Atlantic Richfield Company

Shannon Couch
Operations Project Manager

PO Box 1257
San Ramon, CA 94583
Phone: (925) 275-3804
Fax: (925) 275-3815
E-Mail: shannon.couch@bp.com

November 6, 2012

Re: Work Plan for Groundwater Investigation
Atlantic Richfield Company Station #2107
3310 Park Boulevard, Oakland, California
ACEH Case #RO0002526

"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,

Shannon Couch
Operations Project Manager

Attachment:

Work Plan for Groundwater Investigation
Atlantic Richfield Company Station No. 2107
3310 Park Boulevard, Oakland, California
ACEH Fuel Leak Case No. RO0002526

Prepared for

Ms. Shannon Couch
Environmental Business Manager
Atlantic Richfield Company
P.O. Box 1257
San Ramon, California 94583

Prepared by

BROADBENT
875 Cotting Lane, Suite G,
Vacaville, California 95688
(707) 455-7290
www.broadbentinc.com

November 6, 2012

Project No. 06-08-614

BROADBENT
875 Cotting Ln., Suite G, Vacaville, CA 95688
[T] 707-455-7290 [F] 707-455-7295
broadbentinc.com

November 6, 2012

Project No. 06-08-614

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

Attn.: Ms. Shannon Couch

Re: Work Plan for Groundwater Investigation, Atlantic Richfield Company Station No.2107, 3310 Park Boulevard, Oakland, California; ACEH Case No.RO0002526

Dear Ms. Couch:

Broadbent & Associates, Inc. (Broadbent) is pleased to submit this *Work Plan for Groundwater Investigation* (Workplan) for Atlantic Richfield Company Station No.2107 (herein referred to as Station No.2107) located at 3310 Park Boulevard, Oakland, California (Site). This Workplan has been prepared in order to define the downgradient extent of methyl tert-butyl ether (MTBE) in groundwater near the Site, and to expedite this Site towards a pathway to Closure.

Should you have questions or require additional information, please do not hesitate to contact us at (707) 455-7290.

Sincerely,
BROADBENT & ASSOCIATES, INC.

Kristene Tidwell, P.G., C.Hg.
Senior Geologist

Attachment

cc: Ms. Dilan Roe, Alameda County Environmental Health (Submitted via ACEH ftp site)
Electronic copy uploaded to GeoTracker

WORK PLAN FOR GROUNDWATER INVESTIGATION
Atlantic Richfield Company Station No. 2107
3310 Park Boulevard, Oakland, California
Fuel Leak Case No.RO02526

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APPENDICES

WORK PLAN FOR GROUNDWATER INVESTIGATION
Atlantic Richfield Company Station No. 2107
3310 Park Boulevard, Oakland, California
Fuel Leak Case No.RO02526

1.0 INTRODUCTION

On behalf of the Atlantic Richfield Company, RM – a BP affiliated company; Broadbent & Associates, Inc. (Broadbent) has prepared this *Work Plan for Groundwater Investigation* (Work Plan) for the Atlantic Richfield Company Station No. 2107, located at 3310 Park Boulevard, Oakland, California (Site). This Work Plan was prepared due to current Site data that indicates that the downgradient extent of MTBE in groundwater is not defined. Residual concentrations of petroleum compounds beneath the Site indicate that the Site could potentially be a candidate for Closure under the recently-approved Low Threat Policy (SWRCB, 2012). However, the plume needs to be delineated before the Site can be evaluated using this policy. The purpose of this Work Plan is to collect sufficient groundwater data to define the downgradient extent of MTBE in groundwater, which will enable future evaluation of this Site for closure under the Low Threat Policy. This work plan includes discussions on the site background and previous investigations, regional and Site geology and hydrogeology, and the proposed scope of work.

2.0 SITE BACKGROUND

The Site is an active ARCO brand gasoline retail station located on the southwest corner of Park Boulevard and East 34th Street in Oakland, California (Drawings 1 and 2). The land use in the immediate vicinity of the Site is mixed commercial, residential, and educational. The Site presently consists of a service station building, free-standing canopy over two dispenser islands with four, double-sided pumps, and three double-walled fiberglass 12,000-gallon gasoline underground storage tanks (USTs) with associated piping. The majority of the Site is surfaced with asphalt or concrete. The Site was historically leveled by cutting into the hillside on the southern portion of the Site.

2.1 Previous Site Investigations

On January 12, 1987, contamination by petroleum hydrocarbons was discovered during excavation and removal of a waste-oil UST and three gasoline USTs from the Site. With this discovery, ACEH opened release/leak case number RO651. In a letter dated July 11, 1997, ACEH confirmed that no further action was required at the Site. However, it should be noted that methyl tert-butyl ether (MTBE) was not requested or required to be analyzed for prior to the time of closure. Remediation and monitoring infrastructure (nine monitoring wells and one remediation well) were removed from the Site, with the exception of remediation piping which was left under the main driveway. No additional environmental work was completed at the Site until product line removal and upgrade construction activities in October and November of 2002. Historical data prior to closure of ACEH Case No.RO651, including geologic cross-sections, boring location maps, summarized soil and groundwater laboratory analytical results, and remediation system data, are mostly available within the ACEH files. However, due to the dates of completion and incomplete records, soil boring logs could not be located for the various subsurface investigations conducted prior to 1997.

In November 2002, URS oversaw a product line upgrade at the Site. Numerous soil samples were collected during the product line upgrading activities from depths ranging between 3.5 and 7.5 feet below ground surface (bgs). Gasoline Range Organics (GRO, C6-C12) was detected above laboratory reporting limits in six of the 20 collected soil samples, including over-excavation samples, at concentrations up to 4,000 milligrams per kilogram (mg/kg) in sample S-D7. Benzene was detected above laboratory reporting limits in one of the 20 soil samples collected at a concentration of 0.89

mg/kg in sample S-L2. Toluene, ethylbenzene, and total xylenes were detected above laboratory reporting limits in four of the 20 soil samples collected at concentrations up to 220 mg/kg, 150 mg/kg, and 1,100 mg/kg, respectively, in sample S-D7. MTBE was detected above laboratory reporting limits in 14 of the 20 collected soil samples at concentrations up to 83 mg/kg in sample S-L3.

Two ground-water samples (T-1 and BT-1) were collected during product line replacement activities. Sample T-1 was collected at eight feet bgs from the area underneath Dispenser 8 (S-D8-5) and BT-1, collected from ground water extracted during excavation activities. A water sample (Sump-1) was also collected from the sump for UST1, which appeared to contain free product. Laboratory analysis of sample Sump-1 indicated very high concentrations of GRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), and MTBE, most likely due to the presence of free product within the sump. GRO was detected above the laboratory reporting limit in sample T-1 at a concentration of 4,200 micrograms per liter (µg/L). BTEX was detected above the laboratory reporting limit in sample T-1 at concentrations of 300 µg/L, 3,200 µg/L, 1,300 µg/L, and 11,000 µg/L, respectively. MTBE was reported above the laboratory reporting limit in both samples T-1 and BT-1 at concentrations of 4,900 µg/L and 1,800 µg/L, respectively. Concentrations discovered during product line replacement activities indicated a potential release. Therefore, an Unauthorized Release Report was issued for the Site on 21 January 2003. Field activities are summarized in the URS *Product Line Removal and Upgrade Soil Sampling Report* dated January 31, 2003. A site map depicting sampling locations and a summary of laboratory analytical data are provided in Appendix A.

Additional groundwater investigation activities were carried out at the Site in March and May 2004. A total of 20 soil samples and four ground-water samples were collected during the additional investigation. GRO were detected above laboratory reporting limits in one of the 20 soil samples at a concentration of 350 mg/kg in sample SB-4-1.0. Toluene and total xylenes were detected above the laboratory reporting limits in one of the 20 soil samples collected at concentrations of 0.096 mg/kg and 0.016 mg/kg, respectively, in sample SB-1-5. MTBE was detected above laboratory reporting limits in three of the 20 soil samples at concentrations up to 0.027 mg/kg in samples SB-3-13 and SB-3-23.0. No other analytes were detected above their respective reporting limits.

GRO was detected above laboratory reporting limits in one of the four ground-water samples collected at a concentration of 88 µg/L in sample SB-3. Toluene was detected above the laboratory reporting limit in one of the four ground-water samples collected at a concentration of 1.4 µg/L in sample SB-2. MTBE was detected above the laboratory reporting limit in two of the four samples at a concentration of 34 µg/L in both samples SB-3 and SB-5. No other analytes were detected above their respective reporting limits. A *Site Investigation Report and Well Installation Work Plan* was submitted on behalf of Atlantic Richfield Company to ACEH on August 12, 2004. On August 30, 2004 URS received a letter from ACEH requesting additional fieldwork at the Site to complete the scope of work proposed in the original work plan and addendum. ACEH additionally requested depth-discrete ground-water sampling.

These requests by ACEH were addressed in fieldwork conducted in October 2004. URS collected twelve depth-discrete groundwater samples from six locations (HP-3 through HP-8). URS also collected 26 soil samples from six onsite borings (SB-7 through SB-8 and HP-3). Soil analytical results from this investigation are summarized as follows:

- GRO was detected above the laboratory reporting limit in five of the 26 samples at concentrations ranging from 0.31 mg/kg (SB-11-6.5) to 220 mg/kg (SB-11-11.5);

- Total Xylenes were detected above the laboratory reporting limit in two of the 26 samples at concentrations of 0.011 mg/kg (SB-8-29.5) and 0.012 mg/kg (SB-11-29.5); and
- MTBE was detected above the laboratory reporting limit in 10 of the 26 soil samples at concentrations ranging from 0.0069 mg/kg (SB-9-19.5) and 0.56 mg/kg (SB-9-13.5).

Groundwater analytical results from this investigation are summarized as follows:

- GRO was detected above the laboratory reporting limit in six of the 12 samples collected at concentrations ranging from 72 µg/L (HP-6-30) and 1,300 µg/L (HP-7-20);
- Benzene was detected above the laboratory reporting limit in three of the 12 samples at concentrations ranging from 0.64 µg/L (HP-3-35) to 1.6 µg/L (HP-4-18);
- Toluene was detected above the laboratory reporting limit in eight of the 12 samples collected at concentrations ranging from 7.0 µg/L (HP-5-18) to 38 µg/L (HP-4-18);
- Ethylbenzene was detected above the laboratory reporting limit in seven of the 12 samples at concentrations ranging from 0.94 µg/L (HP-5-18) to 5.4 µg/L (HP-4-18);
- Total Xylenes were detected above the laboratory reporting limit in eight of the 12 samples at concentrations ranging from 6.2 µg/L (HP-5-18) to 27 µg/L A(HP-4-18); and
- MTBE was detected above the laboratory reporting limit in seven of the 12 samples collected at concentrations ranging from 6.6 µg/L (HP-6-30) to 3,700 µg/L (HP-7-30).

Results of this subsurface investigation were reported by URS in the *Additional Site Investigation Report and Work Plan for Offsite Investigation* dated November 30, 2004.

On June 25-26, 2007, Stratus observed RSI Drilling (RSI) advance a total of eight soil borings in four distinct locations on the north side of Park Boulevard, north of the Site, to evaluate the off-site horizontal extent of petroleum hydrocarbon impacted soil and groundwater. Soil borings SB-12 through SB-15 and Hydropunch® borings HP-9 through HP-12 were installed along the north side of Park Boulevard. Each soil boring was advanced to a maximum depth of 30 feet bgs, with each Hydropunch® boring advanced to a maximum depth of 25 feet bgs.

MTBE was detected above the laboratory reporting limit of 0.005 mg/kg in two of the 16 soil samples collected June 25-26, 2007 at concentrations of 0.0087 mg/kg in boring sample SB12-15 and 0.0065 mg/kg in boring sample SB15-23. The remaining analytes were not detected above their respective reporting limits. GRO was detected above the laboratory reporting of 50 µg/L in three of the seven groundwater samples collected at concentrations of 51 µg/L in sample HP9-13, 59 µg/L in sample HP11-24, and 84 µg/L in sample HP12-25. Benzene was detected above the laboratory reporting limit of 0.50 µg/L in two of the seven groundwater samples collected at concentrations of 0.63 µg/L in sample HP11-24 and 0.80 µg/L in sample HP10-24. MTBE was detected above the laboratory reporting limit of 0.50 µg/L in each of the seven groundwater samples collected at concentrations ranging from 0.78 µg/L in sample HP10-16 to 110 µg/L in sample HP12-25. The remaining analytes were not detected above their respective reporting limits in the collected Hydropunch® samples. Results were reported by Broadbent in the *Offsite Soil and Ground-Water Investigation Report* dated August 29, 2007. Historical data following initial Site closure in 1997 including boring logs, geologic cross sections, boring location maps, and summarized soil and ground-water laboratory analytical results are provided in Appendix A.

Monitoring wells MW-11A, MW-11B, MW-12A, MW-12B, MW-13A and MW-13B were installed downgradient of the Site in March 2009. These wells were constructed as shallow wells (MW-11A, MW-12A, and MW-13A) and deeper wells (MW-11B, MW-12B, and MW-13B). The shallow wells were completed to total depths around 18 feet bgs and the deeper wells were advanced to approximately 30 feet bgs. The highest concentrations of petroleum compounds were detected in well MW-12B, directly across the street from the Site in the downgradient direction (Drawing 2).

Current hydrocarbon concentrations detected in Site monitoring wells are primarily MTBE, with the highest concentrations being detected in well MW-12B. Lower concentrations of MTBE are detected in wells MW-12A, MW-11B, MW-13A, and MW-13. This current data indicates that the extent of MTBE downgradient of the Site is not defined.

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 Merrit 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 groundwater flow is from east to west or from the Hayward Fault to the San Francisco Bay. Groundwater 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 groundwater in the upper aquifers may be flowing south, with the deeper aquifers, the Alameda Formation, moving north. The nearest natural drainage is Sausal Creek, located approximately 1.0 mile southeast of the Site. Sausal Creek flows generally northeast to southwest near the Site vicinity.

The Site elevation is approximately 127 feet above mean sea level. The water table fluctuates seasonally. Historically, depth-to-water measurements have ranged from approximately 1.2 to 10 feet bgs. Groundwater flow direction is generally to the northwest.

According to the *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report*, the City of Oakland does not have "any plans to develop local groundwater resources for drinking water purposes, because of existing or potential saltwater intrusion, contamination, or poor or limited quantity." However, the RWQCB'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 is typically underlain by gravel, gravelly clay, and silt fill from zero to five ft bgs. The Site consists primarily of silty clay and clayey silt with lenses of silty sand, sand, and gravelly sand from approximately five to 30 feet bgs. A large layer of fine sands and silty sands has been observed from approximately 15 to 25 feet bgs in the northwest portion of the Site.

4.0 PROPOSED SCOPE OF WORK

The purpose of the proposed groundwater investigation is to define the downgradient extent of MTBE in groundwater. This was identified as a data gap in order for the Site to be considered as a candidate for closure according to the Low Threat UST Closure Policy. A draft checklist for the Site based on the policy's criteria has been completed and a copy of this checklist in included in Appendix B. In order to achieve this goal, Broadbent is proposing to advance a total of six (6) cone penetration (CPT) borings at the locations shown in Drawing 3. As indicated in this drawing, the proposed CPT borings are located in the adjacent sports field for Oakland High School. Access to this field will need to be obtained prior to field work and work will likely need to be performed on the weekend in order to avoid the school while students are present. Additionally, advancing CPT borings will allow for a better lihtologic understanding in this area as well as allowing several discrete-depth groundwater samples to be collected. For these reasons, monitoring wells are not proposed in this area. If additional locations and/or procedures are determined to be necessary to carry out this investigation, internal ARC procedures including Management of Change (MOC) will necessary prior to continuing the investigation. If necessary, these procedures may cause some unforeseen project delays.

4.1 Preliminary Activities

Prior to initiating any field work, Broadbent will secure an access agreement with the Oakland Unified School District for the work being performed on the Oakland High School property. This access agreement will include necessary work hours and other terms of the agreement.

Broadbent will obtain the necessary drilling permits from Alameda County, prepare a site health and safety plan (HASP) for the proposed work, clear the Site for subsurface utilities, and provide 72-hour advance notification to ACEH prior to start of field activities. The utility clearance will include notifying Underground Service Alert (USA) of the pending work a minimum of 48 hours prior to initiating the field investigation, and securing the services of a private utility locating company to confirm the absence of underground utilities at the boring location. The borehole will be physically cleared to six and a half feet bgs using hand auger or air knife methods.

The Site-specific HASP will be prepared for use by personnel implementing the work plan. A copy of the HASP will be available on-site during work. The subcontractor(s) performing field activities will be provided with a copy of the HASP prior to initiating work. A safety tailgate meeting will also be conducted daily to review potential hazards and scope of work.

4.2 CPT Borings

A log based on CPT measurements will be created for each boring. Metal rods equipped with a cone penetrometer (cone) will be advanced into the subsurface at each proposed location. This cone will measure parameters in the subsurface. These parameters include tip friction, sleeve friction, and pore pressure. The CPT will measure these parameters in real time with depth, allowing for a vertical soil profile to be created based on these measurements. Depth to groundwater measurements will also be calculated suing CPT technology by performing pore dissipation tests (PDTs). A PDT is conducted when

the cone is halted at specific intervals. The variation in the penetration pore pressure with time is measure behind the tip of the cone. These logs will be created by the contractor and used in determining groundwater collection intervals. Soil borings will be completed under the supervision of a Broadbent field geologist.

CPT borings will be advanced to approximate depths of current deep wells at the Site (MW-12, MW-13B). These wells are approximately completed to approximately 30 feet bgs. However, the proposed CPT boring locations are located up a steep incline near the road. It appears that the elevation difference between MW-12A/12B and the high school field is approximately 20 to 30 feet. Therefore, the proposed CPT borings will be advanced to 55 to 60 feet bgs, and saturated intervals that are most closely likely connected to the depths of MW-12A/12B will be targeted for grab-groundwater sampling. Up to one shallow soil sample may be collected if site conditions warrant. These samples will be analyzed for GRO, BTEX, MTBE, and fuel oxygenates by EPA Method 8260B.

4.3 Grab-Groundwater Sampling

Two groundwater samples will be collected from each boring at the approximate intervals as described above. These intervals, based on the elevation difference between the Site and the high school field where the borings are proposed, will likely be around 35 feet bgs and 50 feet bgs. Higher permeability zones will be targeted for groundwater sampling.

Groundwater samples will be collected using a Hydropunch-type sampler equipped with a retrievable stainless steel or disposable PVC screen with an expendable tip. The groundwater sampler operates by advancing a 1 ¾ - inch hollow-push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired depth, the push rods are retracted, exposing the encased filter screen allowing groundwater to infiltrate hydrostatically from the formation to the inlet screen. A small diameter bailer is lowered through the push rod into the screen section for sample collection.

The Groundwater sample will be decanted into laboratory-supplied containers. Groundwater samples will be submitted under chain of custody protocol to Test America Laboratories, Inc. of Irvine, California, a state certified environmental laboratory. All groundwater samples will be analyzed for GRO, BTEX, MTBE, and fuel oxygenates by EPA Method 8260B.

Investigation-derived residuals will be temporarily accumulated onsite in 55-gallon, DOT-approved drums, pending characterization for proper management. Broadbent will coordinate the removal and transportation of surplus soils and liquids to appropriate California-regulated facilities.

4.4 Groundwater Investigation Report

Upon completion of field activities and receipt of a certified field data package (including copies of permits, field data sheets, and boring logs), Broadbent will prepare a Groundwater Investigation Report. The report will document the results of the investigation, field activities, copies of required permit(s), copies of field notes, soil boring and well logs, discussion of findings, and conclusions. Deviations from the Work Plan or data inconsistencies will be discussed in the report.

5.0 PROPOSED SCHEDULE

The schedule for the above-noted work shall proceed as follows:

- Groundwater Investigation – Upon approval of this work plan and obtaining the necessary permits and access agreements; and
- Groundwater Investigation Report – Within 60 following completion of fieldwork.

Due to the unknown amount of time necessary to successfully negotiate offsite access agreements with the school district, Broadbent suggests that strict calendar dates not be immediately established in the anticipated work plan approval letter, but instead be established after Broadbent immediately notifies ACEH that offsite access with private property owner has been secured. If a signed access agreement is not in place within 90 days following approval of this WorkPlan by the ACEH, assistance with access agreement negotiations from the ACEH will be requested.

6.0 LIMITATIONS

The findings presented in this document are based upon: observation of field personnel from previous consultants, the points investigated, and results of laboratory 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 on implied was made. This report has been prepared for the exclusive use of Atlantic Richfield Company. 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.

7.0 REFERENCES

ACEH, April 15 2003. *Fuel Leak Case No.RO0002526, Arco #2107, 3310 Park Blvd., Oakland, CA 94610.* Letter to Atlantic Richfield Company.

ACEH August 30, 2004. *Fuel Leak Case No.RO0002526, Arco #2107, Active Automobile Service Station at 3310 Park Blvd., Oakland, California.* Letter to Atlantic Richfield Company.

ACEH, January 10, 2005. *Fuel Leak Case No.RO0002526, ARCO #2107, Active Service Station at 3310 Park Blvd., Oakland, California – Response to Report and Workplan.* Letter to Atlantic Richfield Company.

ACEH, October 16, 2006. *Fuel Leak Case No.RO0002526, ARCO #2107, Active Service Station at 3310 Park Blvd., Oakland, California – Work Plan Approval.* Letter to Atlantic Richfield Company.

Broadbent & Associates, Inc., August 29, 2007. *Offsite Soil and Ground-Water Investigation Report, Atlantic Richfield Company Service Station #2107, 3310 Park Boulevard, Oakland, California; ACEH Case #RO0002526.*

California Regional Water Quality Control Board, San Francisco Bay Region, June 1999. *East Bay Plain Groundwater Basin, Beneficial Use Evaluation Report, Alameda and Contra Costa Counties, CA*.

Muir, Kenneth S., 1993. *Classification of Groundwater Recharge Potential in the East Bay Plain, Alameda County, California*. Alameda County Flood Control and Water Conservation District.

State Water Resources Control Board. April 17, 2012. *Low-Threat Underground Storage Tank Case Closure Policy*

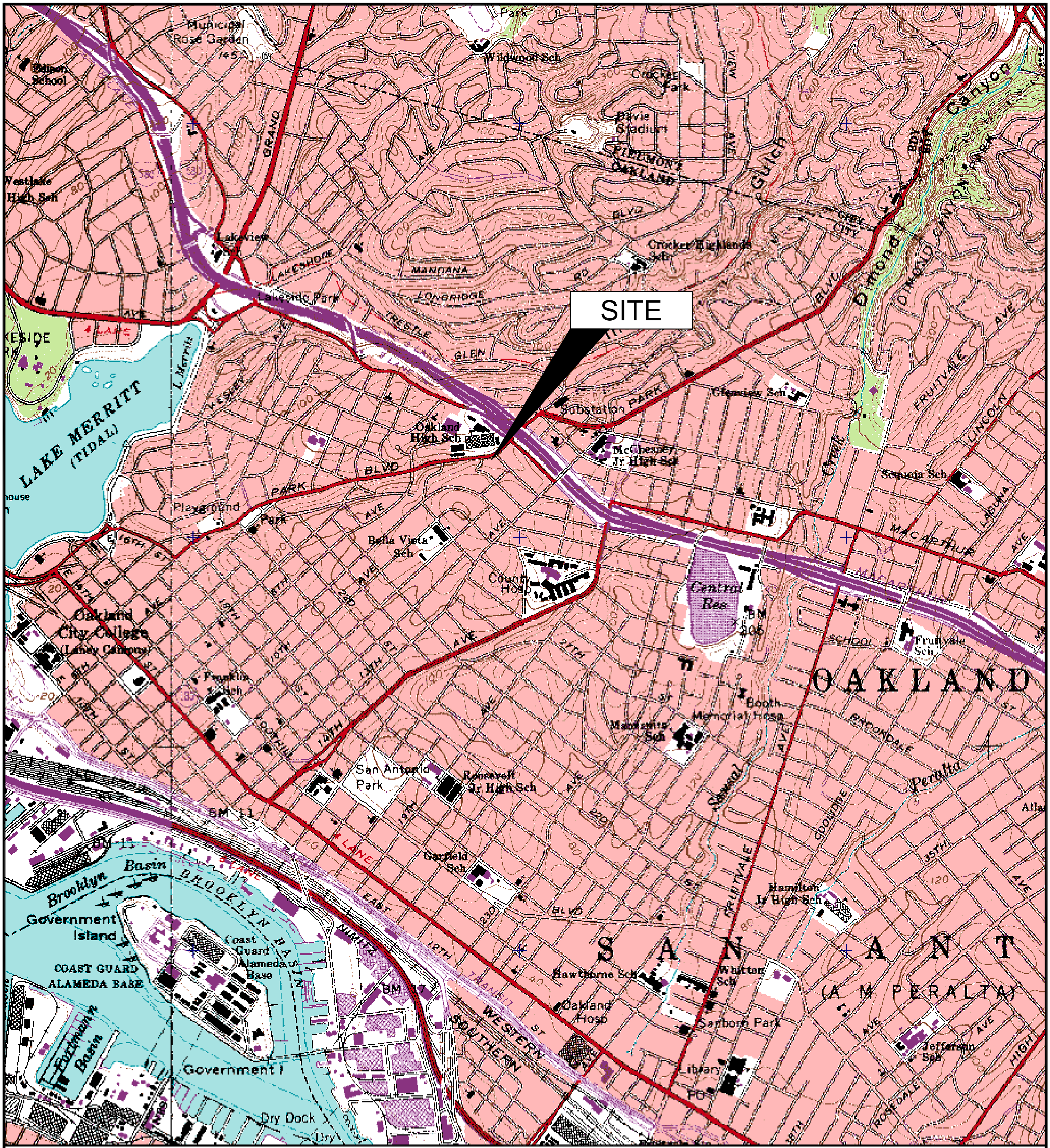
URS, October 29, 2003. *Addendum to Work Plan for Additional Investigation*. Letter to ACEH on behalf of Atlantic Richfield Company.

URS, March 11, 2004. *Second Addendum to Work Plan for Additional Investigation.* Letter to ACEH on behalf of Atlantic Richfield Company.

URS, August 12, 2004. *Site Investigation Report and Well Installation Workplan, Atlantic Richfield Company Service Station #2107, 3310 Park Boulevard, Oakland, California, Fuel Leak Case No. RO0002526, URS Project No. 38486908.0013601*. Letter to ACEH on behalf of Atlantic Richfield Company.

URS, November 30, 2004. *Additional Site Investigation Report and Workplan for Offsite Investigation, Atlantic Richfield Company Service Station #2107, 3310 Park Boulevard, Oakland, California, Alameda County Case No. RO-0002526.* Letter to ACEH on behalf of Atlantic Richfield Company.

URS, April 5, 2005. *Conduit and Well Survey Report and Work Plan Addendum for Offsite Investigation, Atlantic Richfield Company Service Station #2107, 3310 Park Boulevard, Oakland, California, Alameda County Case No. RO-0002526.* Letter to ACEH on behalf of Atlantic Richfield Company.



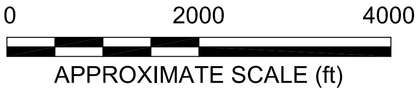
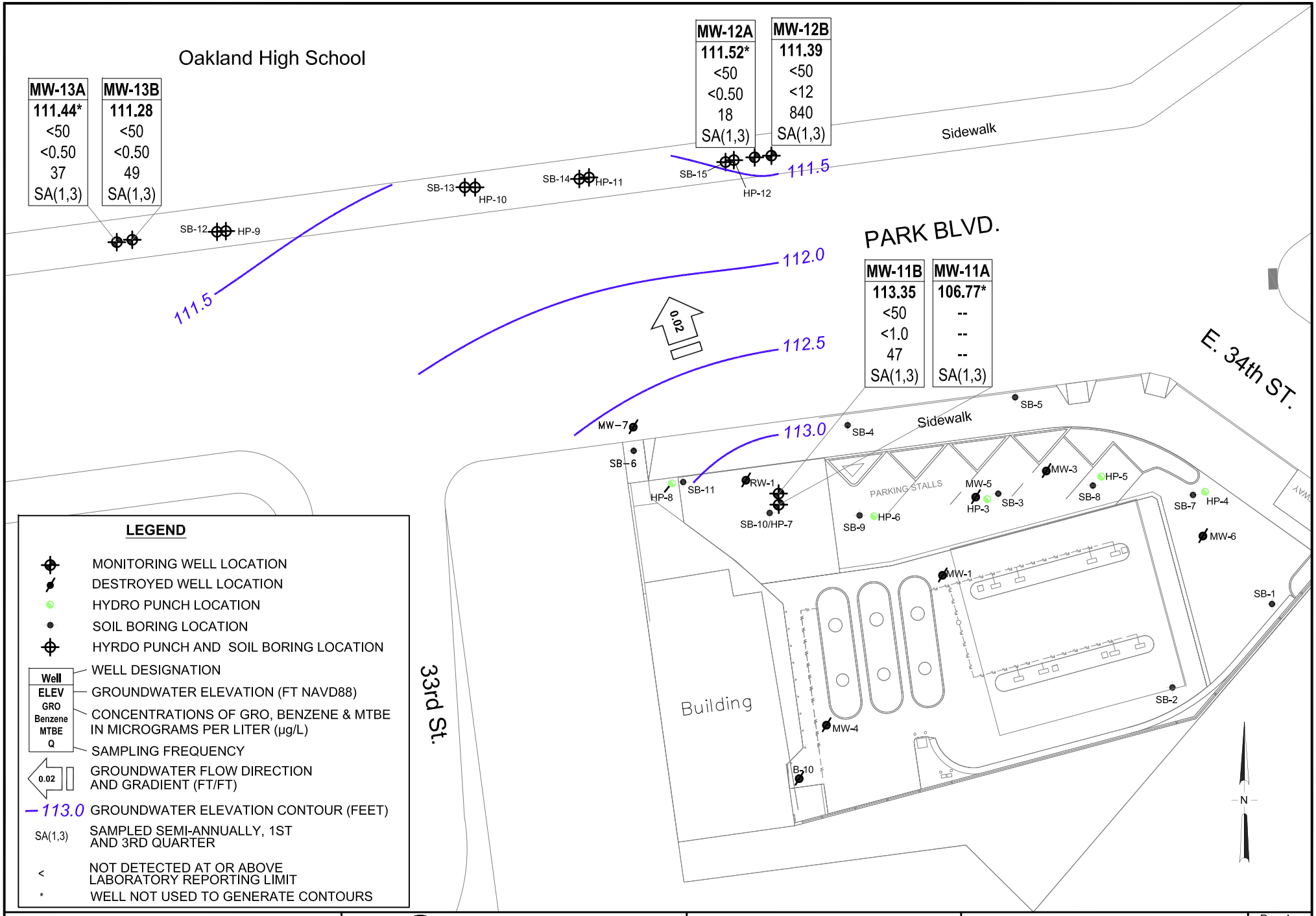


IMAGE SOURCE: USGS

BROADBENT 1324 Mangrove Ave., Suite 212 Chico, California 95926 Project No.: 06-88-614 Date: 10/02/2012	Station #2107 3310 Park Boulevard Oakland, California	Site Location Map	Drawing 1



0 30 60

SCALE (ft)

BROADBENT

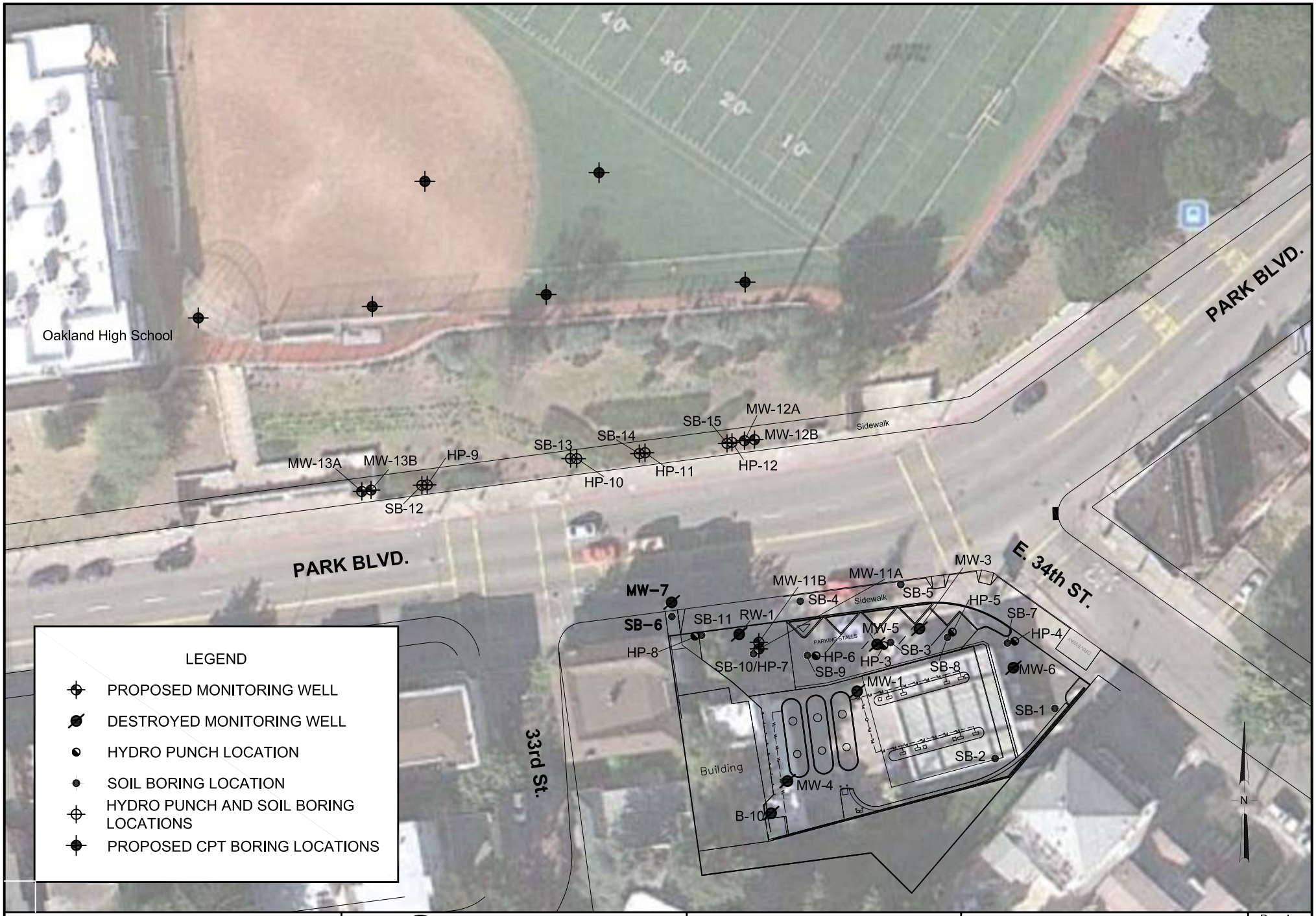
1324 Mangrove Ave., Suite 212
Chico, California 95926

