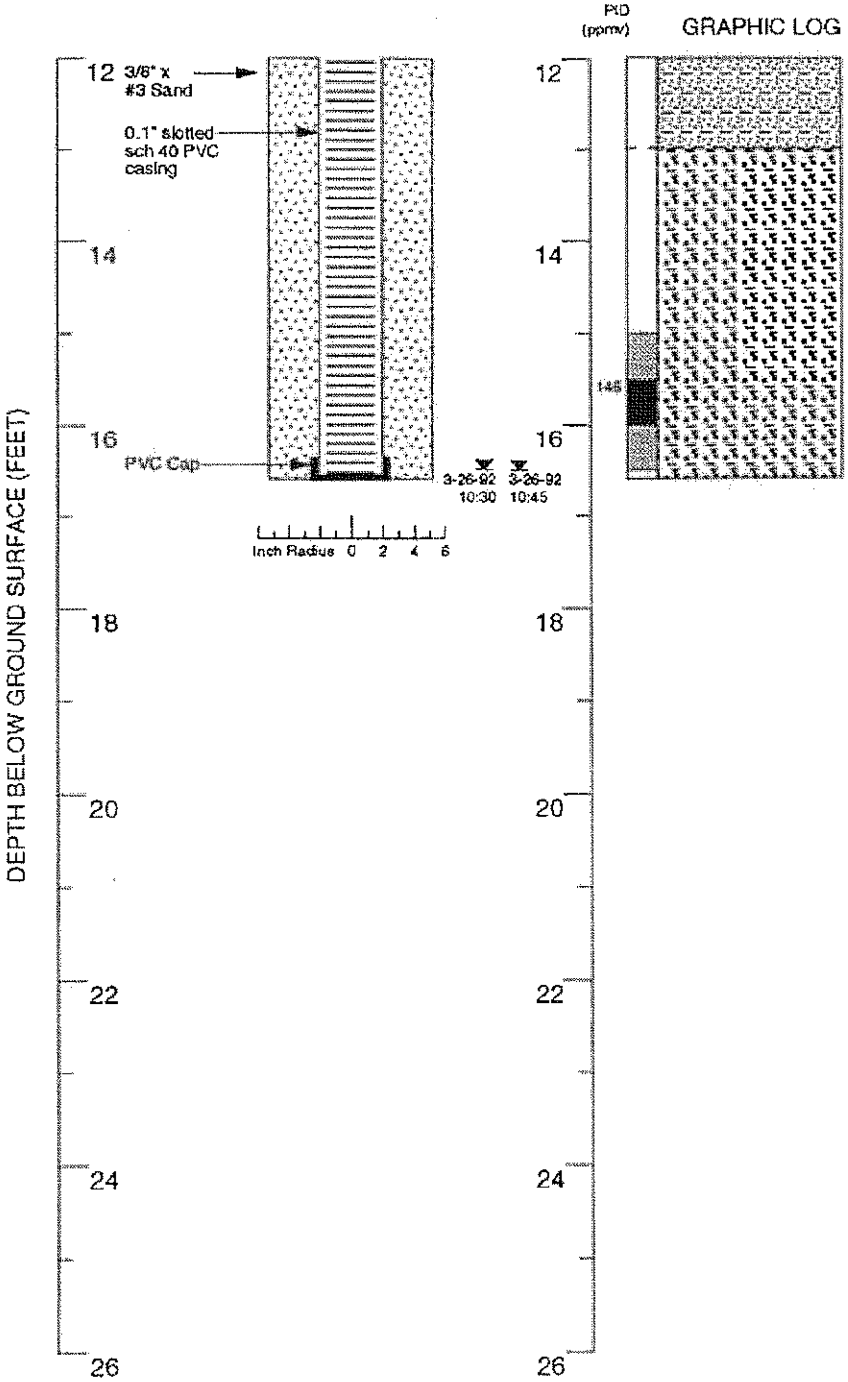
Boring Log and Well Completion Details
VW-1 (Boring B-9)

BP Service Station #11133
2220 98th Avenue
Oakland, California

VADOSE WELL
1

RESNA

32006.01



DESCRIPTION

same as above

Silty GRAVEL (GM); brown with gray mottling; moist; very dense; 10-20% fines; 5-10% fine sand; fine to very coarse gravel to 2.5"; odor

Silty GRAVEL (GM); same as above

TD @ 16.6

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary

NR — No recovery

All symbols and selections may not be applicable

Boring Log and Well Completion Details
VW-1 (Boring B-9)

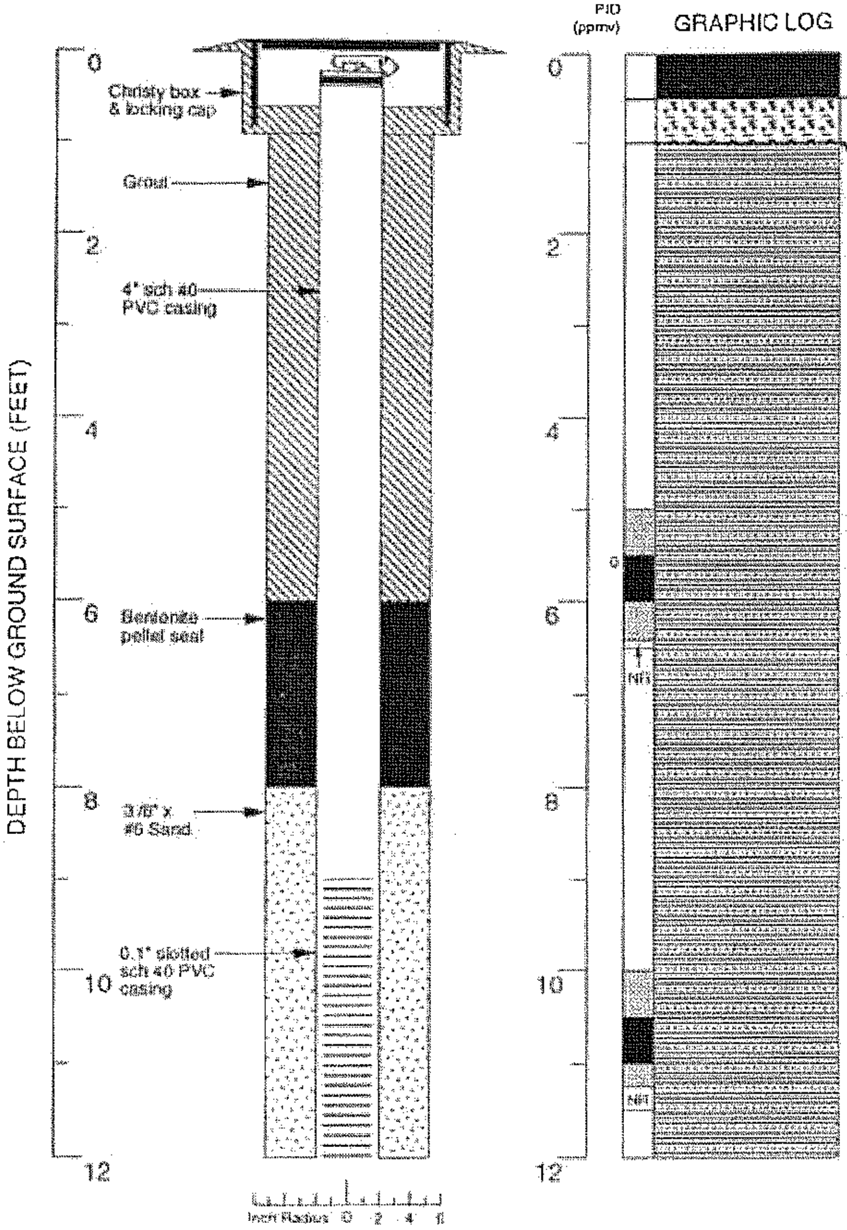
BP Service Station #11133
2220 98th Avenue
Oakland, California

VADOSE WELL

1

RESNA

32006.01



DESCRIPTION

Asphalt

Sandy GRAVEL (GM); brown; medium dense; dry/damp; 5-15% fines; 25-30% fine to coarse sand; fine to coarse gravel; high est K

Sandy CLAY (CL); black; stiff; dry/damp; moderately plastic; 15-25% fine to coarse sand; 0-5% fine to coarse gravel; low est K

Same as above; brown (cuttings)

Same as above; brown with black mottling; medium stiff; very plastic (cuttings)

Sandy CLAY (CL); brown with black mottling; hard; dry/damp; slightly plastic; 5-15% fine to coarse sand; 0-5% fine to medium gravel; low est K

Same as above

Continues

Logged by:	Justin Power	Drilling Company:	Kvilhaug	Well Head Completion:	Christy box & locking cap
Project Mgr:	Keith Romstad	Drilling Method:	11" Hollow stem auger	Type of Sampler:	2.5" split barrel
Dates Drilled:	3/26/92	Driller:	Rod	TD (Total Depth):	16.5 ft.

