URS

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March 2, 2005

Mr. Robert W. Schultz
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **Soil Gas Investigation Report**
ARCO Service Station No. 5387
20200 Hesperian Boulevard, Hayward, CA

Dear Mr. Schultz:

On behalf of Atlantic Richfield Company (RM – a BP affiliated company), URS Corporation (URS) presents this Soil Gas Investigation Report to obtain approval for site closure for the aforementioned Site. This report represents the final step in the investigation, remediation, and monitoring natural attenuation activities performed at the Site.

If you have any questions regarding this submission, please call (510) 874-3280.

Sincerely,

URS CORPORATION

Project Thapa
for
Scott Robinson
Project Manager

Leonard P. Niles
Leonard P. Niles, R.G. #5774, C.H.G. #357
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Enclosure:
Soil Gas Investigation Report

cc: Mr. Paul Supple, ARCO (electronic copy uploaded to ENFOS)

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REPORT

SOIL GAS INVESTIGATION

ARCO SERVICE STATION #5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

Prepared for
Atlantic Richfield Company

March 2, 2005

URS Corporation
1333 Broadway, Suite 800
Oakland, California 94612

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On behalf of the Atlantic Richfield Company (a BP affiliated Company), URS Corporation (URS) has prepared this Soil Gas Investigation Report for ARCO Station #5387 (the Site), located at 20200 Hesperian Boulevard, Hayward, California. This report is based on soil gas investigation work that was performed at the Site in response to a letter from Alameda County Environmental Health (ACEH) to Atlantic Richfield Company (RM) dated August 30, 2004. The respective letter requested additional characterization at this Site for case closure evaluation. The Site investigation work was performed in general accordance with the ACEH's August 30, 2004 letter to RM (Appendix A), the September 28, 2004 *Active Soil Gas Investigation Workplan*, and the November 17, 2004, *Active Soil Gas Investigation Workplan Addendum,* both of which were approved by the ACEH in November 2004.

1.1 SITE FEATURES AND BACKGROUND

This non-operational Site is located in an area of mixed commercial and residential development at the southeastern corner of the Hesperian Boulevard and West Sunset Drive intersection. The site currently consists of a relatively flat asphalt and concrete covered lot, at an elevation of approximately 38 feet above mean seal level (Figures 1, 2 and 3).

In August 1986, Groundwater Technology Inc. (GTI) drilled four exploratory soil borings (SB-1 through SB-4) and installed three groundwater monitoring wells (MW-1 through MW-3). In October and December 1991, GeoStrategies, Inc (GSI) installed four additional groundwater monitoring wells (A-4 through A-7). In August 1992, GSI installed two offsite groundwater monitoring wells (A-8 and A-9) and one groundwater recovery well (AR-1) at the Site. One off-Site downgradient exploratory soil boring was drilled and completed as groundwater monitoring well A-10 on November 18, 1992. GSI drilled six on-Site exploratory soil borings and installed recovery well AR-2, vapor extraction/air sparging well AS-1, and air sparging well AS-2 in these borings on March 16 and 17, 1993.

GSI performed two vapor extraction tests (VET) and one vapor extraction/air sparging test (VEAT) at the Site on March 24, 1993. A fourth test (VET) was performed on August 13, 1993. These tests were performed on four distinct groups of wells. The effective radius of influence was estimated to be 20 feet. The calculated hydrocarbon removal rates for these tests ranged from 11 pounds per day (lbs/day) to 60.7 lbs/day.

In December 1998 a leak was observed from the impact valve of dispenser No. 8 while overseeing the re-booting of the dispenser piping. Petroleum hydrocarbon constituents were detected in soil samples collected beneath dispenser No. 8. As a result, ACEH requested further assessment under dispenser No. 8.

On June 13, 2000, Delta Environmental Consultants, Inc (Delta) completed one hand auger soil boring (HA-1) to a total depth of approximately 13 feet below ground surface (bgs) at an angle approximately 60° off horizontal. Soil samples were collected at 3-feet, 6-feet, 9-feet, and 12.5-feet bgs for chemical analysis. Based on the analytical results, it appeared that the soil beneath dispenser No. 8 was not significantly impacted. Benzene concentrations were not detected at or above the laboratory reporting limits and methyl tertiary butyl ether (MTBE) was reported at less than 1 milligram per kilogram (mg/kg).

In February 2002 Delta conducted soil sampling during the removal of four underground storage tanks (USTs), product distribution lines, and product dispenser islands at the site (Delta 2002).

The third quarter 2003 increase in MTBE concentrations at AR-1, MW-1, and MW-2 may be the result of constituents from the vadose zone being flushed into the groundwater by infiltration of precipitation through areas left exposed after the removal of the tanks. The site has since been paved over and is currently an empty lot.

URS conducted a Dual Phase Extraction (DPE) test between November 4 and November 9, 2002 for approximately 120 hours (the system was shut down for 17.8 hours on November 6 and 7, 2002) on three extraction points (MW-2, AR-2, and EP-1) (URS 2003). Test results indicated limited success using DPE on wells MW-2 and AR-1 to remove hydrocarbons and MTBE from soil and groundwater. On December 16, 2003, URS injected hydrogen peroxide in wells AR-1, AR-2, MW-1, MW-2, and A-7 and monitored baseline natural attenuation parameters for these wells on November 17, 2003 and on March 1, 2004. Peroxide injections were conducted under pressure for wells MW-1 and MW-2. The subsequent monitoring of hydrocarbon concentrations indicated that hydrogen peroxide injection did not have a uniform effect on hydrocarbon concentrations in the injection wells. Additionally, the natural attenuation parameters did not exhibit any conclusive trends.

2.1 SITE HYDROGEOLOGY

The Site lies within the hydrogeologic feature known as the East Bay Plains Groundwater Basin. Groundwater occurs in mostly confined aquifers consisting of unconsolidated Tertiary to Quaternary age deposits. Some unconfined water bearing deposits of Quaternary age exist within this basin. The consolidated basement rocks underlying the Quaternary and Tertiary age deposits are considered to be non-water bearing due to their poor yields.

The water bearing deposits are composed of coalescing alluvial fans sloping westward from the Diablo Range to the east. These alluvial deposits are collectively known as the San Leandro Cone, a sub basin of the East Bay Plains Groundwater Basin. These water-bearing deposits are interfingered with tideland deposits that resulted from accumulations of flood stage silts and clays caused by marine inundations. Where these deposits are laterally extensive and/or thick enough, they can form confining layers that are impervious to the groundwater flow. These aquifers do not correlate at depths over any appreciable distance. They are analogous to the more studied Newark, Centerville, and Fremont aquifers located farther south in the adjacent Niles Cone Basin.

The near surface soils found in borings at the site are clays generally ranging from three to eight feet in thickness (except boring A-10, where no clay is present). The clays are underlain by silts and sandy silts ranging from 15 to 25 feet thick that are interbedded with occasional sand and clay lenses. The silts grade into sands and gravels at depths greater than 20 feet. These sand and gravel lenses pinch out towards the western edge of the site. Silts and clays were encountered at the bottom of several of the deeper wells and soil borings (A-4, AR-1, A-9, and A-8) and may indicate a confining layer below the water bearing sands and gravels. Cross sections illustrate the local geology underlying the site (Figures 4 and 5).

An aquifer pumping and recovery test was performed at the site by GSI on October 13 and 14, 1992 utilizing recovery well AR-1. GSI evaluation of the step-drawdown test suggested that a pumping rate of 3 gallons per minute (gpm) would be the optimal discharge rate for the constant rate test. Maximum observed drawdown in the pumping well was 12.06 feet. Calculated hydraulic conductivity values from the field data plots ranged from 22.2 feet per day (ft/d) (7.85 x 10^{-3} centimeters per second [cm/s]) to 59.0 ft/d (2.08 x 10^{-2} cm/s). Storativity ranged between 1.09 x 10^{-4} and 9.92 x 10^{-2}. Storativity values appear to represent an aquifer that is unconfined to semi-confined. The maximum observation well drawdown was seen in well A-7 at 0.55 feet below initial water-levels. Well A-7 is approximately 80 feet downgradient from the pumping well AR-1. Finally, the well efficiency was calculated to be 16.5% at a constant discharge rate of 3 gpm. Low well efficiency of well AR-1 may be a function of the fine-grained nature of the aquifer in the area around the well (GeoStrategies, 1993).

The analytical results of the physical properties of soil samples collected between approximately 4 and 9 feet bgs during this investigation indicated the following:

- The soils were brown fine sandy clays
- Moisture content ranged between 17.89 and 20.92 percent
- The average total porosity ranged between 33.53 and 37.60 percent

- The average hydraulic conductivity ranged between 1.10×10^{-8} and 5.17×10^{-8} cm/sec, and
- The total organic carbon content ranged between 0.058 and 0.25 percent.

Groundwater occurs at a depth of approximately 10 feet bgs and groundwater flow direction is to the west, toward San Francisco Bay. Figure 2 shows the hydraulic gradient direction at the Site during the most recent fourth quarter 2004 monitoring event. The hydraulic gradient historically ranges from 0.003 to 0.008 feet per foot between the second quarter of 2002 and the fourth quarter of 2004. Sulphur Creek, the most prominent surficial water feature, flows from east to west about 0.2 miles to the south.

2.2 GROUNDWATER

A review of groundwater monitoring data for the Site indicates that the extent of the residual traces of the dissolved phase hydrocarbon plume has been defined (URS 2004b). Wells A-4 through A-10 delineate the area of affected groundwater. Wells A-7 and A-10 located west across Hesperian Boulevard define the downgradient extent of the affected area, wells A-5, A-6, A-8, A-9, and MW-3 define the crossgradient extents, and well A-4 defines the upgradient extent. The well locations are shown in Figures 2 and 3. Groundwater analytical results are presented in Table 1 in comparison to the Environmental Screening Levels (ESLs) for groundwater that is a potential source of drinking water (100 µg/L for TPH-g (Total Petroleum Hydrocarbons as gasoline (TPH-g)/Gasoline range organics (GRO), 1.0 µg/L for benzene, and 5 µg/L for MTBE) and non drinking water sources (500 µg/L for TPH-g/GRO, 46 µg/L for benzene, and 1,800 µg/L for MTBE). The respective ESLs are presented in the California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region "*Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater*" guidelines, as revised in July 2003, "*Volume 1: Summary Tier 1 Lookup Tables, Table F*". The most recent fourth quarter 2004 analytical results are graphically presented in Figure 2. The groundwater monitoring analytical results from 2003 and 2004 for TPH-g/GRO, benzene and MTBE concentrations in the source areas indicate the following:

2.2.1 SITE DELINEATION

Wells A-4 through A-10 that define the extent of the plume have consistently been below reporting limits for TPH-g/GRO and benzene, toluene, ethyl benzene, and xylenes (BTEX), with very low concentrations of MTBE ranging between non-detect to 1.8 µg/L (Table 1).

2.2.2 FORMER UST COMPLEX

Well MW-1 is located immediately adjacent (less than approximately 5 feet) to the primary source area (former UST complex location; Figure 3). During the first and fourth quarters of 2003 and the second quarter of 2004, TPH-g/GRO in MW-1 was present above ESL for potential drinking water sources but was below the ESL for non drinking water sources (Table 1). However, TPH-g/GRO concentrations in MW-1 have been non-detect (<250 µg/L) during the third and fourth quarters of 2004 (Table 1). Although, the laboratory reporting limit exceeded the TPH-g/GRO ESL for potential drinking water sources. BTEX concentrations in well MW-1

have consistently been at non-detect to relatively low levels. During 2003 and 2004, MTBE concentrations in MW-1 ranged between 14 µg/L and 250 µg/L. During the fourth quarter of 2004, MTBE concentrations were 180 µg/L, which is above ESL for potential drinking water sources but below the ESL for non drinking water sources (Table 1).

2.2.3 DOWNGRADIENT OF FORMER UST COMPLEX

Well AR-1 is located approximately 50 feet downgradient of MW-1 and approximately 30 to 50 feet downgradient of the former UST complex location (Figure 3). TPH-g/GRO and BTEX concentrations in this well have consistently been at non-detect levels since the first quarter of 2003. In the fourth quarter of 2004, MTBE concentrations were below ESLs for drinking water sources (Table 1).