Project No.: 06-88-614 Date: 9/17/2012

Station #2107
3310 Park Boulevard
Oakland, California

Groundwater Elevation Contours and Analytical Summary Map
January 16, 2012

Drawing
2



0 50 100
SCALE (ft)

BROADBENT
2000 Kirman Ave.
Reno, Nevada 89502
Project No.: 06-88-614 Date: 9/17/2012

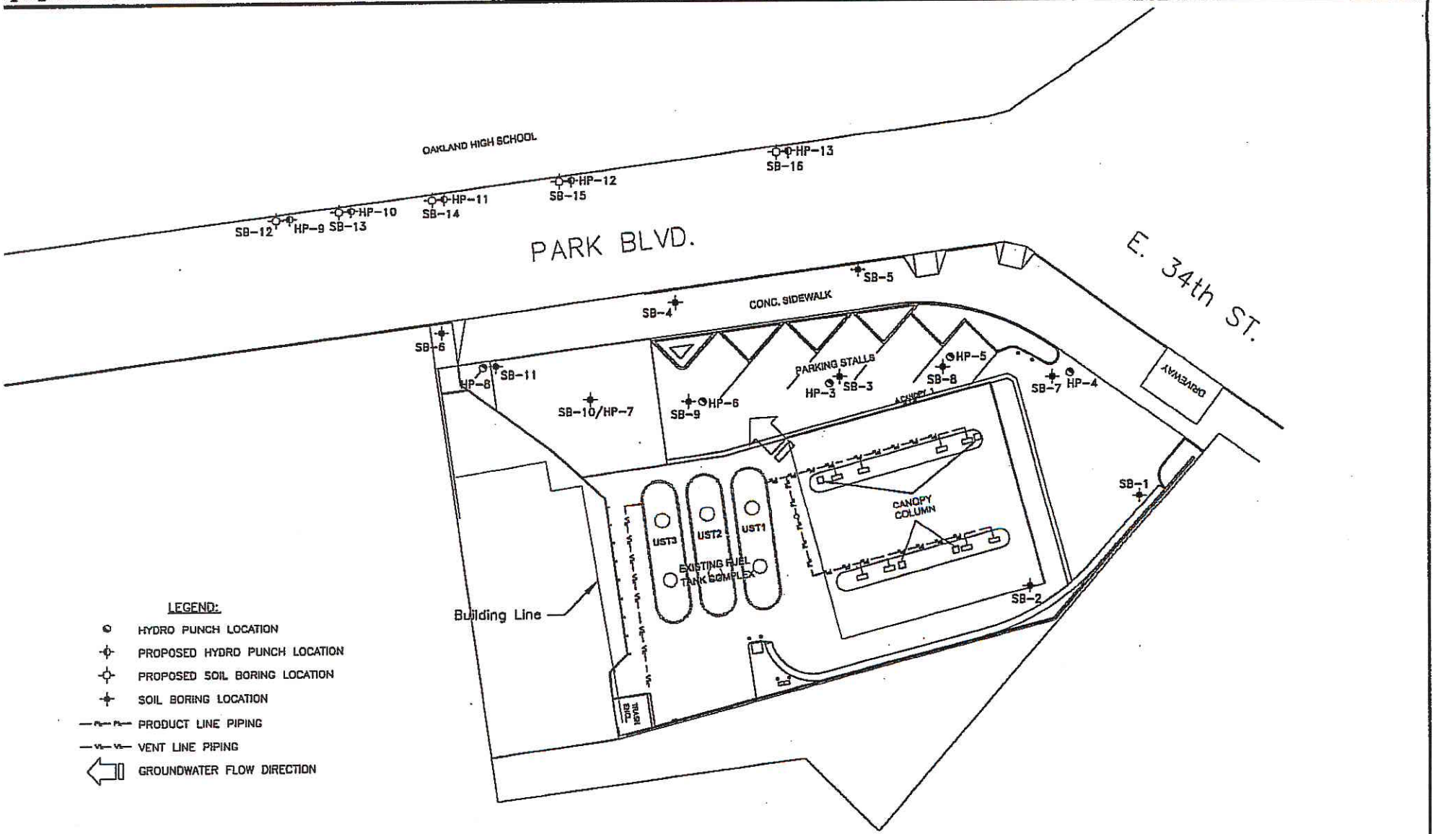
Station #2107
3310 Park Boulevard
Oakland, California

Proposed CPT Boring Locations

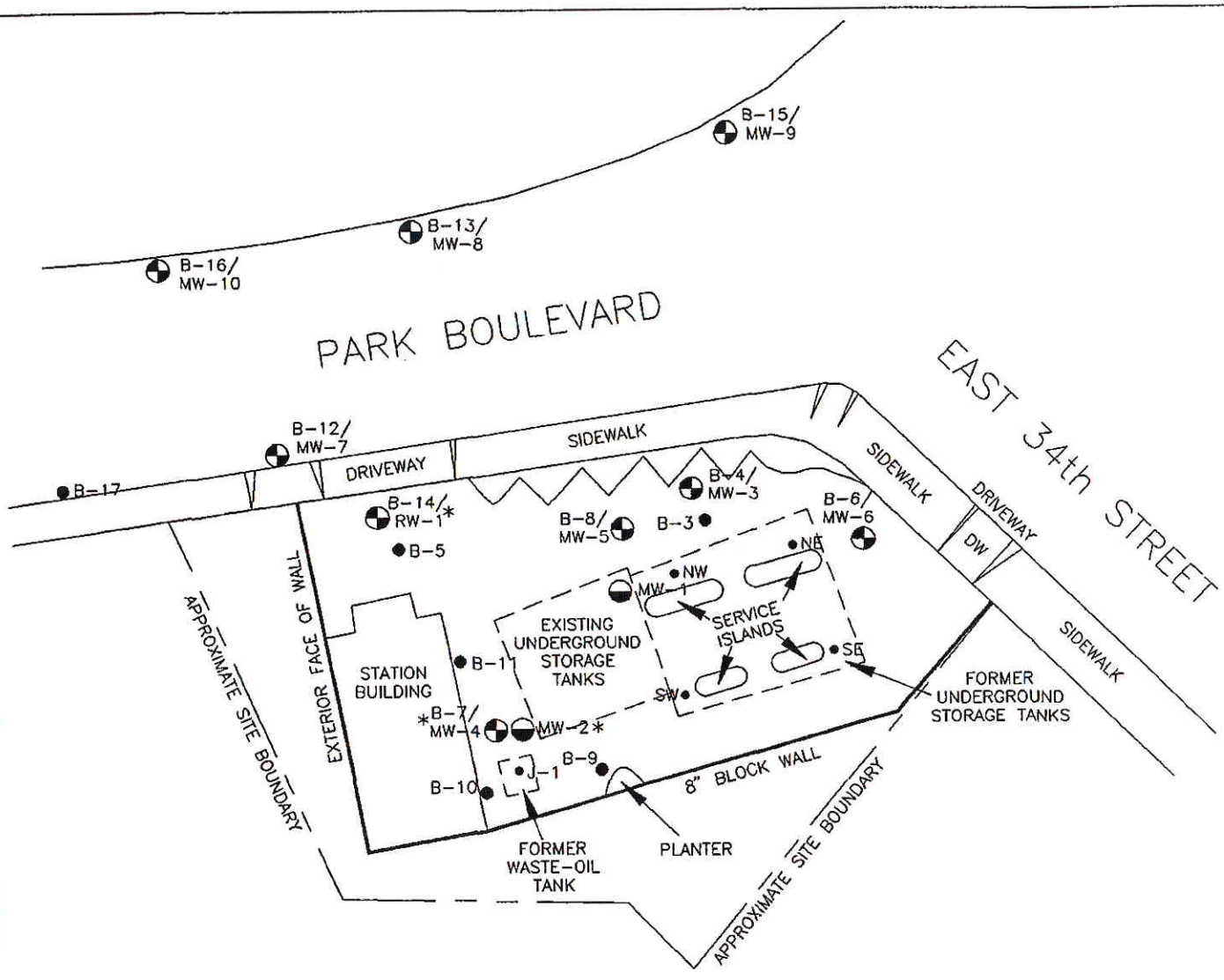
Drawing
3

APPENDIX A

HISTORICAL SOIL AND GROUND-WATER DATA (INCLUDES BORING LOGS, GEOLOGIC CROSS-SECTIONS, BORING LOCATION MAPS, AND SUMMARIZED SOIL AND GROUND-WATER LABORATORY ANALYTICAL RESULTS)



URS	Project No. 38486908 ARCO Service Station #2107 3310 Park Boulevard Oakland, California	PROPOSED OFFSITE SOIL BORING LOCATIONS AND PROPOSED ONSITE MONITORING WELL LOCATIONS	FIGURE 2



EXPLANATION

B-11 ● = Soil boring (RESNA, 04/90, 05/91, and 06/92, and 10/92)

B-16/MW-10 ◓ = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

B-16/RW-1 ◓ = Groundwater recovery well (RESNA, 10/92)

MW-2 ◒ = Tank pit observation well (S.C.S. Engineers, 01/87)

J-1 ● = Soil sample (S.C.S. Engineers, 01/87)

* = Well was not surveyed, location is approximate

N

Approximate Scale

40 20 0 40 80

feet

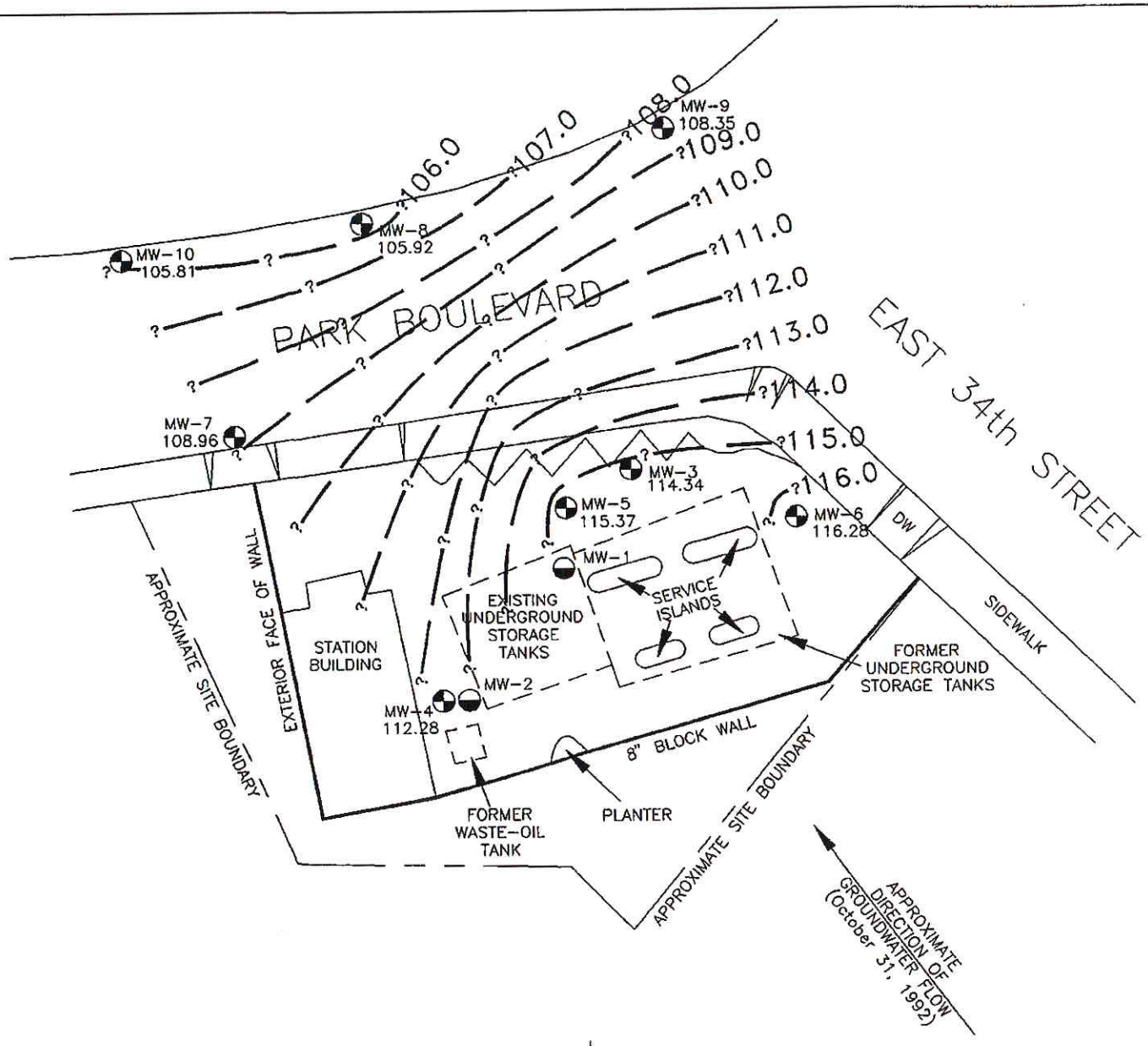
SOURCE: Modified from plan supplied by John E Koch, Land Surveyor, July 27, 1992.

RESNA
Working to Restore Nature

PROJECT 69021.15 69021-15

GENERALIZED SITE PLAN
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE
2



EXPLANATION

—116.0— = Line of equal elevation of groundwater in feet above mean sea level (MSL)

116.28 = Elevation of groundwater in feet above MSL, October 31, 1992

MW-10 ◓ = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

MW-2 ◒ = Tank pit observation well (S.C.S. Engineers, 01/87)

N

Approximate Scale

40 20 0 40 80

feet

SOURCE: Modified from plan supplied by John E. Koch, Land Surveyor, July 27, 1992.

RESNA
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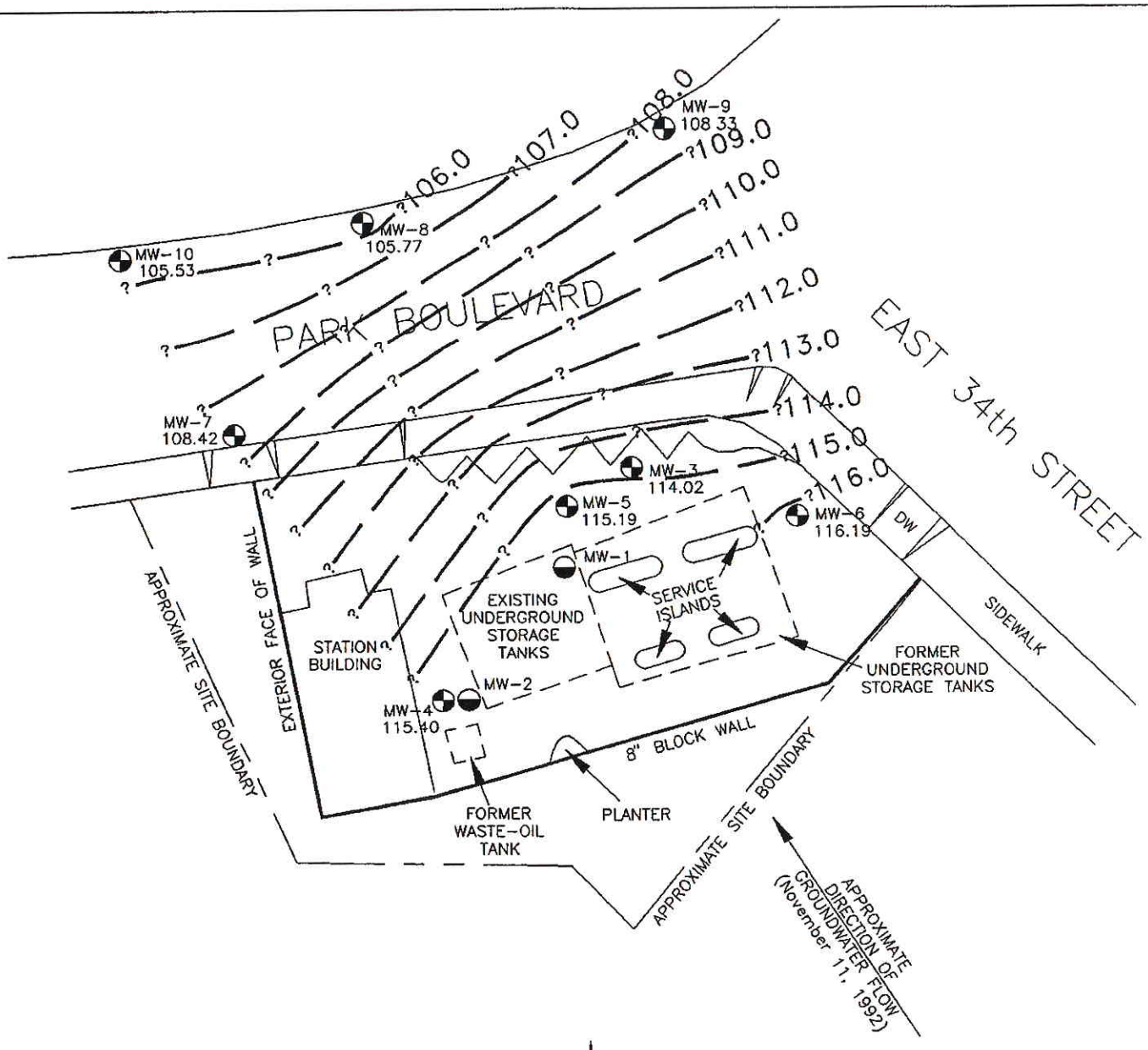
GROUNDWATER GRADIENT MAP
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE 3



EXPLANATION

—116.0— = Line of equal elevation of groundwater in feet above mean sea level (MSL)

116.19 = Elevation of groundwater in feet above MSL, November 11, 1992

MW-10 ◓ = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

MW-2 ◒ = Tank pit observation well (S.C.S. Engineers, 01/87)

N

Approximate Scale

40 20 0 40 80

feet

SOURCE. Modified from plan supplied by John E. Koch, Land Surveyor, July 27, 1992.

RESNA
Working to Restore Nature

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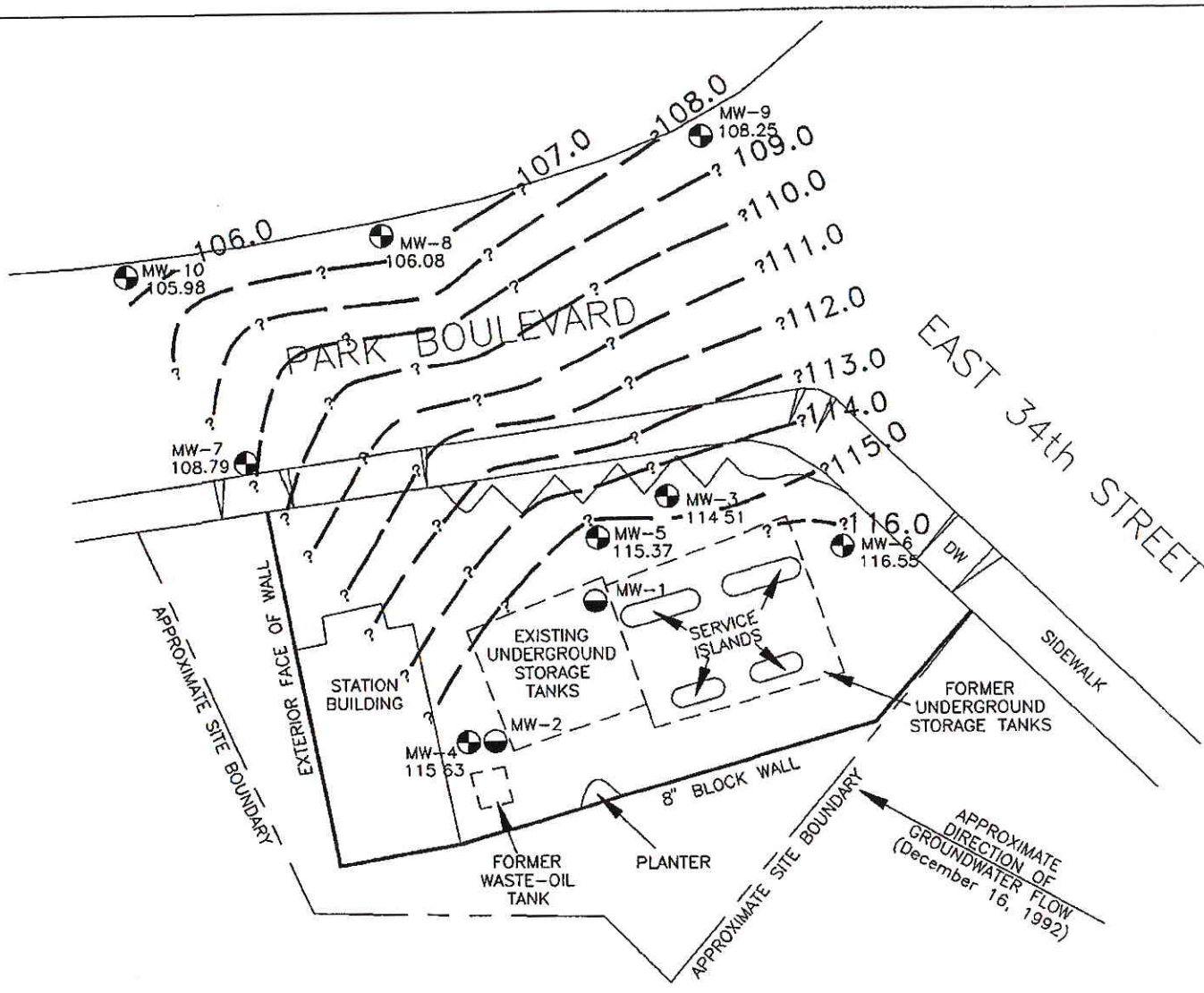
GROUNDWATER GRADIENT MAP
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE
4



EXPLANATION

—116.0— = Line of equal elevation of groundwater in feet above mean sea level (MSL)

116.55 = Elevation of groundwater in feet above MSL, December 16, 1992

RW-1* = This well was not used to interpret the groundwater gradient because it has not been surveyed.

MW-10 ⊕ = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

MW-2 ◒ = Tank pit observation well (S.C.S. Engineers, 01/87)

N

Approximate Scale

40 20 0 40 80

feet

SOURCE: Modified from plan supplied by John E. Koch, Land Surveyor, July 27, 1992

RESNA
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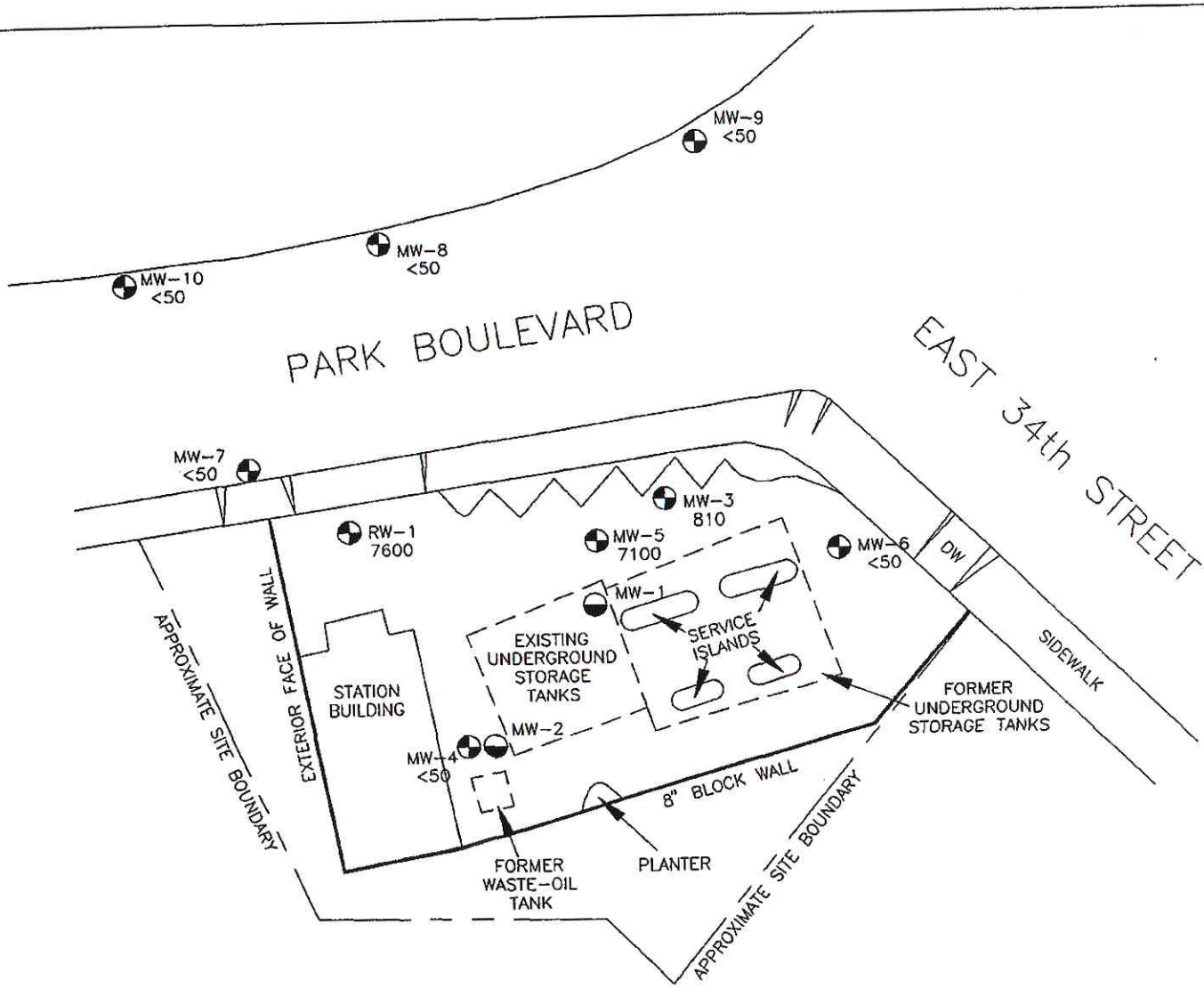
PROJECT 69021.15 90211S04

GROUNDWATER GRADIENT MAP
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE
5



EXPLANATION

7600 = Concentration of TPHg in groundwater in ppb, November 11, 1992

RW-1 = Groundwater recovery well (RESNA, 10/92)

MW-10 = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

MW-2 = Tank pit observation well (S.C.S. Engineers, 01/87)

Approximate Scale

40 20 0 40 80

feet

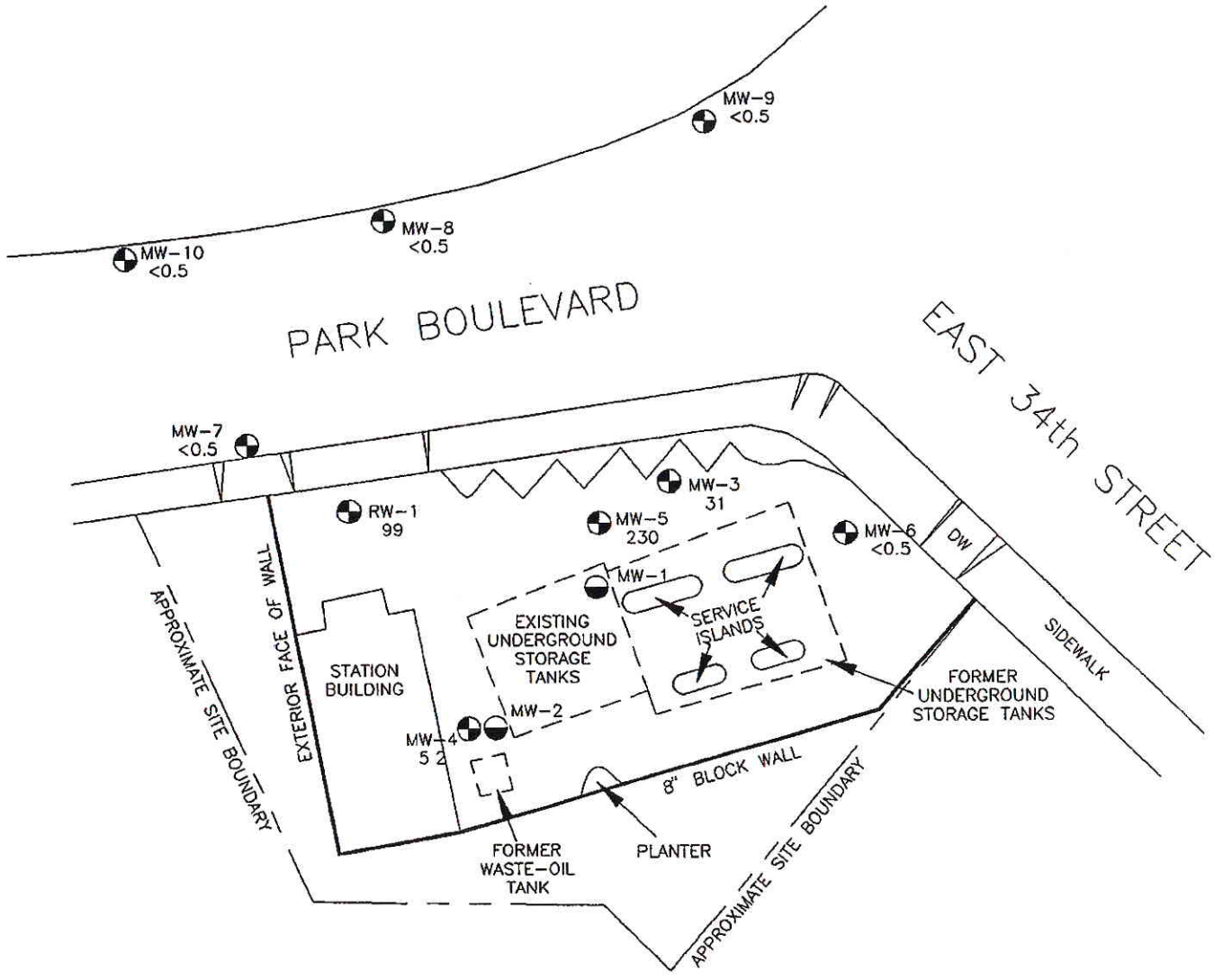
SOURCE: Modified from plan supplied by John E. Koch, Land Surveyor, July 27, 1992

RESNA
Working to Restore Nature

PROJECT 69021.15 90211504

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE 6



EXPLANATION

230 = Concentration of benzene in groundwater in ppb, November 11, 1992

RW-1 = Groundwater recovery well (RESNA, 10/92)

MW-10 = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

MW-2 = Tank pit observation well (S.C.S. Engineers, 01/87)

N

Approximate Scale

40 20 0 40 80

feet

SOURCE: Modified from plan supplied by John E. Koch, Land Surveyor, July 27, 1992.

