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URS

June 3, 2004

Mr. Scott Seery
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **Request for Site Closure Status**
ARCO Service Station No. 5387
20200 Hesperian Boulevard, Hayward, CA

Dear Mr. Seery:

On behalf of Atlantic Richfield Company (RM – a BP affiliated company), URS Corporation (URS) presents this Site Closure 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

Scott Robinson
Project Manager

William Frohlich, C.Hg, C.E.G
Senior Geologist

REGISTERED GEOLOGIST
WILLIAM H. FROHLICH
No. 730
CERTIFIED HYDROGEOLOGIST
Exp. 1/31/04
STATE OF CALIFORNIA

Enclosure:
Site Closure Report

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

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REPORT

SITE CLOSURE

ARCO SERVICE STATION #5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

Prepared for
Atlantic Richfield Company

June 3, 2004

URS
URS Corporation
1333 Broadway, Suite 800
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1.1 SITE DESCRIPTION

1.1.1 Current Use

The former Atlantic Richfield Company (RM) service station #5387 is located at 20200 Hesperian Boulevard in Hayward, California (the site). 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 (Figure 1).

1.1.2 Site Hydrogeology

The following description of site hydrogeology comes from the *Site Assessment Investigation Report* (Groundwater Technology, Inc, 1986).

The site lies within the hydrogeologic feature known as the Bay Plains 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 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 Neward, 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. The cross sections illustrate the local geology underlying the site (Figures 2 and 3).

Groundwater occurs at a depth of approximately 10 feet below ground surface and groundwater flow direction is to the west, toward San Francisco Bay. Figure 1 has a rose diagram showing the historic groundwater flow direction is consistently to the west. The hydraulic gradient historically ranges from 0.003 to 0.008 feet per foot between the second quarter of 2002 and the first of 2004. Sulphur Creek, the most prominent surficial water feature, flows from east to west about 0.2 miles to the south.

1.1.3 Summary of Previous Investigations and Remedial Activities

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.

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 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).

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, ACHCSA 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 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 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 recent (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.

1.1.4 Environmental Conditions

1.1.4.1 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 2004). 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. Groundwater analytical results are presented in Table 2-1 in comparison to Environmental Screening Levels (ESLs) for groundwater that is potential drinking (100 µg/L for TPH-g, 1.0 µg/L for benzene, and 5 µg/L for MTBE) and non drinking water sources (500 µg/L for TPH-g, 46 µg/L for benzene, and 1,800 µg/L for MTBE). Concentration versus time graphs were constructed to demonstrate trends in analytical concentration over time (Appendix A). The groundwater monitoring analytical results from 2003 and 2004 of TPH-g, benzene and MTBE concentrations in source area indicate the following:

- Wells A-4 through A-10 that define the extent of the plume have consistently been below reporting limits for TPH-g/Gasoline range organics (GRO) and benzene, toluene, ethyl benzene, and xylenes (BTEX), with very low concentrations of MTBE ranging between non-detect to 1.1 µg/L (Table 2-1).
- Well MW-1 is located in the immediate vicinity of the primary source area (former UST complex location). BTEX and MTBE concentrations in well MW-1 have consistently been at non-detect to relatively low levels, with concentrations being at non-detect levels during the first quarter of 2004, except for 14 µg/L of MTBE. TPH-g/GRO in MW-1 was present above ESL for potential drinking water sources during the first and fourth quarters of 2003 but was below the ESL for non drinking water sources during the respective quarters (Table 2-1; Appendix A, Graphs 1 and 2).
- Wells AR-1 and A-7 are located immediately downgradient of MW-1 and the former UST complex location. TPH-g/GRO and BTEX concentrations in wells AR-1 and A-7 have consistently been at non-detect levels since the first quarter of 2003. In the first quarter of 2004, MTBE concentrations were at 8.6 µg/L in AR-1, exceeding the ESL for potential drinking water sources but below the ESL for non drinking water sources. MTBE

concentrations were at 1.1 µg/L in A-7 during the first quarter 2004, below ESLs for drinking and non drinking water sources (Table 2-1; Appendix A, Graphs 5 and 6).

- Well MW-2 is located in the vicinity and immediately downgradient of the former pump island locations. BTEX concentrations in MW-2 have consistently been at low to non-detect levels, with concentrations being at non-detect levels during the first quarter of 2004. TPH-g/GRO and MTBE concentrations are at relatively low levels in MW-2 and have generally been declining (Appendix A, Graphs 3 and 4). During the first quarter of 2004, TPH-g/GRO was detected at a concentration of 890 µg/L and MTBE was detected at 36 µg/L in MW-2 (Table 2-1).
- Well AR-2 is located in the vicinity and immediately downgradient of the former pump island locations. TPH-g/GRO, BTEX and MTBE concentrations in AR-2 have consistently been at low to non-detect levels, with concentrations being at non-detect levels during the first quarter of 2004 (Table 2-1).

1.1.4.2 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 (Table 2-3). 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 4). The analytical results of soil samples collected following the removal of USTs, product lines and dispenser islands during February and March of 2002, indicate that residual hydrocarbon impacted soils 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 4 and the associated analytical results are presented in Table 2-3. The maximum remaining TPH-g, benzene and MTBE concentrations 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.

2.1 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) was developed for the site to provide a schematic representation of the links between chemical sources, release and transport mechanisms, exposure media and intake routes, and the potentially exposed receptor populations relevant for the site (Figure 5). The mechanistic processes by which human exposures occur are called "exposure pathways." In general, quantitative evaluations are performed only for potentially complete exposure pathways and scenarios. An exposure pathway is considered complete if and only if all of the four following elements are present:

- A source of chemicals;
- A mechanism of release from the source into an environmental medium;
- A mechanism for direct contact with the chemicals or for transport of the chemicals to the receptor exposure point with plausible receptors present or potentially present; and
- An exposure route (*e.g.,* ingestion, inhalation, dermal contact, etc.) through which the chemicals can enter the human body.