2.2.4 FORMER PUMP ISLANDS

Well MW-2 is located approximately 20 feet downgradient of the former northernmost pump island location and approximately 30 feet downgradient of the former southern pump island location. During the fourth quarter of 2004, TPH-g/GRO was detected at a concentration of 920 µg/L, which is above the TPH-g/GRO ESL for non-drinking water sources. BTEX concentrations in MW-2 have consistently been at low to non-detect levels. TPH-g/GRO and MTBE concentrations in MW-2 have generally been declining. During the fourth quarter of 2004, MTBE was detected at 10 µg/L in MW-2, which is above MTBE ESL for potential drinking water sources but below the ESL for non drinking water sources (Table 1).

2.2.5 DOWNGRADIENT OF FORMER PUMP ISLANDS

Wells AR-2 and A-7 are located in the vicinity and immediately downgradient of the former pump island locations and well MW-2 (Figure 2). Well AR-2 is located approximately 12 feet downgradient of the former northernmost pump island location and approximately 30 feet downgradient of the former southern pump island location. Well A-7 is located approximately 75 feet downgradient of well AR-2. TPH-g/GRO and BTEX concentrations in AR-2 and A-7 have consistently been at low to non-detect levels, with concentrations being at non-detect levels during the fourth quarter of 2004 (Table 1). During the fourth quarter of 2004, the MTBE concentrations detected in AR-2 and A-7 were 1.2 µg/L and 1.8 µg/L, respectively, which were below the ESLs for drinking water sources.

2.2.6 SUMMARY

The groundwater analytical results indicate that the extent of the residual traces of the dissolved phase hydrocarbon plume at the site has been defined and does not appear to be migrating. The residual hydrocarbon impacts appear to be localized and confined to small areas immediately in the vicinity of the former UST complex (MW-1) and the former dispensers (MW-2). This is demonstrated by the consistent non-detectable concentrations of TPH-g/GRO and BTEX, and very low concentrations of MTBE, encountered at wells AR-1, AR-2, and A-7, which are located immediately downgradient of the respective areas. The decreasing concentrations of dissolved petroleum hydrocarbons in wells in these areas is a likely indication of ongoing natural attenuation.

The presence of residual TPH-g/GRO and MTBE at the concentrations currently existing at the Site may not pose a health risk to potential construction/trench workers or hypothetical future residents. The RWQCB basis for the residential TPH-g/GRO and MTBE ESLs protective of groundwater that is a potential drinking water resource is a taste and odor threshold. The RWQCB basis for the construction worker ESL of 500 µg/l for TPH-g comes from aquatic habitat goals. These aquatic goals are meant to protect organisms and habitat that currently do not exist at the Site. Additionally, proper OSHA personal protective equipment (PPE) and limited exposure duration of hypothetical future construction/trench workers may mitigate any potential adverse health effects.

2.3 SOIL

A review of the analytical results of soil samples collected from the Site during 2000 and 2004 investigations (Delta 2000, 2004) indicates that the lateral and vertical extents of hydrocarbon impacts on onsite soils have been characterized and are limited to the source areas in the vicinity of sample locations OE-DP-1-12.3 (at 12.3 feet bgs) and UST-5-15 through UST-8-15 (at 15 feet bgs). The respective sample locations are shown on Figure 3 and the associated analytical results are presented in Table 2.

Most of the hydrocarbon impacted soils in the source areas have been over-excavated. In the former pump island location, soil was excavated to depths of 12.3 feet bgs and in the former UST complex location to depths of 15 feet bgs (Figure 3). The maximum TPH-g/GRO, benzene and MTBE concentrations remaining in soils are 270 mg/kg (UST-6-15; at 15 feet bgs), 0.13 mg/kg (OE-DP-1-12.3; at 12.3 feet bgs), and 1.3 mg/kg (UST-8-15; at 15 feet bgs), respectively. However, it is to be noted that the respective residual hydrocarbon concentrations do not exceed applicable ESLs (Table 2).

One sample result of potential concern (UST-2-14) collected at 14 feet bgs did not contain detectable benzene concentrations above the laboratory reporting limit (ND<0.50 mg/kg), where the laboratory reporting limit is greater than applicable residential ESL of 0.18 mg/kg for benzene. However, the area where sample UST-2-14 was collected was excavated to approximately 13 feet bgs. Additionally, samples UST-3-14, UST-5-14, and UST-5-15 that were collected in the immediate vicinity (Figure 3) and corresponding sample depth of sample UST-2-14, did not contain detectable benzene concentrations at reporting limits ranging from ND<0.025 to ND<0.050 mg/kg (Table 2). Accordingly, the benzene analytical result of ND<0.50 mg/kg at sample location UST-2-14 is unlikely to be of significant concern.

2.4 SENSITIVE RECEPTORS

In May/June 2001, a well survey was conducted within a one-mile radius of the Site using records obtained from the Department of Water Resources (DWR) and Alameda County Public Works department (Figure 6, Appendix D). Approximately 59 wells were noted to be located within a one mile radius of the Site, of which, 9 were domestic, 38 were irrigation, 9 were unknown, and 3 were industrial (Figure 6, Appendix D). Approximately 8 wells were identified within a 2,000 feet radius of the Site, of which 6 were irrigation wells and 2 were of unknown usage. However, of the 8 wells identified within a 2,000 feet radius of the Site, only one irrigation well was identified to be located in the general downgradient direction of the Site, at an approximate distance of 500 feet northwest of the Site. Considering the non-migratory residual

concentrations of dissolved phase petroleum hydrocarbons in the groundwater that is confined to the primary source areas at the Site, no water wells, deeper drinking water aquifers, surface water or other sensitive receptors are likely to be impacted.

The soil gas investigation work was performed in general accordance with the ACEH's August 30, 2004 letter to RM requesting additional characterization at this Site for case closure evaluation (Appendix A), and the September 28, 2004 *Active Soil Gas Investigation Workplan*, and the November 17, 2004, *Active Soil Gas Investigation Workplan Addendum*.

3.1 PRE-FIELD ACTIVITIES

Before initiating field activities, URS obtained a soil boring permit from Alameda County Public Works Agency, Water Resources Section (Appendix B), created a Site Health and Safety Plan (HASP) describing hazards associated with the proposed work, and conducted a subsurface utility clearance. The utility clearance included notifying Underground Service Alert 48 hours prior to initiating field activities and securing the services of Cruz Brothers Locators, a private utility-locating company, to confirm the absence of underground utilities at each boring location.

The HASP, which was prepared for URS personnel conducting field activities, addressed the proposed soil boring and soil gas sampling protocol. A copy of the HASP was available on-site at all times. The URS Site supervisor held tailgate meetings covering aspects of the HASP before starting work at the Site.

3.2 SOIL GAS SAMPLE COLLECTION PLAN AND IMPLEMENTATION

The soil gas investigation conducted at the Site aimed to address ACEH's concerns with regards to petroleum hydrocarbon concentrations detected in the influent samples collected from wells MW-2, AR-2 and EP-1 during a dual phase extraction test conducted in November 2002 (Table 3). During four mobilizations on December 3rd, 6th, 10th and 21st 2004, URS staff supervised Precision Sampling, Inc and Gregg Drilling and Testing, Inc. in advancing ten soil gas borings SG-1 through SG-10 at the Site. The respective boring locations are shown in Figure 3. Borings SG-1 through SG-5 were located near the southwestern site boundary adjacent to well locations MW-2, AR-2, EP-1, MW-1, and AR-1, and immediately adjacent and downgradient of the former UST complex and pump island locations (Figure 3). Borings SG-6 through SG-10 were located hydraulically upgradient (northeast) of the primary and secondary source areas at the Site (Figure 3). Further details of the soil gas boring locations are as follows:

- Soil gas sample location SG-1 was located at least 5 feet from AR-2 and downgradient (west) of EP-1 and the former pump island location.
- SG-2 was located at least 5 feet from MW-2 and directly downgradient of the former location of the southern pump islands, and also downgradient of the former UST complex location. Both SG-1 and SG-2 were within approximately 13 to 15 feet of well location EP-1 and assist in characterizing residual vadose zone hydrocarbon concentrations in the area of well locations of concern MW-2, AR-2 and EP-1, and also in the area directly downgradient of the former northern pump island. Additionally, SG-1 and SG-2 were located within native soil in close proximity to overexcavation soil sample location OE-DP-1.
- SG-3 was located at least 5 feet from AR-1 and downgradient (west) of the former location of the southern pump islands.
- SG-4 was located within native soil immediately adjacent to the former UST complex location, at the northwestern edge of the former UST complex overexcavation boundary, and west of tank basin soil sample UST-8.
- SG-5 was located at least 5 feet from and downgradient of MW-1 and was also located in the vicinity of tank basin soil sample UST-7.

- Upon encountering backfill at the originally planned SG-6 location, SG-6 was subsequently located close to the northeast boundary of the Site, adjacent to well A-4 and upgradient of the former UST complex location and pump islands.
- SG-7 and SG-8 were located upgradient of the former pump islands and north of the former UST complex location.
- SG-9 was located towards the northwestern boundary of the Site, adjacent to former boring location SB-4, and west of the former UST complex and pump island locations.
- SG-10 was located at the northeastern boundary of the Site, adjacent to well AV-2 and served to provide background hydrocarbon concentrations in onsite soils.

To avoid and minimize potential soil gas sample dilution concerns during sampling, each soil gas sample location was drilled using a Geoprobe™ rig, direct pushing from grade to the target sampling depths between 4 and 10 feet bgs and using a direct push vapor probe with extendable screen and expendable point. The inactive status of the Site and the absence of typical service station associated underground utilities at the Site, allowed issuance of an authorized variance from RM's standard safety protocol of air-knifing from 0 to 5 feet bgs. All soil gas borings were located at least 5 feet from existing wells to minimize possible short circuiting and sample dilution caused by drawing surface air through a nearby screened well casing and filter pack. An additional boring was drilled to the total maximum depths of approximately 9 to 10 feet bgs, adjacent to each of the borings SG-1 through SG-10 for lithologic characterization to better determine appropriate soil gas sampling depths. Additionally, two soil samples were collected from each of the borings SG-5, SG-9, and SG-10 at depths ranging from 4.5 to 9 feet bgs for physical properties analyses. Also, prior to collecting soil gas samples, the depth to groundwater was measured in onsite well AV-2 to delineate the extent of the onsite vadose zone, so as to determine the maximum depths at which soil gas samples could be collected. Depth to water in AV-2 measured approximately 12.19 feet below top of casing (TOC) on December 03, 2004, and 13 feet below TOC on December 05, 2004.

Following the set up of the soil gas sampling equipment, two soil gas samples were collected in Summa Canisters from each of the ten locations SG-1 through SG-10. One soil gas sample was collected from within the less permeable clay layer (approximately 4 to 5.5 feet bgs) and the second soil gas sample was collected from the relatively more permeable silts and sandy silts layer (approximately 7 and 9.5 feet bgs) beneath the Site. The rationale for collecting soil gas samples from the uppermost clay layer beneath the Site is that they are likely to be more representative of the surface soil gas hydrocarbon exposure levels at the Site. Duplicate soil gas samples were also collected from SG-3, SG-4, and SG-5 at 7, 5 and 8.5 feet bgs, respectively.

Illustrations of typical soil gas sampling apparatus are provided in Appendix E and the soil gas sampling set up and procedure are discussed in the following section. Sufficient volumes of soil gas samples could not be collected from SG-1 and SG-3 at 4 feet bgs due to low-flow conditions and therefore, soil samples were collected in Encore™ sample containers at these respective locations and depths for laboratory analyses. This is in accordance with the Department of Toxic Substances Control (DTSC) and the California Regional Water Quality Control Board – Los Angeles Region (RWQCB-LAR) January 2003 "Advisory –Active Soil Gas Investigations" standards (Section 2.2.1) for low-flow or no-flow conditions.