EXPLANATION

▼	Water level during drilling	———	Contacts: Solid where certain
▽	Water level in completed well	....	Dotted where approximate
▨	Location of recovered drill sample	— — —	Dashed where uncertain
■	Location of sample sealed for chemical analysis	//////	Hachured where gradational
⊞	Sieve sample	est K	Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
⊠	Grab sample	NR	No recovery

All symbols and definitions may not be applicable

Boring Log and Well Completion Details
VW-2 (Boring B-11)

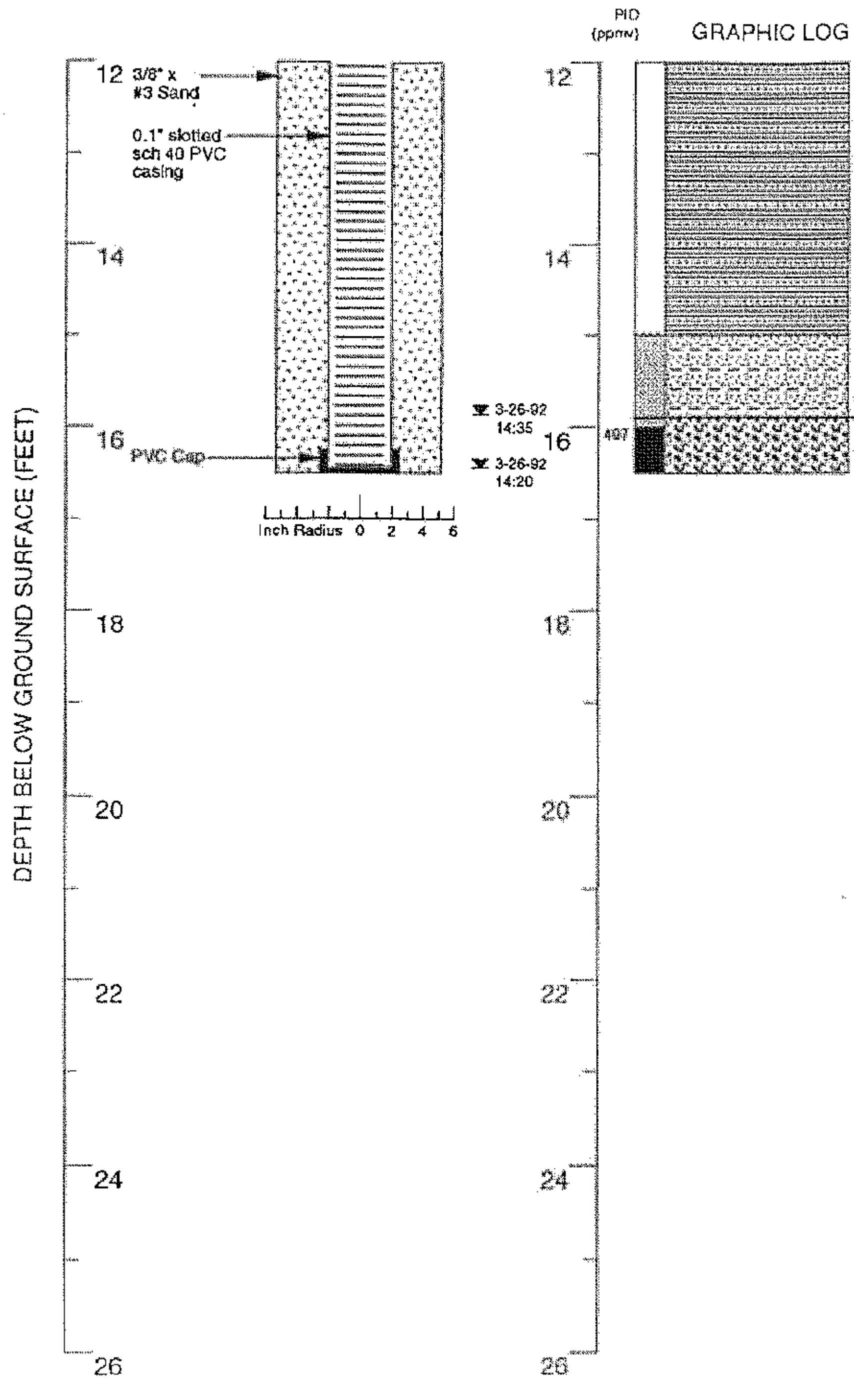
BP Service Station #11133
2220 98th Avenue
Oakland, California

VADOSE WELL

2

RESNA

32006.01



DESCRIPTION

Same as above; pervasive green staining; moist/damp; strong odor

Same as above; brown; medium stiff; increasing moisture

Silty SAND (SM); brown; medium dense; wet; 15-25% fines; fine to medium sand; medium to high est K

Gravelly SAND (SW); brown; medium dense; wet; 5-10% fines; fine to coarse sand; 15-20% fine to coarse gravel; high est K

TD @ 16.5 ft.

EXPLANATION

▼	Water level during drilling	———	Contacts: Solid where certain
▽	Water level in completed well	········	Dotted where approximate
▩	Location of recovered drill sample	— — —	Dashed where uncertain
■	Location of sample sealed for chemical analysis	///////	Hachured where gradational
⊞	Sieve sample	est K	Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
⊠	Grab sample	NR	No recovery

All symbols and definitions may not be applicable

Boring Log and Well Completion Details
VW-2 (Boring B-11)

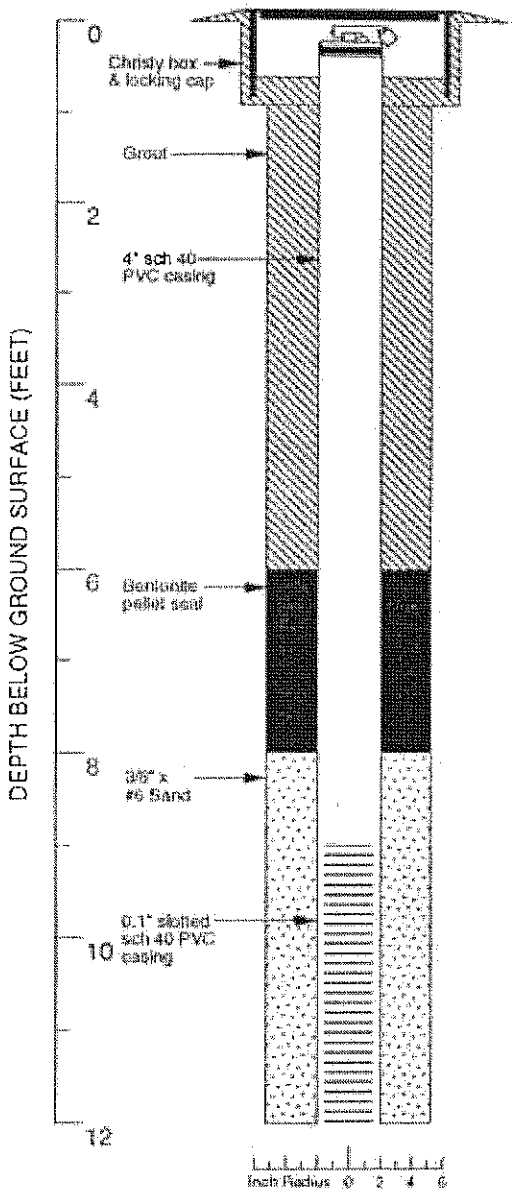
BP Service Station #11133
2220 98th Avenue
Oakland, California

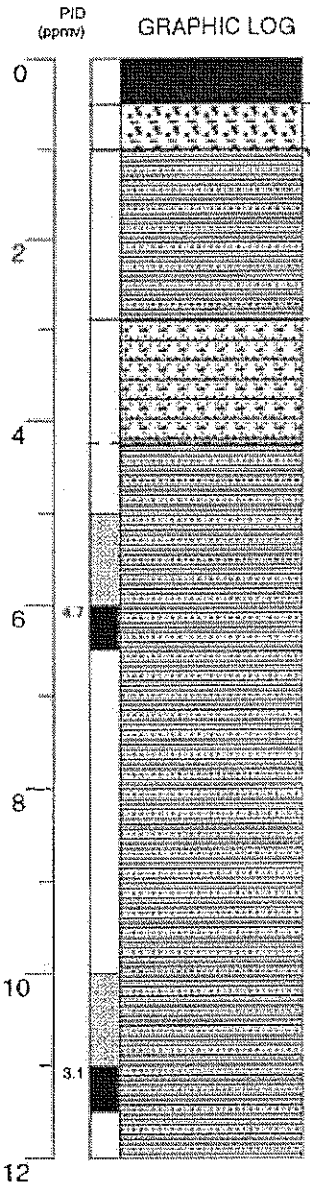
VADOSE WELL

2

RESNA

32006.01





DESCRIPTION

Asphalt

Sandy GRAVEL (GM); brown; loose; damp; 10-15% fines; 20-25 % fine to coarse sand; fine to coarse gravel; high est K