2.1.1 Potentially Complete Exposure Pathways

Although several complete exposure pathways may exist for an identified receptor, not all pathways are comparable in magnitude or significance. The significance of a pathway as a mode of exposure depends on the identity and nature of the chemicals involved and the magnitude of the likely exposure dose. Figure 5 graphically illustrates the relevant potential chemical exposure scenarios for the site. The importance of each of the exposure routes associated with each receptor is represented by a solid circle for potentially complete and significant pathways, by a hollow circle for complete but minor pathways, and by the letters "IC" for incomplete pathways. In general, site-specific risk-based values are developed only for complete exposure scenarios.

Currently, the site is not operational. Trespassing on the site property is controlled through security fencing. There is no current or planned occupancy of the site at this time, nor are there plans to change the site use in the future. Therefore, the potential for human exposure to impacted media on-site is limited at this time.

Potentially at some time in the future, on-site construction/excavation workers may engage in soil disturbing activities such as fence and utility line maintenance and trench excavation. Construction/excavation workers may be exposed to surface and subsurface soils via dermal contact and incidental ingestion, as well as inhalation of particulates and VOCs from trenches. In addition, these workers may also be exposed to shallow groundwater through incidental ingestion, dermal contact, or inhalation of VOCs. Construction workers may potentially be exposed to soil up to ten feet deep during routine construction activities.

Residential or commercial dwellings may hypothetically be located on or near the site in the future. Currently, there is no significant exposure for commercial or residential receptors due to emission from soil or groundwater because the absence of off-site contamination.

Groundwater at the site is believed to be mostly limited to subsurface flow. Discharge of groundwater to surface water is not likely especially since the nearest surface water body

(Sulphur Creek) is located 0.2 miles south of the site. Groundwater at the site flows west toward the San Francisco Bay. Therefore, exposure pathways for aquatic receptors, related to discharge of potential contaminates, from groundwater to surface water are considered *incomplete.*

Based on the above analysis of potential on-site receptors and existing land uses of the site, the following potentially complete exposure pathways were selected for quantitative evaluation in this risk assessment:

- *Inhalation of Airborne Particulates and Volatile Emissions from Soil.* Inhalation of particulate-bound chemicals or impacted soil vapors by hypothetical future residents (exposure to soil vapor emissions from indoor air and soil particulates from soil disturbing activities), hypothetical on-site commercial workers (exposure to soil vapor emissions from indoor air), and construction/excavation workers (exposure to soil vapor emissions and particulates while working in trenches).
- *Incidental Ingestion of Soil.* Ingestion of soil-bound chemicals by construction/excavation workers (exposure in enclosed trenches) and hypothetical future residents (exposure from residential soil disturbing activities);
- *Dermal Contact with Soil.* Absorption of soil-bound chemicals through the skin by construction/excavation workers (exposure in enclosed trenches) and hypothetical future residents (exposure from residential soil disturbing activities);
- *Incidental Ingestion of or Dermal Contact with Shallow Groundwater.* Incidental absorption or ingestion of chemicals in groundwater by construction/excavation workers (exposure to groundwater seeps into trenches);
- *Inhalation of Volatile Emissions from Shallow Groundwater.* Inhalation of VOCs emitted from groundwater by hypothetical future residents (exposure to groundwater vapor emissions from indoor air), hypothetical on-site commercial workers (exposure to groundwater vapor emissions from indoor air), and construction/excavation workers (exposure to groundwater vapor emissions while working in trenches).

The potential health effects associated with the human exposure scenarios described above were quantitatively evaluated by comparing analytical site concentrations with appropriate ESLs. The ESLs were developed by the California Regional Quality Control Board San Francisco Bay Region (RWQCB) to address environmental protection goals presented in the *Water Quality Control Plan for the San Francisco Bay Basin* (RWQCB 2003). The ESLs used in this report can be found in Volume II of *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* prepared by the California Regional Water Quality Control Board's interim final July 2003 report (RWQCB 2003). For the purpose of this risk evaluation a series of conservative ESLs for soil and groundwater were selected and can be directly compared to analytical site concentrations collected at the site.

3.1 RISK CHARACTERIZATION

Appropriately selected ESLs were used to compare soil, soil gas, and groundwater analytical data with the potential human exposure scenarios mentioned above. The following sections provide the results of these comparisons. Selected ESLs used in comparing analytical soil, soil gas, and groundwater data with potential human receptors are listed at the top of each respective comparison table (Tables 2-1 to 2-3). The presence of a chemical at concentrations in excess of an ESL does not necessarily/ indicate that adverse impacts to human health or the environment are occurring: this simply indicates that a potential for adverse risk exist and that additional evaluation is warranted.

3.1.1 Groundwater Analytical Data

RM conducts quarterly monitoring of groundwater wells at the site. Groundwater samples are analyzed for TPH-g, BTEX compounds, and MTBE. Table 2-1 is a compilation of groundwater analytical data from the most recent five monitoring events, which represent the 2003-2004 monitoring period. A map of groundwater monitoring well locations is presented in Figure 1. Groundwater analytical data results were compared against selected ESLs protective of residential and construction worker scenarios. As depicted in the CSM, potential exposure pathways such as inhalation of groundwater vapors, dermal contact and incidental ingestion of groundwater were considered (Figure 5). Groundwater analytical data results for chemicals that exceeded the selected ESLs were bolded and/or shaded in Table 2-1.