RESNA
Working to Restore Nature

PROJECT 69021.15 90211504

BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE 7

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

ARCO Service Station #2107, 3310 Park Boulevard, Oakland, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
							GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-11A															
3/9/2009	P	120.85	16.00	20.00	12.41	108.44	1,000	1.5	<1.0	13	4.8	60	9.20	12.74	
6/18/2009	P		16.00	20.00	14.58	106.27	260	11	<5.0	6.8	<5.0	280	--	9.83	a
9/1/2009	P		16.00	20.00	8.75	112.10	1,400	28	20	61	6.7	340	1.40	7.84	
11/11/2009	--		16.00	20.00	10.40	110.45	--	--	--	--	--	--	1.55	12.5	
2/19/2010	P		16.00	20.00	8.90	111.95	1,300	20	17	25	<5.0	340	2.01	12.13	
7/23/2010	P		16.00	20.00	8.37	112.48	1,300	20	22	23	<5.0	350	1.11	12.0	
3/10/2011	P		16.00	20.00	--	--	250	<5.0	5.4	<5.0	<5.0	76	4.17	12.3	b, c (GRO)
8/8/2011	NP		16.00	20.00	14.88	105.97	730	7.3	16	11	<5.0	310	1.47	12.1	
1/16/2012	**P**		**16.00**	**20.00**	**14.08**	**106.77**	**--**	**--**	**--**	**--**	**--**	**--**	**1.43**	**13.77**	
MW-11B															
3/9/2009	P	121.31	26.00	30.00	7.33	113.98	280	1.3	1.3	7.6	<0.50	240	9.56	7.14	
6/18/2009	P		26.00	30.00	7.38	113.93	130	<5.0	<5.0	<5.0	<5.0	200	--	6.96	a
9/1/2009	P		26.00	30.00	7.66	113.65	69	<5.0	<5.0	<5.0	<5.0	210	1.01	7.01	
11/11/2009	P		26.00	30.00	7.70	113.61	55	<5.0	<5.0	<5.0	<5.0	200	0.38	6.7	
2/19/2010	P		26.00	30.00	7.59	113.72	68	<2.5	<2.5	<2.5	<2.5	180	2.38	7.44	
7/23/2010	P		26.00	30.00	7.42	113.89	<50	<2.5	<2.5	<2.5	<2.5	110	1.57	7.02	
3/10/2011	P		26.00	30.00	7.25	114.06	<50	<1.0	<1.0	<1.0	<1.0	58	1.86	6.8	
8/8/2011	P		26.00	30.00	7.24	114.07	<50	<1.0	<1.0	<1.0	<1.0	60	1.33	7.8	
1/16/2012	**P**		**26.00**	**30.00**	**7.96**	**113.35**	**<50**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**47**	**4.33**	**8.8**	
MW-12A															
3/9/2009	P	120.64	13.00	18.00	8.70	111.94	<50	<0.50	<0.50	<0.50	<0.50	41	4.62	6.76	
6/18/2009	P		13.00	18.00	8.58	112.06	<50	<1.0	<1.0	<1.0	<1.0	40	--	7.92	a
9/1/2009	P		13.00	18.00	9.21	111.43	<50	<0.50	<0.50	<0.50	<0.50	39	1.06	6.97	
11/11/2009	P		13.00	18.00	9.15	111.49	<50	<1.0	<1.0	<1.0	<1.0	41	0.51	6.2	
2/19/2010	P		13.00	18.00	9.13	111.51	<50	<0.50	<0.50	<0.50	<0.50	32	0.38	6.58	
7/23/2010	P		13.00	18.00	9.18	111.46	<50	<0.50	<0.50	<0.50	<0.50	34	0.68	7.6	
3/10/2011	P		13.00	18.00	8.43	112.21	<50	<0.50	<0.50	<0.50	<0.50	27	1.66	6.7	
8/8/2011	P		13.00	18.00	8.33	112.31	<50	<0.50	<0.50	<0.50	<0.50	32	3.40	7.5	
1/16/2012	**P**		**13.00**	**18.00**	**9.12**	**111.52**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**18**	**0.84**	**7.32**	

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

ARCO Service Station #2107, 3310 Park Boulevard, Oakland, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
							GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-12B															
3/9/2009	P	120.84	27.00	30.00	14.89	105.95	<50	<0.50	0.55	<0.50	<0.50	150	5.87	7.74	
6/18/2009	P		27.00	30.00	13.51	107.33	140	<2.5	<2.5	<2.5	<2.5	380	--	8.60	a
9/1/2009	P		27.00	30.00	9.54	111.30	89	<10	<10	<10	<10	460	0.99	6.88	
11/11/2009	P		27.00	30.00	11.53	109.31	<50	<5.0	<5.0	<5.0	<5.0	600	1.00	6.46	
2/19/2010	P		27.00	30.00	11.07	109.77	52	<5.0	<5.0	<5.0	<5.0	620	3.32	6.89	
7/23/2010	P		27.00	30.00	10.75	110.09	<50	<10	<10	<10	<10	510	1.70	7.54	
3/10/2011	P		27.00	30.00	10.05	110.79	<50	<10	<10	<10	<10	700	2.71	6.9	
8/8/2011	P		27.00	30.00	9.35	111.49	<50	<10	<10	<10	<10	510	1.70	6.9	
1/16/2012	**P**		**27.00**	**30.00**	**9.45**	**111.39**	**<50**	**<12**	**<12**	**<12**	**<12**	**840**	**3.36**	**7.0**	
MW-13A															
3/9/2009	P	114.55	11.50	16.50	9.53	105.02	<50	<0.50	<0.50	<0.50	<0.50	13	9.39	7.64	
6/18/2009	P		11.50	16.50	2.88	111.67	<50	<0.50	<0.50	<0.50	<0.50	23	--	7.21	a
9/1/2009	P		11.50	16.50	3.31	111.24	<50	<0.50	<0.50	<0.50	<0.50	34	0.96	6.90	
11/11/2009	P		11.50	16.50	3.66	110.89	<50	<0.50	<0.50	<0.50	<0.50	21	1.79	6.5	
2/19/2010	P		11.50	16.50	3.43	111.12	<50	<0.50	<0.50	<0.50	<0.50	15	0.92	6.69	
7/23/2010	P		11.50	16.50	3.22	111.33	<50	<0.50	<0.50	<0.50	<0.50	24	1.4	7.0	
3/10/2011	P		11.50	16.50	2.57	111.98	<50	<0.50	<0.50	<0.50	<0.50	12	0.76	6.7	
8/8/2011	P		11.50	16.50	8.43	106.12	<50	<0.50	<0.50	<0.50	<0.50	29	3.59	7.2	
1/16/2012	**P**		**11.50**	**16.50**	**3.11**	**111.44**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**37**	**1.25**	**7.08**	
MW-13B															
3/9/2009	P	114.75	18.50	22.50	2.96	111.79	<50	<0.50	<0.50	<0.50	<0.50	13	8.44	6.99	
6/18/2009	P		18.50	22.50	2.85	111.90	<50	<0.50	<0.50	<0.50	<0.50	12	--	6.92	a
9/1/2009	P		18.50	22.50	3.36	111.39	<50	<0.50	<0.50	<0.50	<0.50	17	0.96	7.29	
11/11/2009	P		18.50	22.50	3.49	111.26	<50	<0.50	<0.50	<0.50	<0.50	21	2.45	6.39	
2/19/2010	P		18.50	22.50	3.10	111.65	<50	<0.50	<0.50	<0.50	<0.50	19	1.46	6.50	
7/23/2010	P		18.50	22.50	2.74	112.01	<50	<0.50	<0.50	<0.50	<0.50	15	1.16	7.19	
3/10/2011	P		18.50	22.50	3.72	111.03	<50	<0.50	<0.50	<0.50	<0.50	31	0.72	6.6	
8/8/2011	P		18.50	22.50	2.48	112.27	<50	<0.50	<0.50	<0.50	<0.50	32	1.51	6.8	
1/16/2012	**P**		**18.50**	**22.50**	**3.47**	**111.28**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**49**	**0.86**	**6.8**	

Symbols & Abbreviations:
-- = Not measured/applicable/analyzed/sampled
µg/L = Micrograms per liter
DO = Dissolved oxygen
DTW = Depth to water in ft below TOC
GRO = Gasoline range organics
mg/L = Milligrams per liter
MTBE = Methyl tert butyl ether
< = Not detected at or above specified laboratory reporting limit
NP = Well not purged prior to sampling
P = Well purged prior to sampling
TOC = Top of casing in ft above NAVD88 datum

Footnotes:
a = DO meter not working
b = Well full of water
c = Quantitation of unknown hydrocarbons(s) in sample based on gasoline

Notes:
Values for DO and pH were obtained through field measurements

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #2107, 3310 Park Boulevard, Oakland, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-11A									
3/9/2009	--	<20	60	<1.0	<1.0	<1.0	--	--	
6/18/2009	<3,000	<100	280	<5.0	<5.0	<5.0	<5.0	<5.0	
9/1/2009	<3,000	<100	340	<5.0	<5.0	5.3	<5.0	<5.0	
2/19/2010	<3,000	<100	340	<5.0	<5.0	6.1	<5.0	<5.0	
7/23/2010	<3,000	<100	350	<5.0	<5.0	6.5	<5.0	<5.0	
3/10/2011	<6,000	<100	76	<5.0	<5.0	<5.0	<5.0	<5.0	
8/8/2011	<3,000	<100	310	<5.0	<5.0	<5.0	<5.0	<5.0	
MW-11B									
3/9/2009	--	<10	240	<0.50	<0.50	3.1	--	--	
6/18/2009	<3,000	<100	200	<5.0	<5.0	<5.0	<5.0	<5.0	
9/1/2009	<3,000	<100	210	<5.0	<5.0	<5.0	<5.0	<5.0	
11/11/2009	<3,000	<100	200	<5.0	<5.0	<5.0	<5.0	<5.0	
2/19/2010	<1,500	<50	180	<2.5	<2.5	<2.5	<2.5	<2.5	
7/23/2010	<1,500	<50	110	<2.5	<2.5	<2.5	<2.5	<2.5	
3/10/2011	<600	<20	58	<1.0	<1.0	<1.0	<1.0	<1.0	
8/8/2011	<600	<20	60	<1.0	<1.0	<1.0	<1.0	<1.0	
1/16/2012	**<600**	**33**	**47**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	
MW-12A									
3/9/2009	--	<10	41	<0.50	<0.50	<0.50	--	--	
6/18/2009	<600	<20	40	<1.0	<1.0	<1.0	<1.0	<1.0	
9/1/2009	<300	<10	39	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<600	<20	41	<1.0	<1.0	<1.0	<1.0	<1.0	
2/19/2010	<300	<10	32	<0.50	<0.50	<0.50	<0.50	<0.50	
7/23/2010	<300	<10	34	<0.50	<0.50	<0.50	<0.50	<0.50	
3/10/2011	<300	<10	27	<0.50	<0.50	<0.50	<0.50	<0.50	
8/8/2011	<300	<10	32	<0.50	<0.50	<0.50	<0.50	<0.50	
1/16/2012	**<300**	**19**	**18**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-12B									
3/9/2009	--	<10	150	<0.50	<0.50	<0.50	--	--	
6/18/2009	<1,500	<50	380	<2.5	<2.5	<2.5	<2.5	<2.5	

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #2107, 3310 Park Boulevard, Oakland, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-12B Cont.									
9/1/2009	<6,000	<200	460	<10	<10	<10	<10	<10	
11/11/2009	<3,000	<100	600	<5.0	<5.0	<5.0	<5.0	<5.0	
2/19/2010	<3,000	<100	620	<5.0	<5.0	5.1	<5.0	<5.0	
7/23/2010	<6,000	<200	510	<10	<10	<10	<10	<10	
3/10/2011	<6,000	<200	700	<10	<10	<10	<10	<10	
8/8/2011	<6,000	<200	510	<10	<10	<10	<10	<10	
1/16/2012	**<7,500**	**320**	**840**	**<12**	**<12**	**<12**	**<12**	**<12**	
MW-13A									
3/9/2009	--	<10	13	<0.50	<0.50	<0.50	--	--	
6/18/2009	<300	<10	23	<0.50	<0.50	<0.50	<0.50	<0.50	
9/1/2009	<300	<10	34	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<300	<10	21	<0.50	<0.50	<0.50	<0.50	<0.50	
2/19/2010	<300	<10	15	<0.50	<0.50	<0.50	<0.50	<0.50	
7/23/2010	<300	<10	24	<0.50	<0.50	<0.50	<0.50	<0.50	
3/10/2011	<300	<10	12	<0.50	<0.50	<0.50	<0.50	<0.50	
8/8/2011	<300	<10	29	<0.50	<0.50	<0.50	<0.50	<0.50	
1/16/2012	**<300**	**26**	**37**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-13B									
3/9/2009	--	<10	13	<0.50	<0.50	<0.50	--	--	
6/18/2009	<300	<10	12	<0.50	<0.50	<0.50	<0.50	<0.50	
9/1/2009	<300	<10	17	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<300	<10	21	<0.50	<0.50	<0.50	<0.50	<0.50	
2/19/2010	<300	<10	19	<0.50	<0.50	<0.50	<0.50	<0.50	
7/23/2010	<300	<10	15	<0.50	<0.50	<0.50	<0.50	<0.50	
3/10/2011	<300	<10	31	<0.50	<0.50	<0.50	<0.50	<0.50	
8/8/2011	<300	<10	32	<0.50	<0.50	<0.50	<0.50	<0.50	
1/16/2012	**<300**	**19**	**49**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	

Symbols & Abbreviations:
-- = Not analyzed/applicable/measurable
< = Not detected above reported detection limit
1,2-DCA = 1,2-Dichloroethane
µg/L = Micrograms per Liter
DIPE = Diisopropyl ether
EDB = 1, 2-Dibromoethane
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether
TAME = tert-Amyl methyl ether
TBA = tert-Butyl alcohol

Notes:
All volatile organic compounds analyzed using EPA Method 8260B

Table 3. Historical Groundwater Gradient - Direction and Magnitude

ARCO Service Station #2107, 3310 Park Boulevard, Oakland, CA

Date Measured	Approximate Gradient Direction	Approximate Gradient Magnitude (ft/ft)
3/9/2009	Northeast	0.06
6/18/2009	Northeast	0.06
9/1/2009	North-Northwest	0.03
11/11/2009	North	0.05
2/19/2010	North	0.03
7/23/2010	North	0.05
3/10/2011	North-Northwest	0.04
8/8/2011	North	0.03
1/16/2012	**North-Northwest**	**0.02**

Treatment and Disposal of Affected Material:

Material	Amount (include units)	Action (Treatment or Disposal w/destination)	Date
Tank	3-10000gal	disposed/unknown	1/12/87
Tank	1-550gal	disposed/unknown	1/12/87
Piping	unknown		
Free Product	unknown		
Soil	70 cubic yards	disposed/Redwood Landfill	4/1992
Groundwater	85,000 gallons	disposed/H & H Environmental	2/1992
Groundwater	19,450 gallons	disposed/Gibson Oil	3-4/1992
Barrels			

Maximum Documented Contaminant Concentrations - - Before and After Cleanup

Contaminant	Soil (ppm) Before[1]	Soil (ppm) After[2]	Water (ppb) Before[3]	Water (ppb) After[4]
TPH (Gas)	<10	1,700	22,000	200
TPH (Diesel)	140	2500	4800	250
Benzene	0.79	0.18	1500	1.5
Toluene	5.8	0.10	820	0.51
Ethyl benzene	2.5	25	310	<0.5
Xylenes	14	130	1800	<0.5
Oil & Grease	NA	130	<5000	NA
Heavy metals	NA	*	NA	NA
Other - organic lead	NA	NA	200	NA

* Laboratory analysis of soil samples collected from boring B7, detected the heavy metals cadmium, chromium, lead and zinc, at apparent geogenic concentrations of 0.565, 18.3, 9.95 and 49.8 mg/kg, respectively.

NA=Not analyzed

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[1] "Before" concentrations were detected in sample J-1, collected from beneath the waste-oil UST, with the exception of TPHg. Also detected in sample J-1: acetone 2.4 mg/kg; 2-butanone 0.065 mg/kg; tetrachloroethene 0.010 mg/kg; and ethylbenzene 2.5 mg/kg. Non-detectable concentrations of TPHg were found in the four samples apparently collected from the sidewalls of the gasoline UST excavation.

[2] "After" concentrations were detected in sample S-9-B14, collected from boring B14 on 10/20/92 at a depth of 9' bgs, with the exception of benzene, O&G and toluene. Benzene and O&G concentrations were detected in sample S-8-B11, collected from boring B11, at a depth of 8 feet bgs. Toluene concentrations were detected in sample S-5-B8, collected from boring B-8, at a depth of 5 feet bgs.

[3] "Before" TPHg, TPHd and BTEX concentrations were detected in groundwater samples collected from MW-5 on 7/16/90, 6/30/92, 7/24/91, 7/24/91, 10/31/91 and 10/25/90, respectively.

[4] "After" TPHg, TPHd concentrations were detected from water sample collected from well MW-3 on 11/20/95. Benzene concentration was detected from water sample collected from MW-2 on 11/20/95. Toluene concentration was detected from water sample collected from MW-5 on 11/20/95.

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Subsurface Environmental Investigation
ARCO Station 2107, Oakland, California

December 30, 1992
69021.10

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
ARCO Station 2107
Oakland, California
(Page 1 of 3)

Sample-Date	TPHg	TPHd	B	T	E	X	TOG	BNAs	VOCs	Cd	Cr	Pb	Zn
Former Waste-Oil UST Pit-January 1987													
*J-1	NA	140	0.79	5.8	2.5	14.0	NA	NA	**	NA	NA	NA	NA
Former Gasoline UST Pit-January 1987													
*S.E.	<10	<10	NA	NA	NA	NA	<10	NA	NA	NA	NA	NA	NA
*S.W.	<10	<10	NA	NA	NA	NA	<10	NA	NA	NA	NA	NA	NA
*N.E.	<10	<10	NA	NA	NA	NA	<10	NA	NA	NA	NA	NA	NA
*N.W.	<10	<10	NA	NA	NA	NA	<10	NA	NA	NA	NA	NA	NA
Borings-April 1990													
S-5-B3	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-10-B3	<2.0	NA	<0.050	<0.050	<0.050	0.057	NA	ND	ND	ND	ND	ND	ND
S-20-B3	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-10-B4	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-5-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-7-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-13-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
S-20-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
Borings-July 1990													
S-8.5-B7	<2.0	110	<0.050	<0.050	<0.050	<0.050	<50	ND	ND	0.507	18.3	9.48	41.8
S-14-B7	<2.0	110	<0.050	<0.050	<0.050	<0.050	90	ND	ND	0.565	16.8	9.95	49.8
S-5-B8	<2.0	NA	<0.050	0.10	0.064	0.29	NA	ND	ND	ND	ND	ND	ND
S-7.5-B8	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	NA	NA	NA	NA	<1.0*	NA
S-14.5-B8	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA	ND	ND	ND	ND	ND	ND
Borings-May 1991													
S-15.5-B9	<1.0	<1.0	<0.005	<0.005	<0.005	0.028	<30	NA	NA	NA	NA	NA	NA
S-21-B9	<1.0	<1.0	<0.008	<0.005	<0.005	0.033	<30	NA	NA	NA	NA	NA	NA
S-25.5-B9	<1.0	<1.0	<0.005	<0.005	<0.005	0.007	<30	NA	NA	NA	NA	NA	NA
S-5-B10	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA
S-10-B10	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA
S-15.5-B10	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA
S-20.5-B10	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA

See notes on page 3 of 3.

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TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
ARCO Station 2107
Oakland, California
(Page 2 of 3)

Sample	TPHg	TPHd	B	T	E	X	TOG	BNAs	VOCs	Cd	Cr	Pb	Zn
Borings (continued)													
S-8-B11	90	43	0.18	0.050	0.16	1.1	130	NA	NA	NA	NA	NA	NA
S-12.5-B11	<1.0	3.1	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA
S-20-B11	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	<30	NA	NA	NA	NA	NA	NA
Borings-August 1991													
S-4.5-B12	<1.0	3.3	<0.005	<0.005	<0.005	<0.005	NA	NA	NA	NA	NA	NA	NA
S-10-B12	<1.0	1.2	<0.005	<0.005	<0.005	<0.005	NA	NA	NA	NA	NA	NA	NA
S-5-B13	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	NA	NA	NA	NA	NA	NA	NA
Borings-October 1992													
S-9-B14	1,700	2,500	<0.0050	<0.0050	25	130	NA	NA	NA	NA	NA	NA	NA
S-11-B14	2.5	<1.0	0.023	0.0050	0.12	0.31	NA	NA	NA	NA	NA	NA	NA
S-15-B14	140	230	<0.0050	<0.0050	2.0	10	NA	NA	NA	NA	NA	NA	NA
S-20-B14	3.6	2.4	0.043	<0.0050	0.16	0.26	NA	NA	NA	NA	NA	NA	NA
Borings-June 1992													
S-5-B15	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-8-B15	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-9.5-B15	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-31.5-B15	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-5-B16	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-25-B16	<1.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
Composite Stockpile													
S-0823-SP(a-d)	<1.0	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA	NA	NA	NA	NA	NA
S-0615-SP A-B6		24	<0.050	0.12	0.12	0.11	NA	NA	NA	NA	NA	NA	NA
SP-1019-A-D	55	28	0.26	0.24	0.92	3.4	NA	NA	NA	NA	NA	NA	NA
TTLC										100	2,500	1,000	5,000

See notes on page 3 of 3.

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
ARCO Station 2107
Oakland, California
(Page 3 of 3)

Results are in parts per million (ppm)
TPHg = total petroleum hydrocarbons as gasoline
B: benzene T: toluene E: ethylbenzene X: total xylenes
BNAs = base neutral and acid extractables including polynuclear aromatics
(ᶜ = naphthalene, ᵇ = 2-methylnaphthalene)
VOCs = volatile organics except for BTEX
< = Below indicated laboratory reporting limit
* = Soil sampling performed by SCS during UST removal and replacement (SCS, January 22, 1987).
** Results of VOC analysis:
2,400 ppb Acetone
65 ppb 2-Butone
790 ppb Benzene
10 Tetrachloroethene
5,800 ppb Toluene
2,500 ppb ethylbenzene
14,000 ppb Total xylenes
Nondetectable for 33 additional VOCs.

Estimated Concentrations of Tentatively Identified Extra Compounds:
2200 ppb 2-methylbutane
790 ppb methylcyclopentane
770 ppb methylcyclohexane
670 ppb 3-methylhexane
800 ppb 2,5,6-trimethyloctane

NA = Not Analyzed
* = Organic lead by DHS Method.
TTLC = Total threshold limit concentration values (Title 22 of the California Administrative Code, January 1988)

Sample Number explanation:
S-7.5-B8
S = Soil sample
7.5 = Sample depth in feet below ground surface
B8 = Boring number

Table B-2
Historical Groundwater Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, TEPH as Diesel, and Oil and Grease)

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TEPH as Diesel (ppb)	Oil and Grease (ppb)
MW-1	08/10/94	250	21	3.7	0.8	10	NA	NA
	11/21/94	87	8.4	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	3.2	5.1	<0.50	2.0	NA	NA
	08/23/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	11/20/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
MW-2	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	13	2.3	<0.5	<0.5	1.7	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	11/20/95	<50	1.5	<0.50	<0.50	<0.50	NA	NA
MW-3	07/16/90	4,000	430	8.7	27	85	NA	NA
	10/25/90	5,400	800	6.6	25	30	NA	NA
	01/23/91	6,900	760	12	91	29	NA	NA
	04/24/91	4,300	800	<120	<120	<120	NA	NA
	07/24/91	3,400	620	<0.30	3.6	7.9	NA	NA
	10/31/91	4,100	690	<6.0	<6.0	22	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	2,800	790	<10.0	21	<10.0	NA	NA
	06/30/92	1,100	170	<2.5	<2.5	<2.5	880 *	NA
	09/10/92	790	44	<0.5	1.1	1	NA	NA
	09/25/92	NA	NA	NA	NA	NA	3,300 *	NA
	11/11/92	810	31	<0.5	1.4	1.1	510 *	NA
	02/08/93	390	<0.5	5	1.3	0.9	290 *	NA
	05/10/93	130	<0.5	<0.5	<0.5	<0.5	110 *	NA
	08/27/93	52	<0.5	<0.5	<0.5	<0.5	<50	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	11/21/94	Well Inaccessible						
	02/21/95	310	<0.50	<0.50	<0.50	<0.50	360 *	NA
	05/22/95	100	<0.50	<0.50	<0.50	<0.50	420 *	NA
	08/23/95	Well Sampled Semiannually						
	11/20/95	200	<0.50	<0.50	<0.50	<0.50	250 *	NA
MW-4	07/16/90	1,500	100 (200)	8.3 (15)	4.7 (16)	12 (25)	300	<5,000
	10/25/90	390	28 (<4)	<0.5 (<4)	1.6 (<4)	1.4 (<4)	< 100	<5,000
	01/23/91	520	59 (59)	1.6 (<2)	0.7 (<2)	3.7 (<2)	<100	<5,000
	04/24/91	260	87	<1.5	3.2	<1.5	NA	NA
	07/24/91	56	3.9	0.41	<0.30	0.3	NA	NA
	10/31/91	290	22	1.9	0.4	52	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	260	56	3.4	5.2	83	NA	NA
	06/30/92	880	270	18	22	23	160 *	NA
	09/10/92	270	80	0.6	3.6	<0.5	NA	NA
	09/25/92	NA	NA	NA	NA	NA	<50	NA
	11/11/92	<50	5.2	<0.5	<0.5	<0.5	<50	NA
	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA

Table B-2 (continued)
Historical Groundwater Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, TEPH as Diesel, and Oil and Grease)

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TEPH as Diesel (ppb)	Oil and Grease (ppb)
MW-4	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
(cont.)	05/04/94	<50	1.4	2.1	<0.5	5.9	<50	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	60 *	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	<50 *	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	<50	NA
	05/22/95	<50	0.73	1.3	<0.50	<0.50	130 *	NA
	08/23/95	Well Sampled Semiannually						
	11/20/95	<50	<0.50	<0 50	<0.50	<0.50	NA	NA
MW-5	07/16/90	22,000	500	97	120	1,300	NA	NA
	10/25/90	21,000	750	30	190	1,800	NA	NA
	01/23/91	15,000	510	22	130	710	NA	NA
	04/24/91	15,000	580	260	160	1,100	NA	NA
	07/24/91	16,000	1,500	820	190	750	NA	NA
	10/31/91	21,000	1,500	84	310	1,000	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	9,600	630	97	190	830	NA	NA
	06/30/92	11,000	510	54	120	740	4,800 *	NA
	09/10/92	8,200	210	14	54	170	NA	NA
	09/25/92	NA	NA	NA	NA	NA	570 *	NA
	11/11/92	7,100	230	<10 **	62	87	3,700 *	NA
	02/08/93	3.5	98	<10 **	<10 **	18	1,800 *	NA
	05/10/93	350	13	<0.5	1.2	0.9	240 *	NA
	08/27/93	180	11	5	0.8	1.1	140 *	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	02/08/94	300	13	57	5.7	38	70 *	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	08/10/94	<50	1.8	<0.5	1.5	<0.5	60 *	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	59 *	NA
	02/21/95	<50	1.2	2.0	0.52	1.1	150 *	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	270 *	NA
	08/23/95	Well Sampled Semiannually						
	11/20/95	<50	<0.50	0.51	<0.50	<0.50	170 *	NA
MW-6	07/16/90	<20	<0.5	<0.5	<0.5	<0.5	NA	NA
	10/25/90	<50	<0.5	<0.5	<0.5	<0.5		
	01/23/91	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	04/24/91	<30	<0.30	<0.30	<0.30	<0.30	NA	NA
	07/24/91	<30	<0.30	<0.30	<0.30	<0.30	NA	NA
	10/31/91	<30	<0.30	<0.30	<0.30	<0.30	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	06/30/92	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	09/10/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/11/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	Well Sampled Annually						
	11/20/95	Well Sampled Annually						

Table B-2 (continued)
Historical Groundwater Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, TEPH as Diesel, and Oil and Grease)

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TEPH as Diesel (ppb)	Oil and Grease (ppb)
MW-7	08/29/91	<30	0.73	1.1	<0.30	<0.30	130	NA
	10/31/91	44	1.4	<0.30	0.63	1.3	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	74	21	<0.5	0.7	1.3	<50	NA
	06/30/92	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	09/10/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/11/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	Well Sampled Semiannually						
	11/20/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
MW-8	08/29/91	<30	<0.30	<0.30	<0.30	<0.30	<50	NA
	10/31/91	<30	1.2	<0.30	0.48	0.95	NA	NA
	03/12/92	Well Inaccessible						
	04/16/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	06/30/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	09/10/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/11/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/94	50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	Well Sampled Annually						
	11/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
MW-9	06/30/92	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	09/10/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/11/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	Well Sampled Annually						
	11/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
MW-10	06/30/92	<50	<0.5	<0.5	<0.5	<0.5	<50	NA
	09/10/92	<50	<0 5	<0.5	<0.5	<0.5	NA	NA
	11/11/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA

Table B-2 (continued)
Historical Groundwater Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, TEPH as Diesel, and Oil and Grease)

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TEPH as Diesel (ppb)	Oil and Grease (ppb)
MW-10	02/08/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
(cont.)	05/10/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/12/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/08/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	05/04/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	08/10/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	11/21/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
	02/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	05/22/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
	08/23/95	Well Sampled Annually						
	11/21/95	<50	<0.50	<0.50	<0.50	<0.50	NA	NA
RW-1	11/11/92	7,600	99	30	440	1,300	3,100 *	NA
	02/08/93	430	70	1.9	6.4	9.2	130 *	NA
	05/10/93	280	13	<0.5	7.5	2	490 *	NA
	08/27/93	<50	<0.5	<0.5	<0.5	<0.5	170 *	NA
	11/12/93	350	13	<0.5	2.2	0.7	110 *	NA
	02/08/94	<50	4.2	1	<0.5	2.9	<50	NA
	05/04/94	110	3.3	<0.5	3.2	9.3	ND	NA
	08/10/94	<50	0.6	<0.5	<0.5	<0.5	<50	NA
	11/21/94	<50	<0.5	<0.5	<0.5	1.8	<50	NA
	02/21/95	50	<0.50	<0.50	1.2	2.3	220	NA
	05/22/95	<50	<0.50	<0.50	1.7	<0.50	130 *	NA
	08/23/95	Well Sampled Semiannually						
	11/20/95	<50	<0.50	<0.50	<0.50	<0.50	97 *	NA

TEPH = Total extractable petroleum hydrocarbons
ppb = Parts per billion
NA = Not analyzed
* = Sample reported to contain a lower boiling point hydrocarbon mixture quantitated as diesel. The chromatogram reportedly did not match the typical diesel fingerprint.
** = Raised method reporting limit due to hgh analyte concentration requiring sample dilution.
Prior to June 1995, TPPH as gasoline and TEPH as Diesel were reported as TPH as gasoline and diesel, respectively.

Table B-3
Historical Groundwater Analytical Data
Total Methyl t-Butyl Ether

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Well Number	Date Sampled	Methyl t-Butyl Ether (ppb)
MW-1	08/23/95	<2.5
	11/20/95	8.6
MW-2	08/23/95	<2.5
	11/20/95	18
MW-3	08/23/95	NS
	11/20/95	53
MW-4	08/23/95	NS
	11/20/95	99
MW-5	08/23/95	NS
	11/20/95	98
MW-6	08/23/95	NS
	11/20/95	NS
MW-7	08/23/95	NS
	11/20/95	160
MW-8	08/23/95	NS
	11/21/95	<2.5
MW-9	08/23/95	NS
	11/21/95	14
		27 *
MW-10	08/23/95	NS
	11/21/95	3.5
RW-1	08/23/95	NS
	11/20/95	170
		220 *

ppb = Parts per billion
* = Confirmation for MTBE performed according to EPA Method 8240.

Table C-1
Historical Groundwater Extraction System Performance Data

ARCO Service Station 2107
3310 Park Boulevard at East 34th Street
Oakland, California

Sample I.D.	Date Sampled	Totalizer Reading (gallons)	Net Volume (gallons)	Average Flow Rate (gpm)	TPPH as Gasoline: Influent Concentration (µg/L)	TPPH as Gasoline: Net Removed (lbs)	TPPH as Gasoline: Removed to Date (lbs)	Benzene: Influent Concentration (µg/L)	Benzene: Net Remove (lbs)	Benzene: Removed to Date (lbs)	Primary Carbon Loading (percent)
INFL	01/25/93 a	2,095	2,095	3.2	2,400	0.04	0.04	52	0.001	0.00	0.1
INFL	01/26/93	7,135	5,040	3.5	NS	0.10	0.14	NS	0.007	0.01	0.2
INFL	01/28/93	8,799	1,664	3.6	4,800	0.07	0.21	270	0.004	0.01	0.3
INFL	02/05/93	36,879	28,080	3.6	4,300	1.00	1.21	710	0.115	0.13	1.5
INFL	02/10/93	52,388	15,509	2.2	1,600	0.21	1.42	180	0.058	0.18	1.8
INFL	02/18/93	68,516	16,128	1.4	890	0.12	1.54	76	0.017	0.20	1.9
INFL	02/25/93	86,660	18,144	1.8	220	0.03	1.57	7.1	0.006	0.21	2.0
INFL	03/08/93	94,670	8,010	1.5	5,100	0.34	1.91	610	0.021	0.23	2.4
INFL	03/19/93	113,162	18,492	2.3	5,100	0.79	2.70	300	0.070	0.30	3.4
INFL	03/24/93	123,876	10,714	2.5	2,400	0.21	2.91	140	0.020	0.32	3.6
INFL	04/01/93	139,936	16,060	2.6	3,400	0.45	3.36	160	0.020	0.34	4.2
INFL	05/05/93	210,724	70,788	1.7	680	0.40	3.76	55	0.063	0.40	4.7
INFL	05/20/93	237,367	26,643	1.2	NS	0.15	3.91	NS	0.009	0.41	4.9
INFL	06/01/93	250,687	13,320	1.0	NS	0.07	3.98	NS	0.005	0.41	5.0
INFL	06/09/93	262,835	12,148	1.0	660	0.07	4.05	28	0.004	0.42	5.1
INFL	06/28/93	286,217	23,382	0.9	NS	0.13	4.18	NS	0.003	0.42	5.2
INFL	07/08/93	292,667	6,450	0.5	260	0.01	4.19	1.4	0.001	0.42	5.2
INFL	07/22/93	306,145	13,478	0.7	NS	0.03	4.22	NS	0.004	0.43	5.3
INFL	08/04/93	333,223	27,078	1.4	480	0.11	4.33	67	0.008	0.43	5.4
INFL	08/18/93	359,835	26,612	1.2	NS	0.11	4.44	NS	0.008	0.44	5.6
INFL	09/23/93	389,991	30,156	0.6	NS	0.04	4.48	NS	0.009	0.45	5.6
INFL	10/06/93	402,021	12,030	0.7	130	0.01	4.50	7.4	0.004	0.46	5.6
INFL	10/21/93	419,854	17,833	0.6	NS	0.02	4.52	NS	0.001	0.46	5.6
INFL	11/10/93	426,649	6,795	0.6	850	0.05	4.56	8.4	0.000	0.46	5.7
INFL	11/24/93	441,330	14,681	0.8	NS	0.10	4.66	NS	0.001	0.46	5.8
INFL	01/26/94	454,825	13,495	1.2	NS	0.06	4.72	NS	0.001	0.46	5.9
INFL	02/02/94	455,192	367	0.03	140	0.00	4.72	8.1	0.000	0.46	5.9
INFL	03/01/94	455,604	412	0.01	87	0.00	4.72	2.8	0.000	0.46	5.9
INFL	03/29/94	502,785	47,181	1.2	1,500	0.59	5.31	21	0.005	0.46	6.6
INFL	04/27/94 b	529,277	26,492	0.63	NS	0.33	5.64	NS	0.005	0.47	7.1
INFL	11/30/94 c	531,268	1,991	N/A	830	0.01	5.66	0.93	0.000	0.47	7.1
INFL	12/16/94 d	542,699	11,431	0.50	NS e	0.08	5.73	NS e	0.000	0.47	7.2
INFL	02/02/95	576,998	34,299	0.37	64	0.26	5.99	1.4	0.000	0.47	7.5
INFL	03/07/95	595,175	18,177	0.38	NS e	0.01	6.00	NS e	0.000	0.47	7.5
INFL	04/13/95	602,583	7,408	0.14	ND	0.00	6.00	ND	0.000	0.47	7.5
INFL	05/09/95 f	612,957	10,374	0.28	NS e	0.00	6.00	NS e	0.000	0.47	7.5
REPORTING PERIOD: 12/31/96 - 03/31/96 (f)											
TOTAL POUNDS REMOVED:							6.00			0.47	
TOTAL GALLONS REMOVED:							0.98			0.06	
PERIOD POUNDS REMOVED:						0.00			0.00		
PERIOD GALLONS REMOVED:						0.00			0.00		
TOTAL GALLONS EXTRACTED:					612,957						
PERIOD GALLONS EXTRACTED:					N/A						
PERIOD AVERAGE FLOW RATE (gpm):					N/A						
PRIMARY BED CAPACITY REMAINING (%):					92.5%						

TPPH = Total purgeable petroleum hydrocarbons
gpm = Gallons per minute
µg/L = Micrograms per liter
lbs = Pounds
NS = Not sampled
N/A = Not available or not applicable

a. All data prior to 9/1/94 provided by prior consultant.
b. RESNA shut system down 4/27/94.
c. Pacific Environmental Group, Inc. became consultant for the site 9/1/94.
d. System was shut down 12/16/94 to 12/31/94.
e. TPH/benzene pounds removed estimated from previous data.
f. System left shut down 5/9/95 due to low concentrations/removal rates.