Sandy CLAY (CL); brown with black mottling; very stiff; dry/damp; slightly plastic; 5-15% fine to coarse sand; 0-5% fine gravel; low est K

Sandy SILT (ML); brown with local gray mottling; medium stiff; damp; 10-40% fine to coarse sand; 0-5% fine gravel; low to moderate est K

Sandy CLAY (CL); brown; very stiff; damp; slightly plastic; 5-10% fine sand; 0-5% fine gravel; low est K

Sandy CLAY (CL); brown; hard; damp; slightly plastic; 10-25% fine to coarse sand; low est K

Continues

Logged by:	Justin Power	Drilling Company:	Kvilhaug	Well Head Completion:	Christy box & locking cap
Project Mgr:	Keith Romstad	Drilling Method:	11" Hollow stem auger	Type of Sampler:	2.5" split barrel
Dates Drilled:	3/26/92	Driller:	Rod	TD (Total Depth):	16.5 ft.

EXPLANATION

▼	Water level during drilling	Contacts:	Solid where certain
▽	Water level in completed well	....	Dotted where approximate
▒	Location of recovered drill sample	— — —	Dashed where uncertain
■	Location of sample sealed for chemical analysis	///////	Hachured where gradational
⊞	Sieve sample	est K	Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
⊠	Grab sample	NR	No recovery

All symbols and definitions may not be applicable

Boring Log and Well Completion Details
VW-3 (Boring B-10)

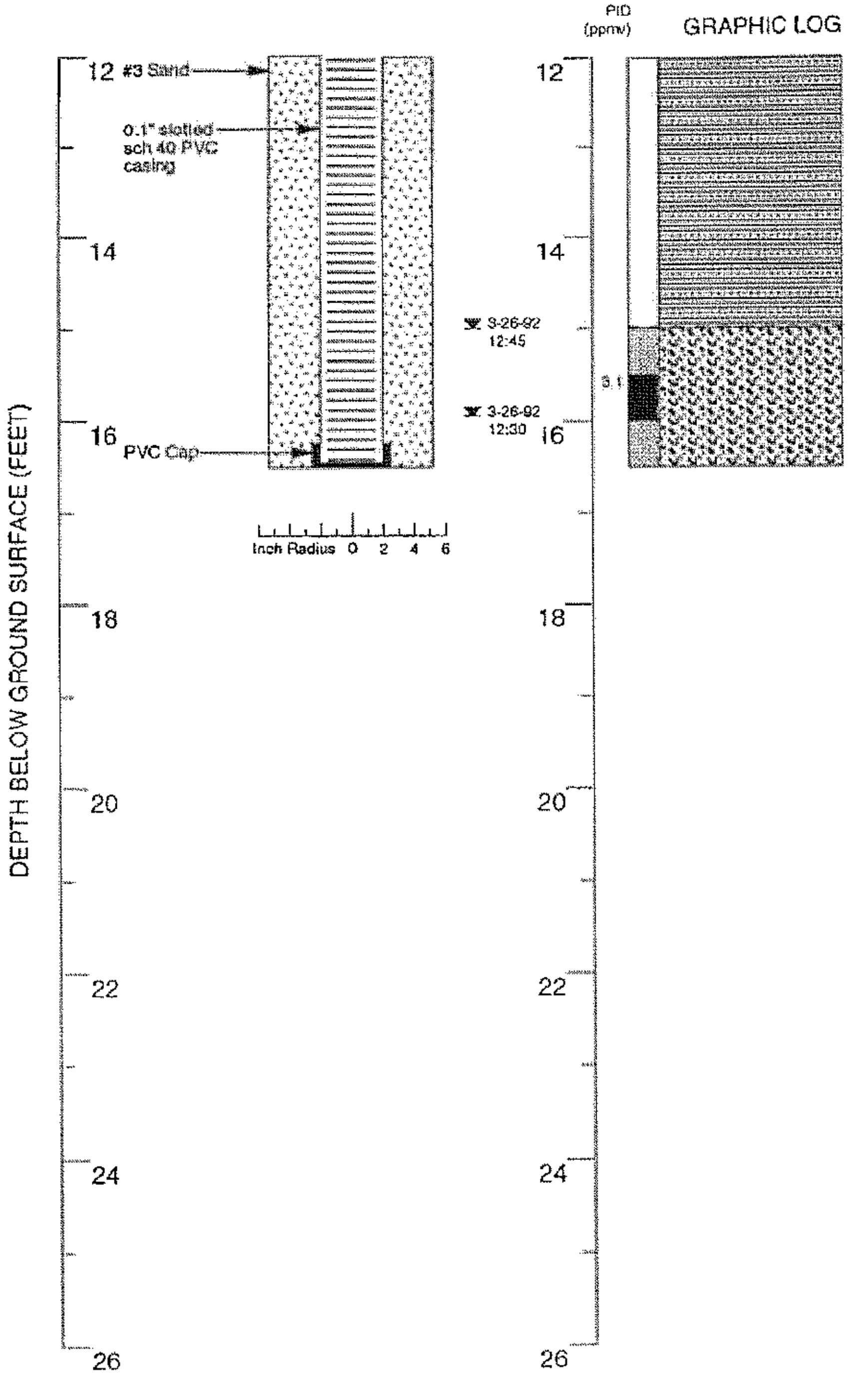
BP Service Station #11133
2220 98th Avenue
Oakland, California

VADOSE WELL

3

RESNA

32006.01



DESCRIPTION

Sandy CLAY (CL); brown; hard; damp; slightly plastic; 10-25% fine to coarse sand; low est K

Sandy CLAY (CL); brown; hard; moist; moderately plastic; 25-40% fine to coarse sand; 5-10% fine gravel (from cuttings)

Increasing moisture and plasticity

Gravelly SAND (SW); brown; dense; wet; 5-10% fines; fine to coarse sand; 10-20% fine to coarse gravel; high est K

TD @ 16.5 ft.

EXPLANATION

Symbol	Meaning	Symbol	Meaning
			Contacts:
▼	Water level during drilling	———	Solid where certain
▽	Water level in completed well	....	Dotted where approximate
▩	Location of recovered drill sample	— — —	Dashed where uncertain
■	Location of sample sealed for chemical analysis	///////	Hachured where gradational
⊞	Sieve sample	est K	Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
☒	Grab sample	NR	No recovery

All symbols and definitions may not be applicable

Boring Log and Well Completion Details
VW-3 (Boring B-10)

BP Service Station #11133
2220 98th Avenue
Oakland, California

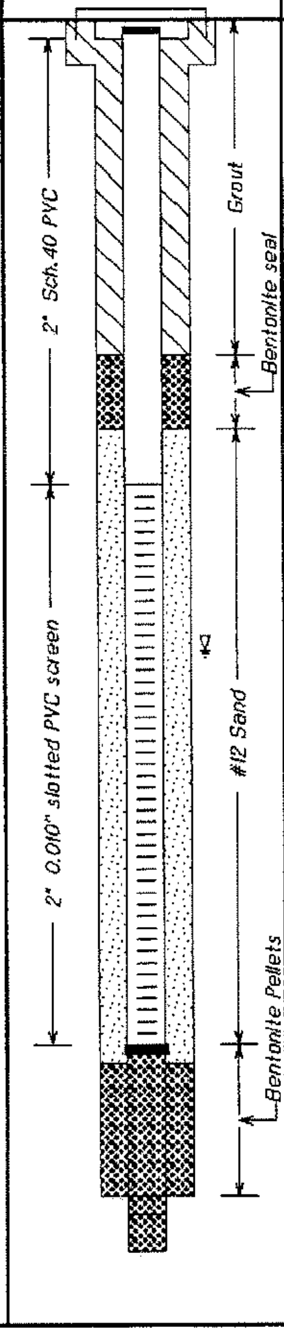
VADOSE WELL

3

32006.01

ALISTO ENGINEERING GROUP WALNUT CREEK, CALIFORNIA	# LOG OF BORING AW-9	

SEE SITE PLAN	
	ALISTO PROJECT NO: *10-025-12* DATE DRILLED: *12/03/98*
	CLIENT: *BP Oil Company*
	LOCATION: *2231 Warner Avenue, Oakland, California*
	DRILLING METHOD: *Hollow-stem Auger (8")*
	DRILLING COMPANY: *V & W Drilling Inc.* CASING ELEVATION: *'MSL*
	LOGGED BY: *Chris Reinheimer* APPROVED BY: *Al Sevilla*