3.3 SOIL GAS SAMPLE COLLECTION PROCEDURE

Soil vapor sample collection procedures applied were consistent with the guidelines published by DTSC and the RWQCB-LAR in the January 28, 2003 Advisory – Active Soil Gas Investigations, RWQCB-LAR "Interim Guidance for Active Soil Gas Investigation", February 25, 1997, and EPA Standard Operating Procedure (SOP) #1704, Summa Canister Sampling. Soil gas samples were collected following the protocols described in the November 17, 2004 *Soil Investigation Workplan Addendum*, which were as follows:

- Soil gas samples were not collected during or immediately after a significant rain event (e.g. ½ inch or greater).
- The soil gas sampling probe was pushed to the target depth; the sampling line was installed; the sampling line was capped with a vapor-tight valve; the valve was closed; the probe was raised six inches; and the line was purged after 30 minutes elapsed.
- Hydrated bentonite was placed around the drill rod prior to sampling in order to inhibit surface air migration down the outer portion of the drill rod.
- A leak check was performed prior to sampling by placing cleaning wipes with propellants containing 1,1-Difluoroethane on all sample line fittings and the top of the vapor probe tubing where the tubing exits the well.
- Three volumes of air was purged from the sample tubing before sample collection using a vacuum pump connected to the sample tubing by a valve, T-fitting, and swage-lok couplings.
- A flow regulator was used to collect soil gas samples at a rate of 100 to 200 milliliters per minute (ml/min) to inhibit partitioning and short-circuiting.
- Summa canisters of 6 liter capacities with vacuum gauges and a pre-sample vacuum of at least 29 inches of mercury (in. Hg) were used to collect samples.
- Sampling was terminated when at least 5 in. Hg vacuum remained in each summa canister. Due to low-flow conditions at 4 feet bgs in SG-1 and SG-3, sampling was discontinued when approximately 25 in. Hg vacuum remained in the canisters after 1 hour and 55 minutes and 2 hours and 47 minutes of sampling, respectively.
- Two duplicate samples were collected, one each from SG-3 and SG-5, which were located in areas potentially impacted by hydrocarbons.
- Soil gas samples were not chilled.
- Laboratory analyses were performed within 30 days of sample collection, in accordance with EPA holding time standards (method TO-15) for Summa canisters.

3.4 SOIL GAS SAMPLE ANALYSES

Soil and gas samples were submitted to Severn Trent Laboratories, Inc. (STL), a State of California Department of Health Services-certified laboratory for analyses. The soil gas samples were analyzed for TPH-g/GRO by EPA Method TO-3; and BTEX and MTBE by EPA Method TO-14A. The soil gas samples were also analyzed for 1,1-Difluoroethane, which was used as a

tracer gas for leak testing the integrity of the soil gas sampling equipment. The soil samples were analyzed for TPH-g/GRO, BTEX and MTBE by EPA Method 8260.

A total of twenty three soil gas samples collected in Summa Canisters, including two duplicates, and two soil samples collected in 14 Encore ™containers were sampled from borings SG-1 through SG-10 and submitted for chemical analyses to STL. Additionally, four composite soil waste samples and one equipment rinsate waste water sample were also collected and submitted for analysis for waste profiling. A total of six soil samples collected from borings SG-5, SG-9, and SG-10 at depths ranging from 4.5 to 9 feet bgs were submitted to URS's Pleasant Hill Laboratory for physical properties analyses, including bulk density, soil moisture, effective permeability, porosity and grain size distribution. The respective samples were also analyzed for organic carbon content by the Walkee Black Method by STL Laboratories.

4.1 SOIL GAS AND SOIL SAMPLE ANALYTICAL RESULTS

Conservative, residential ESLs are being considered as the closure goals for the Site. The RWQCB, San Francisco Bay Region has proposed ESLs for shallow soil gas at industrial/commercial or residential land-use sites, for evaluation of potential indoor-air impacts. The RWQCB, San Francisco Bay Region "*Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater*" guidelines, as revised in July 2003, "*Volume 1: Summary Tier 1 Lookup Tables, Table E*" specifies the following ESLs for residential land use sites:

- 10,000 micrograms per cubic meter ($\mu g/m^3$) (3.33 ppmv) TPH-g/GRO
- 84 $\mu g/m^3$ (25.85 ppbv) benzene,
- 83,000 $\mu g/m^3$ (21,671 ppbv) toluene,
- 2,200 $\mu g/m^3$ (499 ppbv) ethylbenzene,
- 21,000 $\mu g/m^3$ (4,762 ppbv) xylenes, and
- 9,400 $\mu g/m^3$ (2,604 ppbv) MTBE.

The ACEH approved deriving the Site Closure Goals for shallow soil gas for this Site by taking the Lowest Residential Indoor Air Screening Level values from Volume II of the ESL document (ESL 2003), Table E-3, and dividing that by an attenuation factor of 0.0001 (1/10,000). This is to allow for development of more representative shallow soil gas residential ESLs for sites underlain by silty or clayey soils, as recommended in the February 23, 2004 *Technical Memo on Evaluation of Vapor Intrusion Concerns at Sites Underlain by Fine-Grained Soils from the SFRWQCB* (Appendix F). The Indoor Air and Soil Gas for Residential Land Use ESLs from Tables E of SFRWQCB's 2003 Volume II ESL document assume a very permeable (sandy) fill material. However, the lithology at the Site is comprised of a very low permeability clay stratum extending from grade to approximately 4 to 5.5 feet bgs, which is subsequently underlain with a low permeability clay stratum.

The soil and water analytical results are presented in Table 4. The soil gas analytical results and Site Closure Goals (using 0.0001 attenuation factor) are presented in Table 5. The results of the soil physical properties analyses are presented in Table 6. Copies of laboratory analytical reports and chain-of-custody records are presented in Appendix C. The analytical results of the soil gas samples collected from borings SG-1 through SG-10 indicated the following (Table 5):

- Tracer gas analyte 1,1-Difluoroethane was not detected above laboratory reporting limits in any of the samples, verifying the leak proof integrity of the soil gas sampling equipment used to collect samples.
- BTEX and MTBE concentrations in all the samples were below their respective Site Closure Goals for soil gas concentrations.
- TPH-g/GRO concentrations in soil gas samples collected from the uppermost clay stratum at depths ranging between 4 and 5.5 feet bgs were below their respective Site Closure Goals for soil gas concentrations.

- TPH-g/GRO concentrations in soil gas samples collected from the deeper silts and sandy silt stratum, namely, SG-2-8.5 (at 8.5 feet bgs), SG-3-7.0 Dup (at 7.0 feet bgs), SG-4-8.5 (at 8.5 feet bgs), SG-5-8.5 (at 8.5 feet bgs), and SG-5-8.5 (at 8.5 feet bgs) exceeded the Site Closure Goal for TPH-g/GRO concentrations in soil gas.

It is to be noted that site-specific incremental risk and hazard quotients (using the model in RWQCB Volume 2 Appendix 4) for soil vapor impact to residential indoor air exposure cannot be developed for TPH-g/GRO, as the chemical properties lookup table in the site-specific model does not include TPH-g/GRO. Since the BTEX and MTBE concentrations in the soil gas samples collected from SG-1 through SG-10 do not exceed their respective conservative SFRWQCB ESLs for shallow soil gas at residential land-use sites, development of less conservative BTEX and MTBE driven site-specific incremental risk and hazard quotients for soil vapor impact to residential indoor air exposure is not warranted.

The analytical results of the soil samples collected from borings SG-1 and SG-4 at 4 feet bgs indicated non-detect concentrations of TPH-g/GRO, BTEX and MTBE (Table 4).

4.2 SOIL PHYSICAL PROPERTIES

The analytical results of the physical properties of soil samples collected from borings SG-5, SG-9, and SG-10 at depths ranging from 4.5 to 9 feet bgs indicated the following:

- The soils were brown fine sandy clays
- Moisture content ranged between 17.89 and 20.92 percent
- The average total porosity ranged between 33.53 and 37.60 percent
- The average hydraulic conductivity ranged between 1.10×10^{-8} and 5.17×10^{-8} cm/sec, and
- The total organic carbon content ranged between 0.058 and 0.25 percent.

4.3 WASTE DISPOSAL

Soil and equipment rinsate waste generated during Geoprobe boring activities were stored temporarily on-site in two DOT approved 55-gallon drums. Following waste characterization, Dillard Environmental Services was contracted to dispose of all drilling-related waste at an appropriate offsite facility. Four composite soil samples (SP-1 through SP-4) were collected from one waste drum and one water sample was collected from the other drum and analyzed for TPH-g/GRO, BTEX, MTBE and total lead for disposal profiling purposes. Maximum concentrations of 17 mg/kg lead and non-detect concentrations of TPH-g/GRO (<1.0 mg/kg), BTEX (<0.0050 mg/kg) and MTBE (<0.0050 mg/kg) were detected in the composite samples. The analytical reports are included in Appendix C and the waste manifests are included in Appendix G.

5.1 CONCLUSIONS AND RECOMMENDATIONS

The combined analytical results of the soil gas and soil samples collected from SG-1 through SG-10 provide a representative indication of residual hydrocarbon concentrations in soils through out the entire Site. The analytical results of soil gas samples collected from SG-1 through SG-5 assist in characterizing residual hydrocarbon concentrations in onsite soils in the primary and secondary source areas, and also in the historic "hot spots" (Figure 3). The analytical results of soil gas samples collected from SG-6 through SG-9 assist in characterizing residual hydrocarbon concentrations in onsite soils located hydraulically upgradient (northeast) of the primary and secondary source areas at the Site (Figure 3). The results of soil gas samples collected from SG-10 located at the northeast edge of the property provide background concentrations of hydrocarbons in onsite soils. Accordingly, the results of the soil gas investigation effectively characterizes residual petroleum hydrocarbon concentrations in the vadose zone underlying the following three areas of concern:

- In the area where wells MW-2, AR-2 and EP-1 are located (Figure 3). The analytical results of a DPE test conducted on the respective wells in November 2002 were deemed to be of concern (Table 3).
- In the area where residual TPH-g/GRO and MTBE concentrations were detected in groundwater from wells MW-1 and MW-2, and
- In the area adjacent and downgradient of the former UST complex and pump island locations.

The analytical results of soil and soil gas samples collected from SG-1 through SG-10 indicate that the BTEX and MTBE concentrations in onsite soils do not exceed their applicable and ACEH approved Site Closure Goals for the Site or the more conservative soil vapor ESLs. The residual TPH-g/GRO concentrations encountered in deeper onsite soils are unlikely to pose significant human health risks in the future. Considering that the indoor air-soil gas ESLs are more relevant and representatively applicable to soil gas samples collected from within 5 feet bgs, it is likely that the Site Closure Goals may be overly conservative for the residual TPH-g/GRO concentrations encountered in soil gas samples collected from below 5 feet bgs. It is also to be noted that the hydraulic conductivity of the onsite soils in the deeper silty and sandy silty stratum range from 1.10×10^{-8} cm/sec to 8.47×10^{-8} cm/sec, which is very low. This thereby minimizes the potential for residual TPH-g/GRO concentrations in deeper onsite soils from volatilizing to the surface. Also, ongoing natural attenuation of residual petroleum hydrocarbons in onsite soils, as documented in URS's June 3, 2004, Site Closure Report, is likely to further decrease the remaining TPH-g/GRO concentrations in deeper onsite soils. As reported in URS's June 3, 2004 Case Closure Report for the Site, the six criteria for closure as a low-risk groundwater case as listed in the SFRWQCB *Interim Guidance Document* 1996 (December 8, 1995) have been adequately addressed. Accordingly, this Site qualifies for Case Closure.

This report is based on data, site conditions and other information that is generally applicable as of the date of the report, and the conclusions and recommendations herein are therefore applicable only to that time frame. Background information including but not limited to previous field measurements, analytical results, site plans and other data have been furnished to URS by RM, their previous consultants, and/or third parties, which URS has used in preparing this report. URS has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information.

Analytical data provided by RM approved laboratory has been reviewed and verified by the laboratory. URS has not performed an independent review of the data and is neither responsible for nor has confirmed the accuracy of this data. Field measurements have been supplied by a groundwater sampling subcontractor. URS has not performed an independent review of the field sampling data and is neither responsible for nor has confirmed the accuracy of this data.