System operation began 1/25/93 under RESNA Industries, Inc.; system shut down 4/27/94 - 11/29/94.
Carbon loading assumes an 8% isotherm.
Pounds of hydrocarbons removed to date through 3/29/94 provided by RESNA; benzene removed estimated from data provided.

Table C-2
Historical Groundwater Extraction System Analytical Data

ARCO Service Station 2107
3310 Park Boulevard
Oakland, California

Sample I.D.	Date Sampled	TPPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)
SP-1	11/02/94	59	<0.50	<0.50	2.7	7.0
	11/30/94	600	0.93	<0.50	4.8	69
	02/02/95	64	1.4	<0.50	0.54	1.8
	04/13/95	<50	<0.50	<0.50	0.55	3.4
SP-2	11/30/94	760	<0.50	<0.50	4.1	56
	02/02/95	<50	1.2	<0.50	<0.50	1.1
	04/13/95	<50	<0.50	<0.50	<0.50	<0.50
SP-3	11/30/94	<50	<0.50	<0.50	<0.50	<0.50
	02/02/95	<50	<0.50	<0.50	<0.50	<0.50
	04/13/95	<50	<0.50	<0.50	<0.50	<0.50
SP-4	11/02/94	<50	<0.50	<0.50	<0.50	<0.50
	11/30/94	<50	<0.50	<0.50	<0.50	<0.50
	02/02/95	<50	<0.50	<0.50	<0.50	<0.50
	04/13/95	<50	<0.50	<0.50	<0.50	<0.50

TPPH = Total purgeable petroleum hydrocarbons
µg/L = Micrograms per liter
ND = Not detected above detection limits
SP-1 = Sample location at influent to aeration tank
SP-2 = Sample location at midpoint between first and second carbon vessels
SP-3 = Sample location at midpoint between second and third carbon vessels
SP-4 = Sample location at effluent of treatment system
System startup on 1/25/93 by RESNA Industries, Inc.
Pacific Environmental Group, Inc. (PACIFIC) became consultant 9/01/94.
PACIFIC restarted system on 11/29/94.
See certified analytical reports for individual detection limits.

Figure C-1
Historical Groundwater Extraction System Mass Removal Trend

ARCO Service Station 2107
3310 Park Boulevard
Oakland, California

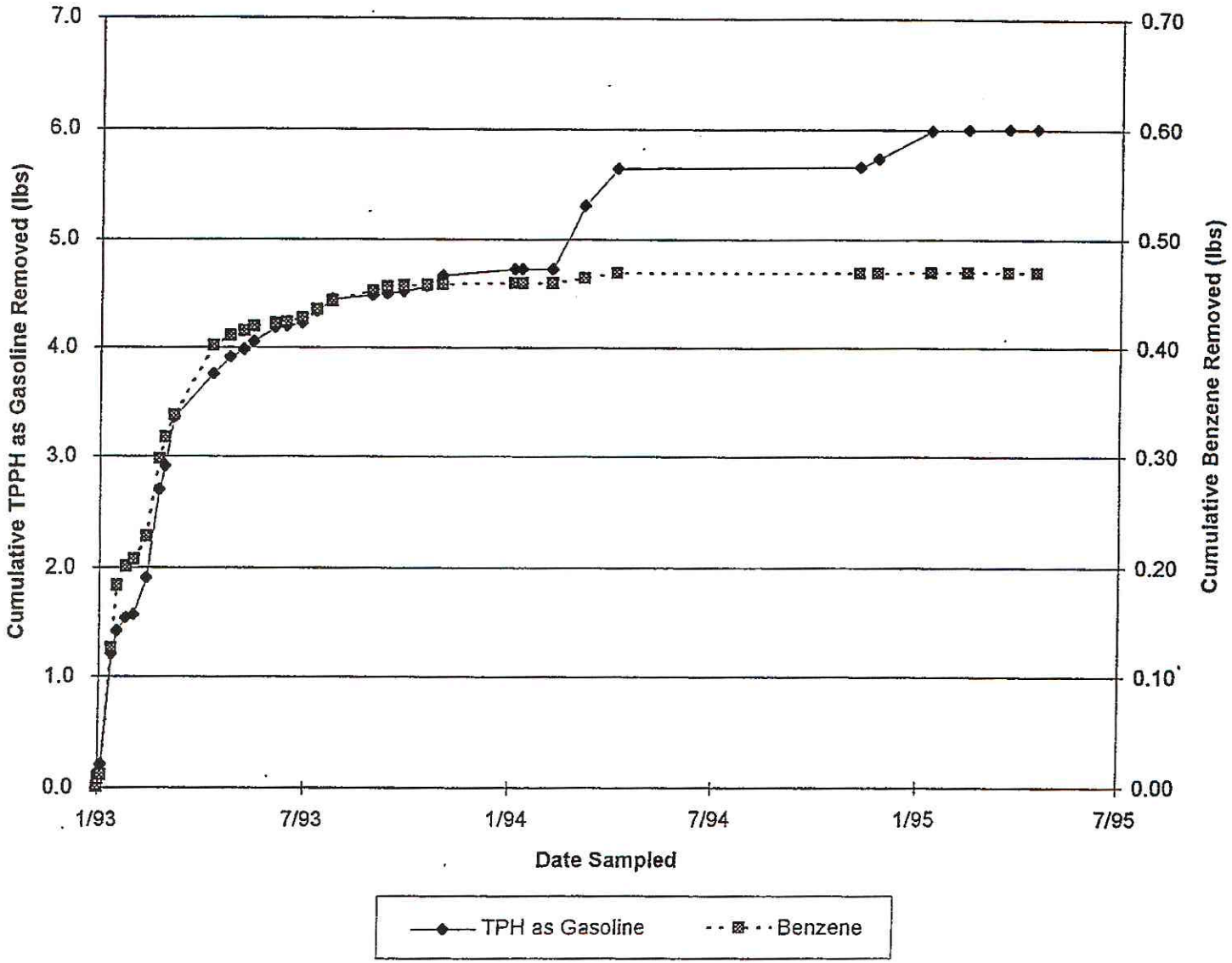
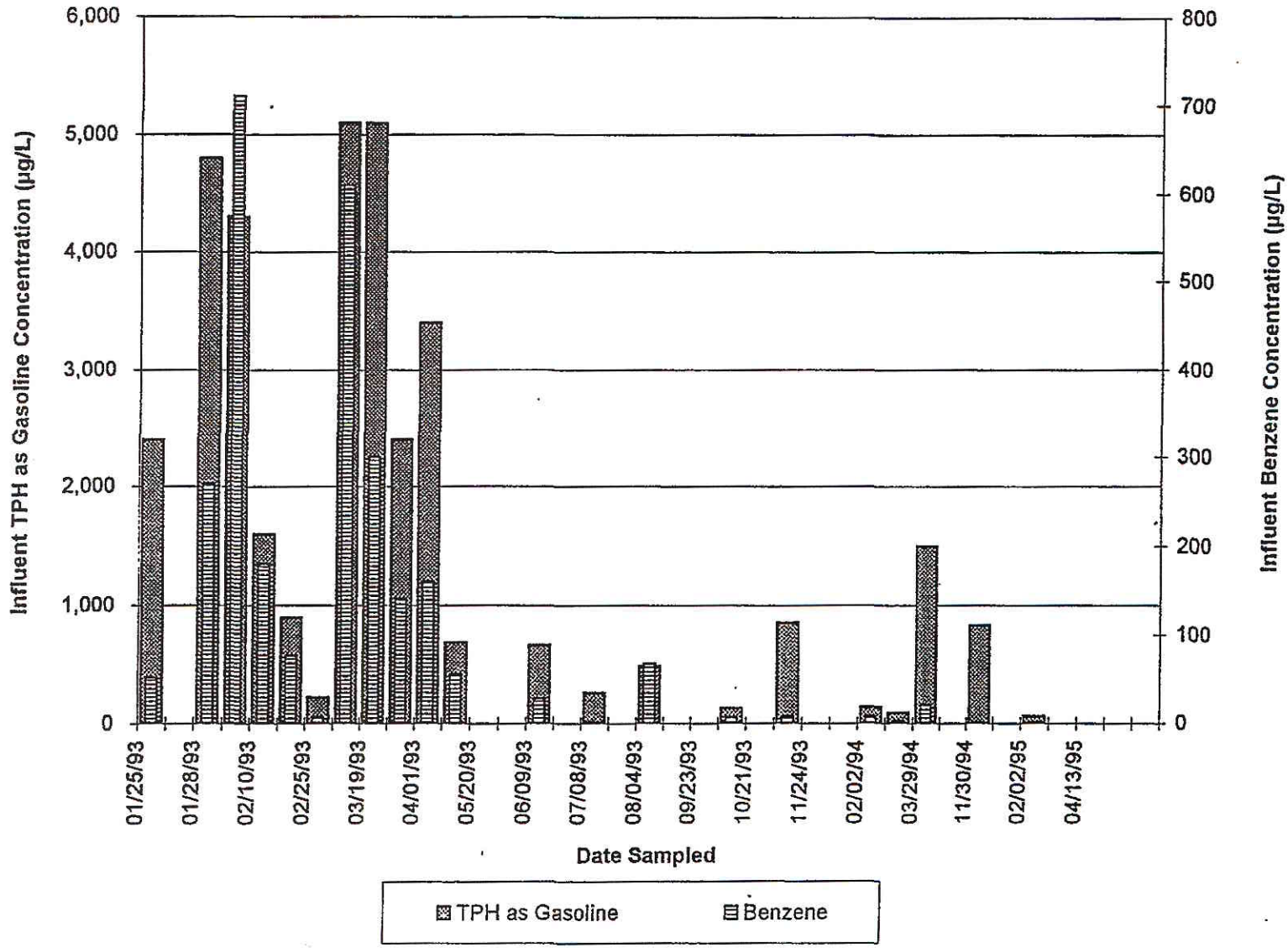


Figure C-2
Historical Groundwater Extraction System Hydrocarbon Concentrations

ARCO Service Station 2107
3310 Park Boulevard
Oakland, California



RESNA
Working To Restore Nature

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

March 9, 1993
69021.15

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 1 of 7)

Well / Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
05/19/89		2.69	116.22	0.125
07/19/90	118.91	2.60	116.31	None
08/07/90		2.61	116.30	None
08/14/90		2.70	116.21	None
08/23/90		NM	NM	NM
08/28/90		NM	NM	NM
10/25/90		2.69	116.22	None
01/23/91		2.69	116.22	None
02/27/91		2.68	116.23	None
03/19/91		2.37	116.54	None
04/24/91		2.40	116.51	None
05/31/91		NM	NM	NM
06/12/91		1.38	117.53	NM
07/24/91		1.29	117.62	None
08/08/91		NM	NM	NM
09/13/91		NM	NM	NM
10/31/91		NM	NM	NM
11/20/91		NM	NM	NM
12/24/91		2.78	116.13	None
01/06/92		2.41	116.50	None
04/16/92	118.15	2.71	115.44	None
05/15/92		2.68	115.47	None
06/30/92		2.45	115.70	None
07/15/92		2.65	115.50	None
08/25/92		2.67	115.48	None
09/10/92		2.68	115.47	None
10/31/92		4.10	114.05	None
11/11/92		2.73	115.42	None
12/16/92		2.56	115.59	None
MW-2				
05/19/89		1.57	116.22	Sheen
07/19/90	117.79	1.49	116.30	None
08/07/90		1.50	116.29	None
08/14/90		1.57	116.22	None
08/23/90		NM	NM	NM
08/28/90		NM	NM	NM
10/25/90		1.55	116.24	None
01/23/91		1.56	116.23	None
02/27/91		1.55	116.24	None
03/19/91		1.25	116.54	None

See notes on page 7 of 7.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 2 of 7)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 continued				
04/24/91		1.26	116.53	None
05/31/91		NM	NM	NM
06/12/91		1.31	116.48	None
07/24/91		1.24	116.55	None
08/08/91		NM	NM	NM
09/13/91		NM	NM	NM
10/31/91		NM	NM	NM
11/20/91		NM	NM	NM
12/24/91		1.65	116.14	None
01/19/92		1.33	116.46	None
04/16/92	117.20	1.80	115.40	None
05/15/92		1.72	115.48	None
06/30/92		1.52	115.68	None
07/15/92		1.68	115.52	None
08/25/92		1.72	115.48	None
09/10/92		1.73	115.47	None
10/31/92		6.52	110.68	None
11/11/92		1.77	115.43	None
12/16/92		1.59	115.61	None
MW-3				
07/19/90	117.85	3.27	114.58	None
08/07/90		3.39	114.46	None
08/14/90		3.41	114.44	None
08/23/90	117.85	3.47	114.38	None
08/28/90		3.49	114.36	None
10/25/90		3.57	114.28	None
01/23/91		3.74	114.11	None
02/27/91		3.75	114.10	None
03/19/91		3.33	114.52	None
04/24/91		3.35	114.50	None
05/31/91		3.52	114.33	None
06/12/91		3.58	114.27	None
07/24/91		3.66	114.19	None
08/08/91		3.56	114.29	None
09/13/91		3.68	114.17	None

See notes on page 7 of 7.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 3 of 7)

Well / Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3 (continued)				
10/31/91		3.30	114.55	None
11/20/91		3.66	114.19	None
12/24/91		3.66	114.19	None
04/16/92		3.52	114.33	None
05/15/92		3.65	114.20	None
06/30/92		3.47	114.38	None
07/15/92		4.06	113.79	None
08/25/92		3.84	114.01	None
09/10/92		3.86	113.99	None
10/31/92		3.51	114.34	None
11/11/92		3.83	114.02	None
12/16/92		3.44	114.51	None
MW-4				
07/19/90		1.69	116.05	None
08/07/90	117.74	5.73	112.01	None
08/14/90		3.42	114.32	None
08/23/90		1.80	115.94	None
08/28/90		1.83	115.91	None
10/25/90		1.77	115.97	None
01/23/91		2.08	115.66	None
02/27/91		1.79	115.95	None
03/19/91		1.37	116.37	None
04/24/91		1.40	116.34	None
05/31/91		1.44	116.30	None
06/12/91		1.46	116.28	None
07/24/91		1.52	116.22	None
08/08/91		1.58	116.16	None
09/13/91		1.67	116.07	None
10/31/91		2.58	115.16	None
11/20/91		3.79	113.95	None
12/24/91		2.30	115.44	None
04-16-92		2.45	115.29	None
05/15/92		2.30	115.44	None
06/30/92		2.26	115.48	None
07/15/92		2.70	115.04	None
08/25/92		2.54	115.20	None

See notes on page 7 of 7.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 4 of 7)

Well / Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 (continued)				
09/10/92		2.47	115.27	None
10/31/92		5.46	112.28	None
11/11/92		2.34	115.40	None
12/16/92		2.11	115.63	None
MW-5				
07/19/90		1.90	116.10	None
08/07/90	118.00	1.94	116.06	None
08/14/90		1.96	116.04	Sheen
08/28/90		1.90	116.10	None
10/25/90		2.05	115.95	None
08/23/90		1.99	116.01	None
01/23/91		2.68	115.32	None
02/27/91	118.00	2.56	115.44	None
02/27/91		2.56	115.44	None
03/19/91		2.44	115.56	None
04/24/91		2.36	115.64	None
05/31/91		2.08	115.92	None
06/12/91		2.14	115.86	None
07/24/91		2.20	115.80	None
08/08/91		2.12	115.88	None
09/13/91		2.23	115.77	None
10/31/91		2.65	115.35	None
11/20/91		2.54	115.46	None
12/24/91		2.62	115.38	None
04/16/92		3.26	114.74	None
05/15/92		3.00	115.00	None
06/30/92		2.79	115.21	None
07/15/92		NM	NM	NM
08/25/92		2.82	115.18	None
09/10/92		2.81	115.19	None
10/31/92		2.63	115.37	None
11/11/92		2.81	115.19	None
12/16/92		2.63	115.37	None

See notes on page 7 of 7.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 5 of 7)

Well / Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-6				
07/19/90		4.23	116.65	None
08/07/90	120.88	4.67	112.01	None
08/14/90		4.39	114.32	None
08/23/90		4.35	115.94	None
08/28/90		4.34	115.91	None
10/25/90		4.34	115.97	None
01/23/91		4.46	115.66	None
02/27/91		4.76	116.12	None
06/12/91		4.14	116.74	None
07/24/91		4.22	116.66	None
08/08/91		4.60	116.28	None
03/19/91		4.56	116.32	None
04/24/91		4.28	116.60	None
05/03/91		4.17	116.71	None
09/13/91		4.27	116.61	None
10/31/91		4.25	116.63	None
11/20/91		4.30	116.58	None
12/24/91		4.25	116.63	None
04/16/92		4.58	116.30	None
05/15/92		4.61	116.27	None
06/30/92		4.52	116.36	None
07/15/92		4.80	116.08	None
08/25/92		4.73	116.15	None
09/10/92		4.69	116.19	None
10/31/92		4.60	116.28	None
11/11/92		4.69	116.19	None
12/16/92		4.33	116.55	None
MW-7				
09/13/91		5.00	108.12	None
10/31/91	113.12	5.00	108.12	None
11/20/91		5.24	107.88	None
12/24/91		5.27	107.85	None
04/16/92		4.88	108.24	None
07/15/92		4.90	108.22	None
08/25/92		NM	NM	NM
09/10/92		4.71	108.41	None
10/31/92		4.16	108.96	None
11/11/92		4.70	108.42	None
12/16/92		4.33	108.79	None

See notes on page 7 of 7.

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

March 9, 1993
69021.15

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 6 of 7)

Well / Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-8				
05/15/92		4.89	108.23	None
06/30/92		4.67	108.45	None
07/15/92		4.90	108.22	None
08/25/92		NM	NM	NM
09/10/92		4.71	108.41	None
09/13/91		9.12	105.62	None
10/31/91	114.74	9.42	105.32	None
11/20/91		10.00	104.74	None
12/24/91		10.02	104.72	None
04/16/92		9.10	105.64	None
05/15/92		8.92	105.82	None
06/30/92		8.83	105.91	None
07/15/92		9.15	105.59	None
08/25/92		8.92	105.82	None
09/10/92		8.87	105.87	None
10/31/92		8.82	105.92	None
11/11/92		8.97	105.77	None
12/16/92		8.66	106.08	None
MW-9				
06/30/92	117.72	9.51	108.21	None
07/15/92		10.07	107.65	None
08/25/92		9.91	107.81	None
09/10/92		9.85	107.87	None
10/31/92		9.37	108.35	None
11/11/92		9.39	108.33	None
12/16/92		9.47	108.25	None
MW-10				
06/30/92	112.43	9.50	102.93	None
07/15/92		6.75	105.68	None
08/25/92		6.83	105.60	None
09/10/92		6.81	105.62	None
10/31/92		6.62	105.81	None
11/11/92		6.90	105.53	None
12/16/92		6.45	105.98	None

See notes on page 7 of 7.

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

March 9, 1993
69021.15

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2107
Oakland, California
(Page 7 of 7)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
RW-1				
11/11/92	not surveyed	3.33	—	None
12/16/92		2.81	—	None

NM = Not measured.
All measurements in feet.
Well elevation datum is mean sea level.

TABLE 2
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES–TPHg, TPHd, TOG, and BTEX
ARCO Station 2107
Oakland, California
(Page 1 of 3)

Well Date	TPHg	TPHd	TOG	Benzene	Toluene	Ethyl-benzene	Total xylenes
MW-3							
07/16/90	4,000	NA	NA	430	8.7	27	8.5
10/25/90	5,400	NA	NA	800	6.6	25	30
01/23/91	6,900	NA	NA	760	12.0	91	29
04/24/91	4,300	NA	NA	800	<120.0	<120	<120
07/24/91	3,400	NA	NA	620	<0.30	3.6	7.9
10/31/91	4,100	NA	NA	690	<6.0	<6.0	22
03/12/92			Not sampled-well inaccessible				
04/16/92	2,800	NA	NA	790	<10.0	21	<10.0
06/30/92	1,100	880*	NA	170	<2.5	<2.5	<2.5
09/10/92	790	NA	NA	44	<0.5	1.1	1.0
09/25/92	NA	3,300*	NA	NA	NA	NA	NA
11/11/92	810	510*	NA	31	<0.5	1.4	1.1
MW-4							
07/16/90	1,500	300	<5,000	100	8.3	4.7	12
				(200)	(15)	(16)	(25)
10/25/90	390	<100	<5,000	28	<0.5	1.6	1.4
				(<4)	(<4)	(<4)	(<4)
01/23/91	520	<100	<5,000	59	1.6	0.7	3.7
				(59)	(<2)	(<2)	(<2)
04/24/91	260	NA	NA	87	<1.5	3.2	<1.5
07/24/91	56	NA	NA	3.9	0.41	<0.30	0.30
10/31/91	290	NA	NA	22	1.9	0.40	52
03/12/92			Not sampled-well inaccessible				
04/16/92	260	NA	NA	56	3.4	5.2	8.3
06/30/92	880	160*	NA	270	18	22	23
09/10/92	270	NA	NA	80	0.6	3.6	<0.5
09/25/92	NA	<50	NA	NA	NA	NA	NA
11/11/92	<50	<50	NA	5.2	<0.5	<0.5	<0.5
MW-5							
07/16/90	22,000	NA	NA	500	97	120	1,300
10/25/90	21,000	NA	NA	750	30	190	1,800
01/23/91	15,000	NA	NA	510	22	130	710
04/24/91	15,000	NA	NA	580	260	160	1,100
07/24/91	16,000	NA	NA	1,500	820	190	750
10/31/91	21,000	NA	NA	1,500	84	310	1,000
03/12/92			Not sampled-well inaccessible				
04/16/92	9,600	NA	NA	630	97	190	830
06/30/92	11,000	4,800*	NA	510	54	120	740

See notes on page 3 of 3.

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

March 9, 1993
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TABLE 2
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES–TPHg, TPHd, TOG, and BTEX
ARCO Station 2107
Oakland, California
(Page 2 of 3)

Well / Date	TPHg	TPHd	TOG	Benzene	Toluene	Ethyl-benzene	Total xylenes
MW-5 (continued)							
09/10/92	8,200	NA	NA	210	14	54	170
09/25/92	NA	570*	NA	NA	NA	NA	NA
11/11/92	7,100	3,700*	NA	230	<10**	62	87
MW-6							
07/16/90	<20	NA	NA	<0.5	<0.5	<0.5	<0.5
10/25/90	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
01/23/91	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
04/24/91	<30	NA	NA	<0.30	<0.30	<0.30	<0.30
07/24/91	<30	NA	NA	<0.30	<0.30	<0.30	<0.30
10/31/91	<30	NA	NA	<0.30	<0.30	<0.30	<0.30
03/12/92			Not sampled-well inaccessible				
04/16/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
06/30/92	<50	<50	NA	<0.5	<0.5	<0.5	<0.5
09/10/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
11/11/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
MW-7							
08/29/91	<30	130	NA	0.73	1.1	<0.30	<0.30
10/31/91	44	NA	NA	1.4	<0.30	0.63	1.3
03/12/92			Not sampled-well inaccessible				
04/16/92	74	<50	NA	21	<0.5	0.7	1.3
06/30/92	<50	<50	NA	<0.5	<0.5	<0.5	<0.5
09/10/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
11/11/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
MW-8							
08/29/91	<30	<50	NA	<0.30	<0.30	<0.30	<0.30
10/31/91	<30	NA	NA	1.2	<0.30	0.48	0.95
03/12/92			Not sampled-well inaccessible				
04/16/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
06/30/92	<50	<50	NA	<0.5	<0.5	<0.5	<0.5
09/10/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
11/11/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
MW-9							
06/30/92	<50	<50	NA	<0.5	<0.5	<0.5	<0.5
09/10/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
11/11/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5

See notes on page 3 of 3.

RESNA
Working To Restore Nature

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

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TABLE 2
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES–TPHg, TPHd, TOG, and BTEX
ARCO Station 2107
Oakland, California
(Page 3 of 3)

Well Date	TPHg	TPHd	TOG	Benzene	Toluene	Ethyl-benzene	Total xylenes
MW-10							
06/30/92	<50	<50	NA	<0.5	<0.5	<0.5	<0.5
09/10/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
11/11/92	<50	NA	NA	<0.5	<0.5	<0.5	<0.5
RW-1							
11/11/92	7,600	3,100*	NA	99	30	440	1,300
MCLs	–	–	–	1	–	680	1,750
DWAL	–	–	–	–	100	–	–

Results are in parts per billion (ppb) and:

BTEX: The volatile gasoline constituents benzene, toluene, ethylbenzene, and total xylenes.
NA: Not analyzed.
TPHg: Total petroleum hydrocarbons as gasoline.
TPHd: Total petroleum hydrocarbons as diesel.
TOG: Total petroleum as oil and grease.
( ): BTEX results analyzed as VOCs by EPA method 624.
<: Less than the laboratory detection limit (nondetectable).
*: Sample reported to contain a lower boiling point hydrocarbon mixture quantitated as diesel. The chromatogram reportedly did not match the typical diesel fingerprint.
**: Raised method reporting limit due to high analyte concentration requiring sample dilution.
MCLs: State recommended Maximum Contaminant Level.
DWAL: Department of Water Resources Action Level.

RESNA
Working To Restore Nature

Quarterly Groundwater Monitoring
ARCO Station 2107, 3310 Park Boulevard, Oakland, CA

March 9, 1993
69021.15

TABLE 3
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES--BNAs, VOCs, and Metals
ARCO Station 2107
Oakland, California

Well / Date	BNAs	VOCs	Cadmium	Chromium	Lead	Zinc
MW-4 / 07/16/90	ND	ND	<0.02	<0.01	<0.02	<0.01

Results in parts per million (ppm).
BNAs: Base neutral and acid extractables including polynuclear aromatics, concentrations are below the laboratory reporting limits (<10 ppb) for all compounds tested.
ND: Results below detection levels, which were analyte specific.

Summary of Groundwater Monitoring Data
Fourth Quarter 1992
ARCO Service Station 2107
3310 Park Boulevard, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH[1] as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	TPH Diesel (ppb)
MW-3(7)	11/11/92	3.83	ND.[2]	810.	31.	<0.5	1.4	1.1	510.
MW-4(14)	11/11/92	2.34	ND.	<50.	5.2	<0.5	<0.5	<0.5	<50.
MW-5(11)	11/11/92	2.81	ND.	7,100.	230.	<10.	62.	87.	3,700.
MW-6(17)	11/11/92	4.69	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.[3]
MW-7(24)	11/11/92	4.70	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.
MW-8(20)	11/11/92	8.97	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.
MW-9(29)	11/11/92	9.39	ND	<50	<0.5	<0.5	<0.5	<0.5	NR.
MW-10(24)	11/11/92	6.90	ND	<50	<0.5	<0.5	<0.5	<0.5	NR.
RW-1(23)	11/11/92	3.33	ND	7,600.	99.	30.	440.	1,300.	3,100.
FB-1[4]	11/11/92	NA.[5]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.