BLOWS/6 IN.	PID VALUES	DEPTH feet	SOIL CLASS	GEOLOGIC DESCRIPTION
				4" asphalt; 8" concrete.
			GC	Fill: Clayey to sandy GRAVEL; gray-green; damp.
17,20,21	0	5	ML	silty CLAY: medium red-brown, damp, medium-grained sand to 5%, root traces and organics to 5%, hard.
17,20,25	0	10		Same: damp to moist, sand <2%, organics <2%, hard.
20,21,23	0	15	SM	clayey to silty SAND: medium red-brown, moist to wet, sand med-coarse, gravel to 1.5 cm 10%, dense.
13,14,14	0			Same
		20		
17,11,21	0	25	GM GC	clayey to silty GRAVEL: medium red-brown, wet, gravel to 1.5 cm 80%, fines to 20%, medium to coarse grained sand to 20%, dense.
17,19,31	NM			Same, very dense.
18,18,28	NM	30	CL	CLAY: medium red-brown, wet, coarse-grained sand <5%, hard.
11,18,24	NM			Same
				Boring terminated at 33 feet. Stabilized water level measured on .

URS 1333 Broadway, Suite 800
Oakland, California 94612

LOG OF BORING

Borehole ID: SB-1

Total Depth: 42 ft bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: BP #11133 Soil and Water Investigation	**Drilling Company:** Gregg Drilling & Testing
Site Location: 2220 98th Avenue, Oakland, CA	**Driller:** Don Pearson,Chris Garner(DP)/Paul Rogers,Marco Ramirez (HP)
Project Manager: Lynelle Onishi	**Type of Drilling Rig:** Marl M2.5 DP
RG:	**Drilling Method:** Direct Push (DP)/Hydro Punch (HP)
Geologist: John McCain	**Sampling Method:** Macro-Core/Hydro Punch
Job Number: 38487352.0013001	**Date(s) Drilled:** 07/22/05 & 09/16/05

BORING INFORMATION

Groundwater Depth: 25 ft bgs	**Boring Location:** In front of 9857 Springfield Ct. residence
Air Knife or Hand Auger Depth: 5.0 feet bgs/Hand Auger	**Boring Diameter:** 2.5-inch
Coordinates: X Y	**Boring Type:** Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		AC/Baserock: Dirt cover, dirt and baserock (2") beneath.	FILL				
		SANDY SILTY CLAY: FILL, dark brown (10YR 3/1), 80% clay, 10% sand, 8% silt, 2% gravel, fine sands, angular gravel to 0.5" diameter, moist, med. plasticity, no petroleum odor.					Borehole grouted to grade with neat Portland cement
2		SANDY SILTY CLAY: brown (10YR 4/4), 60% clay, 35% sand, 5% silt, fine sands, med. dense, moist, low plasticity, no petroleum odor.	CL	3.5			
4		CLAYEY SANDY SILT: brown (10YR 4/4), 70% silt, 20% sand, 10% clay, fine sands, med. stiff, moist, low plasticity, no petroleum odor.	ML	5.0			
		SANDY SILTY CLAY: brown (10YR 4/4), 60% clay, 35% sand, 5% silt, fine sands, med. stiff, moist, low plasticity, no petroleum odor.	CL	4.4 3.6	SB-1 (5-5.5')		
6							
8							
10				3.7	SB-1 (9.5-10')		
12		@ 12 ft bgs, Sandy Gravelly Clay layer, 4-inches thick, angular gravels to 1", becomes stiff at 12 ft bgs, dry, no petroleum odor.					
14				4.0	SB-1 (14.5-15')		
16							

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample I.D.	Recovery	Comments
18							
19–25		CLAYEY SANDY SILT: light brown (10YR 5/4), 70% silt, 20% sand, 10% clay, fine sands, soft, moist, no petroleum odor.	ML	2.8	SB-1 (19.5-20')		
				1.7	SB-1 (21.5-22')		
25–27		SILTY CLAYEY SAND: gray (Gley 1 3/10Y), 60% sand, 20% silt, 15% clay, 5% gravel, fine sands, soft to med. dense, wet, trace gravels at bottom of sand @ 27', petroleum odor.	SM				▽
27–42		SANDY SILTY CLAY: brown (10YR 4/3 to 10YR 5/4), 60% clay, 35% sand, 5% silt, fine sands, stiff, moist, drilling resistence decreased below 27', no petroleum odor.	CL	4.6	SB-1 (27.5-28')		
		@ 28-32 ft bgs, Sandy Silty Clay continues, color grades from gray to brown at 32 ft bgs, no petroleum odor.		28	SB-1 (31.5-32')		
				5.7	SB-1 (34.5-35')		
		@ 37 ft bgs, Sandy Silty Clay continues, trace gravels, no petroleum odor.		0.8	SB-1 (37.5-38')		
		On September 16, 2005, a depth discrete groundwater sample (SB-1) was collected at 27 ft bgs from separate Hydropunch boring completed 1 foot laterally from soil boring SB-1 location. An attempt was made to collect a discrete groundwater sample (SB-1) at 35 ft bgs, but no groundwater accumulated after Hydropunch sampler was left exposed for approximately 1 hour.			SB-1 (41.5-42')		Bottom of Boring = 42 ft bgs
42							

URS 1333 Broadway, Suite 800 Oakland, California 94612

LOG OF BORING

Borehole ID: SB-2

Total Depth: 32 ft bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: BP #11133 Soil and Water Investigation	**Drilling Company:** Gregg Drilling & Testing
Site Location: 2220 98th Avenue, Oakland, CA	**Driller:** Paul Rogers
Project Manager: Lynelle Onishi	**Type of Drilling Rig:** Marl M2.5 DP
RG:	**Drilling Method:** Direct Push (DP)/Hydro Punch (HP)
Geologist: Lynelle Onishi	**Sampling Method:** Macro-Core/Hydro Punch
Job Number: 38487352.0013001	**Date(s) Drilled:** 09/16/05

BORING INFORMATION

Groundwater Depth: 22 ft bgs	**Boring Location:** Northern corner of site
Air Knife or Hand Auger Depth: 5.0 feet bgs/Air Knife	**Boring Diameter:** 2.5-inch
Coordinates: X Y	**Boring Type:** Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		ASPHALT: 2" Asphalt	FILL				
		FILL: SANDY GRAVEL, Brown (10YR 4/3), 40% angular gravel, 30% angular fine-grained sand, 20% clay, 10% silt, moist, no petroleum odor.					Borehole grouted to grade with neat Portland cement
2		SANDY SILTY CLAY: Dark brown (10YR 3/2), 50% clay, 35% silt, 10% fine-grained sand, 5% sub angular gravel, moist, soft, medium plasticity, no petroleum odor.	CL				
4							
6				0.1	SB-2 (5-5.5')		
8		@ 8' bgs, penetration resistance increased to medium stiff - stiff.					
10				0.9	SB-2 (10-10.5')		
12							
14							
16				0.7	SB-2 (15.5-16')		

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample I.D.	Recovery	Comments
18							
20				1.1	SB-2 (20-20.5')		
		GRAVELLY SAND: Brown (10YR 4/4), 50% fine-grained sand, 30% angular to sub-angular gravel, 10% silt, 10% clay, moist, loose, medium plasticity.	SP				
22		SILTY SAND: Light brown (10YR 5/4), 40% fine-grained sand, 35% silt, 15% clay, 10% fines, sub-angular gravel, wet, medium plasticity, no petroleum odor.	SM	2.8	SB-2 (22-22.5')		▽
24							
		@ 25' bgs, no petroleum odor.		1.9	SB-2 (25-25.5')		
26							
28							
30		A depth-discrete groundwater sample (SB-2) was collected at 22 ft bgs from a separate boring completed 1 foot laterally from the original soil boring location using a Hydropunch sampler. An attempt was made to collect a depth-discrete groundwater sample at approximately 32 ft bgs, but no water accumulated after the Hydropunch sampler was left for approximately 1 hour.		1.1	SB-2 (30-30.5')		
32							Bottom of Boring = 32 ft bgs