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Table 1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
Former ARCO Service Station #5387
20200 Hesperian Blvd., Hayward, California

					TPH-g /GRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
Groundwater ESLs for Potential Drinking Water Sources					100	1.0	40	30	13	5.0
Groundwater ESLs for Non Drinking Water Sources					500	46	130	290	13	1,800
Well Number	**Date Sampled**	**Top of Screen (ft, bgs)**	**Bottom of Screen (ft, bgs)**	***Depth to* Groundwater (ft)**	**TPH-g /GRO (µg/L)**	**Benzene (µg/L)**	***Toluene* (µg/L)**	**Ethyl-benzene (µg/L)**	**Total Xylenes (µg/L)**	**MTBE (µg/L)**
AR-1	02/11/03			9.91	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4.7
	06/27/03			10.30	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.6
	09/04/03			---	---	---	---	---	---	---
	11/17/03			11.13	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.4
	03/01/04			9.00	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**8.6**
	06/02/04			10.40	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.6
	09/16/04			11.18	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.2
	12/07/04	10.0	35.0	11.15	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
AR-2	02/11/03			10.80	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.75
	06/27/03			11.14	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**6.0**
	09/04/03			---	---	---	---	---	---	---
	11/17/03			12.08	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.86
	03/01/04			10.01	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/02/04			11.38	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4.3
	09/16/04			12.12	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.5
	12/07/04	5.0	35.0	12.00	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.2
MW-1	02/11/03			9.70	**120**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**76**
	06/27/03			10.10	ND<500	ND<5.0	ND<5.0	ND<5.0	ND<5.0	**170**
	09/04/03			---	---	---	---	---	---	---
	11/17/03			10.94	**420**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**140**
	03/01/04			8.85	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**14**
	06/02/04			10.20	**340**	ND<2.5	ND<2.5	ND<2.5	ND<2.5	**250**
	09/16/04			11.02	ND<250	ND<2.5	ND<2.5	ND<2.5	ND<2.5	**170**
	12/07/04	5.0	30.0	10.83	ND<250	ND<2.5	ND<2.5	ND<2.5	ND<2.5	**180**
MW-2	02/11/03			10.79	**1,100**	ND<0.50	ND<0.50	ND<0.50	0.53	**71**
	06/27/03			11.20	**520**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**45**
	09/04/03			11.84	**500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**28**
	11/17/03			11.98	**530**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**50**
	03/01/04			10.05	**890**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**36**
	06/02/04			11.32	**310**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**9.2**
	09/16/04			12.01	**400**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4.0
	12/07/04	5.0	30.0	12.00	**920**	ND<5.0	ND<5.0	ND<5.0	ND<5.0	**10**
MW-3	02/11/03			8.85	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/27/03			9.12	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.61
	09/04/03			9.85	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	11/17/03			9.93	---	---	---	---	---	---
	03/01/04			7.95	---	---	---	---	---	---
	06/02/04			9.25	---	---	---	---	---	---
	09/16/04			9.95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	12/07/04	5.0	30.0	9.90	---	---	---	---	---	---

Table 1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
Former ARCO Service Station #5387
20200 Hesperian Blvd., Hayward, California

					TPH-g /GRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
Groundwater ESLs for Potential Drinking Water Sources					100	1.0	40	30	13	5.0
Groundwater ESLs for *Non* Drinking Water Sources					500	46	130	290	13	1,800
Well Number	**Date Sampled**	**Top of Screen (ft, bgs)**	**Bottom of Screen (ft, bgs)**	**Depth to Groundwater (ft)**	**TPH-g /GRO (µg/L)**	**Benzene (µg/L)**	**Toluene (µg/L)**	**Ethyl-benzene (µg/L)**	**Total Xylenes (µg/L)**	**MTBE (µg/L)**
A-4	02/11/03			11.82	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.53
	06/27/03			12.12	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	09/04/03			---	---	---	---	---	---	---
	11/17/03			15.09	---	---	---	---	---	---
	03/01/04			10.95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/02/04			12.34	---	---	---	---	---	---
	09/16/04			13.19	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	12/07/04	10.0	35.0	13.00	---	---	---	---	---	---
A-5	02/11/03			11.37	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.97
	06/27/03			11.55	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.98
	09/04/03			12.21	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.50
	11/17/03			12.37	---	---	---	---	---	---
	03/01/04			10.90	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.77
	06/02/04			11.70	---	---	---	---	---	---
	09/16/04			12.40	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.50
	12/07/04	10.0	31.5	12.40	---	---	---	---	---	---
A-6	02/11/03			11.21	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/27/03			11.60	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	09/04/03			12.29	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	11/17/03			12.44	---	---	---	---	---	---
	03/01/04			10.45	---	---	---	---	---	---
	06/02/04			11.75	---	---	---	---	---	---
	09/16/04			12.56	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	12/07/04	- -	- -	12.35	---	---	---	---	---	---
A-7	02/11/03			12.35	54	ND<0.50	ND<0.50	ND<0.50	ND<0.50	21
	06/27/03			12.95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	9.4
	09/04/03			13.59	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.4
	11/17/03			13.84	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.4
	03/01/04			12.65	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.1
	06/02/04			13.08	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.92
	09/16/04			13.89	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.0
	12/07/04	10.0	35.0	13.77	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.8
A-8	02/11/03			9.90	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/27/03			9.73	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	09/04/03			10.32	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	11/17/03			10.55	---	---	---	---	---	---
	03/01/04			8.51	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.76
	06/02/04			9.83	---	---	---	---	---	---
	09/16/04			10.75	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	12/07/04	10.0	35.0	10.55	---	---	---	---	---	---

Table 1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
Former ARCO Service Station #5387
20200 Hesperian Blvd., Hayward, California

					TPH-g /GRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)
Groundwater ESLs for Potential Drinking Water Sources					100	1.0	40	30	13	5.0
Groundwater ESLs for Non Drinking Water Sources					500	46	130	290	13	1,800
Well Number	**Date Sampled**	**Top of Screen (ft, bgs)**	**Bottom of Screen (ft, bgs)**	***Depth to* Groundwater (ft)**	**TPH-g /GRO (µg/L)**	**Benzene (µg/L)**	***Toluene* (µg/L)**	**Ethyl-benzene (µg/L)**	**Total Xylenes (µg/L)**	**MTBE (µg/L)**
A-9	02/11/03			10.97	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	06/27/03			11.41	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	09/04/03			12.00	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	11/17/03			12.18	---	---	---	---	---	---
	03/01/04			10.30	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.50
	06/02/04			11.50	---	---	---	---	---	---
	09/16/04			12.23	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
	12/07/04	10.0	35.0	12.20	---	---	---	---	---	---
A-10	02/11/03			12.21	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.9
	06/27/03			12.66	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.99
	09/04/03			13.31	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.1
	11/17/03			13.27	---	---	---	---	---	---
	03/01/04			11.55	---	---	---	---	---	---
	06/02/04			12.61	---	---	---	---	---	---
	09/16/04			12.51	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.84
	12/07/04	10.0	35.0	13.60	---	---	---	---	---	---

Table 1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
Former ARCO Service Station #5387
20200 Hesperian Blvd., Hayward, California

Notes:

Bolded analytical data indicates an exceedance of the residential direct exposure and ingestion groundwater ESLs. ESLs selected from Vol II of the ESL document (ESL 2003), Table F-1a *Groundwater Screening Levels - for groundwater that is a current or potential drinking water resource*

Bolded and shaded analytical data indicates an exceedance of the construction worker direct exposure groundwater ESLs. ESLs selected from Vol II of the ESL document (ESL 2003), Table F-1b *Groundwater Screening Levels - for groundwater that is not a current or potential drinking water resource*

bgs = Below ground surface
ESL = Environmental Screening Level
ft = Feet
MTBE = Methyl tertiary butyl ether
µg/L = Micrograms per liter
ND< = Not Detected at or above the reporting limit
TPH-g/GRO = Total Petroleum Hydrocarbons as gasoline/Gasoline Range Organics

TABLE 2
Historical Soil Sample Analytical Data
Former ARCO Service Station # 5387
20200 Hesperian Blvd. Hayward,California

Sample ID	Date	Depth (ft)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	TPH-g/GRO (mg/kg)	MTBE (mg/kg)	Lead (mg/kg)
Residential ESL (mg/kg)			0.18	130	8.7	54	500	31	255
Construction Worker ESL (mg/kg)			17	650	400	420	2,300	2,800	750
Dispenser Island Samples									
DP-1-3.5	02/01/02	3.5	**0.19**	1.6	0.47	2.8	16	0.27	ND<10
DP-1-7	02/01/02	7.0	**ND<1.0**	36	**25**	**140**	**1,800**	19	ND<10
DP-2-4	02/01/02	4.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	ND<0.0050	ND<10
DP-3-3.5	02/01/02	3.5	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	ND<0.0050	ND<10
DP-4-4	02/01/02	4.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	ND<0.0050	ND<10
Product Line Samples									
PL-1-4.5	02/01/02	4.5	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	ND<0.0050	ND<10
PL-2-5	02/01/02	5.0	0.0060	0.014	ND<0.0050	0.0080	ND<0.050	0.033	130
Tank Basin Samples									
UST-1-14	02/01/02	14.0	ND<0.025	ND<0.025	ND<0.025	0.029	8.1	ND<0.0050	ND<10
UST-2-14	02/01/02	14.0	**ND<0.50**	ND<0.0050	ND<0.0050	0.025	1.4	0.50	ND<12
UST-3-14	02/01/02	14.0	ND<0.025	0.041	ND<0.025	ND<0.025	0.76	0.67	ND<12
UST-4-14	02/01/02	14.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.50	ND<0.0050	ND<10
UST-5-14	02/05/02	14.0	ND<0.050	0.099	0.23	0.050	56	1.2	ND<10
UST-6-14	02/05/02	14.0	ND<0.050	0.28	0.70	2.2	100	0.74	20
UST-7-14	02/06/02	14.0	ND<0.050	ND<0.050	0.18	ND<0.050	42	1.5	ND<10
UST-8-14	02/06/02	14.0	ND<0.050	0.18	0.49	0.073	110	2.0	ND<10
Over-excavation Results									
OE-DP-1-12	12/06/02	12.0	**ND<0.50**	0.76	2.1	2.5	360	0.85	ND<10
OE-DP-1-12.3	12/06/02	12.3	0.13	0.42	0.15	0.12	16	0.59	ND<12
UST-5-15	02/07/02	15.0	ND<0.050	0.080	ND<0.050	ND<0.050	45	0.47	ND<10
UST-6-15	02/07/02	15.0	ND<0.050	0.87	0.80	0.70	270	0.22	ND<10
UST-7-15	02/07/02	15.0	ND<0.050	0.065	0.23	0.12	50	0.53	ND<10
UST-8-15	02/07/02	15.0	ND<0.050	0.081	0.086	0.28	43	1.3	ND<10

Notes:

Bolded analytical data indicates an exceedance of the residential direct exposure to soil ESLs. Samples that were non detect but with reporting limits greater than ESLs selected from Vol II of the ESL document (ESL 2003), Table K-1, *Direct- Exposure Screening Levels Residentail Exposure Scenario*

ESL = Environmental Screening Level
ft = Feet
MTBE = Methyl tertiary butyl ether
mg/kg = Milligrams per kilogram
ND< = Not Detected at or above the reporting limit
NA = Not analyzed
TPH-g/GRO = Total Petroleum Hydrocarbons as gasoline/Gasoline Range Organics

Reference: Delta Environmental Consultants, Inc., 2002. *Tank Basin, Product Line and Dispenser Island Sampling Results.*

Table 3
Dual Phase Extraction Analytical Data
Former ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Well Number	Date Sampled	Benzene (ppmv)	Benzene (ug/L)	Toluene (ppmv)	Toluene (ug/L)	Ethyl-benzene (ppmv)	Ethyl-benzene (ug/L)	Total Xylenes (ppmv)	Total Xylenes (ug/L)	Gasoline Range Organics* (ppmv)	Gasoline Range Organics* (ug/L)	MTBE (ppmv)	MTBE (ug/L)
Residential ESLs - groundwater screening levels for indoor air impacts (ug/L)		--	1,900	--	530,000	--	52,000	--	160,000	--	NV	--	48,000
Commercial ESLs - groundwater screening levels for indoor air impacts (ug/L)		--	6,400	--	530,000	--	180,000	--	160,000	--	NV	--	160,000
MW-2	11/04/02	ND<0.031	ND<31	ND<0.027	ND<27	ND<0.023	ND<23	0.11	110	ND<2.4	ND<2400	ND<0.14	ND<140
	11/09/02	ND<0.031	ND<31	ND<0.027	ND<27	ND<0.023	ND<23	0.069	69	ND<2.4	ND<2400	ND<0.14	ND<140
AR-2	11/04/02	ND<0.031	ND<31	ND<0.027	ND<27	ND<0.023	ND<23	0.17	170	2.9 [1]	2900 [1]	0.26	260
	11/09/02	ND<0.031	ND<31	ND<0.027	ND<27	ND<0.023	ND<23	0.13	130	20 [2]	20,000 [2]	0.28	280
EP-1	11/04/02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/09/02	0.59	590	1.4	1,400	0.48	480	2.0	2,000	200 [2]	200,000 [2]	1.0	1000