1. TPH. = Total petroleum hydrocarbons
2. ND. = Not detected
3. NR. = Not required, well not sampled for listed parameter
4. FB. = Field blank
5. NA. = Not applicable

Table 1

Soil Analytical Data

ARCO Service Station #2107

3310 Park Blvd, Oakland, CA

Soil Sample ID	Sample Depth (feet bgs)	Sample Elevation (feet msl)	Date Sampled	GRO/ TPH-g (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	t-Butyl Alcohol (TBA) (mg/kg)	Methyl-tert butyl-ether (MTBE) (mg/kg)	Di-isopropal ether (DIPE) (mg/kg)	Ethyl-t-Butyl-Ether (ETBE) (mg/kg)	t-Amyl Methyl Ether (TAME) (mg/kg)	Ethanol (mg/kg)
SB-1-5	5	123.26	3/30/04	ND<1.2	ND<0.0061	**0.096**	ND<0.0061	**0.016**	ND<0.012	ND<0.0061	ND<0.012	ND<0.0061	ND<0.0061	ND<0.1
SB-1-10	10	118.26	3/30/04	ND<1.3	ND<0.0063	ND<0.0063	ND<0.0063	ND<0.0063	ND<0.013	ND<0.0063	ND<0.013	ND<0.0063	ND<0.0063	ND<0.1
SB-1-15	15	113.26	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-1-18	18	110.26	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-2-5	5	121.53	3/30/04	ND<1.3	ND<0.0067	ND<0.0067	ND<0.0067	ND<0.0067	ND<0.013	ND<0.0067	ND<0.013	ND<0.0067	ND<0.0067	ND<0.1
SB-2-10	10	116.53	3/30/04	ND<1.2	ND<0.0061	ND<0.0061	ND<0.0061	ND<0.0061	ND<0.012	ND<0.0061	ND<0.012	ND<0.0061	ND<0.0061	ND<0.1
SB-2-15	15	111.53	3/30/04	ND<1.2	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.012	ND<0.0060	ND<0.012	ND<0.0060	ND<0.0060	ND<0.1
SB-2-20	20	106.53	3/30/04	ND<1.2	ND<0.0062	ND<0.0062	ND<0.0062	ND<0.0062	ND<0.012	ND<0.0062	ND<0.012	ND<0.0062	ND<0.0062	ND<0.1
SB-2-23	23	103.53	3/30/04	ND<1.2	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.012	ND<0.0060	ND<0.012	ND<0.0060	ND<0.0060	ND<0.1
SB-3-8.0	8	115.87	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	**0.024**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-13	13	110.87	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	**0.027**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-18	18	105.87	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.19**	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-23.0	23	100.87	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.29**	**0.027**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-26.5	26.5	97.37	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-31.0	31	92.87	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
HP-3-39.5	39.5	84.37	10/15/04	ND<0.1	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
HP-3-46	46	77.87	10/15/04	ND<0.1	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-4-1.0	1	NM	5/7/04	**350**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<25
SB-5-8	8	114.96	3/30/04	ND<1.1	ND<0.0056	ND<0.0056	ND<0.0056	ND<0.0056	ND<0.011	ND<0.0056	ND<0.011	ND<0.0056	ND<0.0056	ND<0.1
SB-5-16	16	106.96	3/30/04	ND<1.3	ND<0.0065	ND<0.0065	ND<0.0065	ND<0.0065	**0.016**	ND<0.0065	ND<0.013	ND<0.0065	0.0066	ND<0.1
SB-5-19	19	103.96	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-6-1.0	1	NM	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-7- 6.0	6	120.22	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-7- 11.5	11.5	114.72	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-7- 16.0	16	110.22	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	**0.0056**	ND<0.0050	ND<0.0050	NA
SB-7- 19.5	19.5	106.72	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-8-6.0	6	118.82	10/15/04	ND<0.1	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.048**	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-8-14.0	14	110.82	10/15/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-8-16.0	16	108.82	10/15/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-8-25.0	25	99.82	10/15/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA

Table 1

Soil Analytical Data

ARCO Service Station #2107

3310 Park Blvd, Oakland, CA

Soil Sample ID	Sample Depth (feet bgs)	Sample Elevation (feet msl)	Date Sampled	GRO/ TPH-g (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	t-Butyl Alcohol (TBA) (mg/kg)	Methyl-tert butyl-ether (MTBE) (mg/kg)	Di-isopropal ether (DIPE) (mg/kg)	Ethyl-t-Butyl-Ether (ETBE) (mg/kg)	t-Amyl Methyl Ether (TAME) (mg/kg)	Ethanol (mg/kg)
SB-8-29.5	29.5	95.32	10/15/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	**0.011**	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-9-10.5	10.5	112.29	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-9-13.5	13.5	109.29	10/14/04	ND<2.5	ND<0.050	ND<0.050	ND<0.050	ND<0.050	ND<5.0	**0.56**	ND<0.025	ND<0.025	ND<0.025	NA
SB-9-17.5	17.5	105.29	10/14/04	ND<0.50	ND<0.025	ND<0.025	ND<0.025	ND<0.025	ND<0.10	**0.22**	ND<0.025	ND<0.025	ND<0.025	NA
SB-9-19.5	19.5	103.29	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.026**	**0.0069**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-10-6.5	6.5	115.29	10/20/04	**0.51**	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	**0.025**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-10-14.0	14	107.79	10/20/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.048**	**0.034**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-10-20.5	20.5	101.29	10/20/04	ND<2.5	ND<0.050	ND<0.050	ND<0.050	ND<0.050	ND<5.0	**0.21**	ND<0.025	ND<0.025	ND<0.025	NA
SB-10-22.5	22.5	99.29	10/20/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	**0.059**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-10-31.5	31.5	90.29	10/20/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	**0.011**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-11-6.5	6.5	113.73	10/14/04	**0.31**	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-11-11.5	11.5	108.73	10/14/04	**220**	ND<0.25	ND<0.25	ND<0.25	ND<0.25	ND<0.25	ND<0.12	ND<0.12	ND<0.12	ND<0.12	NA
SB-11-16.5	16.5	103.73	10/14/04	**14**	ND<0.050	ND<0.050	ND<0.050	ND<0.050	ND<5.0	ND<0.025	ND<0.025	ND<0.025	ND<0.025	NA
SB-11-21.5	21.5	98.73	10/14/04	**24**	ND<0.050	ND<0.050	ND<0.050	ND<0.050	ND<5.0	ND<0.025	ND<0.025	ND<0.025	ND<0.025	NA
SB-11-26.0	26	94.23	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.020	**0.012**	ND<0.0050	ND<0.0050	ND<0.0050	NA
SB-11-28.5	28.5	91.73	10/14/04	ND<0.10	ND<0.0050	ND<0.0050	ND<0.0050	**0.012**	ND<0.020	**0.022**	ND<0.0050	ND<0.0050	ND<0.0050	NA

Notes:

1) Samples analyzed by EPA method 8260B.
2) Concentrations above laboratory reporting limits in **bold**.

bgs = below ground surface
GRO = Gasoline Range Organics
mg/kg = milligrams per kilogram
msl = mean sea level
NA = Not analyzed
ND< = Not detected below stated laboratory reporting limit
NM = Not measured
TPH-g = Total petroleum hydrocarbons as gasoline

Table 2
Groundwater Analytical Data
ARCO Service Station #2107
3310 Park Blvd, Oakland, CA

Sample ID	Elevation (msl)	Sample Depth/ Interval (feet bgs)	Sample elevation (msl)	Date Sampled	GRO/ TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	t-Butyl Alcohol (TBA) (µg/L)	MTBE (µg/L)	Di-isopropal ether (DIPE) (µg/L)	Ethyl-t-Butyl-Ether (ETBE) (µg/L)	tert-Amyl Methyl Ether (TAME) (µg/L)	Ethanol (µg/L)
SB-1	128.26	18.5	109.8	03/30/04	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	ND<5.0	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<50
SB-2	126.532	23	103.532	03/30/04	ND<50	ND<0.50	**1.4**	ND<0.50	ND<1.0	ND<5.0	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<50
SB-3	123.867	32	91.867	05/07/04	**88**	ND<0.50	ND<0.50	ND<0.50	ND<1.0	**110**	**34**	ND<1.0	ND<0.50	**1.1**	ND<50
SB-5	122.964	19.5	103.464	03/30/04	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	**45**	**34**	ND<1.0	ND<0.50	ND<0.50	ND<50
HP-3-35	123.867	31-35	88.9- 92.9	10/15/04	ND<50	**0.64**	**10**	**1.5**	**8.9**	ND<5.0	**3.8**	ND<1.0	ND<0.50	ND<0.50	ND<50
HP-4-18	126.217	18-22	104.2- 108.2	10/14/04	**140**	**1.6**	**38**	**5.4**	**27**	ND<20	ND<0.50	ND<0.50	ND<0.50	ND<0.50	NA
HP-4-30	126.217	26-30	96.2- 100.2	10/14/04	**96**	**0.91**	**23**	**3.5**	**17**	ND<20	ND<0.50	ND<0.50	ND<0.50	ND<0.50	NA
HP-5-18	124.821	18-22	102.8- 106.8	10/20/04	ND<50	ND<0.50	**7**	**0.94**	**6.2**	ND<20	ND<0.50	ND<0.50	ND<0.50	ND<0.50	NA
HP-5-29	124.821	25-29	95.8- 99.8	10/20/04	ND<50	ND<0.50	**9.2**	**1.2**	**7**	ND<20	ND<0.50	ND<0.50	ND<0.50	ND<0.50	NA
HP-6-8	122.792	8-12	110.8- 114.8	10/14/04	ND<250	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<100	**92**	ND<2.5	ND<2.5	ND<2.5	NA
HP-6-20	122.792	16-20	102.8- 106.8	10/14/04	**170**	ND<1.0	**15**	**2.9**	**16**	**76**	**82**	ND<1.0	ND<1.0	ND<1.0	NA
HP-6-30	122.792	26-30	92.8- 96.8	10/14/04	**72**	ND<0.50	**13**	**2.2**	**13**	ND<20	**6.6**	ND<0.50	ND<0.50	ND<0.50	NA
HP-7-20	121.791	16-20	101.8- 105.8	10/20/04	**1300**	ND<10	ND<10	ND<10	ND<10	ND<400	**1200**	ND<10	ND<10	ND<10	NA
HP-7-30	121.791	26-30	91.8- 95.8	10/20/04	ND<5,000	ND<50	ND<50	ND<50	ND<50	ND<2,000	**3700**	ND<50	ND<50	ND<50	NA
HP-8-27	120.229	23-27	93.2- 97.2	10/15/04	ND<2,500	ND<25	28	ND<25	**28**	ND<1,000	**2100**	ND<25	ND<25	ND<25	NA
HP-8-34	120.229	30-34	86.2- 90.2	10/15/04	ND<2,500	ND<25	ND<25	ND<25	ND<25	ND<1,000	**880**	ND<25	ND<25	ND<25	NA

Notes:

1) Groundwater samples analyzed by EPA method 8260B.
2) Concentrations above laboratory reporting limits in **bold**.
3) SB- indicates groundwater grab sample from bottom of soil boring. HP- indicates depth distrete groundwater sample using a hydropunch.

bgs = below ground surface
ESL =Environmental Screening Level
GRO = Gasoline Range Organics
(mg/L) = micrograms per litre
msl =Mean sea level
MTBE = methyl tertiary butyl ether.
NA = Not Analyzed
ND< = Not detected below stated laboratory reporting limit
TPH-g = Total petroleum hydrocarbons as gasoline

Soil Water Analytical Data
ARCO Service Station 2107
3310 Park Boulevard
Oakland, California

TABLE 1
Dispenser and Product Line Soil Sample Results

Soil Sample ID	Sample Depth (feet)	Date Sampled	TPHg as Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	Pb (ppm)
S-D1	4	10/18/02	ND<0.5	ND<1.8	ND<1.8	ND<1.8	ND<1.8	0.061	6.7
S-D2	4	10/18/02	ND<0.5	ND<1.6	ND<1.6	ND<1.6	ND<1.6	ND<1.6	36
S-D3	3.5	10/18/02	ND<0.5	ND<0.78	ND<0.78	ND<0.78	ND<0.78	34	8.2
S-D4	3.5	10/18/02	ND<0.5	ND<1.1	ND<1.1	ND<1.1	ND<1.1	11	29
S-D5	5	10/18/02	ND<0.5	ND<0.98	ND<0.98	ND<0.98	ND<0.98	8.9	ND<5.0
S-D6	5	10/18/02	ND<0.5	ND<1.0	ND<1.0	ND<1.0	ND<1.0	17	ND<5.0
S-D7	5	10/18/02	4,000	ND<10.0	220	150	1,100	19	7.6
S-D8	5	10/18/02	2,900	ND<10.0	52	46	400	6.7	8.9
S-L1	4.5	10/18/02	ND<0.5	ND<1.2	ND<1.2	ND<1.2	ND<1.2	19	ND<5.0
S-L2	4	10/18/02	ND<0.5	0.89	ND<0.62	ND<0.62	ND<0.62	19	ND<5.0
S-L3	4.5	10/18/02	ND<0.5	ND<1.0	ND<1.0	ND<1.0	2.3	83	10
S-L4	5	10/18/02	ND<0.5	ND<0.84	ND<0.84	ND<0.84	ND<0.84	37	ND<5.0
S-L5	5	10/18/02	450	ND<2.5	3.4	4.9	44	ND<1.2	ND<5.0
S-L6	6.5	10/18/02	37	ND<0.79	ND<0.79	ND<0.79	ND<0.79	0.099	6.7
VP-1	4	10/21/02	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<0.025	--
VP-2	4	10/21/02	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<0.025	--

TABLE 2
Groundwater Sample Results

Water Sample ID	Sample Depth (feet)	Date Sampled	TPHg as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MTBE (ppb)
T-1	7.5	10/21/02	4,200	300	3,200	1,300	11,000	4,900
BT-1	N/A	10/18/02	ND<1000	ND<25	ND<25	ND<25	ND<25	1,800
Sump-1	N/A	10/18/02	640,000,000	4,000,000	70,000,000	170,000,000	990,000,000	53,000,000

TABLE 3
Over-excavation Sample Results

Soil Sample ID	Sample Depth (feet)	Date Sampled	TPHg as Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	Pb (ppm)
S-OE1	7.5	10/18/02	2,200	ND<2.5	7.9	7.1	40	3.4	5.5
S-OE2	7.5	10/18/02	21	ND<0.5	ND<0.5	ND<0.5	ND<0.5	3.4	8.1
OE-3	7	10/21/02	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<0.025	--
OE-4	7	10/21/02	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<0.025	--

TPH	= Total purgeable petroleum hydrocarbons using EPA Method 8015, modified.
BTEX	= Benzene, toluene, ethylbenzene, total xylenes using EPA Method 8021B.
MTBE	= Methyl Tertiary Butyl Ether.
ppb	= Parts per billion.
ppm	= Parts per million.
ND<	= Less than stated laboratory detection limit.

Table 1
Soil Analytical Data
Atlantic Richfield Company Service Station #2107
3310 Park Blvd, Oakland, CA

Soil Sample ID	Sample Depth (feet bgs)	Date Sampled	GRO (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	t-Butyl Alcohol (TBA) (mg/kg)	MTBE (mg/kg)	Diisopropal Alcohol (DIPE) (mg/kg)	Ethyl-t-Butyl-Ether (ETBE) (mg/kg)	t-Amyl Methyl Ether (TAME) (mg/kg)	Ethanol (mg/kg)
SB-1-5	5	3/30/04	ND<1.2	ND<0.0061	**0.096**	ND<0.0061	**0.016**	ND<0.012	ND<0.0061	ND<0.012	ND<0.0061	ND<0.0061	ND<0.1
SB-1-10	10	3/30/04	ND<1.3	ND<0.0063	ND<0.0063	ND<0.0063	ND<0.0063	ND<0.013	ND<0.0063	ND<0.013	ND<0.0063	ND<0.0063	ND<0.1
SB-1-15	15	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-1-18	18	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-2-5	5	3/30/04	ND<1.3	ND<0.0067	ND<0.0067	ND<0.0067	ND<0.0067	ND<0.013	ND<0.0067	ND<0.013	ND<0.0067	ND<0.0067	ND<0.1
SB-2-10	10	3/30/04	ND<1.2	ND<0.0061	ND<0.0061	ND<0.0061	ND<0.0061	ND<0.012	ND<0.0061	ND<0.012	ND<0.0061	ND<0.0061	ND<0.1
SB-2-15	15	3/30/04	ND<1.2	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.012	ND<0.0060	ND<0.012	ND<0.0060	ND<0.0060	ND<0.1
SB-2-20	20	3/30/04	ND<1.2	ND<0.0062	ND<0.0062	ND<0.0062	ND<0.0062	ND<0.012	ND<0.0062	ND<0.012	ND<0.0062	ND<0.0062	ND<0.1
SB-2-23	23	3/30/04	ND<1.2	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.0060	ND<0.012	ND<0.0060	ND<0.012	ND<0.0060	ND<0.0060	ND<0.1
SB-3-8.0	8.0	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	**0.024**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-13	13.0	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	**0.027**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-18	18.0	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.19**	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-23.0	23.0	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	**0.29**	**0.027**	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-26.5	26.5	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-3-31.0	31	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1
SB-4-1.0	1	5/7/04	**350**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<25
SB-5-8	8.0	3/30/04	ND<1.1	ND<0.0056	ND<0.0056	ND<0.0056	ND<0.0056	ND<0.011	ND<0.0056	ND<0.011	ND<0.0056	ND<0.0056	ND<0.1
SB-5-16	16.0	3/30/04	ND<1.3	ND<0.0065	ND<0.0065	ND<0.0065	ND<0.0065	**0.016**	ND<0.0065	ND<0.013	ND<0.0065	**0.0066**	ND<0.1
SB-5-19	19.0	3/30/04	ND<1.2	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.0059	ND<0.012	ND<0.0059	ND<0.012	ND<0.0059	ND<0.0059	ND<0.1
SB-6-1.0	1.0	5/7/04	ND< 1.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.010	ND<0.0050	ND<0.01	ND<0.0050	ND<0.0050	ND<0.1

Notes:

1) Groundwater samples analyzed by EPA method 8260B.
2) Concentrations above laboratory reporting limits in **bold**.

GRO = Gasoline Range Organics
bgs = below ground surface
mg/kg = milligrams per kilogram
MTBE = Methyl Tertiary Butyl Ether.
ND< = Less than stated laboratory detection limit.

Table 2
Groundwater Analytical Data
Atlantic Richfield Company Service Station #2107
3310 Park Blvd, Oakland, CA

Water Sample ID	Sample Depth (feet bgs)	Date Sampled	GRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)	t-Butyl Alcohol (TBA) (µg/L)	MTBE (µg/L)	Diisopropal Alcohol (DIPE) (µg/L)	Ethyl-t-Butyl Ether (ETBE) (µg/L)	tert-Amyl Methyl Ether (TAME) (µg/L)	Ethanol (µg/L)
SB-1	18.5	3/30/04	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	ND<5.0	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<50
SB-2	23.0	3/30/04	ND<50	ND<0.50	**1.4**	ND<0.50	ND<1.0	ND<5.0	ND<0.50	ND<1.0	ND<0.50	ND<0.50	ND<50
SB-3	32.0	5/7/04	**88**	ND<0.50	ND<0.50	ND<0.50	ND<1.0	**110**	**34**	ND<1.0	ND<0.50	**1.1**	ND<50
SB-5	19.5	3/30/04	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	**45**	**34**	ND<1.0	ND<0.50	ND<0.50	ND<50

Notes:

1) Groundwater samples analyzed by EPA method 8260B.
2) Concentrations above laboratory reporting limits in **bold**.

GRO = Gasoline Range Organics
bgs = below ground surface
(mg/L) = micrograms per litre
MTBE = methyl tertiary butyl ether.
ND< = Less than stated laboratory detection limit.

Table 1. Summary of Depth-Discrete Soil Sampling Data
BP Service Station No. 2107
3310 Park Boulevard, Oakland, California (ACEH Case No. RO0002526)

Boring I.D.	Date	Laboratory Analytical Results (mg/kg)												
		GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	DIPE	ETBE	TBA	TAME	Ethanol	EDB	1,2 DCA
SB12-9	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB12-15	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	**0.0087**	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB12-23	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB12-27	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB13-11	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB13-15	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB13-21	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB13-29	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB14-9	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB14-15	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB14-19	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB14-29	6/26/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB15-9	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB15-17	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB15-23	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	**0.0065**	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
SB15-29	6/25/2007	<0.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.10	<0.0050	<0.0050
Soil Quality Objectives*		5.0	1.0	42	29	17	5.0	0.8	13	12	13	---	0.05	0.5

EDB = 1,2-Dibromoethane
1,2 DCA = 1,2 Dichloroethane
TAME = Tertiary amyl methyl ether
TBA = Tertiary butyl alcohol
GRO = Gasoline Range Organics, C4-C12
DIPE = Di-isopropyl ether
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether
* = Water Quality Objectives compiled from the CRWQCB's *A Compilation of Water Quality Goals - August 2003* and from other CRWQCB sources.

Table 2. Summary of Depth-Discrete Ground-Water Sampling Data
BP Service Station No. 2107
3310 Park Boulevard, Oakland, California (ACEH Case No. RO0002526)

Boring I.D.	Date	Laboratory Analytical Results (µg/l)												
		GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	DIPE	ETBE	TBA	TAME	Ethanol	EDB	1,2 DCA
HP9-13	6/26/2007	51 [1]	<0.50	<0.50	<0.50	<0.50	67	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP9-21	6/26/2007	<50	<0.50	<0.50	<0.50	<0.50	7.4	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP10-16	6/26/2007	<50	<0.50	<0.50	<0.50	<0.50	0.78	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP10-24	6/26/2007	<50	0.80	<0.50	<0.50	<0.50	50	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP11-24	6/26/2007	59	0.63	<0.50	<0.50	<0.50	66	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP12-19	6/25/2007	<50	<0.50	<0.50	<0.50	<0.50	30	<0.50	<0.50	<20	<0.50	<300	<0.50	<0.50
HP12-25	6/25/2007	84 [1]	<1.0	<1.0	<1.0	<1.0	110	<1.0	<1.0	<40	<1.0	<600	<1.0	<1.0
Water Quality Objectives*		5.0	1.0	42	29	17	5.0	0.8	10	12	13		0.05	0.5

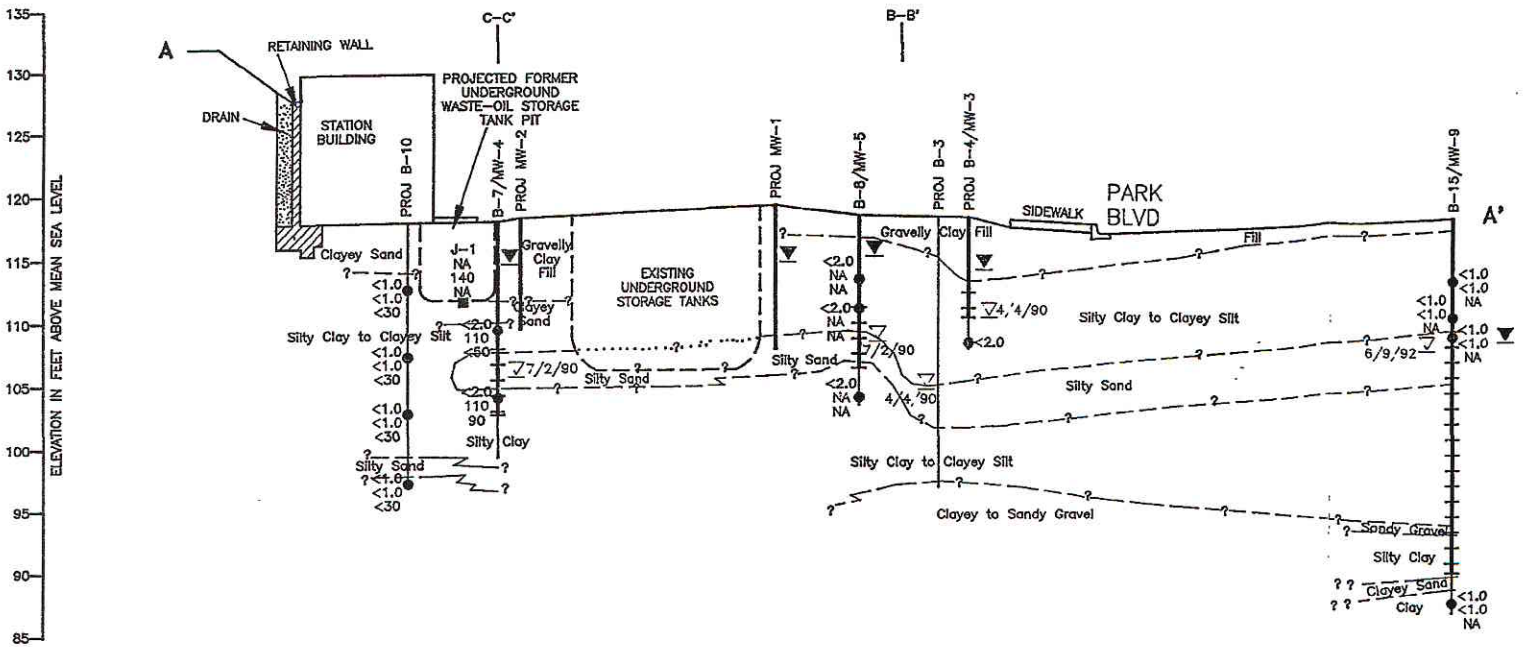
EDB = 1,2-Dibromoethane
1,2 DCA = 1,2 Dichloroethane
TAME = Tertiary amyl methyl ether
TBA = Tertiary butyl alcohol

GRO = Gasoline Range Organics, C4-C12
DIPE = Di-isopropyl ether
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether

[1] = Hydrocarbon result partly due to individual peak(s) in quantitation range

* = Water Quality Objectives compiled from the CRWQCB's *A Compilation of Water Quality Goals - August 2003* and from other CRWQCB sources.

Cross Sections



EXPLANATION

J–1 ■ = Former underground waste–oil storage tank pit soil sample

<2.0 / 110 / 90 = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHD (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

▽ = Initial water level in boring

▽ = Static water level in well (11/11/92)

NA = Not analyzed

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

20 10 0 20 40

feet

Approximate Vertical Scale

10 5 0 10 20

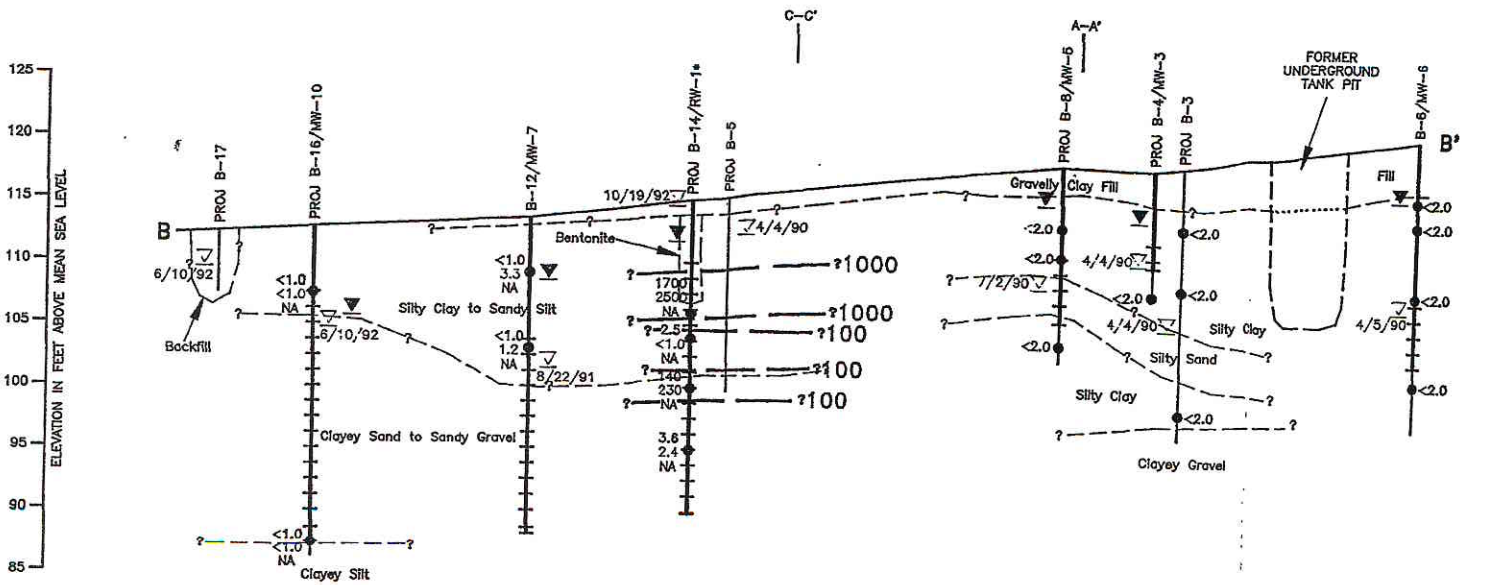
feet

RESNA
Working to Restore Nature

PROJECT 69021.10 690211GA

GEOLOGIC CROSS SECTION A-A'
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE 11



EXPLANATION

1700 / 2500 / NA = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHd (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (11/11/92)

NA = Not analyzed

* = This well was not surveyed. Elevation and location are approximate.

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale
20 10 0 20 40
feet

Approximate Vertical Scale
10 5 0 10 20
feet

RESNA
Working to Restore Nature

PROJECT 69021.10 69021108

GEOLOGIC CROSS SECTION B-B'
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE
12

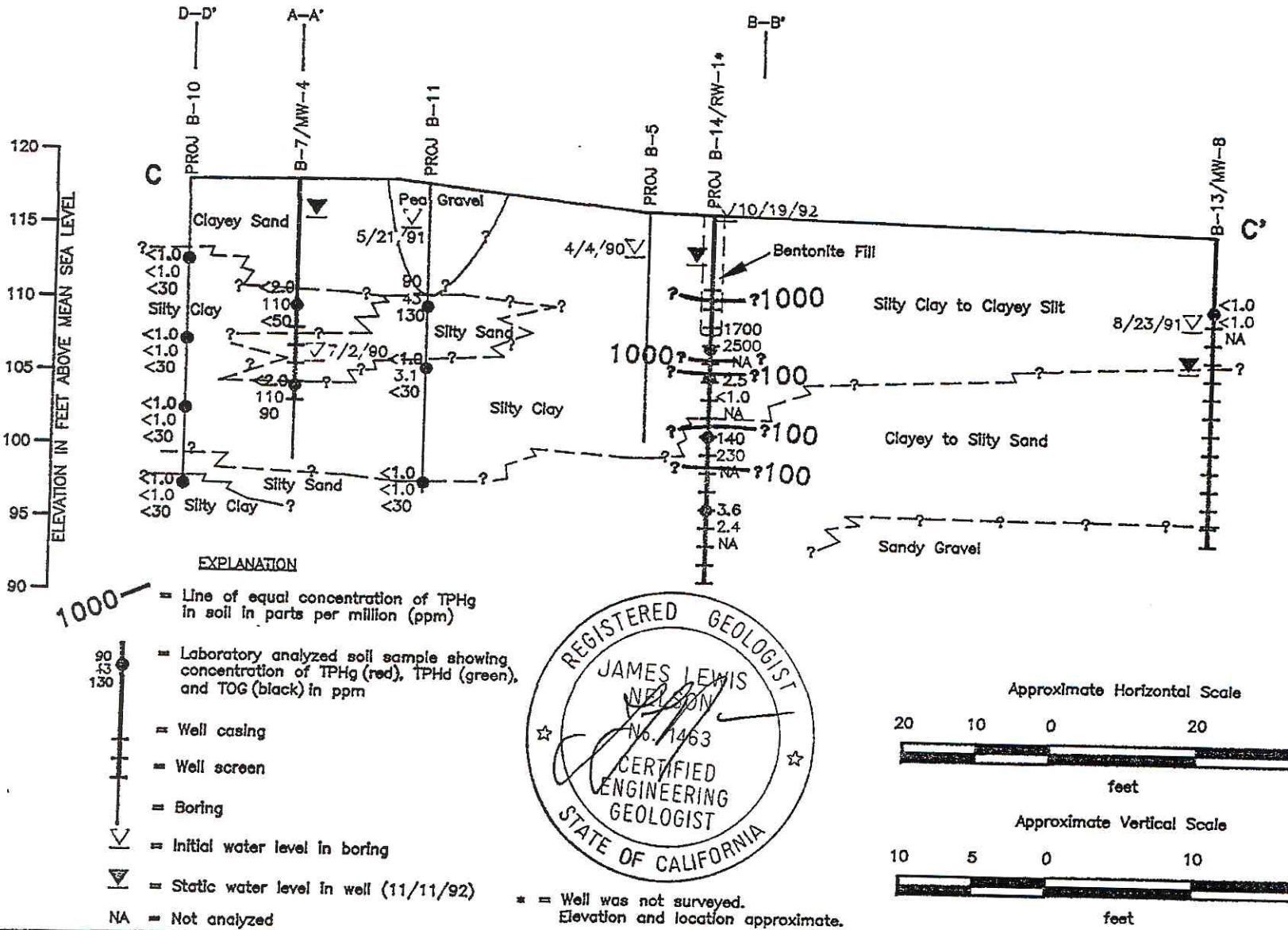


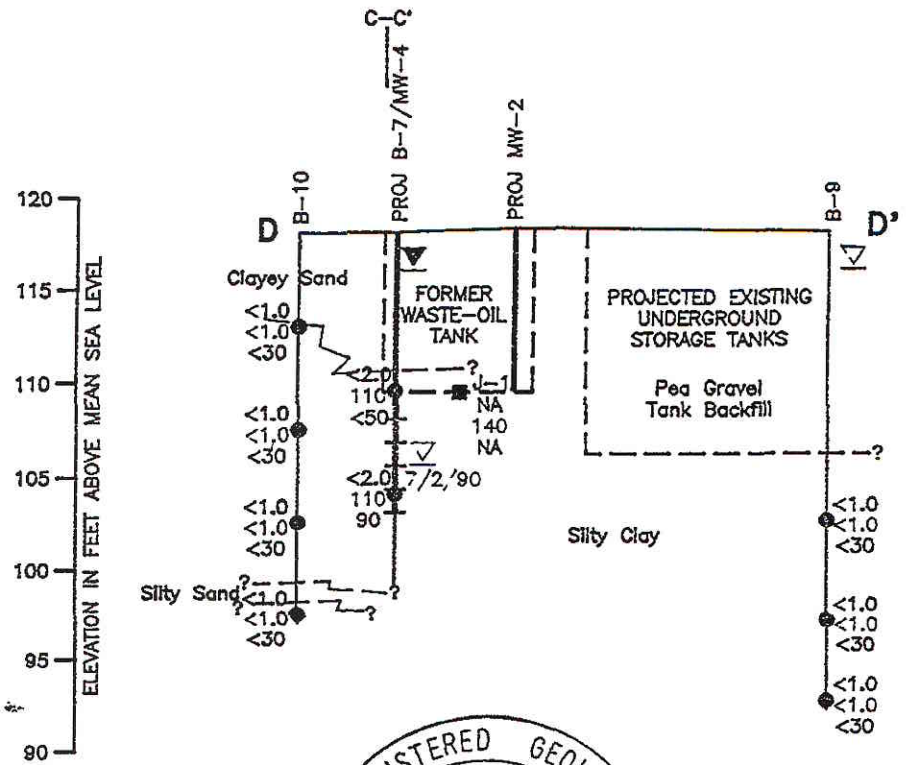
PLATE 13

GEOLOGIC CROSS SECTION C-C'
ARCO Station 2107
3310 Park Boulevard
Oakland, California

RESNA
Working to Restore Nature

PROJECT 69021.10

6902110C



EXPLANATION

2.0 / 110 / 90 = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHd (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (11/11/92)

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

10 5 0 10 20

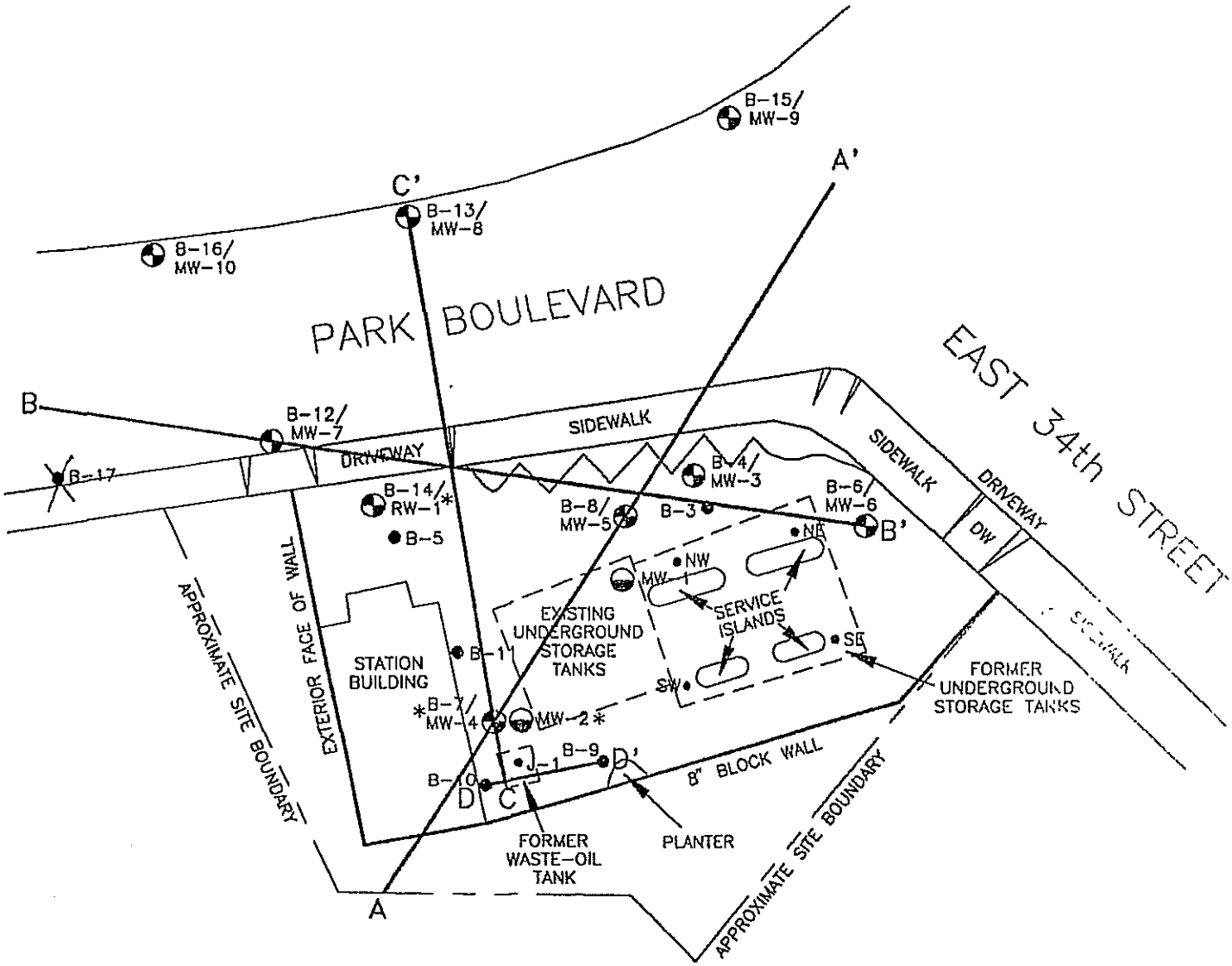
feet

Approximate Vertical Scale

10 5 0 10 20

feet

PLATE 14	GEOLOGIC CROSS SECTION D-D' ARCO Station 2107 3310 Park Boulevard Oakland, California	RESNA Working to Restore Nature PROJECT 69021.10 6902110D