ESLs protective of groundwater that is a current or potential drinking water resource were selected as conservative screening levels for hypothetical future residents who may be exposed to groundwater. These ESL values come from Volume II of the ESL document (ESL 2003), in Table F-1a *Groundwater Screening Levels - for groundwater that is a current or potential drinking water resource.* Concentrations that were above the selected TPH-g ESL (100 µg/L) ranged from 120 µg/L (MW-1) to 1,100 µg/L (MW-2) during the most recent five monitoring events. Concentrations above the selected MTBE ESL (5 µg/L) ranged from 9.4 µg/L (A-7) to 170 µg/L (MW-1) for the same period. These ESLs are considered conservative because currently residential drinking water is provided by East Bay Municipal Utilities District (GTI, 1986). Also, due to the depth at which groundwater is first encountered (approx 10 - 12 ft bgs), hypothetical future residents and commercial workers are not expected to encounter groundwater directly

ESLs protective of groundwater that is not a current or potential drinking water resource were selected as screening levels for construction/trench workers who may directly encounter groundwater seepage during trenching activities. These ESLs are listed in Table F-1b *Groundwater Screening Levels - for groundwater that is not a current or potential drinking water resource* (ELS 2003). Concentrations that exceed the TPH-g ESL (500 µg/L) ranged from 500 µg/L to 1,100 µg/L (MW-2) during the most recent five monitoring events. However, due to the depth at which groundwater is first encountered (approx 10 - 12 ft bgs), hypothetical future residents and commercial workers are not expected to encounter groundwater directly. There were no exceedances of residential or commercial ESLs from Table E-1a, *Groundwater Screening Levels for Evaluation of Potential Indoor-Air Impacts.*

The presence of TPH-g and MTBE at these concentrations may not pose a health risk to potential construction/trench workers or hypothetical future residents. The RWQCB basis for the residential TPH-g 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.

3.1.2 Soil Analytical Data

As mentioned in Section 1.1.3, Delta conducted soil sampling following the removal of USTs, product lines and dispenser islands during February and March of 2002 (Delta 2002). Soil samples were analyzed for TPH-g, BTEX compounds, MTBE, and lead. Table 2-2 is a compilation of soil analytical data, which represent the most recent soil data collection event. A map of soil sampling locations is presented in Figure 5. In Table 2-2, soil analytical data results were compared against selected ESLs (Tables K-1, and K-3 *Direct Exposure Screening Levels*, ESL 2003) protective of construction/trench workers and hypothetical residential scenarios. Potential exposure pathways such as dermal contact and incidental ingestion of soil were considered (Figure 5). Soil analytical data results for chemicals that exceeded the selected ESLs were bolded.

Concentrations of benzene, ethylbenzene, total xylenes, and TPH-g were above the selected ESLs protective of residents in direct contact with potentially impacted soil however these exceedances occurred at depths greater than 3 feet (Table 2-2). Hypothetical future residents of the site would not be expected to encounter soil at depths greater than 3 feet during normal residential soil disturbing activities. It should also be noted that currently there are no residents on the site. No future plans have been made to develop the site at this time. As previously mentioned the site has historically served as a commercial site and is currently completely paved over. ESLs protective of construction workers in direct contact with soil were not exceeded.

3.1.3 Dual Phase Extraction Analytical Data

In the absence of soil vapor data, DPE data was used to evaluate potential impacts from volatile organic compounds (VOCs) in soil. DPE includes the extraction of soil vapors as well as total fluids from the site. The ESLs selected for this comparison comes from Table E-2 *Shallow Soil Gas Screening Levels For Evaluation of Potential Indoor Air Impacts* (ESL, 2003).

As mentioned in Section 1.1.3, Delta conducted a DPE pilot test during November of 2002 (Delta 2003). DPE samples were analyzed for TPH-g, BTEX compounds and MTBE. A map of the DPE sample locations is provided in Figure 4. Table 2-3 is a compilation of DPE analytical data converted from parts per million by volume (ppmv) to micrograms per cubic meter ($\mu g/m^3$) for the purpose of comparison with appropriate ESLs. The equation used to convert units from ppmv to $\mu g/m^3$ is found in the footnotes of Table H-3 *Components for Deep Soil Ceiling Levels* (RWQCB 2003). In Table 2-3, DPE analytical data results were compared against selected ESLs protective of indoor air for construction/trench workers, hypothetical on-site commercial workers, and hypothetical residential exposure scenarios (Figure 3). DPE analytical data results for chemicals that exceeded the selected ESLs were bolded and/or shaded.

Concentrations of benzene, total xylenes, and TPH-g were above the selected ESLs protective of residents exposed to potentially impacted indoor air (Table 2-3). Concentrations of benzene, and TPH-g were above the selected ESLs protective of construction workers exposed to potentially impacted indoor air. Currently there are no ESLs that are protective of outdoor air potentially impacted by VOCs. Construction workers would not be exposed to soil vapors from indoor air but rather soil vapors emitting from trenches. In the absence of outdoor air ESLs the ESLs protective of indoor air were conservatively used to evaluate potential impacts to construction workers. The exceedances of indoor air ESLs protective of construction workers may represent an overestimation of potential health risks associated with the construction/trench worker exposure pathway. Additionally, proper air-monitoring, personal protective equipment (PPE), and limited exposure duration of hypothetical future construction/trench workers may mitigate any potential adverse health effects.

It should be noted that at the time of the DPE test approximately 20 to 25 percent of the ground surface at the site was dirt, rather than asphalt or concrete, allowing for increased infiltration. The elevated concentrations of benzene and TPH-g may have resulted from the constituents from the vadose zone flushing into the groundwater by increased infiltration of precipitation at that time. The site has since been completely paved over.

4.1 RECOMMENDATIONS

Based on the findings of this report, it is concluded that the six criteria for closure as a low-risk groundwater case as listed in the San Francisco Regional Water Quality Control Board (SFRWQCB) *Interim Guidance Document* 1996 (December 8, 1995) have been adequately addressed, as detailed below:

The leak has been stopped and ongoing sources, including free product, have been removed or remediated:

The primary source(s) comprising of four USTs and associated dispensers and product lines were removed from the site in 2002, and appropriately disposed offsite. Potential secondary sources such as hydrocarbon-impacted soils were over-excavated from the UST excavation and dispenser and product piping trenching, and appropriately disposed offsite.