Notes:
ESLs selected for the evaluation of indoor air impacts from groundwater **were not** exceeded.
The ESLs selected for that comparison come from Vol II of the ESL document (ESL 2003), Table E-1a.
* = Gasoline Range Organics (C6-C10). The molecular weight of gasoline (103 grams) calculated by averaging the molecular weight of benzene (C6) and napthalene (C10).
1 = Chromatogram Pattern: Gasoline C6-C10
2 = Hydrocarbon pattern is present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.
ESL = Environmental Screening Level
TPH = Total Petroleum Hydrocarbons
MTBE = Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted
$\mu g/m^3$ = Micrograms per cubic meter
NA = Not analyzed
ND< = Not Detected at or above the reporting limit
NV = No Value
Reference: URS., 2003. *Results of a Dual Phase Extraction Test.*
Assumptions: units of ppmv are approximately equal to units of mg/L

TABLE 4
Soil Sample and Waste Profiling Analytical Data
Former ARCO Service Station # 5387
20200 Hesperian Blvd. Hayward,California

Sample ID	Sample Date	Sample Matrix	Depth (ft bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	TPH-g/GRO (mg/kg)	MTBE (mg/kg)	Lead (mg/kg)
Residential ESL (mg/kg)				0.18	130	8.7	54	500	31	255
Construction Worker ESL (mg/kg)				17	650	400	420	2,300	2,800	750
SG-1-4.0	12/06/04	Soil	4.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	NA
SG-3-4.0	12/06/04	Soil	4.0	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	NA
Waste Profile Samples-Soil										
SP-1	12/21/04	Soil	Composite	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	17
SP-2	12/21/04	Soil	Composite	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	7.3
SP-3	12/21/04	Soil	Composite	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	5.8
SP-4	12/21/04	Soil	Composite	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<1.0	ND<0.0050	5.3

Sample ID	Sample Date	Sample Matrix	Depth (ft bgs)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	TPH-g /GRO (µg/L)	MTBE (µg/L)
Waste Profile Sample-Water									
Drum	12/21/04	Water	Composite	ND<0.50	ND<0.50	ND<0.50	ND<1.0	63 [1]	ND<0.50

Notes:

[1] Quantity of unknown hydrocarbon(s) in sample based on gasoline

ESL = Environmental Screening Level
ft bgs = Feet below grade surface
MTBE = Methyl tertiary butyl ether
mg/kg = Milligrams per kilogram
µg/L = Micrograms per liter
ND< = Not Detected at or above the reporting limit
NA = Not analyzed
TPH-g/GRO = Total Petroleum Hydrocarbons as gasoline/Gasoline Range Organics (C6-C12)

Table 5
Soil Gas Investigation Analytical Data
BP Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Soil Gas Sample Location	Date Sampled	Sample Depth (ft bgs)	Benzene (ppmv)	Benzene (µg/m³)	Toluene (ppmv)	Toluene (µg/m³)	Ethyl-benzene (ppmv)	Ethyl-benzene (µg/m³)	Total Xylenes (ppmv)	Total Xylenes (µg/m³)	Gasoline Range Organics* (ppmv)	Gasoline Range Organics* (µg/m³)	MTBE (ppmv)	MTBE (µg/m³)
Site Closure Goals (µg/m³)				840		830,000		22,000		210,000		100,000		94,000
SG-1-4.0	12/06/04	4.0	0.0075	24	0.026	100	0.0088	39	0.037	491	1.5 [1]	6,437 [1]	ND<0.0031	ND<11
SG-1-7.0	12/06/04	7.0	0.0026	8	0.0045	17	0.0016 [1]	7 [1]	0.0059	78	0.45 [1]	1,931 [1]	ND<0.0020	ND<7
SG-2-4.0	12/06/04	4.0	0.0017 [1]	6	0.0080	31	0.0031	14	0.0097	129	0.20 [1]	858 [1]	ND<0.0020	ND<7
SG-2-8.5	12/06/04	8.5	ND<0.051 [2]	ND<166 [2]	ND<0.051 [2]	ND<196 [2]	ND<0.051 [2]	ND<226 [2]	ND<0.051 [2]	ND<677 [2]	280	**1,201,667**	1.1 [2]	4,040
SG-3-4.0	12/06/04	4.0	0.0059 [3]	19 [3]	0.029 [3]	111 [3]	0.0097 [3]	43 [3]	0.047 [3]	624 [3]	0.83 [1]	3,562 [1]	0.0016 [1,3]	6 [1,3]
SG-3-7.0	12/06/04	7.0	0.00083 [1]	3 [1]	0.0040	15	0.0011 [1]	5 [1]	0.0031	41	1.7 [1]	7,296 [1]	0.00076 [1]	3 [1]
SG-3-7.0 Dup	12/06/04	7.0	ND<0.050 [2]	ND<163 [2]	0.022 [1,2]	84 [1,2]	ND<0.050 [2]	ND<221 [2]	ND<0.050 [2]	ND<664 [2]	370	**1,587,917**	1.4 [2]	5142 [2]
SG-4-4.5	12/10/04	4.5	0.0011 [1]	4 [1]	0.0030	12	0.00098 [1]	4 [1]	0.0091	121	0.44 [1]	1,888 [1]	ND<0.0020	ND<7
SG-4-5.0	12/10/04	5.0	0.0014 [1]	5 [1]	0.0034	13	0.0021	9	0.0034	45	0.74 [1]	3,176 [1]	0.0075	28
SG-4-8.5	12/10/04	8.5	ND<0.050 [2]	ND<163 [2]	ND<0.050 [2]	ND<192 [2]	ND<0.050 [2]	ND<221 [2]	ND<0.050 [2]	ND<664 [2]	340	**1,459,167**	1.7 [2]	6244 [2]
SG-5-4.5	12/10/04	4.5	0.0045	15	0.0076	29	0.0014 [1]	6 [1]	0.0056	74	0.28 [1]	1,202 [1]	0.0037	14
SG-5-8.5	12/10/04	8.5	0.0025 [1]	8 [1]	0.0039 [1]	15 [1]	0.0034 [1]	15 [1]	0.0053	70	37	**158,792**	2.2	8,080
SG-5-8.5 Dup	12/10/04	8.5	ND<0.059 [2]	ND<192 [2]	ND<0.059 [2]	ND<227 [2]	ND<0.059 [2]	ND<261 [2]	ND<0.059 [2]	ND<783 [2]	350	**1,502,083**	1.8 [2]	6611 [2]
SG-6-5.5	12/21/04	5.5	0.0017 [1]	6 [1]	0.0043	17	0.0011 [1]	5 [1]	0.0072	96	4.0	17,167	ND<0.0020	ND<7
SG-6-9.5	12/21/04	9.5	0.0013 [1]	4 [1]	0.0039	15	0.0014 [1]	6 [1]	0.013	173	ND<1.7	ND<7,296	0.00086 [1]	3 [1]
SG-7-5.5	12/03/04	5.5	0.0011 [1]	4 [1]	0.0037	14	0.00089 [1]	4 [1]	0.0043	57	0.10 [1]	429 [1]	ND<0.0020	ND<7
SG-7-10	12/03/04	10.0	0.0038	12	0.0087	33	0.0015 [1]	7 [1]	0.0057	76	0.95 [1]	4,077 [1]	ND<0.0020	ND<7
SG-8-5.0	12/10/04	5.0	0.0013 [1]	4 [1]	0.0031	12	0.00065 [1]	3 [1]	0.0032	42	1.5 [1]	6,438 [1]	0.0029	11
SG-8-9.0	12/10/04	9.0	0.00087 [1]	3 [1]	0.0041	16	0.00092 [1]	4 [1]	0.0026	35	0.27 [1]	1,159 [1]	0.00062 [1]	2 [1]
SG-9-5.5	12/21/04	5.5	0.0012 [1]	4 [1]	0.0036	14	0.00069 [1]	3 [1]	0.0033	44	ND<2.0	ND<8,583	ND<0.0020	ND<7
SG-9-9.5	12/21/04	9.5	ND<0.0020	ND<7	0.0012 [1]	5 [1]	ND<0.0020	ND<9	ND<0.0020	ND<27	ND<1.8	ND<7,725	ND<0.0020	ND<7
SG-10-5.5	12/03/04	5.5	0.0016 [1]	5 [1]	0.0086	33	0.0025	11	0.013	173	0.33 [1]	1,416 [1]	ND<0.0020	ND<7
SG-10-9	12/03/04	9.0	0.0010 [1]	3 [1]	0.0036	14	0.00085 [1]	4 [1]	0.0038	50	0.12 [1]	515 [1]	ND<0.0020	ND<7

Table 5
Soil Gas Investigation Analytical Data
BP Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Notes:
The equation for converting ppmv to ug/m3 was taken from the ESL document Volume II, Table H-2, (ppmv = ug/m3 * 0.024/ molecular weight).
Bolded analytical data indicates an exceedance of the Site Closure Goals. Site Closure Goals derived by dividing indoor air ESLs by 0.0001 attenuation factor. ESLs selected from Vol II of the ESL document (ESL 2003), Table E-3 (Indoor Air Screening Levels)

* = Gasoline Range Organics (C6-C10). The molecular weight of gasoline (103 grams) calculated by averaging the molecular weight of benzene (C6) and napthalene (C10).

1 = Laboratory qualifier JDX: J=EPA Flag-Estimated value; DX=Value < lowest standard (MQL) but >MDL

2 = Laboratory qualifier DF: Reporting limits elevated due to matrix interferences.

3 = Laboratory qualifier DH: Reporting limits elevated due to insufficient sample quantity.

ESL - Environmental Screening Level
TPH = Total Petroleum Hydrocarbons
MTBE = Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted
$\mu g/m^3$ = Micrograms per cubic meter
ND< = Not Detected at or above the reporting limit

Table 6
Soil Physical Properties Data
Former ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Sample ID	Date Sampled	Sample Depth (feet bgs)	Moisture Content %	Average Assumed Specific Gravity	Average Total Porosity %	Average Hydraulic Conductivity (cm/sec)	Total Organic Carbon Content %	% Fine [1]	% Sand [1]	% Gravel [1]	Soil Classification
SG-5-P-4.5	12/10/05	4.5	18.17	2.7	33.99	1.36E-08	0.11	64	36	0	Dark brown fine sandy clay
SG-5-P-8.5	12/10/05	8.5	19.42	2.7	35.68	8.47E-08	ND<0.058	80	20	0	Brown fine sandy clay
SG-9-P-5.5	12/10/05	5.5	18.66	2.7	34.67	5.17E-08	0.25	73	27	0	Dark brown fine sandy clay
SG-9-P-9.0	12/10/05	9.0	17.89	2.7	33.53	1.10E-08	0.056 [2]	67	33	0	Brown fine sandy clay
SG-10-P-5.5	12/10/05	5.5	20.92	2.7	37.60	1.85E-08	0.25	71	27	2	Dark brown fine sandy clay with trace gravel
SG-10-P-9.0	12/10/05	9.0	20.19	2.7	36.71	2.05E-08	ND<0.060	85	15	0	Brown fine sandy clay

Notes:

[1] Fines include particles smaller than Sieve number 200, sands fall between Sieve number 4 and 200, and gravels are larger than Sieve number 4.