EXPLANATION

B-11 ● = Soil boring (RESNA, 04/90, 05/91, and 06/92, and 10/92)

B-16/MW-10 ◓ = Groundwater monitoring well (RESNA, 04/90, 07/90, 08/91, and 06/92)

B-16/RW-1 ◓ = Groundwater recovery well (RESNA, 10/92)

MW-2 ◒ = Tank pit observation well (S.C.S. Engineers, 01/87)

J-1 ● = Soil sample (S.C.S. Engineers, 01/87)

* = Well was not surveyed, location is approximate

D —— D' = Geologic cross section

N

Approximate Scale

40 20 0 40 80

feet

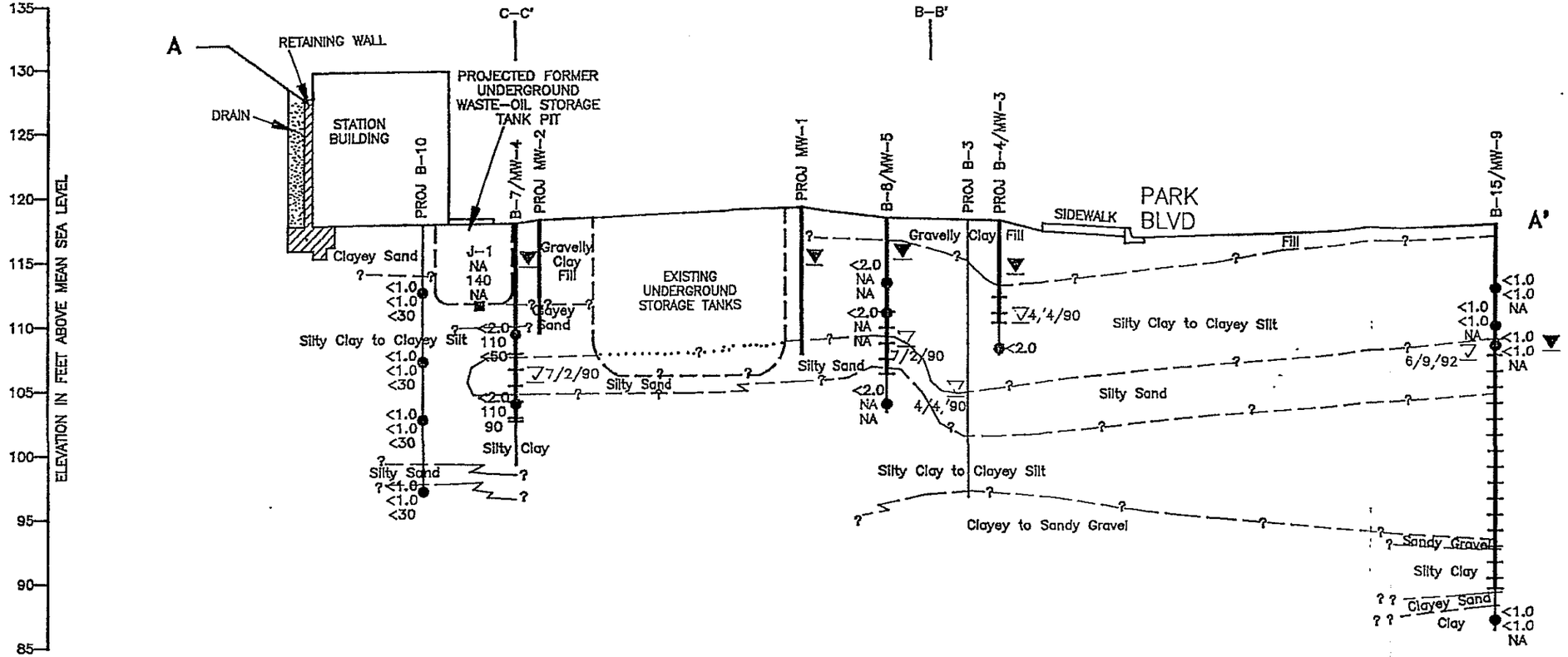
SOURCE: Modified from plan supplied by John L. Koch, Land Surveyor, [illegible]

RESNA
Working to Restore Nature

PROJECT 69021.10 69021-10

GENERALIZED SITE PLAN
ARCO Station 2107
3310 Park Boulevard
Oakland, California

[illegible]



EXPLANATION

J–1 ■ = Former underground waste–oil storage tank pit soil sample

<2.0 / 110 / 90 = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHD (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

▽ = Initial water level in boring

▽ = Static water level in well (11/11/92)

NA = Not analyzed

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1468
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

20 10 0 20 40

feet

Approximate Vertical Scale

10 5 0 10 20

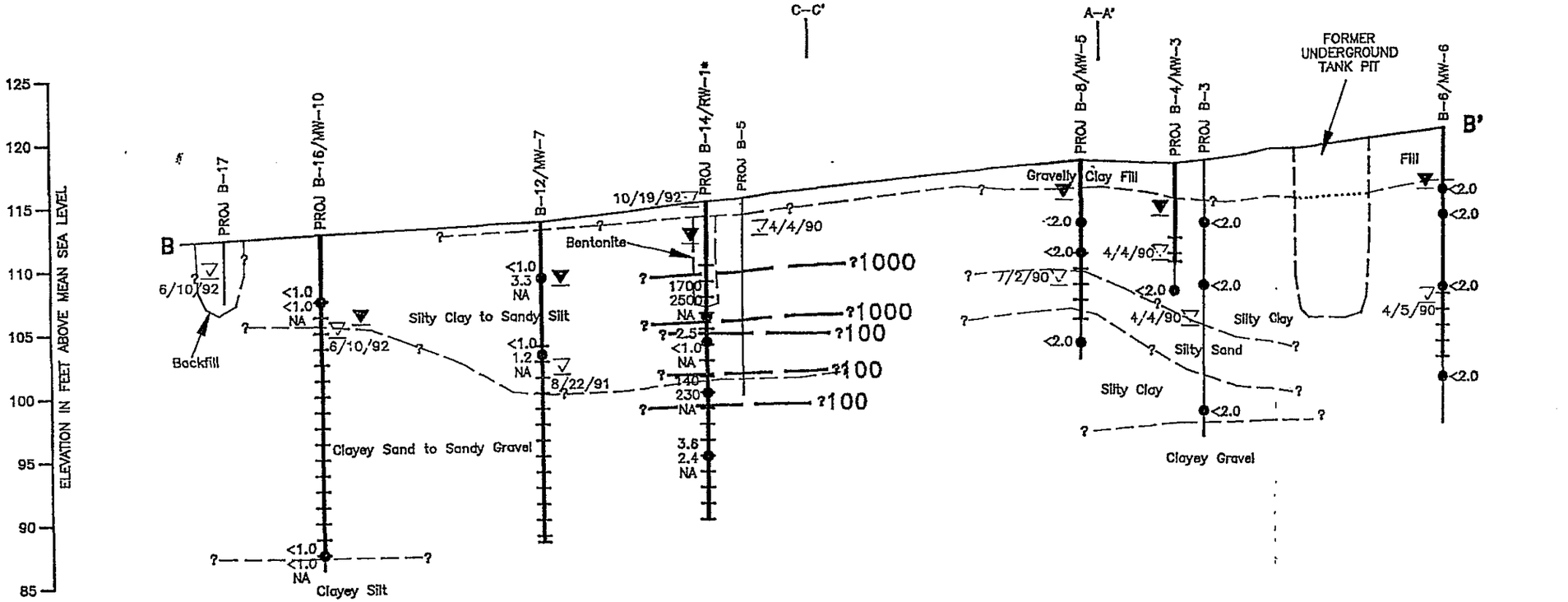
feet

RESNA
Working to Restore Nature

PROJECT 69021.10 6902110A

GEOLOGIC CROSS SECTION A-A'
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE 11



EXPLANATION

1700 / 2500 / NA = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHd (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (11/11/92)

NA = Not analyzed

* = This well was not surveyed. Elevation and location are approximate.

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

20 10 0 20 40

feet

Approximate Vertical Scale

10 5 0 10 20

feet

RESNA
Working to Restore Nature

PROJECT 69021.10 69021108

GEOLOGIC CROSS SECTION B-B'
ARCO Station 2107
3310 Park Boulevard
Oakland, California

PLATE
12

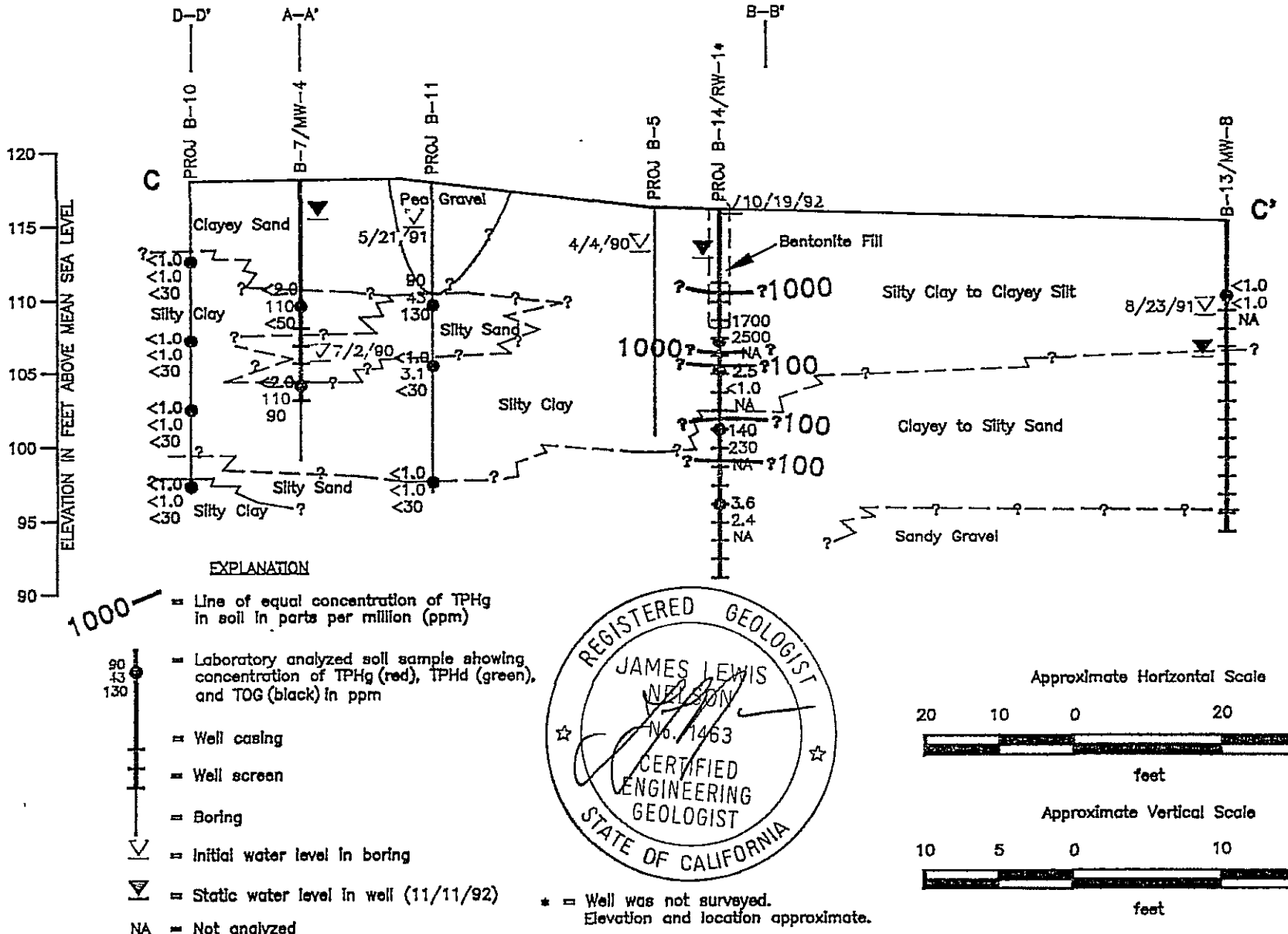
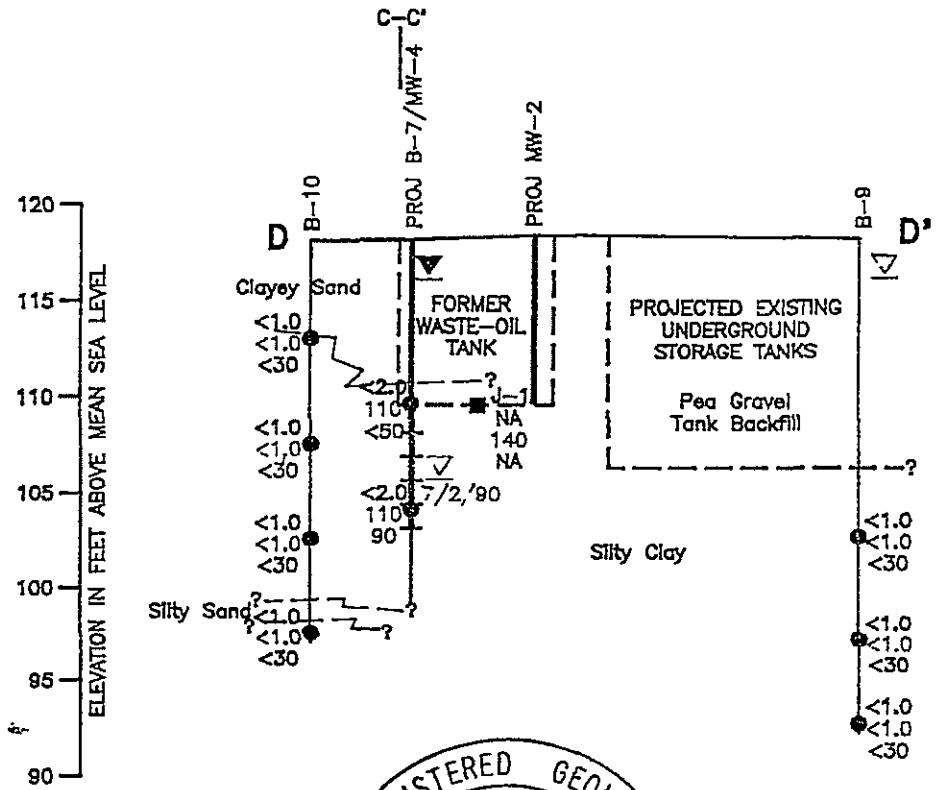


PLATE	GEOLOGIC CROSS SECTION C-C'	RESNA
13	ARCO Station 2107 3310 Park Boulevard Oakland, California	Working to Restore Nature
		PROJECT 69021.10

6902110C



EXPLANATION

2.0 / 110 / 90 = Laboratory analyzed soil sample showing concentration of TPHg (red), TPHd (green), and TOG (black) in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (11/11/92)

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

10 5 0 10 20

feet

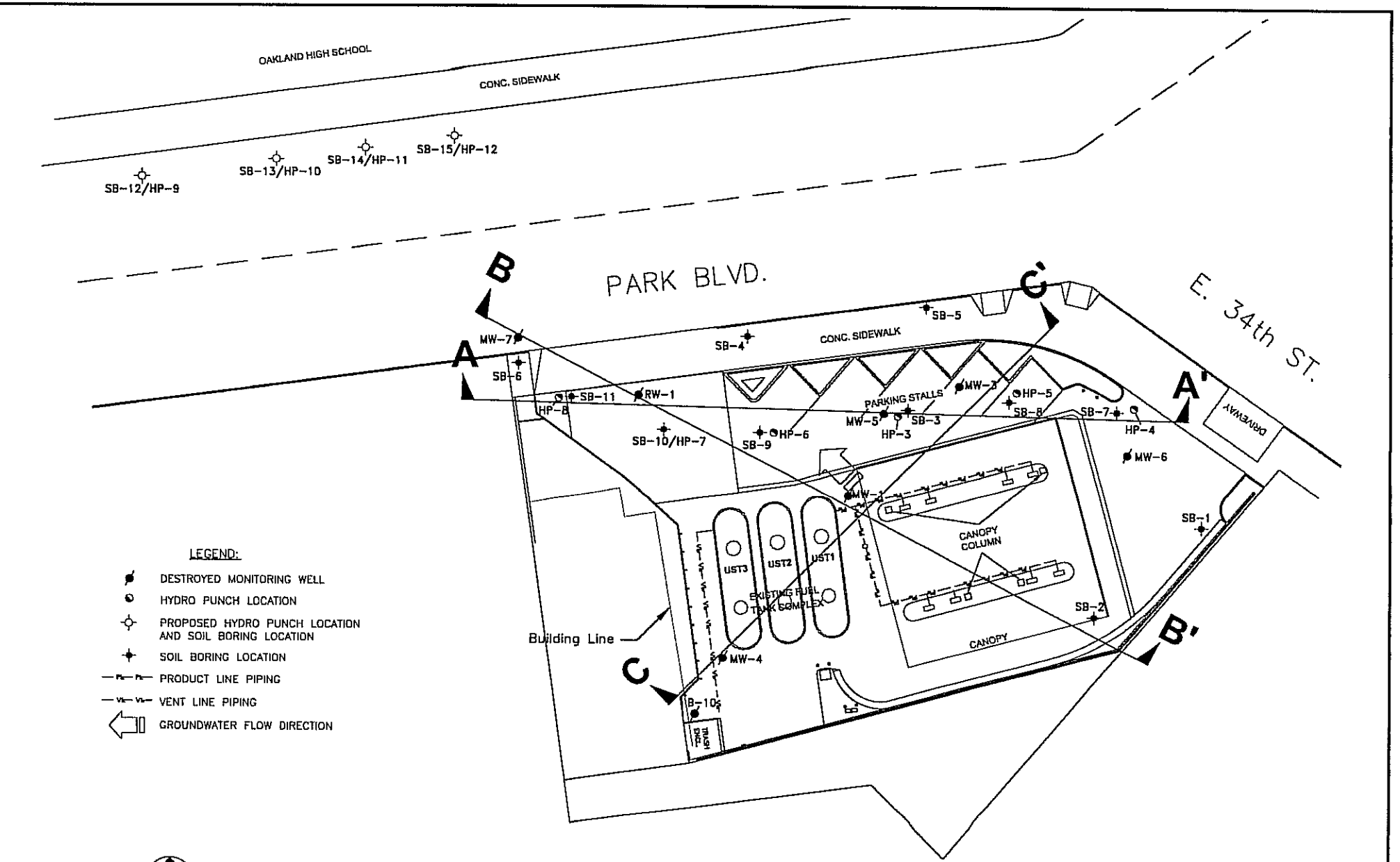
Approximate Vertical Scale

10 5 0 10 20

feet

PLATE	GEOLOGIC CROSS SECTION D-D'	RESNA
14	ARCO Station 2107 3310 Park Boulevard Oakland, California	Working to Restore Nature
		PROJECT 69021.10

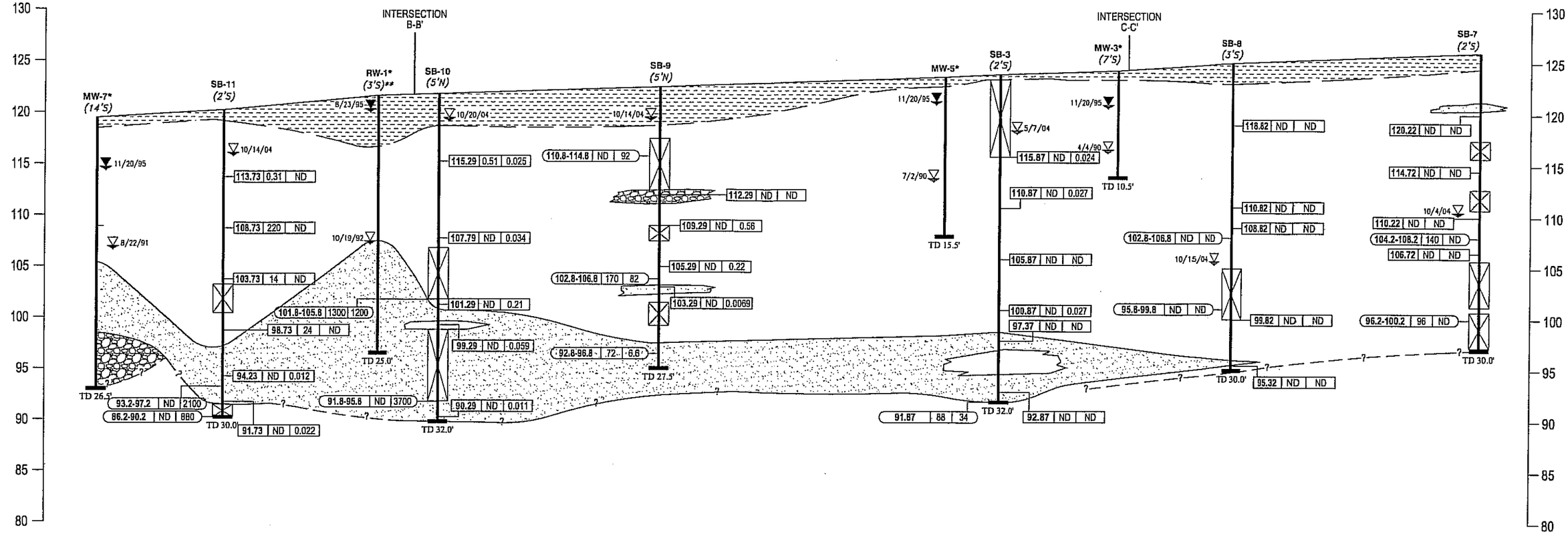
6902110D

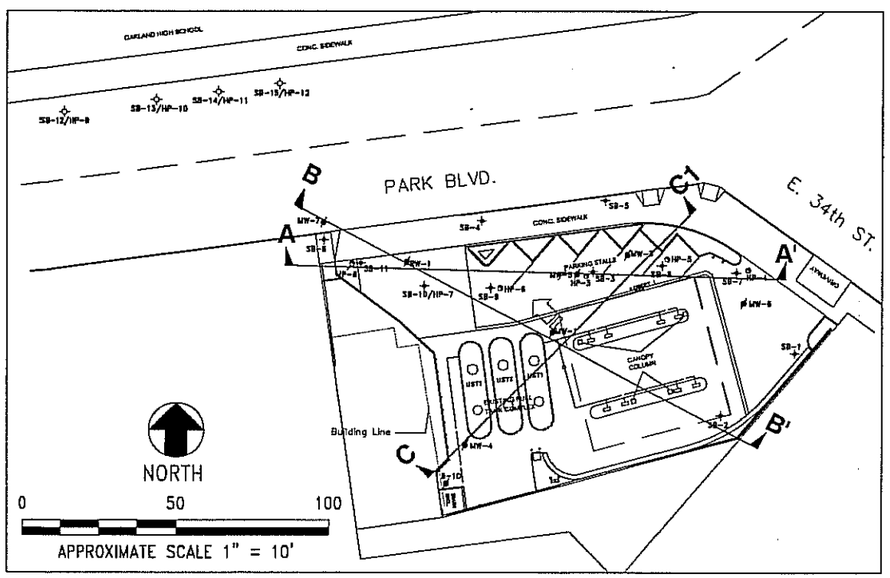


URS	Project No. 38487287 ARCO Service Station #2107 3310 Park Boulevard Oakland, California	PROPOSED OFFSITE SOIL BORING HYDROPUNCH LOCATIONS	FIGURE 2

West
A

East
A'





0 10 20
VERTICAL & HORIZONTAL 1" = 10'

LEGEND

SP/SW/SC/SM		Well to poorly graded sands or gravely sands, minor to no fines.
ML/CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
GM/GP/GW		Well to poorly graded gravel-sand mixtures, little to no fines.
		Fill/Asphalt
	▽	First encountered groundwater
	▼	Static water level
	*	Wells were destroyed in 1997
	**	RW-1 depth to water not measured 11/25/98

MW-7 (10'N) — Well or soil boring number; Distance in feet and direction of projection

No recovery

TD 26.5' — Total depth 26.5 feet below ground surface

112.29 | ND | ND
- MTBE (mg/kg)
- GRO (mg/kg)
- Soil sample elevation (ft/MSL)

86.2-99.2 | ND | 880
- MTBE (µg/L)
- GRO (µg/L)
- Groundwater sample elevation (ft/MSL)

URS

Project No. 38487194

ARCO Service Station #2107

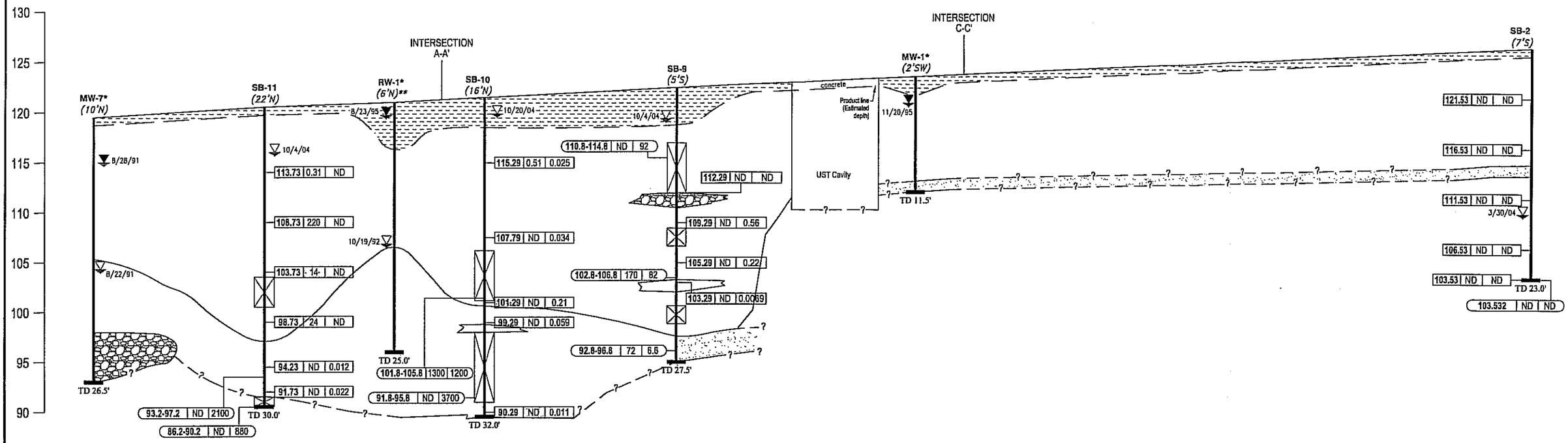
GEOLOGIC CROSS SECTION A - A'

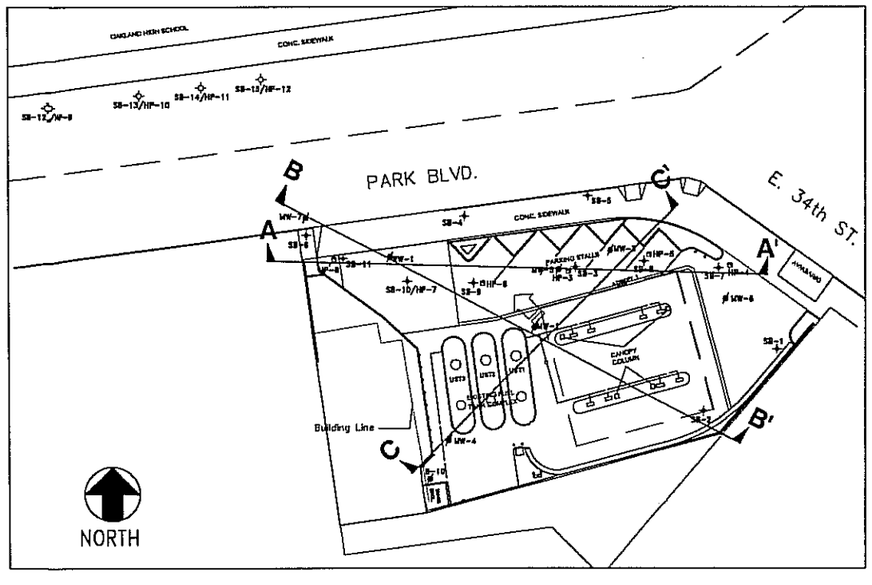
FIGURE 4

jktingi0 Apr 07, 2005 - 2:03pm
X:\e_env_waste\BP GEM\sites\Scott Robinson\Paul Supple\2107\Soil Investigation\Drawings\WELW-A-A_XSECTION.dwg

Northwest
B

Southeast
B'





0 10 20

VERTICAL & HORIZONTAL 1" = 10'

LEGEND

SP/SW/SC/SM		Well to poorly graded sands or gravely sands, minor to no fines.
ML/CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
GM/GP/GW		Well to poorly graded gravel-sand mixtures, little to no fines.
		Fill/Asphalt
	▽	First encountered groundwater
	▼	Static water level
	*	Wells were destroyed in 1997
	**	RW-1 depth to water not measured 11/25/98

MW-7 (10'N) — Well or soil boring number; Distance in feet and direction of projection

⊠ — No recovery

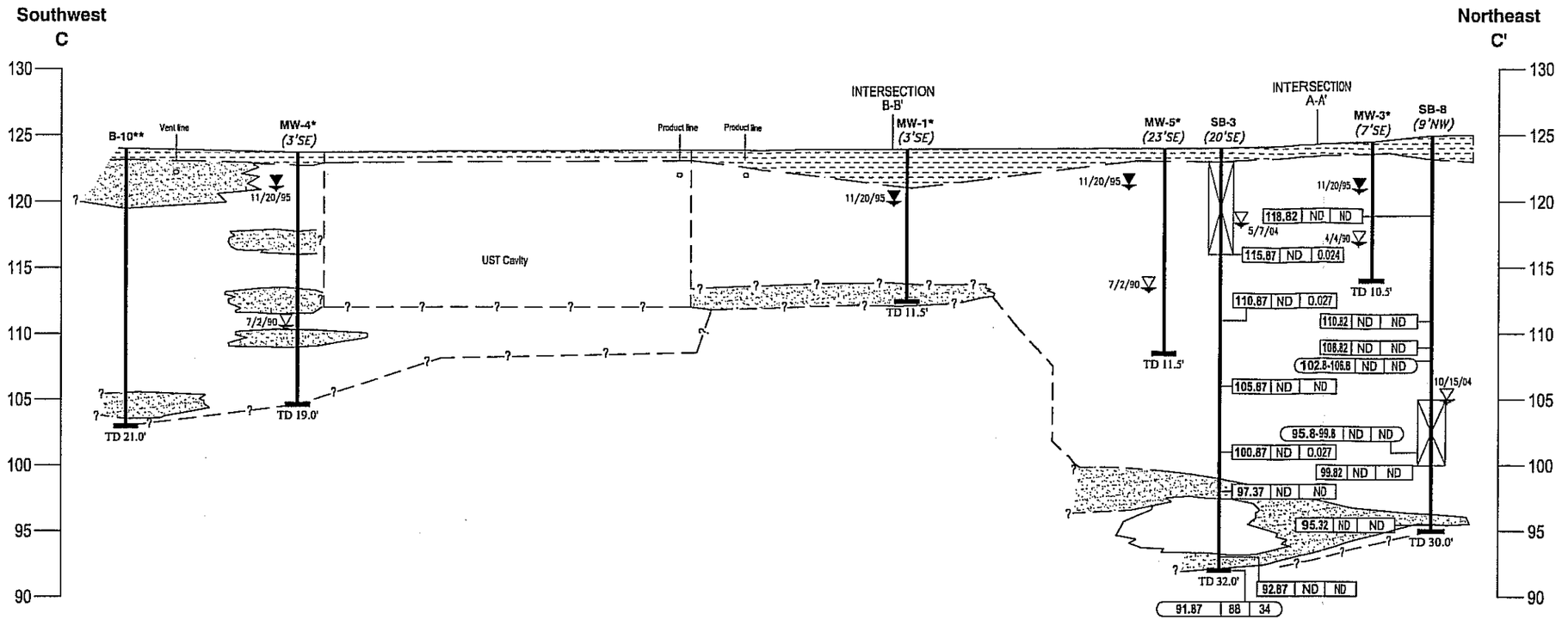
TD 26.5' — Total depth 26.5 feet below ground surface