The site has been adequately characterized:

As discussed in Section 1.1.4, the extent of the residual traces of the dissolved phase hydrocarbon plume at the site has been defined, and the lateral and vertical extents of hydrocarbon impacts on onsite soils have been characterized. Residual traces of the dissolved hydrocarbon plume are most likely limited to the immediate vicinity of the former onsite sources areas such as the former locations of the UST complex and pump islands. Based on the extensive hydrogeologic data collected from the site over the last 20 years and the most recent cross-sections detailed in this report, the current number and placement of monitoring wells is appropriate for site characterization.

The dissolved hydrocarbon plume is not migrating:

As discussed in Section 1.1.4.1, the dissolved hydrocarbon plume is not migrating.

No water wells, deeper drinking water aquifers, surface water or other sensitive receptors are likely to be impacted:

Based on the discussion in Sections 2.1.1 and 3.1.1, no water wells, deeper drinking water aquifers, surface water or other sensitive receptors are likely to be impacted.

The site presents no significant risk to human health:

As discussed in Section 3.1, the site is unlikely to present significant risk to human health. Should the site be developed for residential use in the future, an evaluation of potential exposure to volatile emissions from the subsurface should be performed to assess the need (if any) for further consideration (in terms of additional investigation, evaluation, engineering control, or remediation) for protection of human health. Human health risk can be managed and adequately mitigated by using the appropriate health and safety precautions for construction workers.

The site presents no significant risk to the environment:

Based on the discussion in Section 3.1, the site is unlikely to present significant risk to the environment.

5.1 REFERENCES

GTI 1986. *Site Assessment Investigation Report.* Groundwater Technology Inc.

GSI 1993. *Additional Remedial Investigation and Interim Remedial Action Plan.* GeoStrategies, Inc. December 13, 1993.

Delta 2000. *Hand Auger Boring Results Report.* Delta Environmental Consultants, Inc.

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

RWQCB 2003. *Screening for Environmental Concerns At Sites With Contaminated Soil and Groundwater. Volume 2: Background Documentation For The Development of Tier 1 Environmental Screening Levels.* Interim Final. California Regional Water Quality Control Board – San Francisco Bay. July.

URS 2003. *Results of a Dual Phase Extraction Test.* URS Corporation. April 02, 2003.

URS 2004. *First Quarter 2004 Groundwater Monitoring Report.* URS Corporation. April 06, 2004.

Table 2-1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
BP 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										
Direct Contact and Ingestion Residential ESLs (µg/L)					100	1.0	40	30	13	5.0
Inhalation Residential ESLs (µg/L)					NA	530	500,000	14,000	150,000	24,000
Inhalation Commercial ESLs (µg/L)					NA	1,800	530,000	47,000	160,000	80,000
Groundwater ESLs for Non Drinking Water Sources										
Direct Contact Construction Worker ESLs (µg/L)					500	46	130	290	13	1800
Inhalation Residential ESLs (µg/L)					NA	530	500,000	14,000	150,000	24,000
Inhalation Commercial ESLs (µg/L)					NA	1,800	530,000	47,000	160,000	80,000
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	10.0	35.0	9.00	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**8.6**
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	5.0	35.0	10.01	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
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	5.0	30.0	8.85	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**14**
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	5.0	30.0	10.05	**890**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	**36**
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	5.0	30.0	7.95	---	---	---	---	---	---
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			13.09	---	---	---	---	---	---
	03/01/04	10.0	35.0	10.95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
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	10.0	31.5	10.90	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.77

Table 2-1
Comparison of Groundwater Analytical Data with Selected Groundwater ESLs
BP 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										
Direct Contact and Ingestion Residential ESLs (µg/L)					100	1.0	40	30	13	5.0
Inhalation Residential ESLs (µg/L)					NA	530	500,000	14,000	150,000	24,000
Inhalation Commercial ESLs (µg/L)					NA	1,800	530,000	47,000	160,000	80,000
Groundwater ESLs for Non Drinking Water Sources										
Direct Contact Construction Worker ESLs (µg/L)					500	46	130	290	13	1800
Inhalation Residential ESLs (µg/L)					NA	530	500,000	14,000	150,000	24,000
Inhalation Commercial ESLs (µg/L)					NA	1,800	530,000	47,000	160,000	80,000
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-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	---	---	---	---	---	---
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	10.0	35.0	12.65	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.1
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	10.0	35.0	8.51	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.76
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	10.0	35.0	10.30	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.50
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	---	---	---	---	---	---

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 poten*

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 2-2
Soil Sample Analytical Results
BP Service Station No. 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 - Residential Exposure Scenario*. Direct exposure ESLs protective of construction workers (Table K-3, ESL 2003) were not exceeded.

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 2-3
Dual Phase Extraction Analytical Data
BP Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Well Number	Date Sampled	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethyl-benzene ($\mu g/m^3$)	Total Xylenes ($\mu g/m^3$)	Gasoline Range Organics* ($\mu g/m^3$)	MTBE ($\mu g/m^3$)
Residential ESL ($\mu g/m^3$)		84	83,000	2,200	21,000	10,000	9,400
Commercial ESL ($\mu g/m^3$)		280	230,000	7,400	58,000	29,000	31,000
MW-2	11/04/02	**ND<101**	ND<104	ND<102	1,460	**ND<10,314**	514
	11/09/02	**ND<101**	ND<104	ND<102	916	**ND<10,314**	ND<514
AR-2	11/04/02	**ND<101**	ND<104	ND<102	2,256	**12,463** [1]	955
	11/09/02	**ND<101**	ND<104	ND<102	1,725	**85,953** [2]	1,028
EP-1	11/04/02	NA	NA	NA	NA	NA	NA
	11/09/02	**1920**	5,375	2,123	**26,542**	**859,928** [2]	3,673