[2] Laboratory note: this analyte was present in the associated method blank

bgs = below grade surface

% = Percentage

cm/sec = centimeter per second

REFERENCE:

BASE MAP FROM USGS TOPO!
NORTH REGION 7

7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1998

QUADRANGLE LOCATION

NORTH

0 1400 2800

APPROXIMATE SCALE 1"= 1400'

URS	Project No. 38486576	SITE LOCATION MAP	FIGURE
	ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California		1

Feb 10, 2005 - 11:23am
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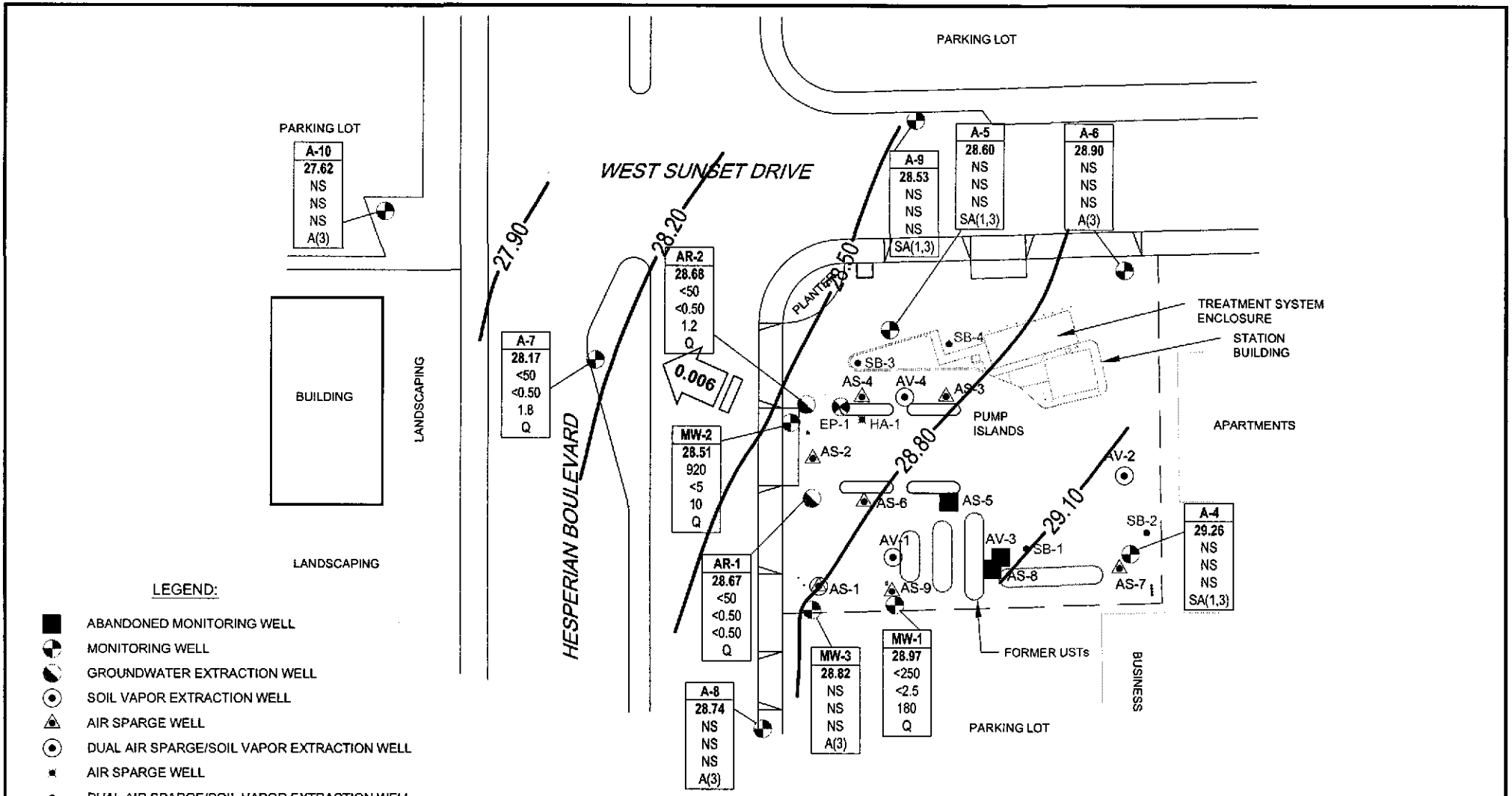

LEGEND:

- ABANDONED MONITORING WELL
- MONITORING WELL
- GROUNDWATER EXTRACTION WELL
- SOIL VAPOR EXTRACTION WELL
- AIR SPARGE WELL
- DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL
- AIR SPARGE WELL
- DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL
- EXTRACTION POINT
- 29.10 APPOXIMATE GROUNDWATER ELEVATION CONTOUR (FEET ABOVE MSL)
- 0.006 GROUNDWATER FLOW DIRECTION AND GRADIENT (FEET/FOOT)

Well	WELL DESIGNATION
ELEV	GROUNDWATER ELEVATION
GRO	
Benzene	GRO, BENZENE & MTBE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)
MTBE	
Q/SA/A	SAMPLING FREQUENCY
Q	SAMPLED QUARTERLY
SA(1,3)	SAMPLED SEMI-ANNUALLY 1st & 3rd QUARTER
A(3)	SAMPLED ANNUALLY 3rd QUARTER

< NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMITS

NS NOT SAMPLED

* NOT USED IN CONTOURING

NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES. SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

NORTH

0 50 100

SCALE IN FEET

URS

Project No. 38487286

ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

GROUNDWATER ELEVATION CONTOUR AND ANALYTICAL SUMMARY MAP Fourth Quarter 2004 (December 7, 2004)

FIGURE 2

Feb 22, 2005 - 3:23pm
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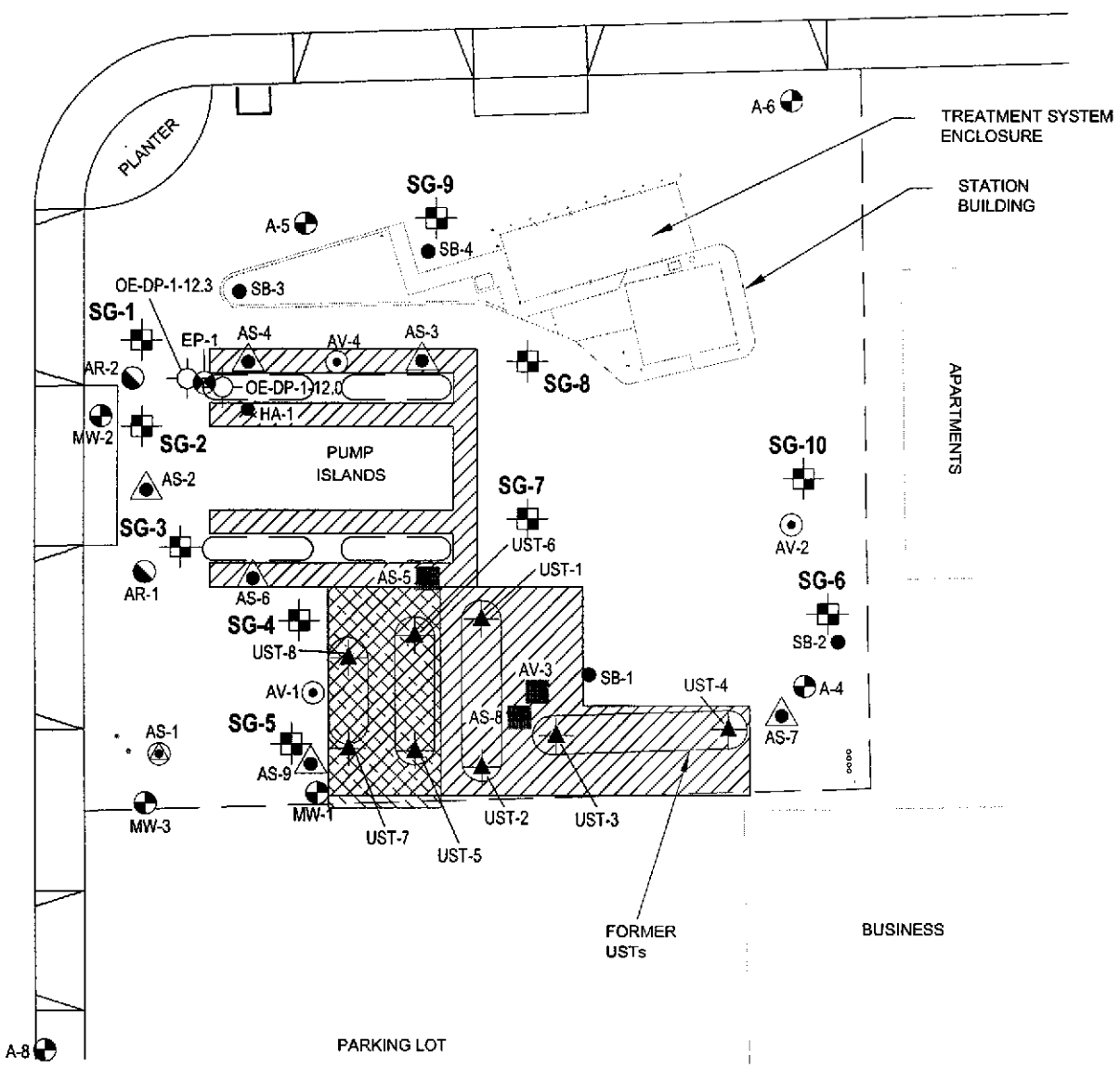


LEGEND:

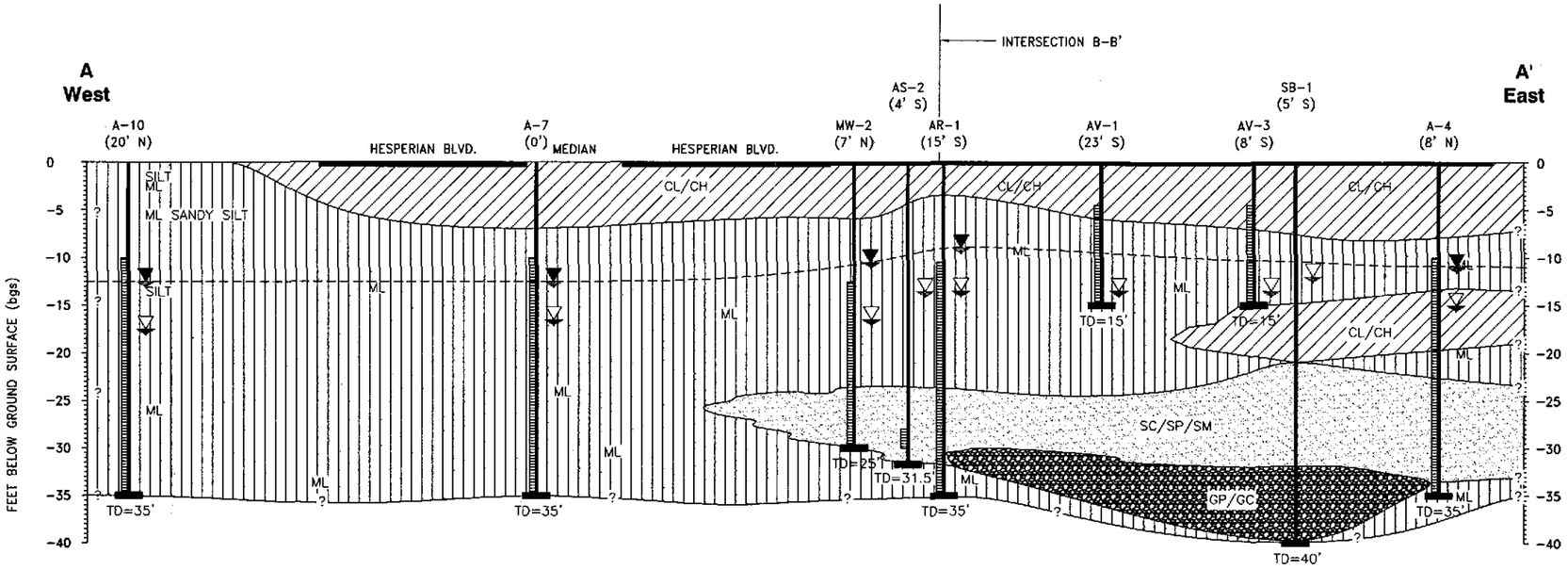
- SOIL GAS SAMPLE
- ABANDONED MONITORING WELL
- MONITORING WELL
- GROUNDWATER EXTRACTION WELL
- SOIL VAPOR EXTRACTION WELL
- AIR SPARGE WELL
- DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL
- AIR SPARGE WELL (DELTA ENVIRONMENTAL, 2000)
- DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL
- EXTRACTION POINT
- OVER-EXCAVATION SOIL SAMPLE (DELTA ENVIRONMENTAL, 2002)
- TANK BASIN SOIL SAMPLE (DELTA ENVIRONMENTAL, 2002)
- AREA OF OVER-EXCAVATION DURING REPLACEMENT OF TANKS/PRODUCT LINES/DISPENSER PUMPS (DELTA ENVIRONMENTAL, 2002)
- AREA OF SOIL EXCAVATION DURING REPLACEMENT OF TANKS/PRODUCT LINES/DISPENSER PUMPS (DELTA ENVIRONMENTAL, 2002)