URS 1333 Broadway, Suite 800 Oakland, California 94612

LOG OF BORING

Borehole ID: SB-3

Total Depth: 8 ft bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: BP #11133 Soil and Water Investigation	**Drilling Company:** Gregg Drilling & Testing
Site Location: 2220 98th Avenue, Oakland, CA	**Driller:** Don Pearson, Chris Garner
Project Manager: Lynelle Onishi	**Type of Drilling Rig:** Hand Auger
RG:	**Drilling Method:** Hand Auger
Geologist: John McCain	**Sampling Method:** Hand Auger
Job Number: 38487352.0013001	**Date(s) Drilled:** 07/22/05

BORING INFORMATION	
Groundwater Depth: Not Encountered	**Boring Location:** In front of 9857 Springfield Ct. residence
Air Knife or Hand Auger Depth: 8.0 feet bgs/Hand Auger	**Boring Diameter:** 3.25-inch
Coordinates: X Y	**Boring Type:** Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		AC/Baserock: Dirt cover, dirt and baserock (2") beneath	FILL				
		SANDY SILTY CLAY: FILL, dark brown (10YR 3/1), 80% clay, 10% sand, 8% silt, 2% gravel, fine-grained sands, angular gravel to 0.5" diameter, moist, soft, med. plasticity, no petroleum odor.	CL	4.5			Borehole grouted to grade with neat Portland cement.
2							
				5.2			
4		SANDY SILTY CLAY: brown (10YR 3/4 to 10YR 5/4), 80% clay, 10% sand, 10% silt, fine sands, med. stiff, moist, med. plasticity, no petroleum odor.					
		@ 4 ft bgs, Sandy Silty Clay continues, color change to light brown (10YR 5/4), sand increases with depth.					
		SILTY CLAYEY SAND: brown (10YR 4/3 to 10YR 5/4), 60% sand, 20% silt, 20% clay, fine sands, med. dense, moist, no petroleum odor.	SM	5.5			
				3.5			
6				4.1			
		@ 6.5 ft bgs, Silty Clay continues, course sands/subangular gravels up to 0.25" diameter.					
8		No soil samples collected from boring SB-3. Groundwater not encountered.		6.4			Bottom of Boring = 8 ft bgs

URS 1333 Broadway, Suite 800 Oakland, California 94612

LOG OF BORING

Borehole ID: SB-4

Total Depth: 12 ft bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: BP #11133 Soil and Water Investigation	Drilling Company: Gregg Drilling & Testing
Site Location: 2220 98th Avenue, Oakland, CA	Driller: Paul Rogers
Project Manager: Lynelle Onishi	Type of Drilling Rig: Hand Auger, Geoprobe Direct Push Rig
RG:	Drilling Method: Hand Auger, Geoprobe
Geologist: Lynelle Onishi	Sampling Method: Hand Auger, Geoprobe
Job Number: 38487352.0013001	Date(s) Drilled: 09/16/05

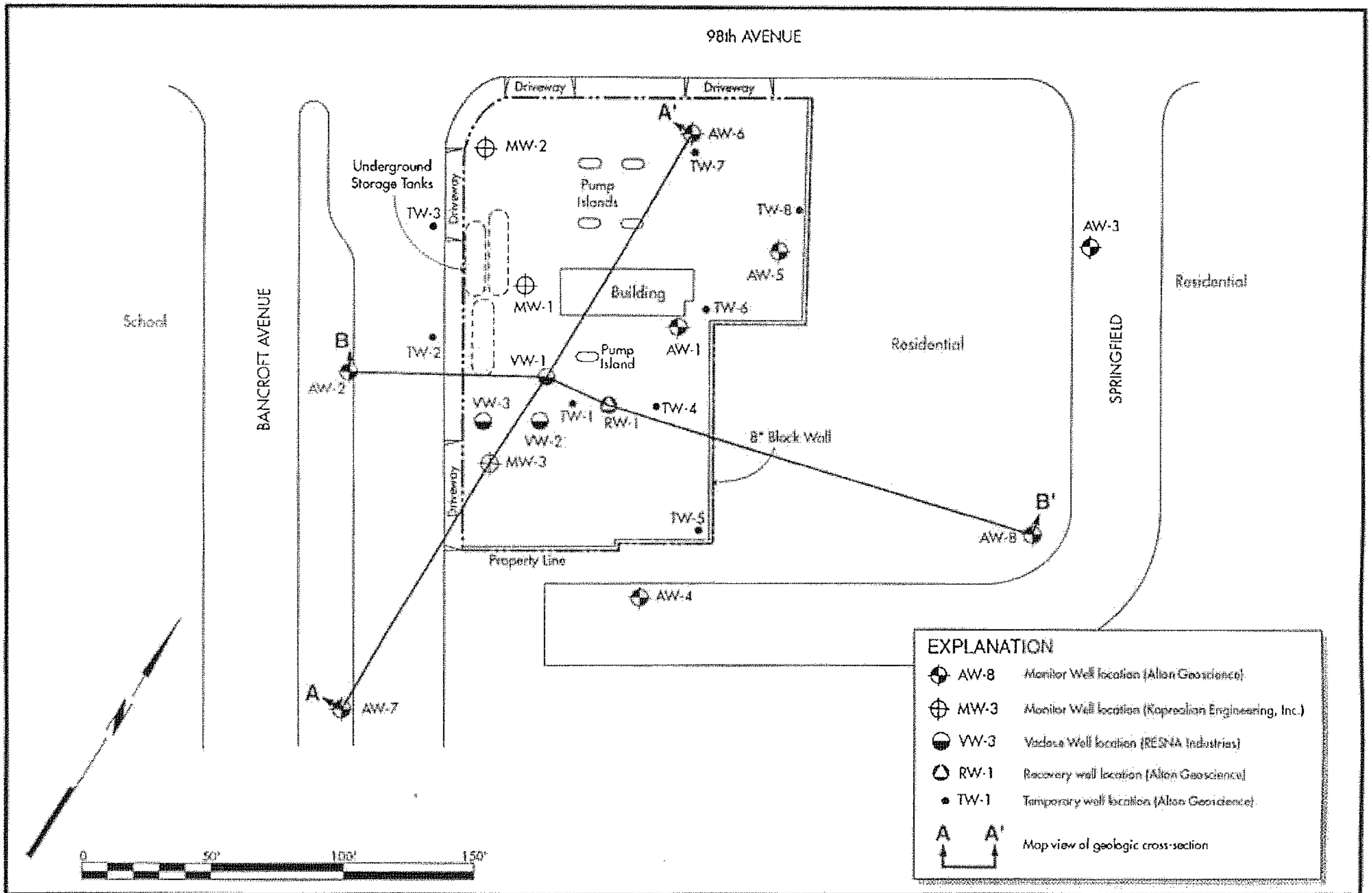
BORING INFORMATION

Groundwater Depth: Not Encountered	Boring Location: Northern corner of site, east of AW-6
Air Knife or Hand Auger Depth: 8.0 feet bgs/Hand Auger	Boring Diameter: 3.25-inch
Coordinates: X Y	Boring Type: Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		ASPHALT: 2" Asphalt.	FILL				
		SANDY GRAVEL: FILL, brown (10YR 4/3), 40% fine to coarse angular gravel, 30% sandy gravel, 20% clay, 10% silt, moist, loose, no petroleum odor.					
2		SANDY SILTY CLAY: dark yellowish brown (10YR 4/4), 50% clay, 30% silt, 15% sand, 5% sub angular gravel, moist, soft to medium stiff, medium plasticity, no petroleum odor.	CL				
				1113	SB-4 @3'		
6		@ 6 ft bgs, penetration resistance increased to medium stiff - stiff.		1127	SB-4 @6'		
		@ 9 ft bgs, direct push sampler advanced from 9 - 12 ft bgs.		1250	SB-4 @9'		
10		After reaching total depth, the boring was allowed to sit for approximately 1 hour for groundwater to accumulate. No water was encountered or accumulated within the boring during this time.					
12				1250			Bottom of Boring = 12 ft bgs