Notes:
Bolded analytical data indicates an exceedance of the residential soil gas screening levels. ESLs selected from Vol II of the ESL document (ESL 2003), Table E-2
Bolded and shaded analytical data indicates an exceedance of both the commercial and residential soil gas screening levels. ESLs selected from Vol II of the ESL document (ESL 2003), Table E-2
* = 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
Reference: URS., 2003. *Results of a Dual Phase Extraction Test.*

2004 - 2:04pm
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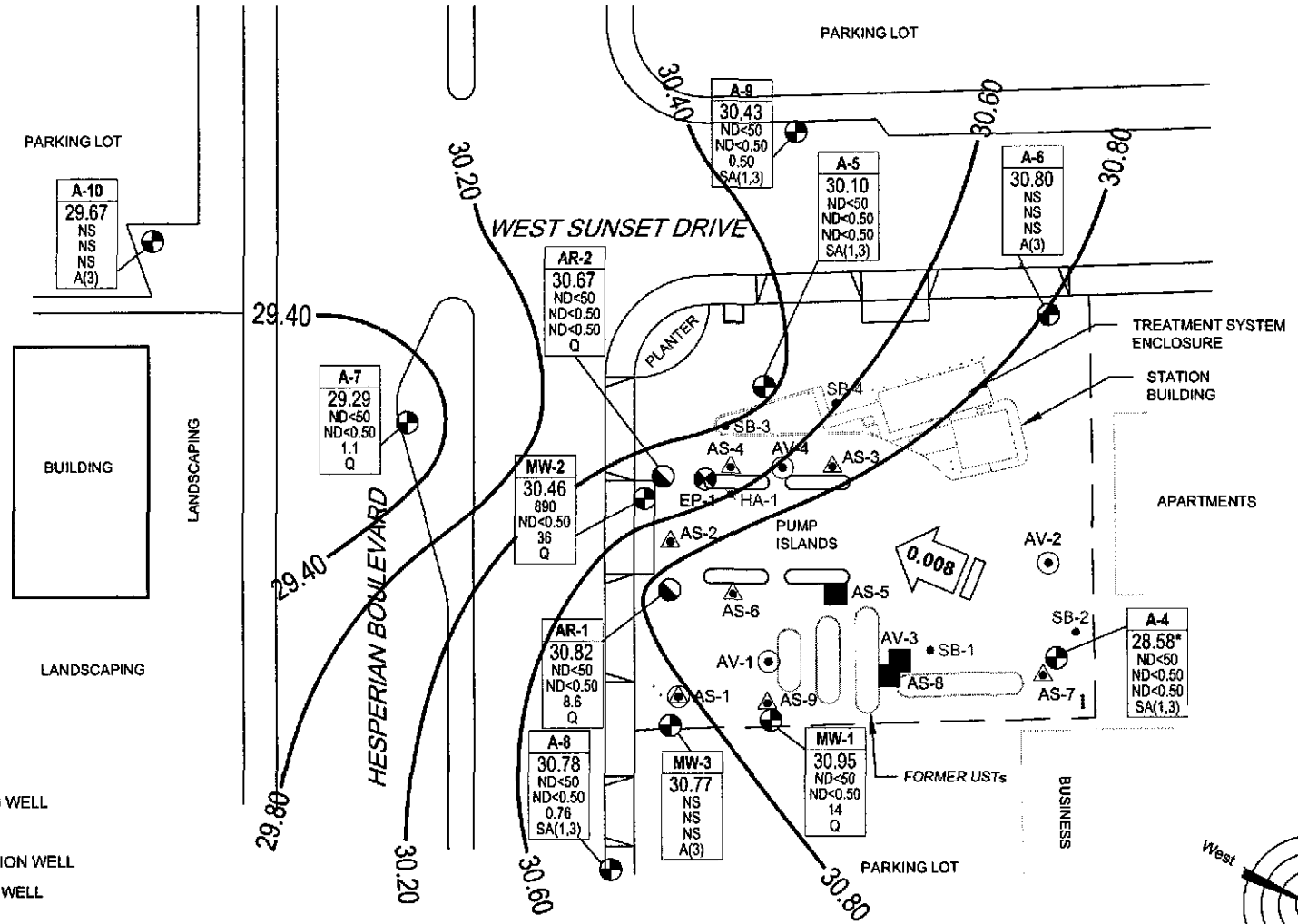


LEGEND:

- 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
- SOIL BORING
- EXTRACTION POINT
- 26.00 APPOXIMATE GROUNDWATER ELEVATION CONTOUR (FEET ABOVE MSL)
- 0.008 GROUNDWATER FLOW DIRECTION AND GRADIENT (FEET/FOOT)
- Well — WELL DESIGNATION
- ELEV — GROUNDWATER ELEVATION
- GRO / Benzene / MTBE — GRO, BENZENE & MTBE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)
- A/SA/Q — SAMPLING FREQUENCY

* NOT USED IN GROUNDWATER ELEVATION CONTOURS (SURVEYED TO DIFFERENT DATUM)

ND< NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMITS

NS NOT SAMPLED

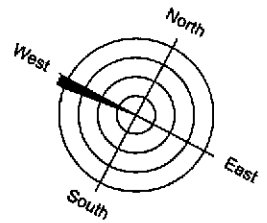
A(3) SAMPLED ANNUALLY, 3RD QUARTER

SA(1,3) SAMPLED SEMI-ANNUALLY, 1ST & 3RD QUARTERS

Q SAMPLED QUARTERLY

NOTES:

1. SITE MAP ADAPTED FROM IT CORPORATION FIGURES. SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.
2. ROSE DIAGRAM INDICATES GROUNDWATER FLOW DIRECTION BASED ON DATA FROM QUARTERLY MONITORING FROM 2Q 2002-1Q 2004 (N=7)