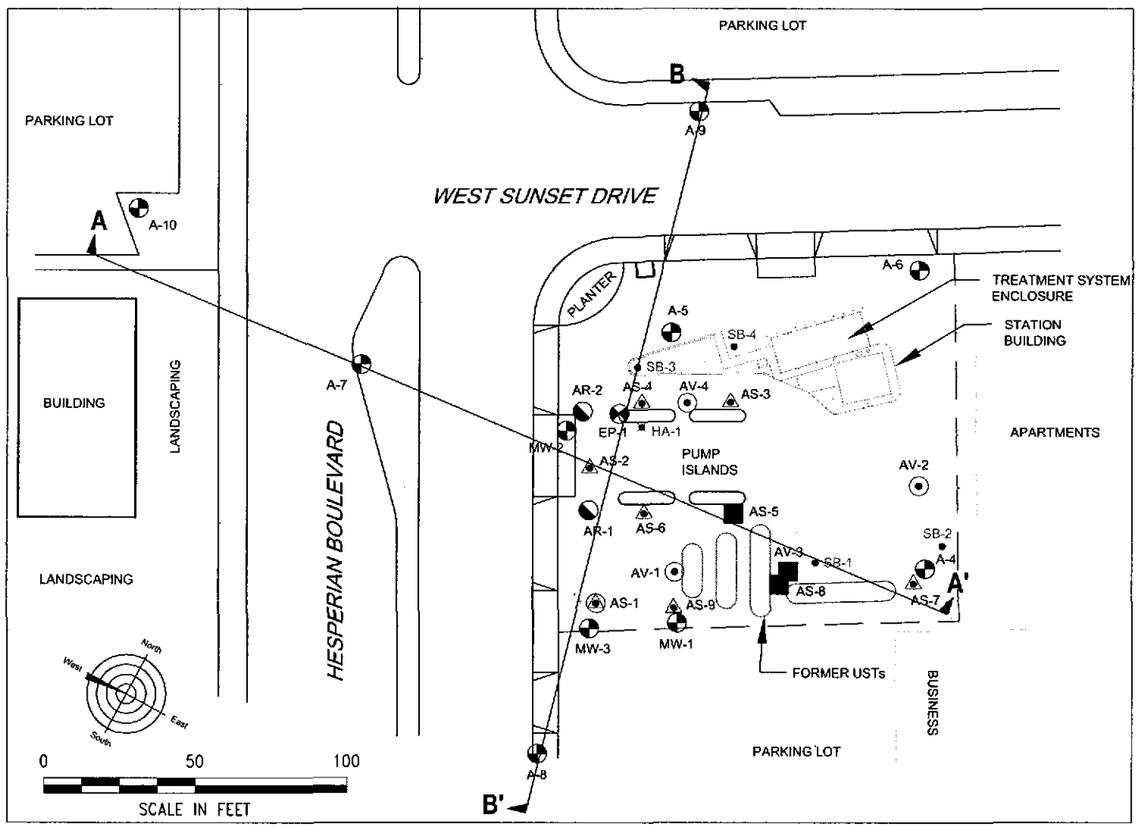
NORTH

0 30 60

SCALE IN FEET

URS	Project No. 38487286 Former ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	SITE PLAN WITH HISTORIC SAMPLE LOCATIONS AND SOIL GAS SAMPLE LOCATIONS	FIGURE 3





LEGEND:

- FIRST ENCOUNTER GROUNDWATER LEVEL
- STATIC WATER LEVEL (3/1/04)
- A' —— A' GEOLOGICAL CROSS-SECTION LINE
- ESTIMATED WATER TABLE
- GP/GC (GRAVELS)
- SC/SP/SM (SANDS)
- ML (SILTS)
- CL/CH (CLAYS)
- ASPHALT/CONCRETE
- MW-5 (X') WELL OR SOIL BORING NUMBER AND DISTANCE IN FEET AND DIRECTION OF PROJECTION
- MONITORING WELL SCREENED INTERVAL
- TD=36' TOTAL DEPTH (FEET BELOW GROUND SURFACE)

0 15 30
VERT. SCALE IN FEET

0 30 60
HORIZ. SCALE IN FEET

URS	Project No. 38487286 Former ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	GEOLOGIC CROSS-SECTION A-A'	FIGURE 4

Mar 02, 2005 - 4:21pm
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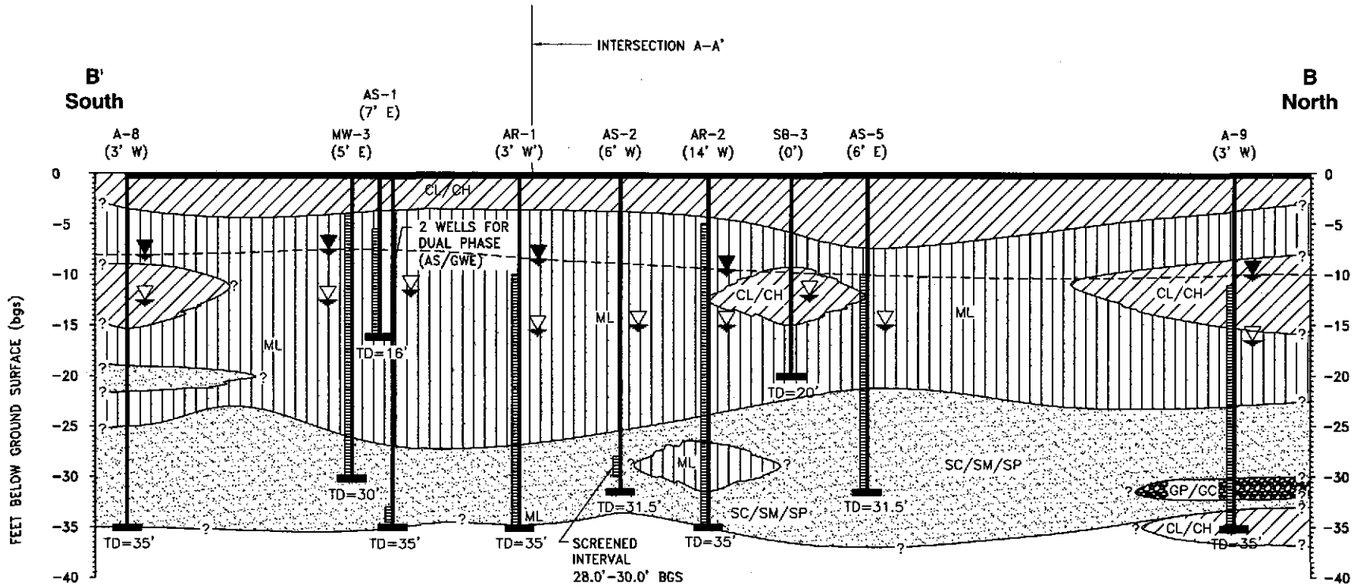

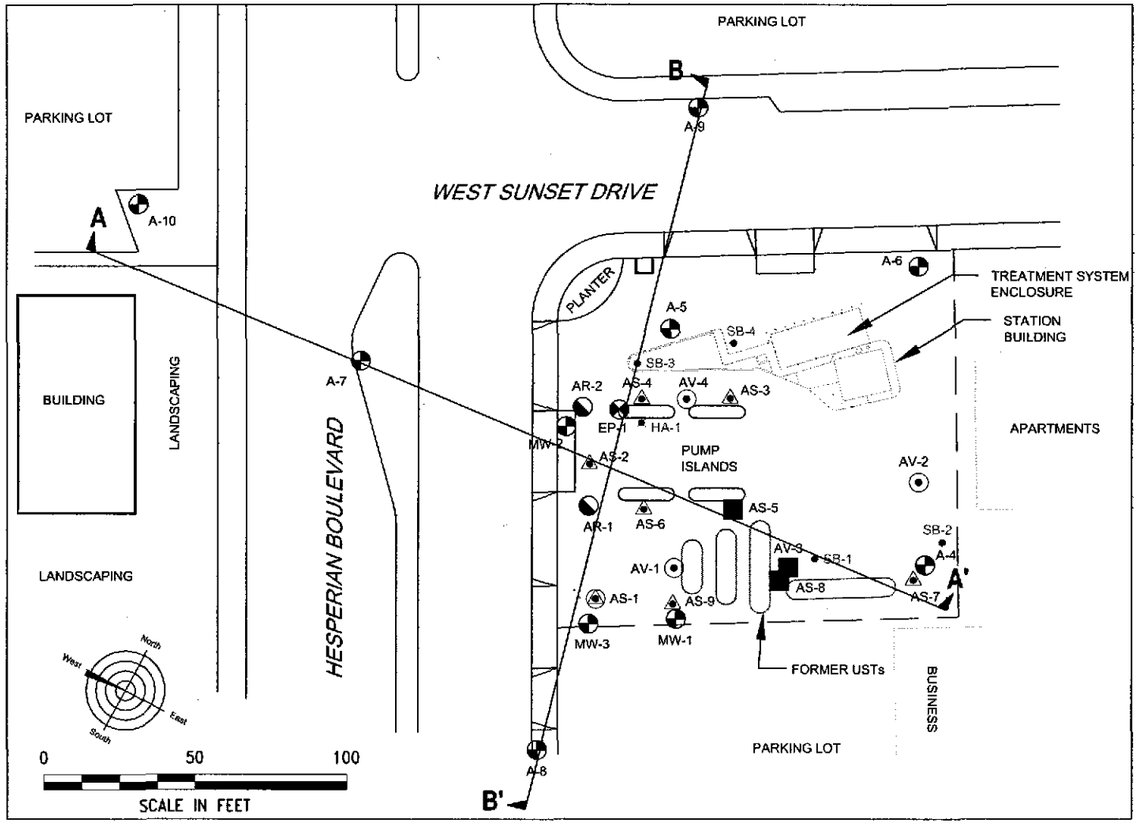

LEGEND:

- FIRST ENCOUNTER GROUNDWATER LEVEL
- STATIC WATER LEVEL (3/1/04)
- A' —— A' GEOLOGICAL CROSS-SECTION LINE
- ESTIMATED WATER TABLE
- GP/GC (GRAVELS)
- SC/SP/SM (SANDS)
- ML (SILTS)
- CL/CH (CLAYS)
- ASPHALT/CONCRETE
- MW-5 (X') WELL OR SOIL BORING NUMBER; DISTANCE IN FEET AND DIRECTION OF PROJECTION
- MONITORING WELL SCREENED INTERVAL
- TD=36' TOTAL DEPTH (FEET BELOW GROUND SURFACE)

0 15 30
VERT. SCALE IN FEET

0 30 60
HORIZ. SCALE IN FEET

URS	Project No. 38487286 Former ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	GEOLOGIC CROSS-SECTION B-B'	FIGURE 5

Mar 02, 2005 - 4:47pm
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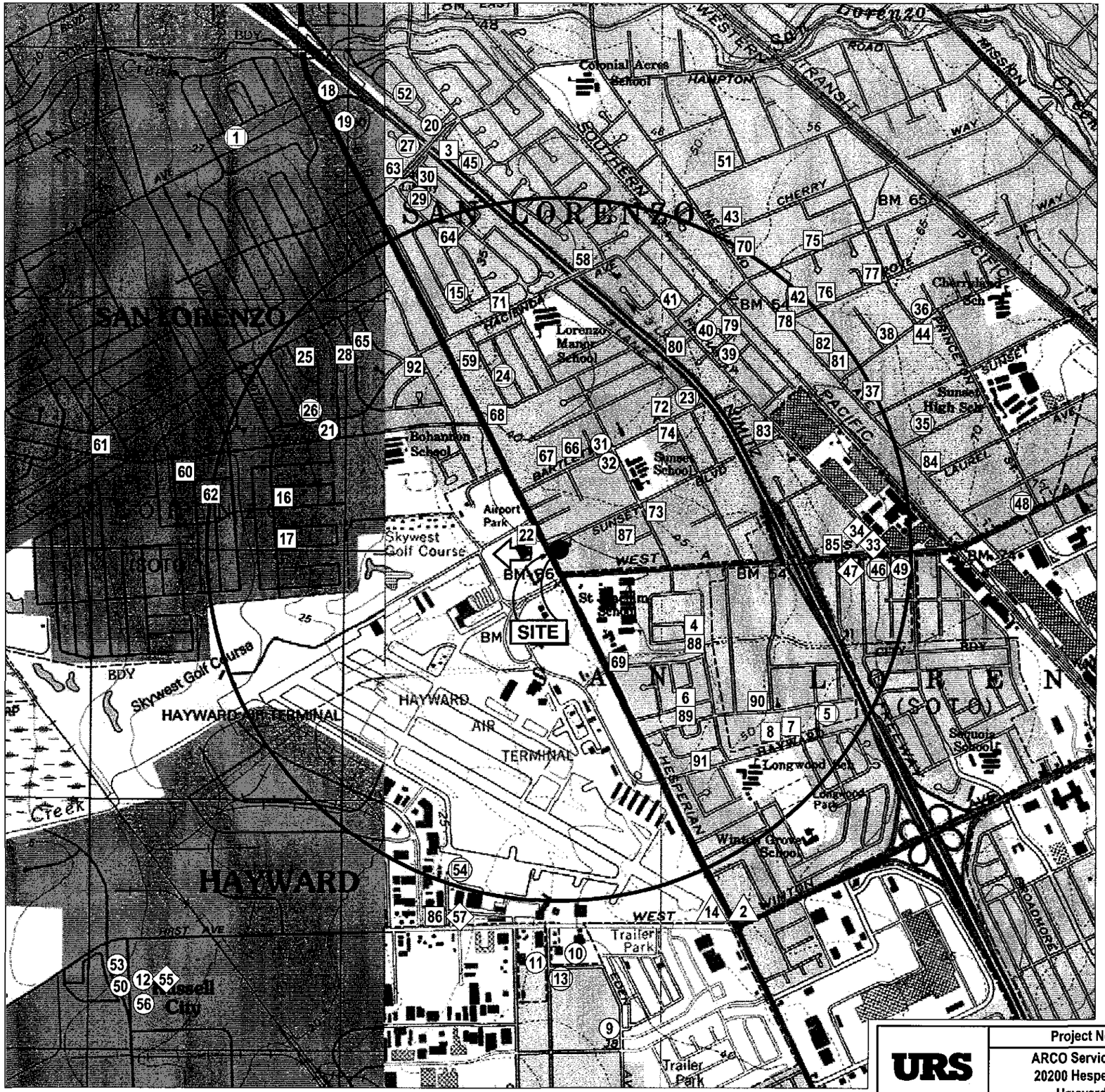