APPENDIX D

Geologic Cross-Sections



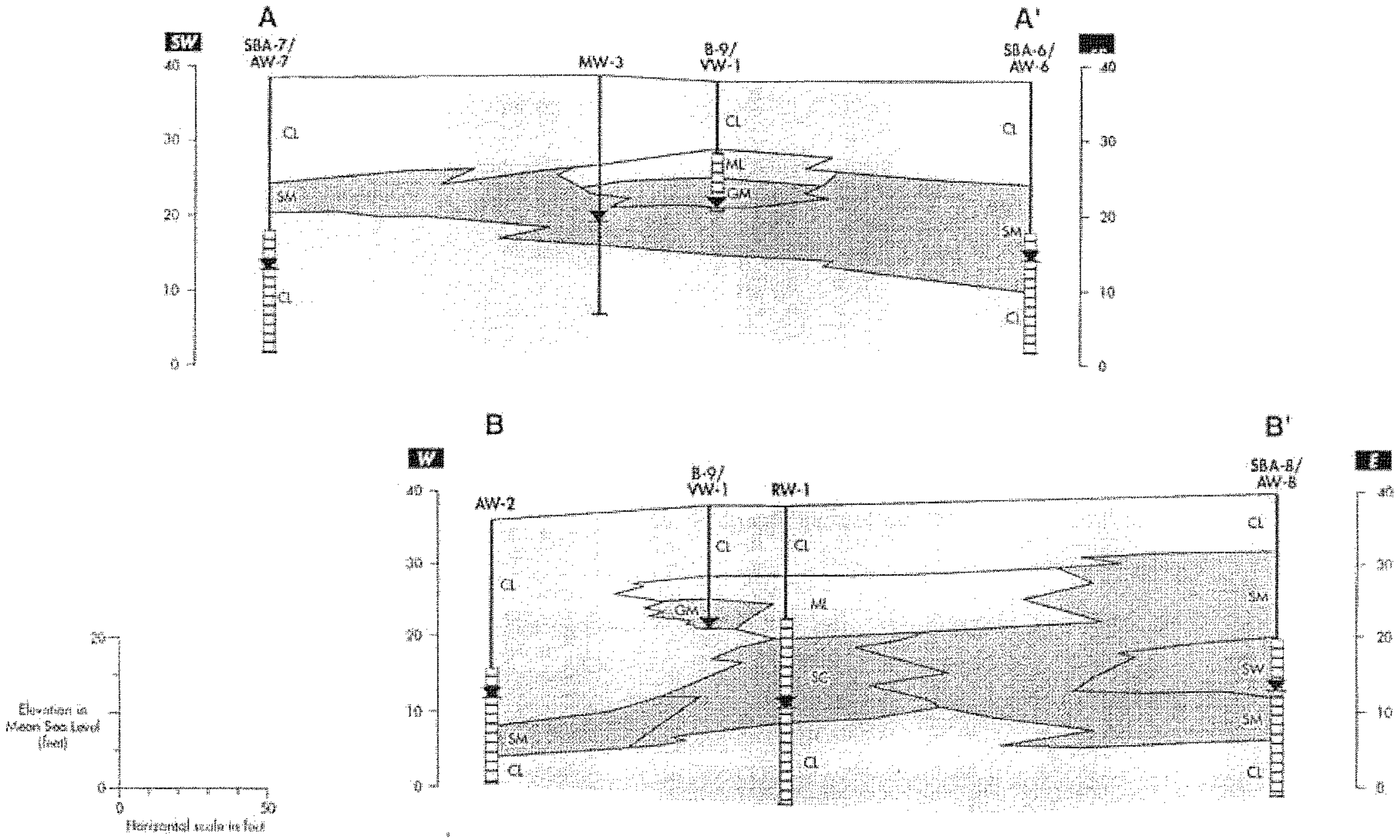
RESNA

PROJECT NO. 32006.03 | 12/92

GENERALIZED SITE PLAN

BP Facility No. 11133
2220 98th Avenue
Oakland, California

PLATE
2



EXPLANATION

Silty CLAY (CL); SILT (ML)

Silty SAND (SM); SAND (SW); Clayey Sand/Sandy Clay (SC); Silty GRAVEL (GM)

SBA-7/ AM-7 — Boring/Monitor Well location (Alton Geoscience)

B-9/ VW-1 — Boring/Vadose Well location (RESNA Industries, Inc.)

MW-3 — Monitor Well location (Kaprealian Engineering, Inc.)