2002-2004 GROUNDWATER FLOW DIRECTION

0 50 100

SCALE IN FEET

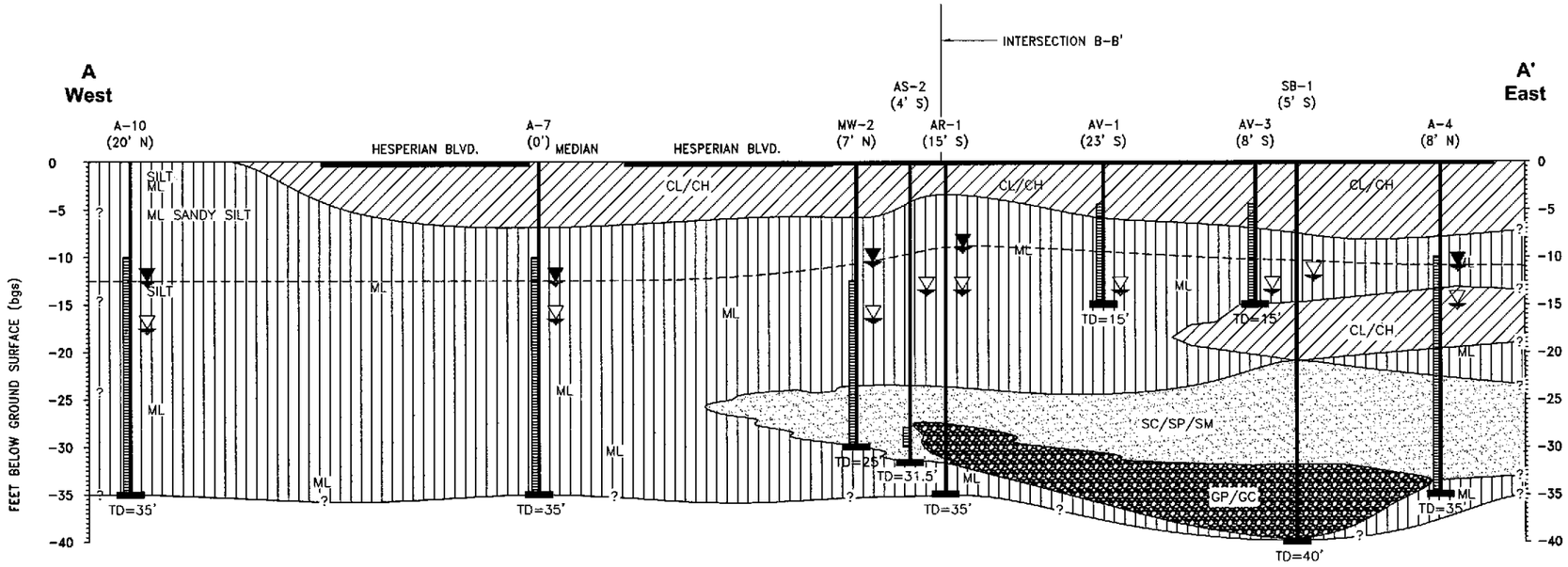
URS

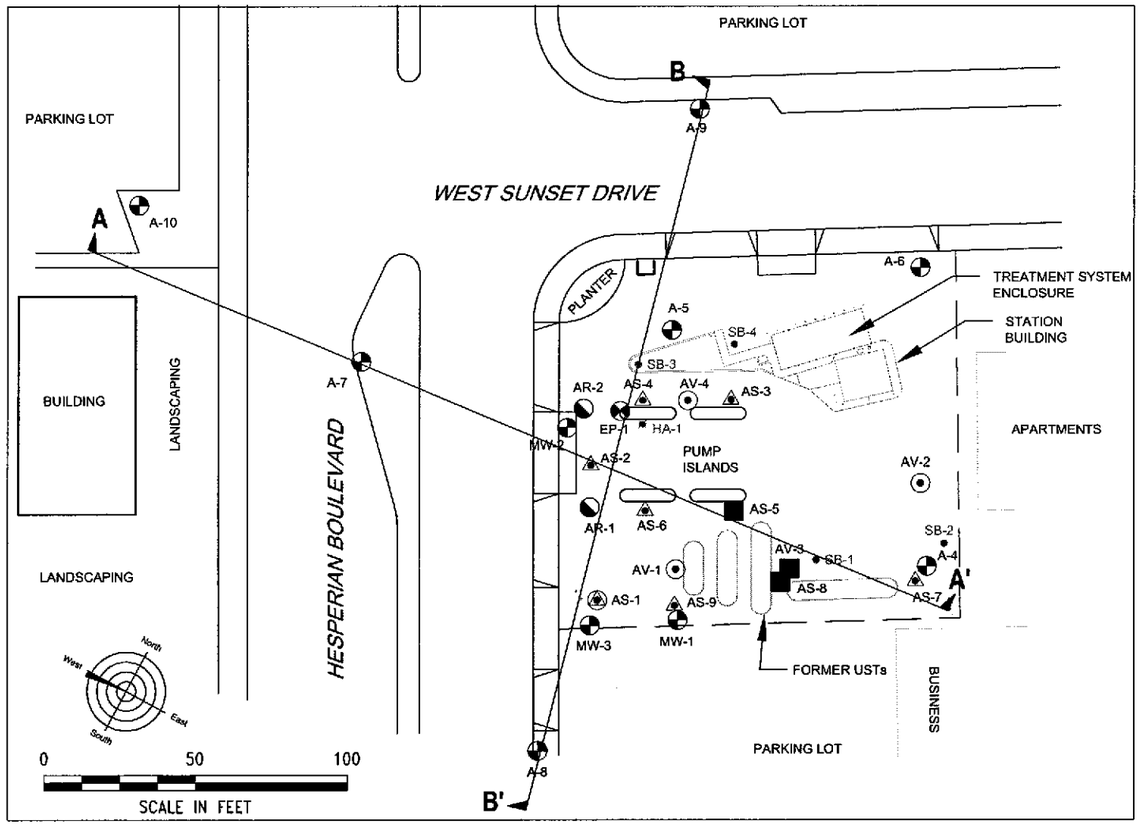
Project No. 38486910

Former ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

GROUNDWATER ELEVATION CONTOUR AND ANALYTICAL SUMMARY MAP First Quarter 2004 (March 1, 2004)