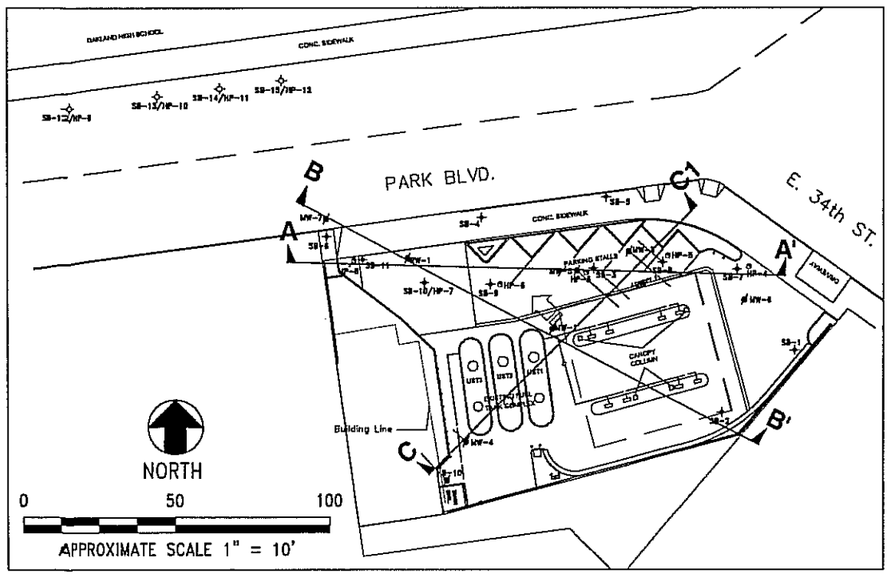
112.29 | ND | ND — MTBE (mg/kg); GRO (mg/kg); Soil sample elevation (ft/MSL)

86.2-90.2 | ND | 880 — MTBE (µg/L); GRO (µg/L); Groundwater sample elevation (ft/MSL)

URS	Project No. 38487287 ARCO Service Station #2107 3310 Park Boulevard Oakland, California	GEOLOGIC CROSS SECTION B - B'	FIGURE 5

jking10 Apr 07, 2005 - 12:05pm
X:\r_env_waste\BP GEM\sites\Scott Robinson\Paul Supple\2107\Soil Investigation\Drawings\B-B_XSECTION.dwg





0 10 20
VERTICAL & HORIZONTAL 1" = 10'

LEGEND

SP/SW/SC/SM		Well to poorly graded sands or gravely sands, minor to no fines.
ML/CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Fill/Asphalt
		First encountered groundwater
		Static water level
	*	Wells were destroyed in 1997
	**	Lithology adapted from previous cross section (Resna, 1992)

SB-3 — Well or soil boring number
(20'SE) — Distance in feet and direction of projection
— No recovery
TD 32.0' — Total depth 32 feet below ground surface
100.87 | ND | ND — MTBE (mg/kg) / GRO (mg/kg) / Soil sample elevation (ft/MSL)
91.87 | 88 | 34 — MTBE (µg/L) / GRO (µg/L) / Groundwater sample elevation (ft/MSL)

URS

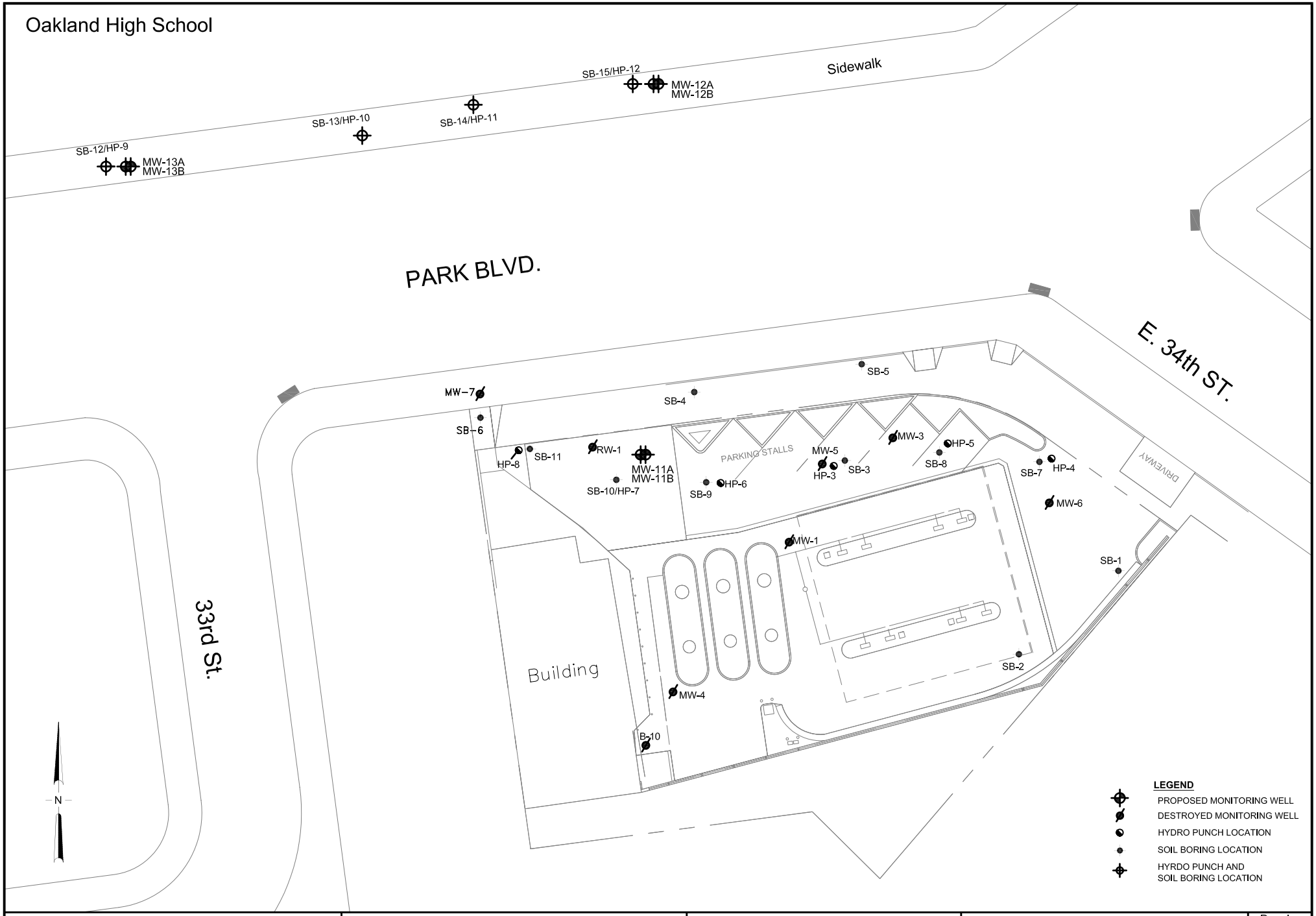
Project No. 38487287

ARCO Service Station #2107
3310 Park Boulevard
Oakland, California

GEOLOGIC CROSS SECTION C - C'

FIGURE
6

jkting10 Apr 07, 2005 - 12:09pm
X:\e_env_waste\BP GEM\sites\Scott Robinson\Paul Supple\2107\Soil Investigation\Drawings\C-C_XSECTION.dwg



0 30 60

SCALE (ft)

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
1324 Mangrove Ave. Suite 212, Chico, California
Project No.: 06-08-614 Date: 8/25/08

Station #2107
3310 Park Boulevard
Oakland, California

Site Map with Proposed Monitoring Well Locations

Drawing
2

URS

1333 Broadway, Suite 800
Oakland, California 94612

LOG OF BORING

Borehole ID: SB-1

Total Depth: 18.5'

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe
RG: James Durkin	**Drilling Method:** 2" Direct Push
Geologist: Chris Sheridan	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 3/30/04

BORING INFORMATION

Groundwater Depth: NA	**Boring Location:** East corner of property, near entrance on East 34th St.
Air Knife or Hand Auger Depth: 5.0 feet	**Boring Diameter:** 2"
Coordinates: X -122.2344641 Y 37.8031429	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
128	0		CONCRETE					
			SILTY GRAVELLY CLAY: dark brown (7.5 YR 3/3), clay with silt and fine to coarse gravel and sand; soft; no plasticity, moist.	CL				Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
126	2							
124	4							
			Low plasticity.		0	SB-1-5		
122	6							
120	8							
					0			
118	10		Moderately stiff to stiff.			SB-1-10		
116	12				6			
114	14				0			
						SB-1-15		
112	16							
						SB-1-18		
110	18		SILTY SANDY GRAVEL: brown (7.5 YR 5/3) subangular to angular gravel, sand, silt, little clay; well graded, moist. EOB: Refusal @18.5' bgs.	GW	0			

URS

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LOG OF BORING

Borehole ID: SB-2

Total Depth: 23.0'

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe
RG: James Durkin	**Drilling Method:** 2" Direct Push
Geologist: Chris Sheridan	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 3/30/04

BORING INFORMATION

Groundwater Depth: 16'	**Boring Location:** Under east corner of canopy
Air Knife or Hand Auger Depth: 5 feet	**Boring Diameter:** 2"
Coordinates: X -122.2345458 Y 37.8030865	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
126	0		CONCRETE					
			Air knifed to 5' bgs					Borehole grouted with neat Portland Cement. Top 3" finished to grade with cement.
124	2				0			
122	4							
			SILTY CLAY: brown (7.5 YR 4/3) clay with silt and fine to coarse sand; soft, moist, low plasticity.	CL		SB-2-5		
120	6				0			
118	8							
					6			
116	10		CLAYEY SILT: brown (7.5 YR 4/3), silt with clay and trace fine to coarse gravel and sand; moist, slight plasticity.	ML		SB-2-10		
			SAND: brown, fine; moist.	SP	0			
114	12		SILTY CLAY: brown (7.5 YR 3/4), clay with silt; moist, low plasticity.	CL				
					0			
112	14							
			Wet.			SB-2-15		
110	16							
					0			
108	18							
			Some gravel.		0			
106	20					SB-2-20		
					0			
104	22		EOB: Refusal @23.0' bgs.			SB-2-23		Groundwater grab sample SB-2.

URS

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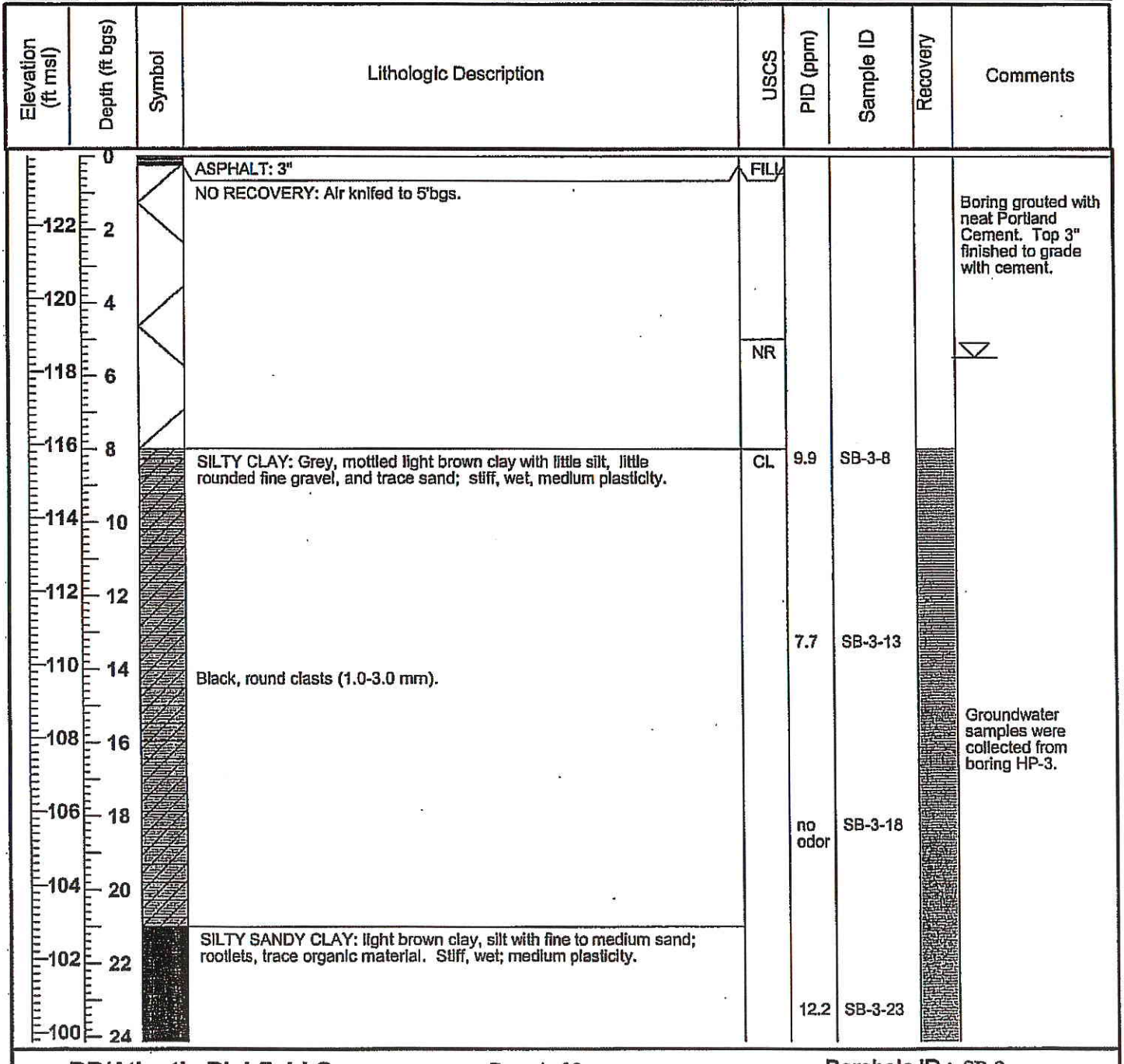
LOG OF BORING

Borehole ID: SB-3

Total Depth: 32.0 ft. bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe
RG: James Durkin	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 5/7/04

BORING INFORMATION	
Groundwater Depth: 5.5 ft. bgs	**Boring Location:** Parking stall across from pump #6.
Air Knife or Hand Auger Depth: 5 feet	**Boring Diameter:** 2"
Coordinates: X -122.2347087 Y 37.8032083	**Boring Type:** Exploratory



Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
98 / 26		SILTY SAND: light brown, fine to coarse sand with little silt, loose, saturated.	SM			
96 / 28		CLAYEY SANDY SILT: grey, mottled light brown, silt, some clay and little fine to coarse sand and trace gravel, moderately stiff, wet, medium plasticity.	ML	12.1	SB-3-26	
94 / 30				no odor	SB-3-31	
92 / 32		SAND: light brown, mostly coarse sand, little silt, trace gravel. Moderately dense, saturated. EOB: 32.0 ft. bgs.	SM			

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LOG OF BORING

Borehole ID: SB-4

Total Depth: 2.0 ft. bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Hand Auger
RG: James Durkin	**Drilling Method:** Hand Auger
Geologist: Kevin Uno	**Sampling Method:** Hand packed brass tube.
Job Number: 38486908.0013601	**Date(s) Drilled:** 5/7/04

BORING INFORMATION	
Groundwater Depth: 2.0 ft. bgs	**Boring Location:** Sidewalk along Park Blvd.
Air Knife or Hand Auger Depth: NA	**Boring Diameter:** 2 inch
Coordinates: X NA Y NA	**Boring Type:** Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		CONCRETE: 9"					
		SAND: FILL, dark gray, sand with silt. Strong hydrocarbon odor. Wet.	SP	HC odor	SB-4-1.0		Boring grouted with neat Portland Cement. Top 3" finished to grade with cement. ▽
2		EOB 2.0 ft' bgs. Boring abandoned when sloughing prevented air-knifing or hand augering to 5 ft. bgs.					

URS

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LOG OF BORING

Borehole ID: SB-5

Total Depth: 19.5'

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe
RG: James Durkin	**Drilling Method:** 2" Direct Push
Geologist: Chris Sheridan	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 3/30/04

BORING INFORMATION

Groundwater Depth: 4.0'	**Boring Location:** Sidewalk along Park Blvd near intersection w/E 34th St.
Air Knife or Hand Auger Depth: 5 feet	**Boring Diameter:** 2"
Coordinates: X -122.2346814 Y 37.8032765	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
122	0		ASPHALT: 3"					
			Air knifed to 5'bgs.					Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
120	2							
	4							▽
118			5.0-8.0' bgs: No Recovery.					
	6							
116	8		SILTY CLAY: brown to dark brown (5Y 3/1) clay with some silt and few fine to medium sand, soft, wet, low to moderate plasticity.	CL	0	SB-5-8		
114	10				0			
112	12		12.0-16.0' bgs: No Recovery.		6			
110	14							
108	16		First two feet of sample were slough (16.0-18.0').			SB-5-16		
106	18				0			
104			SANDY GRAVEL: brown (5Y 3/3) angular to subangular fine gravel with some sand, few clay and silt, stiff, wet. EOB: Refusal @ 19.5 ft. bgs	GW	0	SB-5-19		Groundwater grab sample at 19.5' bgs.

URS

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LOG OF BORING

Borehole ID: SB-6

Total Depth: 2.0 ft. bgs

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Gregg Drilling and Testing, Inc.
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul Rogers
Project Manager: Scott Robinson	**Type of Drilling Rig:** Hand Auger
RG: James Durkin	**Drilling Method:** Hand Auger
Geologist: Kevin Uno	**Sampling Method:** Hand packed brass tube.
Job Number: 38486908.0013601	**Date(s) Drilled:** 5/7/04
BORING INFORMATION	
Groundwater Depth: 2.0 ft. bgs	**Boring Location:** Sidewalk along Park Blvd.
Air Knife or Hand Auger Depth: NA	**Boring Diameter:** 2 inch
Coordinates: X NA Y NA	**Boring Type:** Exploratory

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
0		CONCRETE: 9"					Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
		SAND: (FILL), dark gray sand with silt. Strong hydrocarbon odor; wet.	SP	HC odor	SB-6-1.0		▽
2		EOB: 2.0 ft. bgs. Boring abandoned when sloughing prevented air-knifing or hand augering to 5 ft. bgs.					

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LOG OF BORING

Borehole ID: SB-7

Total Depth: 30 ft

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Vironex
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul White
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe 6610DT
RG: Bob Horwath	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 10/14/04

BORING INFORMATION

Groundwater Depth: 16'	**Boring Location:** Along curb at E 34th St. entrance to Site.
Air Knife or Hand Auger Depth: Air knife to 5' bgs	**Boring Diameter:** 2"
Coordinates: X -122.2345316 Y 37.8032140	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
126	0		ASPHALT: 3"	GP				
			SANDY CLAYEY GRAVEL: (2.5Y 3/3) Dark olive brown. 60% gravel, 25% sand, 10 silt, 5% clay. Loose, moist, low plasticity.					Boring grouted with neat Portland Cement. Top 3". finished to grade with cement.
124	2		CLAYEY SILT: (2.5Y 2.5/1) Black. 75% silt, 25% clay. Moderately stiff, moist, low to medium plasticity.	ML				
122	4		60% silt, 40% clay. Medium plasticity.					
			SILTY SAND: (2.5Y 3/2) Very dark greyish brown. 65% fine sand, 30% silt, 5% clay. Loose, moist to wet, low plasticity.	SM				
120	6		SANDY SILT: (2.5Y 4/2) Dark grayish brown. 65% silt, 20% sand, 15% clay, trace gravel. Stiff, moist, low plasticity.	ML		SB-7-6.0		
118	8		NO RECOVERY		0			
116	10		CLAYEY SILT: (2.5Y 4/2) Dark grayish brown. 75% silt, 15% clay, 10% sand. Stiff, moist, medium plasticity.	ML				
114	12		Oxidation, mottling (Very dark gray and olive).			SB-7-11.5		
112	14		NO RECOVERY					
110	16		SANDY CLAYEY SILT: (2.5Y 4/2) Dark grayish brown. 65% silt, 25% sand, 10% clay. Mottling (Very dark gray and olive), stiff, moist to wet, medium plasticity.		0	SB-7-16.0		▽
108	18				No Odor			Groundwater samples were collected from boring HP-4.
106	20		NO RECOVERY		No Odor	SB-7-19.5		
104	22							
	24							

URS

LOG OF BORING

Borehole ID: SB-7

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
102						
100		CLAYEY SILT: Recovered cutting shoe: Olive. 85% silt, 15% clay, trace sand and clay.	ML			
26		NO RECOVERY				
98						
28						
30		GRAVELLY SILTY SAND: Recovered cutting shoe: Olive brown. 65% fine to coarse sand, 25% gravel, 10% silt. Moist to wet, no plasticity. EOB: Refusal @30.0' bgs.	SW			

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LOG OF BORING

Borehole ID: SB-8

Total Depth: 30 ft

PROJECT INFORMATION	DRILLING INFORMATION
Project: Soil and Water Investigation	**Drilling Company:** Vironex
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul White
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe 6610 DT
RG: Bob Horwath	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 10/15/04

BORING INFORMATION

Groundwater Depth: 20'	**Boring Location:** Located in parking stall closest to E 34th St. entrance.
Air Knife or Hand Auger Depth: Hand auger to 5' bgs	**Boring Diameter:** 2"
Coordinates: X -122.2346152 Y 37.8032190	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
124	0		ASPHALT: 2"					
	2		SANDY CLAYEY GRAVEL: (2.5Y 3/3) Dark olive brown. 60% gravel, 25% sand, 10 silt, 5% clay. Loose, moist, low plasticity.	GM				Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
122			CLAYEY SILT: (2.5Y 2.5/1) Black. 88% silt, 10% clay, 2% sand. Moderately stiff, moist, low to medium plasticity.	ML				
	4							
120			SANDY SILT: 70% silt, 20% fine sand, 10% clay. Stiff, moist to wet, low plasticity.					
	6		CLAYEY SILT: (10Y 4/1) Dark greenish gray. 85% silt, 15% clay. Stiff, moist, medium plasticity.			SB-8-6.0		
118								
	8							
116								
	10							
114								
	12							
112								
	14					SB-8-14		
110			CLAYEY SANDY SILT: (2.5Y 4/3) Olive brown. 70% silt, 15% clay, 15% sand. Stiff, moist to wet, medium plasticity.					Groundwater samples were collected from boring HP-5.
	16		Mottling: Dark olive brown and olive brown.			SB-8-16.0		
108								
	18							
106								
	20					SB-8-19.5		▽
104			NO RECOVERY					
	22							
102								
	24							

URS

LOG OF BORING

Borehole ID: SB-8

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
100 / 26		CLAYEY SILT: 75% silt, 20% clay, 5% fine sand. Moderately stiff, moist, low to medium plasticity.	ML			
98 / 28		SILTY SAND: 65% fine sand, 30% silt, 5% clay. Moist to wet, no to low plasticity.	SM		SB-8-29.5	30 ft. bgs: End of Boring
96 / 30		CLAYEY SILT: 70% silt, 30% clay. Very stiff, moist, medium plasticity.	ML			

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LOG OF BORING

Borehole ID: SB-9
Total Depth: 27.5 ft.

PROJECT INFORMATION	DRILLING INFORMATION
Project: Arco Site 2107 Soil and Water Investigation	**Drilling Company:** Vironex
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul White
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe 6610 DT
RG: Bob Horwath	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 10/14/04

BORING INFORMATION

Groundwater Depth: 2.5 ft. bgs	**Boring Location:** Parking stall closest to Park Blvd..
Air Knife or Hand Auger Depth: Airknife to 5' bgs	**Boring Diameter:** 2"
Coordinates: X -122.2348093 Y 37.8031964	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
122	0		ASPHALT: 4"					
	2		SANDY GRAVEL: (2.5Y 3/3) Dark olive brown. 60% gravel, 25% sand, 10 silt, 5% clay. Loose, moist, low plasticity.	GM				
120	4		GRAVELLY CLAY: (10GY 4/1) Dark greenish gray. 60% clay, 25% gravel, 15% silt. Stiff, wet, high plasticity.	CL				
118	6		NO RECOVERY					Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
116	8							
114	10		SANDY GRAVEL: (2.5Y 3/1) Very dark gray. 55% fine to medium subangular gravel, 30% fine to coarse sand, 10% silt, 5% clay. Stiff, wet, low plasticity.	ML		SB-9-10.5		
112	12		CLAYEY SILT: (2.5Y 5/3) Light olive brown. 80% silt, 20% clay. Mottling, stiff, wet, medium plasticity.			SB-9-13.0		
110	14		NO RECOVERY					
108	16		CLAYEY SILT: (2.5Y 5/3) Light olive brown. 80% silt, 20% clay. Mottling, stiff, wet, medium plasticity.	ML				Groundwater samples were collected from boring HP-6.
106	18		GRAVELLY SANDY SILT: 40% silt, 30% gravel, 25% sand, 5% clay. Mottling, stiff, wet, no to low plasticity.			SB-9-17.5		
104	20		SANDY SILT: 90% silt, 10% fine sand. Wet; low plasticity. Grades to silty sand.			SB-9-19.5		
102	22		SILTY SAND: 60% fine sand, 40% silt. Wet; low plasticity. Grades to silty sand.	SM				
100	24		SANDY GRAVELLY SILT: 50% silt, 25% sand, 15% gravel, 10% clay. Wet, no to low plasticity.	ML				
			NO RECOVERY					
			GRAVELLY SILT: 50% silt, 25% gravel, 10% fine sand, 15% clay.	ML				

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
98		Wet, no to low plasticity.				
26		SILTY SAND: 2.5Y 4/3 Olive brown. 70% sand, 30% silt. Moist, no plasticity.	SM			
96						

URS

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LOG OF BORING

Borehole ID: SB-10

Total Depth: 32 ft.

PROJECT INFORMATION	DRILLING INFORMATION
Project: Arco Site 2107 Soil and Water Investigation	**Drilling Company:** Vironex
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul White
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe 6610 DT
RG: Bob Horwath	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 10/20/04

BORING INFORMATION	
Groundwater Depth: 1.3 ft. bgs	**Boring Location:** Middle of driveway on Park Blvd..
Air Knife or Hand Auger Depth: Hand auger to 5' bgs	**Boring Diameter:** 2"
Coordinates: X -122.2348842 Y 37.8031970	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Sample ID	Recovery	Comments
120	0		ASPHALT: 3"					
	2		SANDY GRAVEL: (2.5Y 3/3) Dark olive brown. Gravel and concrete pieces (to 1.0 ft. bgs), sand, and clay. Loose, moist to wet, low plasticity.	GM				▽
118	4		CLAYEY SILT: (10Y 2.5/1) Greenish black. 70% silt, 20% clay, 5% fine to coarse rounded sand and gravel. Stiff, moist, medium plasticity.	ML				
116	6							Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
114	8		(2.5Y 4/3) Olive brown.			SB-10-6.5		
112	10		Core sample sleeve destroyed from 10-13.5 ft. bgs.					
110	12							
108	14		Mottling.			SB-10-14.0		
106	16		NO RECOVERY					Groundwater samples collected from boring labeled as HP-7.
			NO RECOVERY: Hydropunch: HP-7-20					
104	18							
102	20		CLAYEY SANDY SILT: (5Y 4/2) Olive gray. 70% silt, 20% clay, 10% sand. Moderately stiff to stiff, moist, medium plasticity.	ML		SB-10-20.5		
100	22		SILTY SAND: (2.5Y 5/4) Light olive brown. 45% sand, 40% silt, 15% clay. Moist, dense, no to low plasticity.	SM				
98	24		CLAYEY SANDY SILT: (5Y 4/2) Olive gray. 70% silt, 20% clay, 10% sand. Moderately stiff to stiff, moist, medium plasticity.	ML		SB-10-22.5		

URS

LOG OF BORING

Borehole ID: SB-10

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
96 / 26		NO RECOVERY				
		NO RECOVERY: Hydropunch: HP-7-30				
94 / 28						
92 / 30						
		GRAVELLY SILTY SAND: (2.5Y 4/3) Olive brown. 45% sand, 30% subangular to angular gravel, 20% silt, 5% clay. Moderately dense, moist, no plasticity.	SM			
90 / 32		Refusal: End of Boring at 32' bgs			SB-10-31.5	

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LOG OF BORING

Borehole ID: SB-11

Total Depth: 30 ft.

PROJECT INFORMATION	DRILLING INFORMATION
Project: Arco Site 2107 Soil and Water Investigation	**Drilling Company:** Vironex
Site Location: 3310 Park Blvd., Oakland, CA	**Driller:** Paul White
Project Manager: Scott Robinson	**Type of Drilling Rig:** Geoprobe 6610 DT
RG: Bob Horwath	**Drilling Method:** 2" Direct Push
Geologist: Kevin Uno	**Sampling Method:** Continuous Core
Job Number: 38486908.0013601	**Date(s) Drilled:** 10/14/04

BORING INFORMATION

Groundwater Depth: 3.8 ft. bgs	**Boring Location:** W side of driveway on Park Blvd..
Air Knife or Hand Auger Depth: Airknife to 5' bgs	**Boring Diameter:** 2"
Coordinates: X -122.2349568 Y 37.8032163	**Boring Type:** Exploratory

Elevation (ft msl)	Depth (ft bgs)	Lithologic Description	USCS	Sample ID	Comments
120	0	ASPHALT: 6"			
		SANDY GRAVEL: (2.5Y 3/3) Dark olive brown. 60% gravel, 25% sand, 10 silt, 5% clay. Loose, moist, low plasticity.	GM		
118	2	CLAYEY SILT: (10Y 2.5/1) Greenish black. 70% silt, 20% clay, 10% fine to coarse rounded gravel. Moderately stiff, moist, medium plasticity.	ML		
116	4				▽
114	6	2.5Y 2.5/1 Black			Boring grouted with neat Portland Cement. Top 3" finished to grade with cement.
		Increase to 10% fine to coarse sand; decrease clay.		SB-11-6.5	
112	8				
110	10	(5Y 4/2) Olive gray. 75% silt, 15% clay, 10% fine to coarse sand. Moist; Low to medium plasticity.			
		(2.5Y 5/1) Gray. Wet, soft.		SB-11 -11.5	
108	12				
106	14				
		SANDY CLAYEY SILT: (5Y 4/2) Olive gray. 70% silt, 25% sand, 5% clay. Stiff, moist to wet, low plasticity.			Groundwater samples were collected from boring HP-8.
104	16	(2.5Y 2.5/1) Black		SB-11 -16.5	
		NO RECOVERY			
102	18				
100	20	SANDY CLAYEY SILT: (5Y 4/2) Olive gray. 65% silt, 20% fine to coarse sand, 10% clay. Low plasticity.	ML		
98	22	(2.5Y 2.5/1) Black		SB-11 -21.5	
		SILTY SAND: (5Y 5/3) Olive. 70% sand, 30% silt, trace gravel. Low plasticity.	SM		
	24				

URS

LOG OF BORING

Borehole ID: SB-11

Depth (ft bgs)	Symbol	Lithologic Description	USCS	PID (ppm)	Recovery	Sample ID / Comments
96						
94	26	23.5 ft : Color change to (5G 4/1) dark greenish gray. GRAVELLY SILTY SAND: 65% sand, 20% gravel, 15% silt. Dense, wet, no plasticity.				SB-11-26
92	28					SB-11 -28.5
	30	NO RECOVERY				

SOIL BORING LOG Boring No. SB-12 Sheet 1 of 2

Client: ARCO Station No. 2107
Address: 3310 Park Boulevard, Oakland, CA
Project No.: E-2107
Logged By: Scott Bittinger
grout: 0 ft. to 28 ft.

Date: 6/26/2007
Drilling Company: RSI rig type: Geoprobe 6600
Drilling Foreman: Art
Method: Direct Push hole diam.: 2"

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						1		Concrete	
						2			
						3		air knife to 7.2' bgs. Not logged.	
						4			
						5			
						6			
						7			
						8	SC	CLAYEY SAND with SILT, 7.2'-8.5', light olive brown, 60% fine grained sand, 40% silty clay, moist	
						9	SP-SC	SAND with CLAY 8.5'-9.2', light olive brown, 90% fine grained sand, 10% silty clay, damp	
S	SB12-9		11:36			10	CL	SILTY CLAY 9.2'-11.2', light olive brown, 0-10% fine grained sand, dry, stiff	0
						11			
S	SB12-11		11:38			12	SP-SC	SAND with CLAY and SILT, 11.2'-14', dark yellowish brown, 85-90% fine grained sand, 10-15% silty clay, damp to wet	0
						13			
						14			
						15	SC	CLAYEY SAND 14'-15.8', grayish brown, 50-60% fine grained sand, 40-50% silty clay, moist	
S	SB12-15		11:42			16			0
						17			
S	SB12-17		11:45			18	SW-SC	SAND with CLAY and SILT 15.8'-22', fine to coarse grained, 5% fine gravel, 10-15% silty clay, damp to wet	0
						19			
S	SB12-19		11:47			20			0

Comments: Soil continuously recovered in acrylic liners. Total depth of boring is 28 feet bgs. Boring backfilled to surface grade with neat cement.

STRATUS ENVIRONMENTAL, INC.

SOIL BORING LOG Boring No. SB-12 Sheet 2 of 2

Client: ARCO Station No. 2107
Address: 3310 Park Boulevard
Oakland, CA
Project No.: E-2107
Logged By: Scott Bittinger

Date: 6/26/2007
Drilling Company: RSI rig type: Geoprobe 6600
Drilling Foreman: Art
Method: Direct Push hole diam.: 2"

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						21	SW-SC	SAND with CLAY and SILT 15.8'-22', fine to coarse grained, 5% fine gravel,	
S	SB12-21		11:55			22		10-15% silty clay, damp to wet	0
						23	SP-SC	SAND with CLAY and SILT 22'-23', fine grained, 10-15% silty clay, damp to wet	
S	SB12-23		11:57			24	CL	SILTY CLAY 23'-24', light olive brown with iron oxide staining, dry, stiff	0
						25			
S	SB12-25		11:59			26			0
						27	CL	SILTY CLAY 24'-28', very dark gray, dry to moist, stiff	
S	SB12-27		12:01			28			0

SOIL BORING LOG

Boring No. SB-13 **Sheet** 1 of 2

Client	ARCO Station No. 2107	Date	6/25/2007
Address	3310 Park Boulevard	Drilling Company	RSI rig type: Geoprobe 6600
	Oakland, CA	Drilling Foreman	Art
Project No.	E-2107	Method	Direct Push hole diam.: 2"
Logged By:	Scott Bittinger		
	grout: 0 ft. to 30 ft.		