Boring

Screen interval

Static water level on July 6, 1992

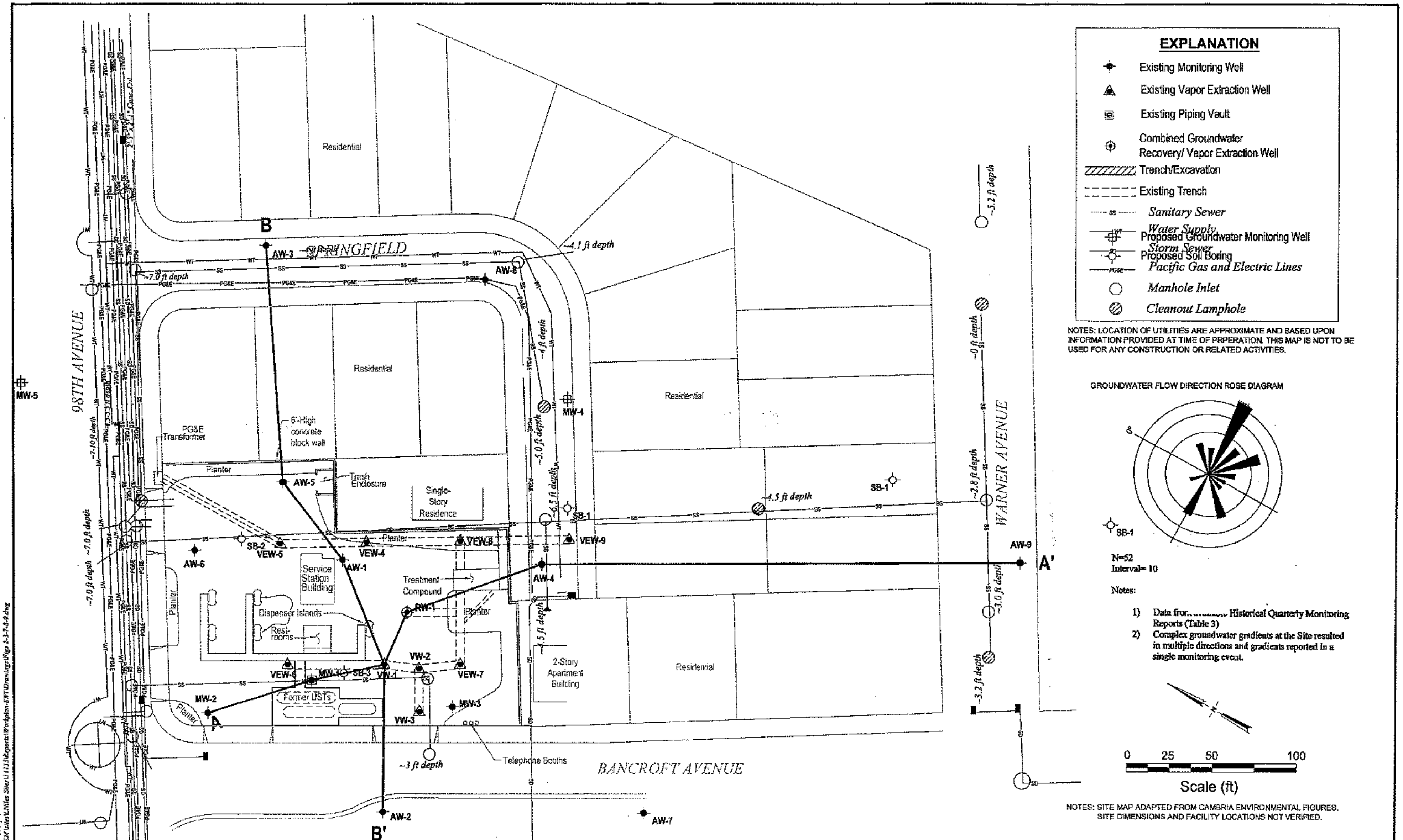
RESNA

PROJECT NO. 32006.03 | 12/92

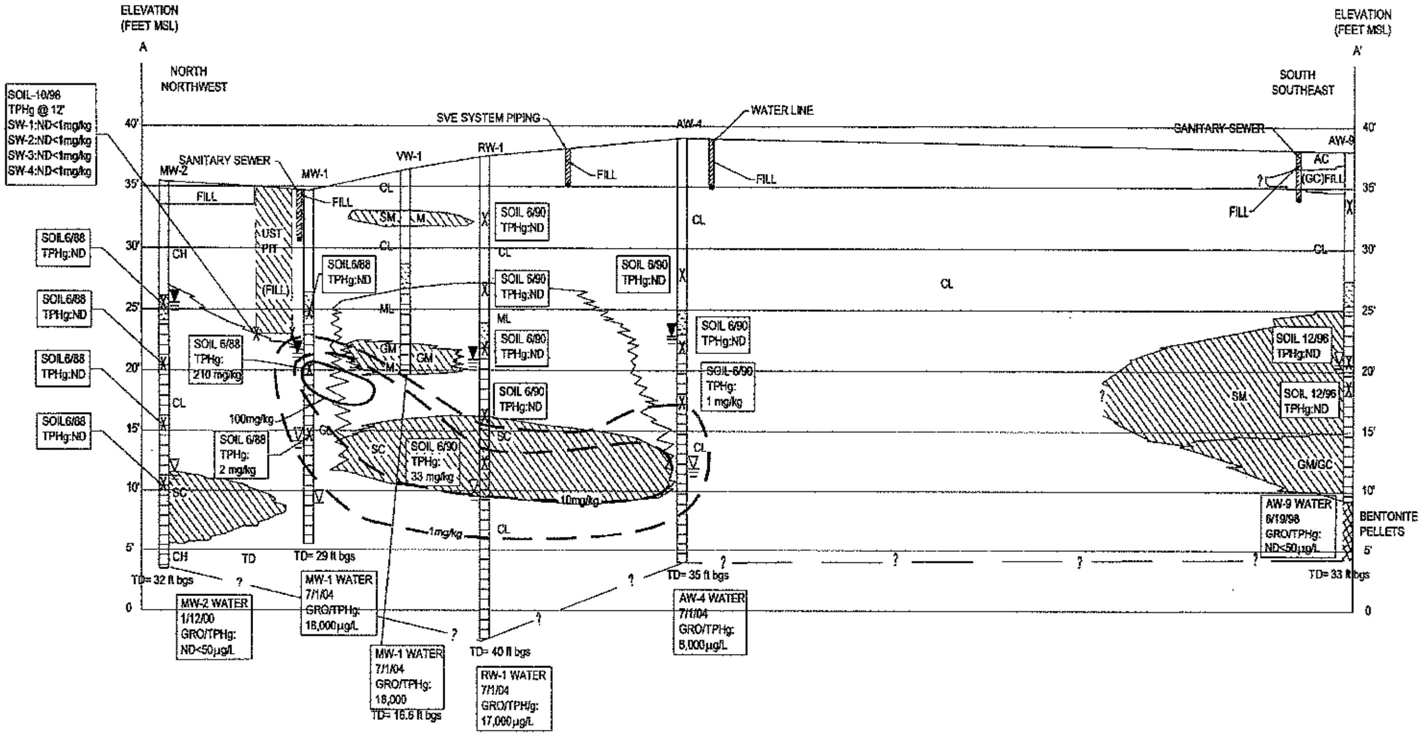
CROSS-SECTIONS A-A' & B-B'

BP Facility No. 11133
2220 98th Avenue
Oakland, California

PLATE 3



URS	Project No. 38486823 Former BP Service Station #11133 2220 98th Avenue Oakland, California	SITE MAP WITH CROSS SECTION TRANSECTS AND UNDERGROUND UTILITIES	FIGURE 3



EXPLANATION

- WELL CASING
- FILTER PACK INTERVAL
- SCREENED INTERVAL
- FIRST ENCOUNTERED WATER WHILE DRILLING
- STATIC WATER LEVEL IN COMPLETED WELL, JULY 1, 2004
- MSL — FEET ABOVE MEAN SEA LEVEL
- X-SOIL-TPH-G 0.018mg/kg — SOIL SAMPLE ANANYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM
- WATER-GRO/TPH-G .75 µg/L — WATER SAMPLE ANANYTICAL RESULTS IN MICROGRAMS PER LITER
- CL / SM — LITHOLOGY CONTACT; INFERRED WHERE DASHED OR QUERIED
- UST EXCAVATION; BACKFILLED WITH GRAVEL
- GP= GRAVEL, GW= GRAVEL, SP= SAND, SW-SAND — HIGH PERMEABILITY
- SM=SILTY SAND, GM=SILTY GRAVEL, GC=CLAYEY GRAVEL, SC=CLAYEY SAND — MODERATE PERMEABILITY
- ML=SILT, CL=CLAY, CH=CLAY — LOW PERMEABILITY
- UTILITY LINE BACKFILLED TRENCH
- 10 mg/kg — ISOCONCENTRATION CONTOUR, TPH-g IN mg/kg

HORIZONTAL SCALE IN FEET: 0, 50, 100

VERTICAL SCALE IN FEET: 0, 10, 20

URS

Project No. 38486828

Former BP Service Station #11133
2220 98th Avenue
Oakland, California

HYDROGEOLOGIC CROSS-SECTION A-A'

FIGURE 4

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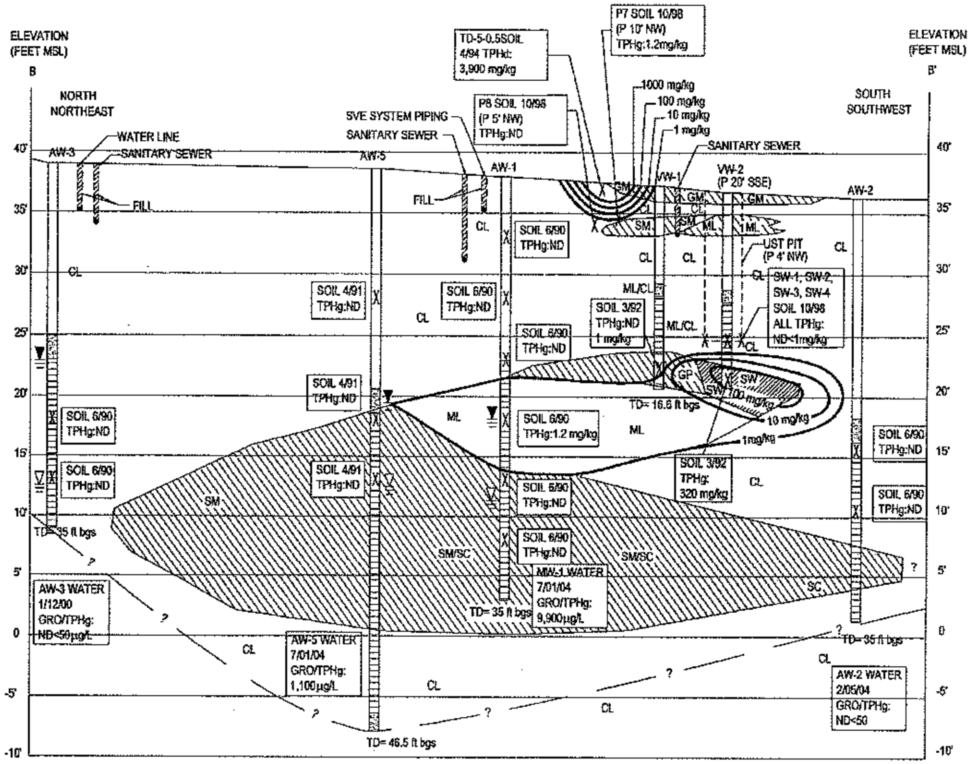

EXPLANATION

(P 20' SSE)	BORING IS PROJECTED, WITH DISTANCE IN FEET AND DIRECTION FROM CROSS-SECTION LINE.
	WELL CASING
	FILTER PACK INTERVAL
	SCREENED INTERVAL
▽	FIRST ENCOUNTERED WATER WHILE DRILLING
▼	STATIC WATER LEVEL IN COMPLETED WELL, JULY 1, 2004
MSL	FEET ABOVE MEAN SEA LEVEL
X-SOIL-TPH-G 0.018mg/kg	SOIL SAMPLE ANANYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM
WATER-GRO/TPH-G .75 µg/L	WATER SAMPLE ANANYTICAL RESULTS IN MICROGRAMS PER LITER
? CL SM	LITHOLOGY CONTACT; INFERRED WHERE DASHED OR QUERIED
	UST EXCAVATION; BACKFILLED WITH GRAVEL
	GP= GRAVEL, GW= GRAVEL, SP= SAND, SW-SAND } HIGH PERMEABILITY
	SM=SILTY SAND, GM=SILTY GRAVEL, GC=CLAYEY GRAVEL, SC=CLAYEY SAND } MODERATE PERMEABILITY
	ML=SILT, CL=CLAY, CH=CLAY } LOW PERMEABILITY
	UTILITY LINE BACKFILLED TRENCH
10 mg/kg	ISOCONCENTRATION CONTOUR, TPH-g IN mg/kg

0 50 100 HORIZONTAL SCALE IN FEET

0 10 20 VERTICAL SCALE IN FEET

URS	Project No. 38486828 Former BP Service Station #11133 2220 98th Avenue Oakland, California	HYDROGEOLOGIC CROSS-SECTION B-B'	FIGURE 5