FIGURE 1





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. 38486910 Former ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	GEOLOGIC CROSS-SECTION A-A'	FIGURE 2

Jun 02, 2004 - 2:19pm
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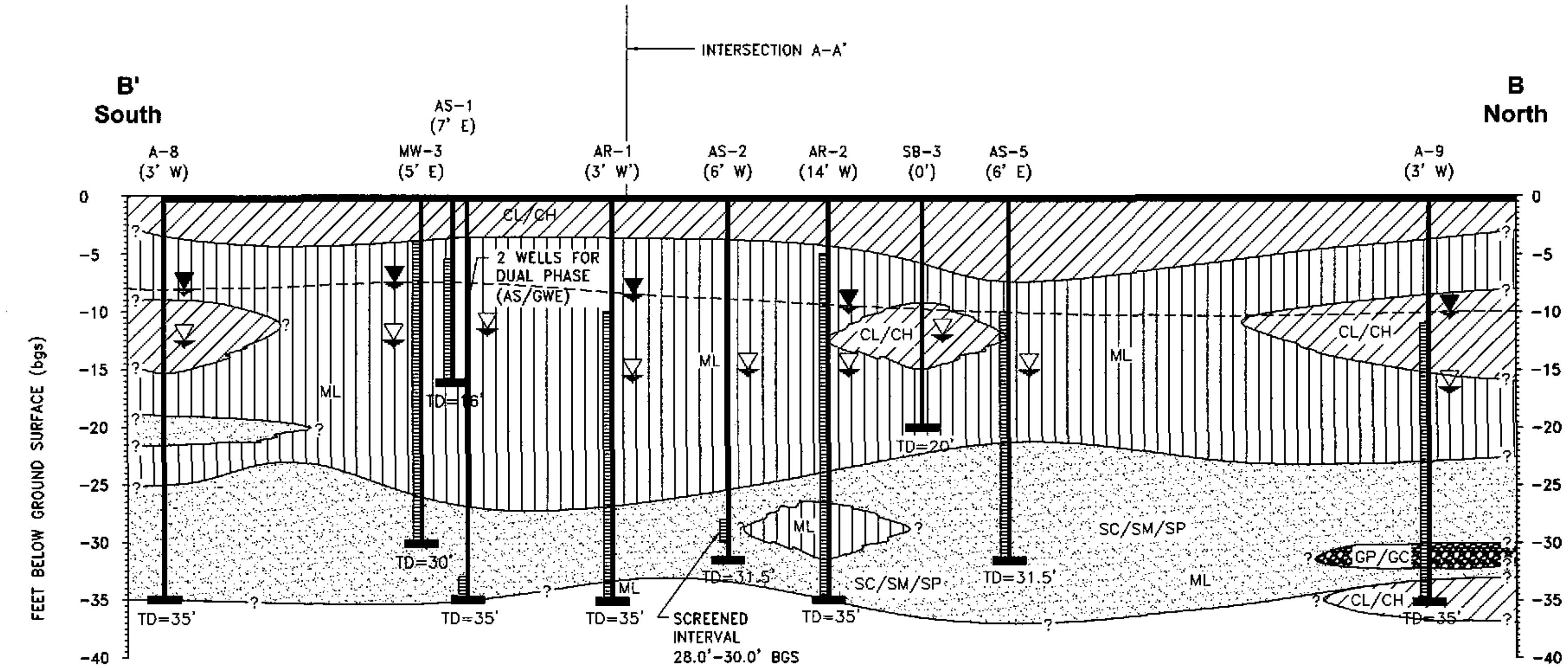