LEGEND

- (X) Unknown well
- [X] Irrigation well
- (X) Domestic well
- ◇X◇ Industrial well
- △X△ Other well
- Site historic groundwater direction

NORTH

0 1400 2800

APPROXIMATE SCALE 1"= 1400'

URS	Project No. 38487286 ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	WELL SURVEY MAP	FIGURE 6

Feb 10, 2005 - 11:36am
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Appendix A

ACEH's Correspondence

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

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

November 18, 2004

Paul Supple
Atlantic Richfield Company
P.O. Box 6549
Moraga, CA 94570

Chris Panaitescu
Thrifty Oil Co.
13116 Imperial Hwy.
Santa Fe Springs, CA 90670

Subject: Fuel Leak Case No. RO0000174, ARCO #5387 / Thrifty oil #52, 20200 Hesperian Boulevard, Hayward, California

Dear Mssrs. Supple and Panaitescu:

Alameda County Environmental Health (ACEH) has reviewed your September 30, 2004 *Active Soil Gas Investigation Work Plan*, your November 17, 2004 *Active Soil Gas Investigation Work Plan Addendum* and the case file for the above-referenced site. We concur with your workplan as amended provided the following conditions are met:

1. A soil gas-to-indoor air attenuation factor of 0.001 appears appropriate unless additional information is provided. We request that you analyze a representative number (minimum of three) of soil samples for physical properties, including: bulk density, organic carbon content (by Walkee Black Method), soil moisture, effective permeability, porosity and grain size distribution. Depending on the results of these analyses, a lower attenuation factor may be considered.
2. All soil gas samples need to be analyzed for the full suite of TO-14 chemicals, including alkanes, aromatics, naphthalenes, etc. (approx. 60 compounds). Analysis needs to include the leak test tracer gas(es) (i.e. shaving cream propellants).

Please implement the proposed investigation and submit the requested report following the schedule below.

TECHNICAL REPORT REQUEST

Please submit your Active Soil Gas Investigation Report to ACEH by **February 18, 2005.** ACEH makes this request pursuant to California Health & Safety Code Section 25296.10. CCR Title 23 Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party in response to a reportable unauthorized release from a petroleum UST system, and require your compliance with this request.

Professional Certification

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

Perjury Statement

All work plans, technical reports, or technical documents submitted to ACEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge." This letter must be signed by an officer or legally authorized representative of your company. Please include a cover letter satisfying these requirements with all future reports and technical documents submitted for this fuel leak case.

AGENCY OVERSIGHT

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

Please call me at (510) 567-6719 with any questions regarding this case.

Sincerely,

Robert W. Schultz, R.G.
Hazardous Materials Specialist

cc: Scott Robinson, URS Corporation, 500 12th St., Ste. 200, Oakland, CA 94607-4014
Donna Drogos, ACEH
Robert W. Schultz, ACEH

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

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

August 30, 2004

Paul Supple
Atlantic Richfield Company
P.O. Box 6549
Moraga, CA 94570

Subject: Fuel Leak Case No. RO0000174, Thrifty Oil #52/ARCO #5387, 20200 Hesperian Blvd., Hayward, California

Dear Mr. Supple:

Alameda County Environmental Health (ACEH) has reviewed your June 3, 2004, *Request For Site Closure Status* prepared by URS Corporation for the above-referenced site. Based upon our review, your site does not appear to be meet the minimum criteria for case closure at this time. To progress the case towards regulatory closure, we request that you address the following technical comments and submit a workplan for additional characterization by the due date specified below.

TECHNICAL COMMENTS

1. Source Area

During the November 2002 two-phase extraction (TPE) test, URS detected up to 859,928 ug/m^3 GRO and 1,920 ug/m^3 benzene in vapor influent from onsite well EP-1. In addition, URS states in Section 3.1.3 that "elevated [dissolved] concentrations of benzene and TPHg may have resulted from the constituents from the vadose zone flushing into the groundwater by increased infiltration of precipitation at that time." These findings suggest that residual hydrocarbons in vadose zone soil are not fully characterized by the analytical results presented in Table 2-2 of the subject report. Please propose additional tasks to further define the onsite subsurface impact in the workplan requested below. Your workplan should include rationale supporting proposed sampling locations including evaluation of historical investigation results.

2. Well Survey

URS states that no water wells are likely to be impacted; however, the August 21, 1986 *Site Assessment Investigation Report* prepared by Groundwater Technology, Inc. identified "a minimum of 20 permitted wells within a one mile radius of the site." The locations of these wells never appear to have been evaluated. We request that you perform an updated well survey to locate all wells (monitoring and production wells: active, inactive, standby, decommissioned, abandoned and dewatering, drainage and cathodic protection wells) within a 2,000 foot radius of the site. Submittal of maps showing the location of all wells identified in your study, and the use of tables to report the data collected as part of your survey are required. We recommend that you obtain well information from the State of California Department of Water Resources, at a minimum. Please include an analysis and interpretation of your findings, and report your results in the workplan requested below.

3. Risk To Human Health

URS states that an evaluation of potential impacts to human health should be formed if the site is developed for residential use. URS also states that human health can be safeguarded through appropriate precautions for potential future onsite construction activities. ACEH concurs with these recommendations. If residual pollution is to be left in place, a deed restriction could be placed on the property and a soil management plan filed with ACEH. In addition, we request you perform an onsite soil vapor assessment. This assessment may be used to simultaneously address Comment No. 1, above. Please perform your soil vapor survey following the guidelines published by DTSC and the RWQCB-LAR in the January 28, 2003 *Advisory – Active Soil Gas Investigations*. We also recommend that you evaluate your results using either the RWQCB-SFBR ESLs or the protocol detailed in ASTM E1739-95(2002) *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*.

REPORT REQUEST

Please submit an *Acitve Soil Gas Investigation Workplan* and address the comments above by **September 30, 2004**. CCR, Title 23, Chapter 16 requires your compliance with this request. If it appears as though significant delays are occurring or reports are not submitted as requested we will consider referring your case to the County District Attorney or other appropriate agency, for enforcement. Under California Health and Safety Code, Section 25299.76, you may be subject to civil penalties of up to $10,000 per day for each day of violation.

Please call me at (510) 567-6719 with any questions regarding this case.

Sincerely,

Robert W. Schultz, R.G.
Hazardous Materials Specialist

cc: Scott Robinson, URS Corporation, 500 12th St., Ste. 200, Oakland, CA 94607-4014
Chris Panaitescu, Thrifty Oil Co., 13116 Imperial Hwy., Santa Fe Springs, CA 90760
Donna Drogos, ACEH
Robert W. Schultz, ACEH

Appendix B

Soil boring permit from Alameda County Public Works Agency, Water Resources Section

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD CA. 94544-1395
PHONE (510) 670-6633 James Yoo
FAX (510) 782-1939 www.acfcwcd.org

APPLICANTS: PLEASE ATTACH A SITE MAP FOR ALL DRILLING PERMIT APPLICATIONS
DESTRUCTION OF WELLS OVER 45 FEET REQUIRES A SEPARATE PERMIT APPLICATION

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT FORMER ARCO 5387
20300 HESPERIAN BLVD.
HAYWARD, CA

CLIENT
Name ATLANTIC RICHFIELD COMPANY
Address P.O. BOX 6549 Phone 925-299-8891
City MORAGA Zip CA 94569

APPLICANT
Name URS CORPORATION / SATISH THAPA Fax 510-874-3268
Address 1333 BROADWAY, STE 800 Phone 510-874-3010
City OAKLAND Zip CA 94612

TYPE OF PROJECT

Well Construction	Geotechnical Investigation
Cathodic Protection	General
Water Supply	✓Contamination
Monitoring	Well Destruction

PROPOSED WATER SUPPLY WELL USE
New Domestic — Replacement Domestic
Municipal — Irrigation
Industrial — Other

DRILLING METHOD:
Mud Rotary — Air Rotary — Auger
Cable — ✓Other DIRECT PUSH

DRILLER'S NAME PRECISION SAMPLING

DRILLER'S LICENSE NO. C 636387

WELL PROJECTS
Drill Hole Diameter ___ in. Maximum
Casing Diameter ___ in. Depth ___ ft.
Surface Seal Depth ___ ft. Owner's Well Number ___

GEOTECHNICAL/CONTAMINATION PROJECTS
Number of Borings 11 Maximum
Hole Diameter ~3 in Depth ~3 ft. SG-1 to SG-11

STARTING DATE 12/01/04

COMPLETION DATE 12/03/04

FOR OFFICE USE
PERMIT NUMBER W04-1227
WELL NUMBER
APN

PERMIT CONDITIONS
Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted original Department of Water Resources Well Completion Report.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL/CONTAMINATION
Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings.

E. CATHODIC
Fill hole anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
Send a map of work site. A separate permit is required for wells deeper than 45 feet.

G. SPECIAL CONDITIONS B#1

NOTE: One application must be submitted for each well or well destruction. Multiple borings on one application are acceptable for geotechnical and contamination investigations.

APPROVED ___ DATE 11-23-04

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Satish Thapa DATE 11/22/04

PLEASE PRINT NAME SATISH THAPA

Rev.5-11-04

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD, CA. 94544-1395
PHONE (510) 670-6633 James Yoo FAX (510) 782-1939

PERMIT NO. W04-1227

WATER RESOURCES SECTION
GROUNDWATER PROTECTION ORDINANCE
B#1-GENERAL CONDITIONS: GEOTECHNICAL & CONTAMINATION BOREHOLES

1. Prior to any drilling activities, it shall be the applicants responsibilities to contact and coordinate a Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits required for that Federal, State, County or to the City and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained.

2. Boreholes shall not be left open for a period of more than **24 hours**. All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.

3. Permitte, permittee's, contractors, consultants or agents shall be responsible to assure that all material or waters generated during drilling, boring destruction, and/or other activities associated with this Permit will be safely handled, properly managed, and disposed of according to all applicable federal, state, and local statues regulating such. In no case shall these materials and/or waters be allowed to enter, or potentially enter, on-or off site storm sewers, dry wells, or waterways or be allowed to move off the property where work is being completed.

4. Permit is valid only for the purpose specified herein **December 1 to December 3, 2004**. No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.

5. Drilling Permit(s) can be voided/ canceled only in writing. It is the applicants responsibilities to notify Alameda County Public Works Agency, Water Resources Section in writing for an extension or to cancel the drilling permit application. No drilling permit application(s) shall be extended beyond ninety (90) days from the original start date. Applicants may not cancel a drilling permit application after the completion date of the permit issued has passed.

6. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, property damage, personal injury and wrongful death.

7. **Applicant shall contact George Bolton for a inspection time at 510-670-5594 at least five (5) working days prior to starting, once the permit has been approved.**