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						1		Concrete	
						2			
						3		air knife to 7.2' bgs. Not logged.	
						4			
						5			
						6			
						7			
						8	SC	CLAYEY SAND 7.2'-10', very dark gray, 55% fine grained sand, 45% clayey fines, damp	
						9			
S	SB13-9		13:53			10			1
						11	CL	SILTY CLAY 10'-12', olive brown, moist, stiff	
S	SB13-11		13:59			12		SANDY CLAY with SILT 12'-12.8', olive gray, 65% silty clay, 35% fine grained sand, moist, stiff	3.5
						13	CL	SILTY CLAY 12.8'-13.6', olive gray, moist, stiff	
S	SB13-13		14:02			14		SANDY CLAY with SILT 13.6'-14', dark yellowish brown, 70% silty clay, 30% fine grained sand, moist	
						15	SC	CLAYEY SAND 14'-16.5', dark yellowish brown, 70-90% fine grained sand, 10-30% silty clay, damp	
S	SB13-15		14:07			16			0
						17	SW-SC	SAND with CLAY and SILT, 16.5'-18', dark yellowish brown, fine to coarse grained, 5% fine gravel, 10-15% silty clay, damp to wet	
S	SB13-17		14:09			18			0
						19	CL	SILTY CLAY 18'-20', light olive gray with iron oxide staining, moist, stiff	
S	SB13-19		14:12			20			0

Comments: Soil continuously recovered in acrylic liners. Total depth of boring is 30 feet bgs. Boring backfilled to surface grade with neat cement.

STRATUS ENVIRONMENTAL, INC.

SOIL BORING LOG

Boring No. SB-13

Sheet 2 of 2

Client: ARCO Station No. 2107

Address: 3310 Park Boulevard, Oakland, CA

Project No.: E-2107

Logged By: Scott Bittinger

Date: 6/25/2007

Drilling Company: RSI rig type: Geoprobe 6600

Drilling Foreman: Art

Method: Direct Push hole diam.: 2"

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						2 1	SC	CLAYEY SAND with SILT 20'-22', light olive gray, fine to medium grained, 25% silty clay, damp	
S	SB13-21		14:14			2 2			0
						2 3	SW-SC	SAND with CLAY and SILT 22'-26.3', fine to coarse grained, trace gravel, 10-12% silty clay, damp	
S	SB13-23		14:16			2 4			0
						2 5			
S	SB13-25		14:19			2 6			0
						2 7			
S	SB13-27		14:22			2 8	CL	SILTY CLAY 26.3'-30', very dark gray, dry to moist, stiff	0
						2 9			
S	SB13-29		14:26			3 0			0

SOIL BORING LOG Boring No. SB-14 Sheet 1 of 2

Client: ARCO Station No. 2107
Address: 3310 Park Boulevard, Oakland, CA
Project No.: E-2107
Logged By: Scott Bittinger
Date: 8/26/2007
Drilling Company: RSI rig type: Geoprobe 6600
Drilling Foreman: Art
Method: Direct Push hole diam.: 2"
grout: 0 ft. to 30 ft.

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						1		Concrete	
						2			
						3		air knife to 6.5' bgs. Not logged.	
						4			
						5			
						6			
						7			
						8	SC	CLAYEY SAND with SILT, 6.5'-11.5', light olive brown 6.5'-10', dark yellowish	
						9		brown 10'-11.5', 50-65% fine grained sand, 35-50% silty clay, moist	
S	SB14-9		8:44			10			
						11			
S	SB14-11		8:46			12	CL	SILTY CLAY with SAND 11.5'-12', dark yellowish brown, 85% silty clay,	
						13	SC	15% fine grained sand, moist CLAYEY SAND with SILT, 12'-13.3', grayish brown, 60% fine grained sand,	
S	SB14-13		8:48			14	CL	40% silty clay, moist SILTY CLAY 13.3'-15', grayish brown, 8% fine grained sand, dry to moist,	
						15		stiff	
S	SB14-15		8:50			16	SP-SC	SAND with CLAY and SILT 15'-16', fine grained, 7-10% silty clay, damp	
						17	CL	SANDY CLAY with SILT 16'-17.2', grayish brown, 80% silty clay, 20% fine	
S	SB14-17		8:52			18	SC	grained sand, moist CLAYEY SAND with SILT, 17.2'-20', grayish brown to light olive brown,	
						19		55-65% fine grained sand, 35-45% silty clay, moist	
S	SB14-19		8:54			20			0

Comments: Soil continuously recovered in acrylic liners. Total depth of boring is 30 feet bgs. Boring backfilled to surface grade with neat cement.

STRATUS ENVIRONMENTAL, INC.

SOIL BORING LOG

Boring No. SB-14

Sheet 2 of 2

Client: ARCO Station No. 2107

Address: 3310 Park Boulevard, Oakland, CA

Project No.: E-2107

Logged By: Scott Bittinger

Date: 6/26/2007

Drilling Company: RSI rig type: Geoprobe 6600

Drilling Foreman: Art

Method: Direct Push hole diam.: 2"

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construc L	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						21	SP-SC	SAND with CLAY and SILT 20'-21', fine grained, 5-10% silty clay, damp to wet	
S	SB14-21		8:58			22	SW-SC		0
						23		SAND with CLAY and SILT 21'-26.5', fine to coars grained, 10% fine gravel, 10-12% silty clay, damp to wet	
S	SB14-23		9:00			24			0
						25			
S	SB14-25		9:02			26			0
						27			
S	SB14-27		9:05			28	CL	SILTY CLAY 26.5'-30', light olive brown/pale yellow with iron oxide stains 26.5'-28', very dark gray 28'-30', dry to moist, stiff	0
						29			
S	SB14-29		9:08			30			0

SOIL BORING LOG

Boring No. SB-15

Sheet 1 of 2

Client: ARCO Station No. 2107

Address: 3310 Park Boulevard, Oakland, CA

Project No.: E-2107

Logged By: Scott Bittinger

Date: 6/25/2007

Drilling Company: RSI rig type: Geoprobe 6600

Drilling Foreman: Art

Method: Direct Push hole diam.: 2"

grout: 0 ft. to 30 ft.

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						1		Concrete	
						2			
						3		air knife to 6.5' bgs. Not logged.	
						4			
						5			
						6			
						7			
S	SB15-7		11:28			8	CL	SILTY CLAY 6.5'-9.3', dark grayish brown, moist, stiff	0
						9			
S	SB15-9		11:30			10	SC	CLAYEY SAND with SILT 9.3'-12', dark yellowish grown, 80% fine to coarse grained sand, 20% silty clay, damp	0
						11			
S	SB15-11		11:33			12			0
						13	SC	CLAYEY SAND 12'-13.5', grayish brown, 85% fine grained sand, 15% silty clay, moist	
						14			
						15	CL	SILTY CLAY 13.5'-16.5', light olive brown, moist, stiff	
						16			
						17			
S	SB15-17		12:20			18	SP-SC	SAND with CLAY and SILT 16.5'-18', dark yellowish brown, 85% fine grained sand, 5% medium grained sand, 10% silty clay, wet	0
						19	SW	SAND with CLAY and SILT 18'-27', fine to coarse grained, 5% fine gravel, 10% silty clay, wet	
S	SB15-19		12:22			20			0

Comments: Soil continuously recovered in acrylic liners. Total depth of boring is 30 feet bgs. Boring backfilled to surface grade with neat cement.

STRATUS ENVIRONMENTAL, INC.

SOIL BORING LOG Boring No. SB-15 Sheet 2 of 2

Client: ARCO Station No. 2107 Date: 6/25/2007

Address: 3310 Park Boulevard Drilling Company: RSI rig type: Geoprobe 6600

Oakland, CA Drilling Foreman: Art

Project No.: E-2107 Method: Direct Push hole diam.: 2"

Logged By: Scott Billinger

Sample Type	Sample No.	Blow Count	Sample Time	Sample Recov.	Well Construct.	Depth Scale	LITHO COLUMN	Descriptions of Materials and Conditions	PID (PPM)
						2 1			
S	SB15-21		12:25			2 2	SW	SAND with CLAY and SILT 18'-27', fine to coarse grained, 5% fine gravel,	0
						2 3		10% silty clay, wet	
S	SB15-23		12:27			2 4			0
						2 5			
S	SB15-25		12:35			2 6			0
						2 7			
S	SB15-27		12:38			2 8	CL		0
						2 9		SILTY CLAY 27'-30', light olive brown with black manganese oxide stains 27'-29', very dark gray 29'-30', moist, stiff	
S	SB15-29		12:45			3 0			0

APPENDIX B

DRAFT CLOSURE CHECKLIST

Agency Name : Alameda County Environmental Health Local Oversight Program	Date: 10/25/12
Case Worker: Dilan Roe	Fuel Leak Case No: RO0000651
Site Name: Arco 2107	GeoTracker Global ID: T0600100095
Site Address: 3310 Park Boulevard, Oakland, CA	USTCF Claim No:

☐ PASS ☐ FAIL

The site does [complies/does not comply] with the requirements of the Low-Threat Underground Storage Tank Case Closure Policy (LTCP) as described below.[1]

General Criteria (must be satisfied by all candidate sites)

a. Is the unauthorized release located within the service area of a public water system? ☒ Yes ☐ No

If Yes, then Provide Name of Water System:

Water system info will be presented upon completion of proposed field work and revision of this checklist.

If Yes, are there Site Specific Conditions that Need to be Considered in Evaluation?

Does the property owner use the water system? ☒ Yes ☐ No

Do property owners in the vicinity of the site use the water system? ☒ Yes ☐ No

Are there other sources of water for property owners in the vicinity of the site?

☐ Irrigation Wells ☐ Water Supply Wells

☐ Other Capture Systems:

Pertinent Information Provided:

DWR Well Search ☒ Yes ☐ No

Name/Date Of Document:
Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)	

b. Does the unauthorized release consist only of petroleum? ☒ Yes ☐ No

If No, then List Other Contaminants:

☐ Chlorobenzene ☐ PCE ☐ TCE ☐ Chloroform ☐ Vinyl Chloride

☐ Bromoform ☐ Other

If Other, then:

☐ PCBs ☐ Phenol ☐ 1,4-dioxane ☐ Dibenzofurans ☐ Dioxins

☐ Metals:

☐ Other SVOCs:

☐ Other VOCs:

Pertinent Information Provided:

Description of Site History, Types of Products or Chemicals Used at the Site ☒ Yes ☐ No

History of Types of Releases other than Petroleum ☒ Yes ☐ No

Tabulation and Discussion of Sampling Results for All Chemicals other than Petroleum ☒ Yes ☐ No

Name/Date of Document:
Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)

c. Has the unauthorized ("primary") release from the UST system been stopped? ☒ Yes ☐ No

If No, then Explain:

Pertinent Information Provided:

Description of the history of release(s) and the actions that were taken to stop each release not provided or incomplete ☒ Yes ☐ No

Evaluation and accounting for changing contaminant concentrations over the full time period of site investigation ☒ Yes ☐ No

Name/Date of Document:

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)

d. Has free product been removed to the maximum extent practicable?

☒ FP Not Encountered

☐ Yes ☐ No

If No, then,

Removal Methods Tried: ☐ HVDPE ☐ Skimmer ☐ Bailing ☐ Absorbent Materials ☐ Did Not Try to Remove FP ☐ Other

If Other, then Explain:

Pertinent Information Provided:

Description of investigation and monitoring activities that have been undertaken to assess whether free product is present.	☒ Yes ☐ No
Data including tables and figures showing any observation and measurements of free product.	☒ Yes ☐ No
Description of corrective action(s) that were taken to remove free product, dates of removal actions, and volumes removed	☒ Yes ☐ No
An evaluation of whether free product removal is practicable, or if not practicable, a description of the conditions that prevent free product removal	☒ Yes ☐ No

Name(s)/Date(s) of Document(s):

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)

e. Has a conceptual site model that assesses the nature, extent, and mobility of the release been developed? ☐ Yes ☒ No

If No, Then:

☐ GW Not Evaluated

☒ Groundwater Assessment Incomplete – Areal Extent of Contamination Not Defined

☐ Hydrogeology Not Adequately Defined

☐ Potential Receptors Not Identified

☐ Soil Assessment Incomplete – Aerial Extent Not Defined

☐ Soil Assessment Incomplete – Depth Unknown

☐ Soil Vapor Not Evaluated

☐ Other

Pertinent Information Provided:

Sensitive Receptor Survey	☐ Yes ☐ No
Preferential Pathway Study	☒ Yes ☐ No
Cross Sections	☒ Yes ☐ No
Bore Logs	☒ Yes ☐ No
Rose Diagrams	☐ Yes ☐ No
Monitoring Well Construction Logs	☐ Yes ☐ No
Table Providing Details of Monitoring Well Network	☒ Yes ☐ No
Evaluation of Groundwater Flow Direction and Gradient	☒ Yes ☐ No
Description of Type and Effectiveness of Corrective Action	☒ Yes ☐ No

Name(s)/Date(s) of Documents:

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)

f. Has secondary source been removed to the extent practicable? ☒ Yes ☐ No

The secondary source is the petroleum-impacted soil, free product, or groundwater that acts as a long-term source releasing contamination to the surrounding area. Unless site conditions prevent secondary source removal petroleum-release sites are required to undergo secondary source removal to the maximum extent practicable.

If No, then identify Impediments to Removing Secondary Source:

☐ Remediation Has Not Been Attempted

☐ Remediation Was Designed Incorrectly

☐ Remediation Was Shut Off Prematurely

☐ Poor Remediation O&M

☐ Other

If Other, then:

Site Conditions Prevent Secondary Source Removal (e.g., physical or infrastructural constraints exist whose removal or relocation would be technically or economically infeasible) ☐ Yes ☐ No

Pertinent Information Provided:

History of corrective actions for the site including the types of cleanup actions taken, dates of the actions, and mass removed ☒ Yes ☐ No

Figures depicting the location of the removal action ☒ Yes ☐ No

Confirmation sampling results which demonstrate the effectiveness of secondary source removal ☒ Yes ☐ No

Narrative description of the actions and areas of success or infeasibility of actions ☒ Yes ☐ No

Long-term monitoring data for in-situ corrective actions that demonstrate the concentrations have not rebounded following the cessation of corrective actions ☐ Yes ☐ No

Name(s)/Date(s) of Document(s):

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)	
g. Has soil or groundwater been tested for MTBE and results reported in accordance with Health and Safety Code Section 25296.15?	☒ Yes ☐

Pertinent Information Required:

Sufficient data including tables and figures to assess whether MTBE is or was present in soil and groundwater at the site ☐ Yes ☒ No

Name(s)/Dates(s) of Document(s):

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

General Criteria (continued)

h. Does a nuisance as defined by Water Code section 13050 exist at the site? ☐ Yes ☒ No

If Yes, then Describe Nuisance Condition:

Pertinent Information Required:

Sufficient data to evaluate whether site contamination is present in locations that currently exist or potentially could exist in the future to pose nuisance conditions during common or reasonably expected site activities.	☒ Yes ☐ No
Descriptions of the type and vertical and lateral extent of shallow soil	☒ Yes ☐ No
Data on the lateral extent of surface soil contamination	☒ Yes ☐ No
Discussion of odors or visual evidence of contamination	☒ Yes ☐ No
Preferential pathway and utility conduit surveys	☐ Yes ☐ No
Review of potential points for exposure (such as groundwater seeps into basements)	☐ Yes ☐ No
Current use of the site	☒ Yes ☐ No
Expected use of the site	☒ Yes ☐ No
Description of surface water runoff from the property to storm drains or other sites	☐ Yes ☐ No

Name(s)/Date(s) of Documents:

Reference Lists will be compiled upon completion of proposed field work and revision of this checklist.

1. Media Specific Criteria: Groundwater

Exemption – Soil Only Case (Release has not Affected Groundwater)
Sites with soil that does not contain sufficient mobile constituents [leachate, vapors, or light non-aqueous-phase liquids (LNAPL)] to cause groundwater to exceed the groundwater criteria in this policy shall be considered low-threat sites for the groundwater medium. For older releases, the absence of current groundwater impact is often a good indication that residual concentrations present in the soil are not a source for groundwater pollution.

☐ Yes ☒ No

If Site Does Not Qualify for Soil Only Exemption, then,

☒ Yes ☐ No

Is the contaminant plume stable or decreasing in areal extent (i.e. has the contaminant mass expanded to its maximum extent defined as the distance from the release where attenuation exceeds migration)?

Has sufficient data been presented to demonstrate that site characterization activities have defined the horizontal and vertical extent of the plume? ☐ Yes ☒ No

Has plume stability has been demonstrated using a valid technical analysis that considers: ☐ Yes ☒ No

The accuracy of data from the wells	☐ Yes ☐ No
Placement within the plume	☐ Yes ☐ No
Changes in areal extent of the plume	☐ Yes ☐ No
Valid concentration trends within the plume (Note:plotting of decreasing concentrations using data from a single well is not likely to be sufficient)	☐ Yes ☐ No

Have the following factors been considered:

Seasonal variability	☐ Yes ☐ No
Water level changes	☐ Yes ☐ No
Sampling methods	☐ Yes ☐ No
Well construction	☐ Yes ☐ No
Other factors that can affect data quality	☐ Yes ☐ No

Has a recent well survey that uses all available wells from both the Department of Water Resources and local agencies (Zone 7 Water Agency or Alameda County Public Works as appropriate) been presented? ☐ Yes ☒ No

Are supply wells located within 2,000 feet of the site presented on a site figure with a table identifying each well along with the well construction details been presented? ☐ Yes ☒ No

Media Specific Criteria: Groundwater (continued)

If the Contaminant Plume is Stable or Decreasing, then

Does it meet all of the additional characteristics of one of the five (5) classes of sites listed below? ☐ Yes ☐ No

(1) a.	Is < 100 feet in length	☐ Yes ☐ No
b.	There is no free product	☐ Yes ☐ No
c.	The nearest existing water supply well is > 250 feet from the defined plume boundary	☐ Yes ☐ No
d.	The nearest existing surface water body is > 250 feet from the defined plume boundary	☐ Yes ☐ No

(2) a.	Is < 250 feet in length	☐ Yes ☐ No
b.	There is no free product	☐ Yes ☐ No
c.	The nearest existing water supply well is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No
d.	The nearest existing surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No
e.	The dissolved concentration of benzene is <3,000 µg/L	☐ Yes ☐ No
f.	The dissolved concentration of MTBE is is <1,000 µg/L	☐ Yes ☐ No

(3) a.	Is < 250 feet in length	☐ Yes ☐ No
b.	Free product has been removed to the maximum extent practicable, may still be present below the site where the release originated, but does not extend off-site	☐ Yes ☐ No
c.	The plume has been stable or decreasing for a minimum of 5 years	☐ Yes ☐ No
d.	The nearest existing water supply well is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No
e.	The nearest existing surface water body is > 1,000 feet from the defined plume boundary	☐ Yes ☐ No
f.	The property owner is willing to accept a land use restriction if the regulatory agency requires a land use restriction as a condition for closure	☐ Yes ☐ No

(continued on next page)

Media Specific Criteria: Groundwater (continued):	
(4) a. Is < 1,000 feet in length ☐ Yes ☐ No b. There is no free product ☐ Yes ☐ No c. The nearest existing water supply well or surface water body is > 1,000 feet from the defined plume boundary ☐ Yes ☐ No d. The nearest existing surface water body is > 1,000 feet from the defined plume boundary ☐ Yes ☐ No e. The dissolved concentration of benzene is <1,000 µg/L ☐ Yes ☐ No f. The dissolved concentration of MTBE is <1,000 µg/L ☐ Yes ☐ No	
(5) The regulatory agency determines, based on an analysis of site specific conditions, that the site under current and reasonable anticipated near-term future scenarios, the contaminant plume poses a low threat to human health and safety and to the environment and water quality objectives will be achieved within a reasonable time frame. ☐ Yes ☐ No	

If the Site Does Not Meet any of the 5 Groundwater Specific Criteria Scenarios Listed Above, then Answer the Additional Questions Below

Plume Length (That Exceeds Water Quality Objectives):

☐ ≥ 100 Feet and < 250 Feet ☐ ≥ 100 Feet and < 250 Feet ☐ ≥ 100 Feet and < 250 Feet

☐ ≥ 1,000 Feet ☐ ≥ Unknown

Free Product in Groundwater: ☐ Yes ☐ No ☐ Unknown

Free Product Has Been Removed to the Maximum Extent Practicable: ☐ No ☐ Unknown

For Sites with Free Product, the Plume has Been Stable or Decreasing for 5-Years: ☐ No ☐ Unknown

For Sites with Free Product, owner Willing to Accept a Land Use Restriction (if Required):

☐ No ☐ Unknown

Free Product Extends Offsite: ☐ Yes ☐ Unknown

Benzene Concentration: ☐ ≥ 1,000 µg/L and < 3,000 µg/L ☐ ≥ 3,000 µg/L ☐ Unknown

MTBE Concentration: ☐ ≥ 1,000 µg/L ☐ Unknown

Nearest Supply Well (From Plume Boundary):

☐ ≤ 250 Feet ☐ > 250 Feet and ≤ 1,000 Feet ☐ Unknown

Nearest Surface Water Body (From Plume Boundary):

☐ ≤ 250 Feet ☐ > 250 Feet and ≤ 1,000 Feet ☐ Unknown

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air

The low-threat vapor-intrusion criteria described below apply to sites where the release originated and impacted or potentially impacted adjacent parcels when: (1) existing building are occupied or may be reasonably expected to be occupied in the future, or (2) buildings for human occupancy are reasonably expected to be constructed in the near future. Appendices 1 through 4 (attached) illustrate four potential exposure scenarios and describe characteristics and criteria associated with each scenario.

EXEMPTION – Active Commercial Petroleum Facility

☐ Yes ☒ No

According to the Policy, exposures to petroleum vapors associated with historical fuel system releases are comparatively insignificant relative to exposures from small surface spills and fugitive vapor releases that typically occur at active fueling facilities. Therefore, satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities, except in cases where release characteristics can be reasonably believed to pose an unacceptable health risk.

Do release characteristics pose an unacceptable health risk to facility users or nearby facilities? ☐ Yes ☒ No

If Yes, Provide Explanation:

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

If Site Does Not Qualify for Vapor Intrusion to Indoor Air Exemption, then,

Does the release site meet one of the three petroleum vapor intrusion to indoor air specific criteria listed below (a, b, or c)? ☐ Yes ☐ No

a. Do site-specific conditions at the release site satisfy all of the applicable characteristics and criteria of **Scenarios 1 through 3 or** all of the applicable characteristics and criteria of **Scenario 4**?

If YES, check applicable scenarios: ☐ **1** ☐ **2** ☐ **3** ☐ **4**

Scenario 1: Unweathered LNAPL in Groundwater *(App. 1)* ☐ Yes ☐ No

1. The bioattenuation zone is a continuous zone provides a separation of at least 30 feet vertically between the LNAPL in groundwater and the foundation of existing or potential buildings; and
2. Total TPH (TPH-g and TPH-d combined) are less than 100 mg/kg throughout the entire depth of the bioattenuation zone

Scenario 2: Unweathered LNAPL in Soil *(App. 2)* ☐ Yes ☐ No

1. The boattenuation zone is a continuous zone that provides a separation of at least 30 feet vertically between the LNAPL in soil and the foundation of existing or potential buildings; and
2. Total TPH (TPH-g and TPH-d combined) are <100 mg/kg throughout the entire lateral and vertical extent of the bioattenuation zone

Scenario 3: Dissolved Phase Benzene Concentrations in Groundwater *(App. 3)* ☐ Yes ☐ No

Defining the Bioattenuation Zone For Sites without Oxygen Data or Where Oxygen is <4%

Figure A: For Benzene concentrations < 100 µg/l

a. The bioattenuation zone is a continuous zone that provides a separation of at least 5 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings; and

b. Contains total TPH (TPH-g and TPH-d combined) < 100 mg/kg throughout the entire depth of the bioattenuation zone

Figure B: For Benzene concentrations ≥ 100 µg/L but < 1,000 µg/L

a. The bioattenuation zone is a continuous zone that provides a separation of at least 10 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings

Defining the Bioattenuation Zone For Sites with Oxygen ≥ 4%

Figure C: For Benzene concentrations < 1,000 µg/L

1. A continuous zone that provides a separation of at least 10 feet vertically between the dissolved phase benzene and the foundation of existing or potential buildings
2. Contains total TPH (TPH-g and TPH-d combined) < 100 mg/kg throughout the entire depth of the bioattenuation zone

Scenario 4: Direct Measurement of Soil Gas Concentrations (see Next Page)

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

a. Do site-specific conditions at the release site satisfy all of the applicable characteristics and criteria of **Scenarios 1 through 3 <u>or</u>** all of the applicable characteristics and criteria of **Scenario 4**?

Scenario 4: Direct Measurement of Soil Gas Concentrations *(App 4)*

Soil Gas Sampling Locations (According to the Policy, when applying the criteria listed below, the soil gas sample must be obtained from the following locations)

Was the soil gas sample obtained from the following locations:

a. **Beneath or adjacent to an existing building:** Soil gas sample collected at least 5 feet below the bottom of the building foundation ☐ Yes ☐ No

b. **Future construction:** Soil gas sample collected from at least five feet below ground surface ☐ Yes ☐ No

If no, then provide justification for the validity of the soil gas data:

Soil Gas Sampling Protocol

Were soil gas samples collected in accordance with DTSC Advisory – Active Soil Gas Investigations (April 2012) ☐ Yes ☐ No

Soil Gas Criteria – With Bioattenuation Zone

Are the following criteria for a bioattenuation zone satisfied?

1. There is a minimum of five vertical feet of soil between the soil vapor measurement and the foundation of an existing building or ground surface of future construction; <u>and</u> ☐ Yes ☐ No
2. TPH (TPHg + TPHd) is less than 100 mg/kg (measured in at least two depths within the five-foot zone; <u>and</u> ☐ Yes ☐ No
3. Oxygen is ≥ 4% measured at the bottom of the five-foot zone ☐ Yes ☐ No

If yes, then use Soil Gas Criteria listed below:

	Residential	Commercial
Constituent	**Soil Gas Concentration (µg/m^3)**	
Benzene	**<85,000**	**<280,000**
Ethylbenzene	**<1,100,000**	**<3,600,000**
Napthalene	**<93,000**	**<310,000**

If no, then use No Bioattenuation Zone Criteria listed in the section below

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

Soil Gas Criteria – No Bioattenuation Zone

	Residential	Commercial
Constituent	**Soil Gas Concentration ($\mu g/m^3$)**	
Benzene	**<85**	**<280**
Ethylbenzene	**<1,100**	**<3,600**
Napthalene	**<93**	**<310**

Pertinent Information Provided:

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

b. Has a site-specific risk assessment for the vapor intrusion pathway been conducted and demonstrates that human health is protected to the satisfaction of the regulatory agency? ☐ Yes ☐ No

Was the risk assessment conducted in accordance with the DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (October 2011)?	☐ Yes ☐ No
Were the following DTSC Guidance recommendations followed:	
Use of multiple lines of evidence (i.e., soil gas, soil matrix, and groundwater data) to reasonably estimate the level of risk posed by vapor intrusion	☐ Yes ☐ No
Use of maximum contaminant concentrations (i.e., data collected above the source)	☐ Yes ☐ No
Use of reasonable site-specific input parameters in the California version of the USEPA's Vapor Intrusion Model by Johnson and Ettinger, created by the DTSC to include California-specific chemical toxicity factors	☐ Yes ☐ No
Calculation of cumulative health effects conducted	☐ Yes ☐ No
Use of data representing seasonable variability before making a final risk determination as short term measurements rarely represent long-term conditions	☐ Yes ☐ No
No preferential pathways exist at the site	☐ Yes ☐ No
Knowledge of adjacent building construction (e.g., slab-on-grade, crawl spaces, etc.)	☐ Yes ☐ No

Pertinent Information Provided:

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, has the regulatory agency determined that petroleum vapors migrating from soil or groundwater will have no significant risk of adversely affecting human health?

☐ Yes ☐ No

Mitigation Measures:

Institutional Controls:

Deed Restrictions ☐ Yes ☐ No

Engineering Controls:

Pertinent Information Provided

2. Media Specific Criteria: Petroleum Vapor Intrusion to Indoor Air (continued)

Additional Questions – Please indicate only those conditions that do not meet the policy criteria

Soil Gas Samples:

☐ No soil gas samples ☐ Taken incorrectly ☐ Not taken at two depths within 5 foot zone

Exposure Type:

☐ Residential ☐ Commercial

Free Product:

☐ In Groundwater ☐ In Soil ☐ Unknown

TPH in the Bioattenuation Zone:

☐ ≥ 100 mg/kg ☐ Unknown

Bioattenuation Zone Thickness:

☐ < 5 feet (No Biozone**)** ☐ ≥5 Feet and < 10 Feet ☐ ≥10 Feet and < 30 Feet ☐ ≥30 Feet

☐ 30 Feet BioZone Compromised ☐ Unknown

Oxygen Data in Bioattenuation Zone:

☐ No Oxygen Data ☐ Oxygen < 4% ☐ Oxygen ≥ 4%

Benzene in Groundwater:

☐ ≥ 100 µg/L and < 1,000 µg/L ☐ ≥ 1,000 µg/L ☐ Unknown

Soil Gas Benzene:

☐ ≥ 85 µg/m^3 and < 280 µg/m^3 ☐ ≥ 280 µg/m^3 and < 85,000 µg/m^3 ☐ ≥ 85,000 µg/m^3 and < 280,000 µg/m^3

☐ ≥ 280,000 µg/m^3 ☐ Unknown

Soil Gas Ethylbenzene:

☐ ≥ 1,100 µg/m^3 and < 3,600 µg/m^3 ☐ ≥ 3,600 µg/m^3 and < 1,100,000 µg/m^3

☐ ≥ 1,100,000 µg/m^3 and < 3,600,000 ☐ ≥ 3,600,000 µg/m^3 ☐ Unknown

Soil Gas Napthalene:

☐ ≥ 93 µg/m^3 and < 310 µg/m^3 ☐ ≥ 310 µg/m^3 and < 93,000 µg/m^3 ☐ ≥ 93,000 µg/m^3 and < 310,000 µg/m^3

☐ ≥ 310,000 µg/m^3 ☐ Unknown

Media-Specific Criteria: Direct Contact and Outdoor Air Exposure	
3. Direct Contact and Outdoor Air Exposure: The site is considered low-threat for direct contact and outdoor air exposure if site-specific conditions satisfy one of the three classes of sites (a through c).	
a. Are maximum concentrations of petroleum constituents in soil less than or equal to those listed in Table 1 for the specified depth below ground surface (bgs)?	☒ Yes ☐ No ☐ NA ☐ UND
b. Are maximum concentrations of petroleum constituents in soil less than levels that a site specific risk assessment demonstrates will have no significant risk of adversely affecting human health?	☒ Yes ☐ No ☐ NA ☐ UND
c. As a result of controlling exposure through the use of mitigation measures or through the use of institutional or engineering controls, has the regulatory agency determined that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health?	☒ Yes ☐ No ☐ NA ☐ UND
Media-Specific Criteria: Direct Contact and Outdoor Air Exposure	

Additional Questions – Indicate only those conditions that do not meet the policy

Exposure Type:

☐ Residential ☒ Commercial ☐ Utility Worker

Petroleum Constituents in Soil:

☐ ≤ 5 Feet bgs ☒ > 5 Feet bgs and ≤ 10 Feet bgs ☐ Unknown

Soil Concentrations of Benzene:

☒ > 1.9 mg/kg and ≤ 2.8 mg/kg ☐ > 2.8 mg/kg and ≤ 8.2 mg/kg ☐ > 12 mg/kg and ≤ 14 mg/kg

☐ > 14 mg/kg

Soil Concentrations of EthylBenzene:

☒ > 21 mg/kg and ≤ 32 mg/kg ☐ > 32 mg/kg and ≤ 89 mg/kg ☐ > 89 mg/kg and ≤ 134 mg/kg

☐ > 134 mg/kg and ≤ 314 mg/kg ☐ > 314 mg/kg ☐ Unknown

Soil Concentrations of Naphthalene:

☒ > 9.7 mg/kg and ≤ 45 mg/kg ☐ > 45 mg/kg and ≤ 219 mg/kg ☐ > 219 mg/kg ☐ Unknown

Soil Concentrations of PAH:

☐ > 0.063 mg/kg and ≤ 0,68 mg/kg ☐ > 0.68 mg/kg and ≤ 4.5 mg/kg ☐ > 4.5 mg/kg

☒ Unknown

Area of Impacted Soil :

☒ Area of Impacted Soil > 82 by 82 Feet ☐ Unknown

Notes:

[1]This site [complies/does not comply] with the State Water Resources Control Board (SWRCB) policies and state law. Section 25296.10 of the Health and Safety Code requires that sites be cleaned up to protect human health, safety, and the environment. The current site conceptual model based on information contained in the case file databases (Alameda County Environmental Health ftp site and SWRCB GeoTracker website), is not adequate to determine that residual petroleum constituents at the site do not pose a significant risk to human health, safety, or the environment. See Attachment 2 for details.