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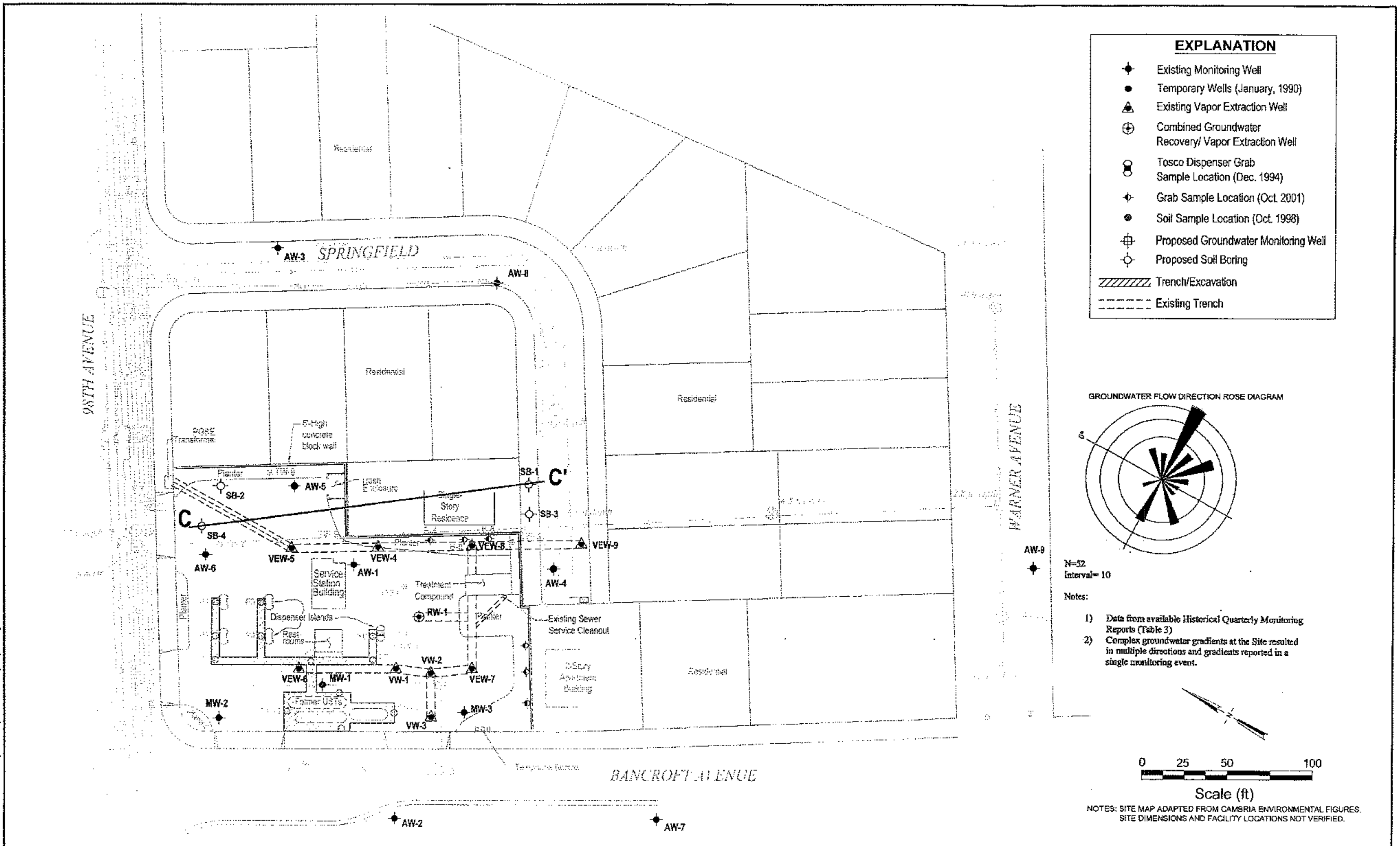
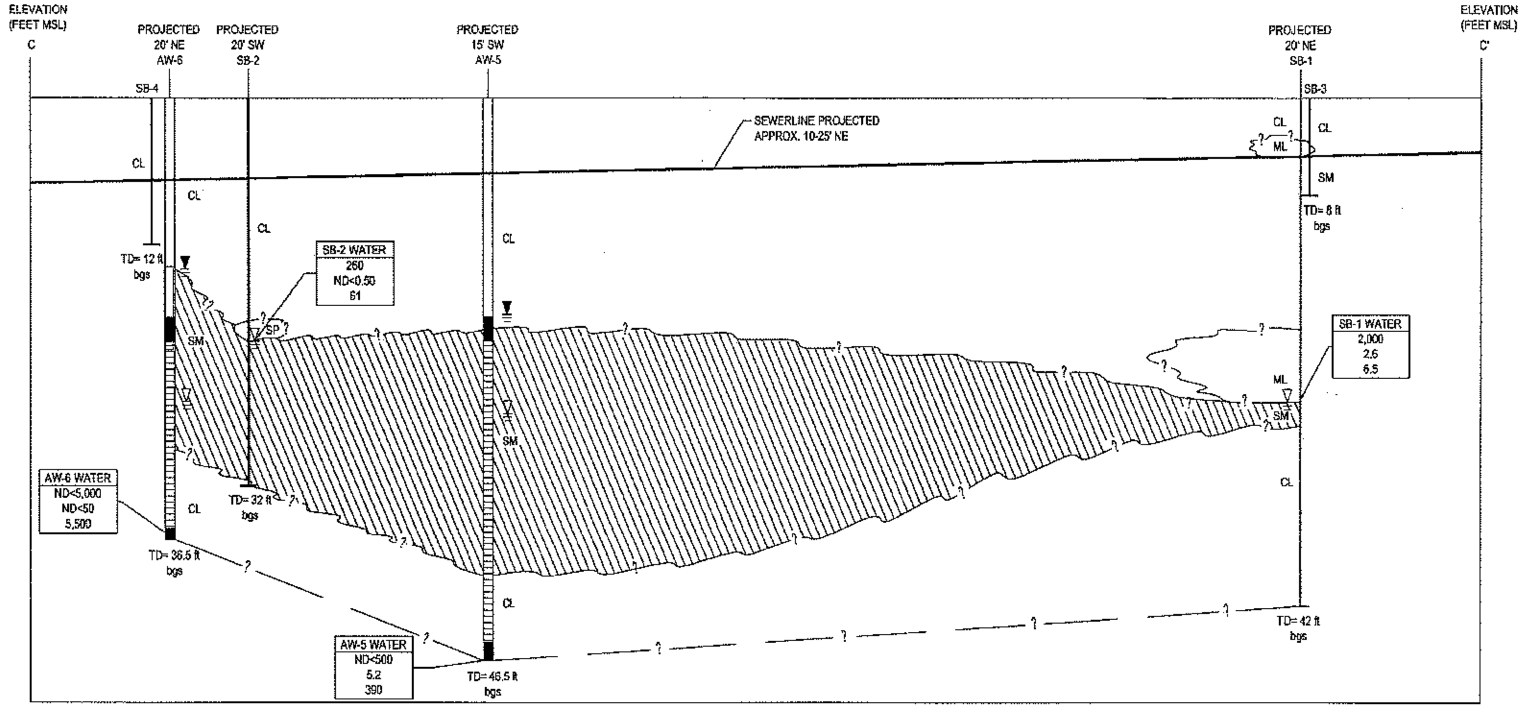


URS	Project No. 38487351 Former BP Service Station #11133 2220 98th Avenue Oakland, California	SITE MAP WITH CROSS-SECTION TRANSECT AND UNDERGROUND UTILITIES	FIGURE 3



EXPLANATION

WELL CASING

FILTER PACK INTERVAL

SCREENED INTERVAL

FIRST ENCOUNTERED WATER WHILE DRILLING

STATIC WATER LEVEL IN COMPLETED WELL, JULY 22, 2005

MSL — FEET ABOVE MEAN SEA LEVEL

SAMPLE ID — WATER SAMPLE

GRO, B, MTBE — GRO, BENZENE, AND MTBE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

< — NOT DETECTED AT OR ABOVE THE SPECIFIED LABORATORY REPORTING LIMIT

CL / SM — LITHOLOGY CONTACT; INFERRED WHERE DASHED OR QUERIED

GP= GRAVEL, GW= GRAVEL, SP= SAND, SW-SAND } HIGH PERMEABILITY

SM=SILTY SAND, GM=SILTY GRAVEL, GC=CLAYEY GRAVEL, SC=CLAYEY SAND } MODERATE PERMEABILITY

ML=SILT, CL=CLAY, CH=CLAY } LOW PERMEABILITY

HORIZONTAL SCALE IN FEET: 0, 10, 20

VERTICAL SCALE IN FEET: 0, 20, 40

URS	Project No. 38486828		FIGURE
	Former BP Service Station #11133 2220 98th Avenue Oakland, California	HYDROGEOLOGIC CROSS-SECTION C-C'	4

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