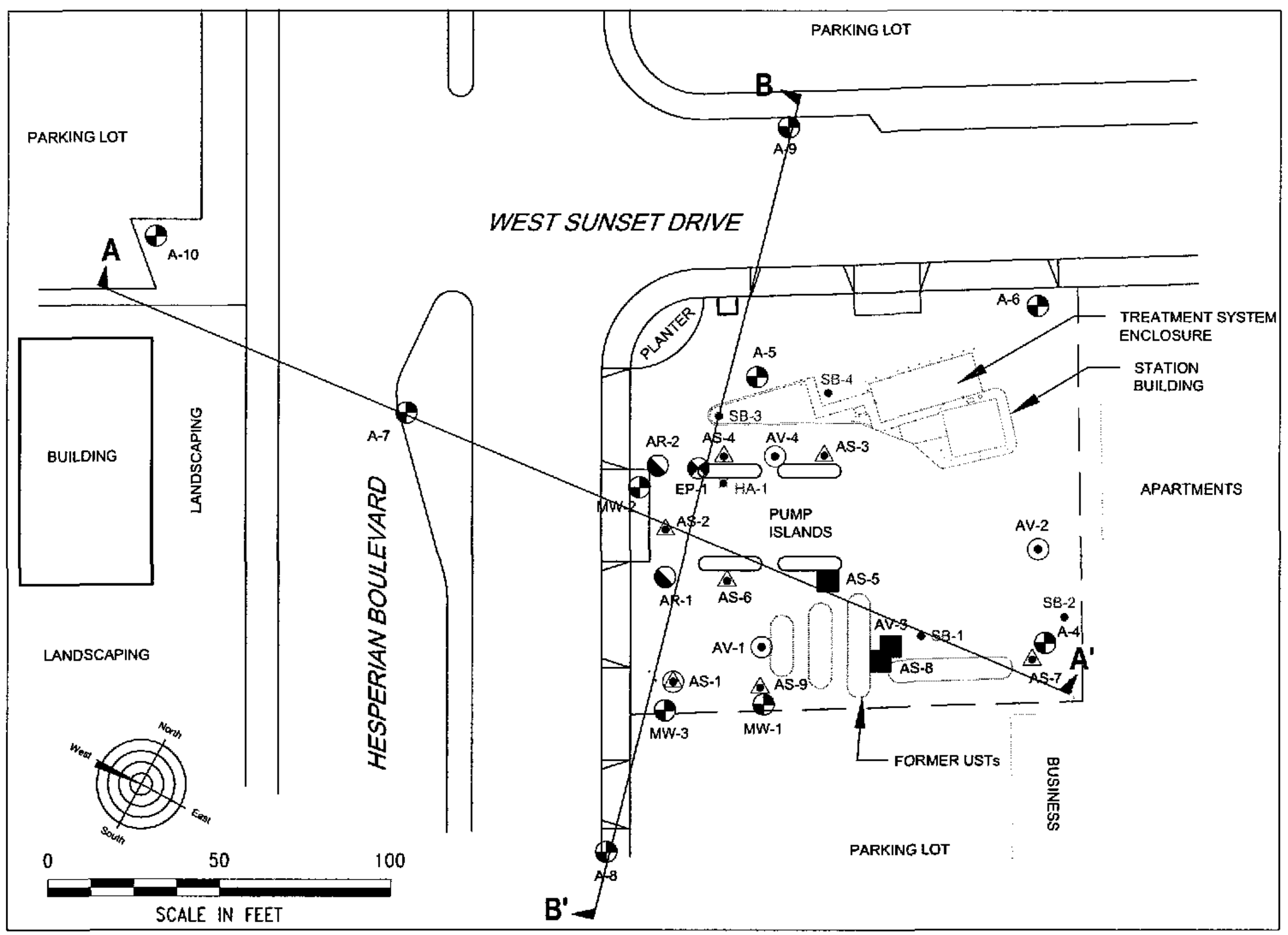

LEGEND:

- ▽ 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. 38486910 Former ARCO Service Station #5387 20200 Hesperian Boulevard Hayward, California	GEOLOGIC CROSS-SECTION B-B'	FIGURE 3

May 21, 2004 - 4:28pm
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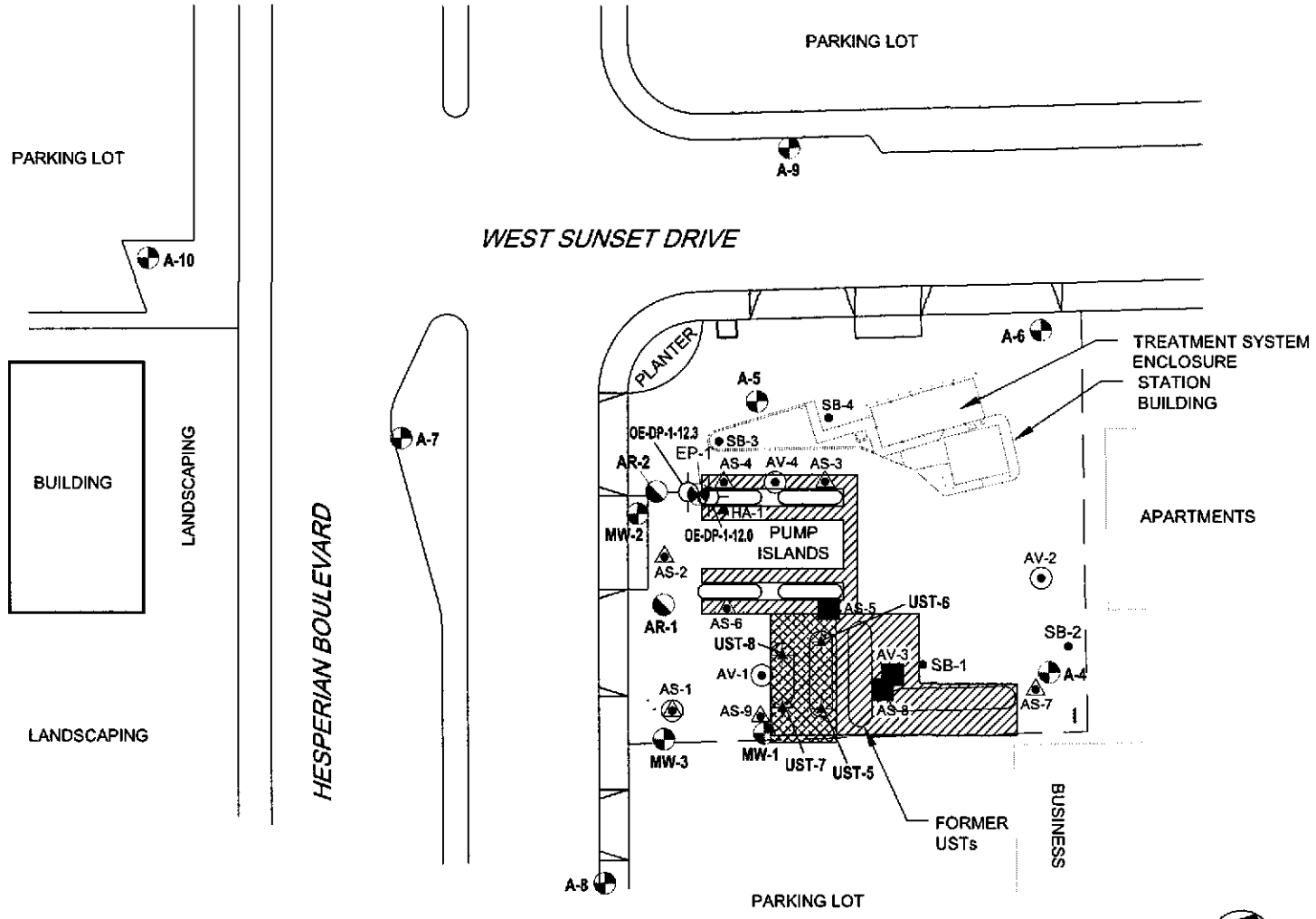


LEGEND:

- 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 (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

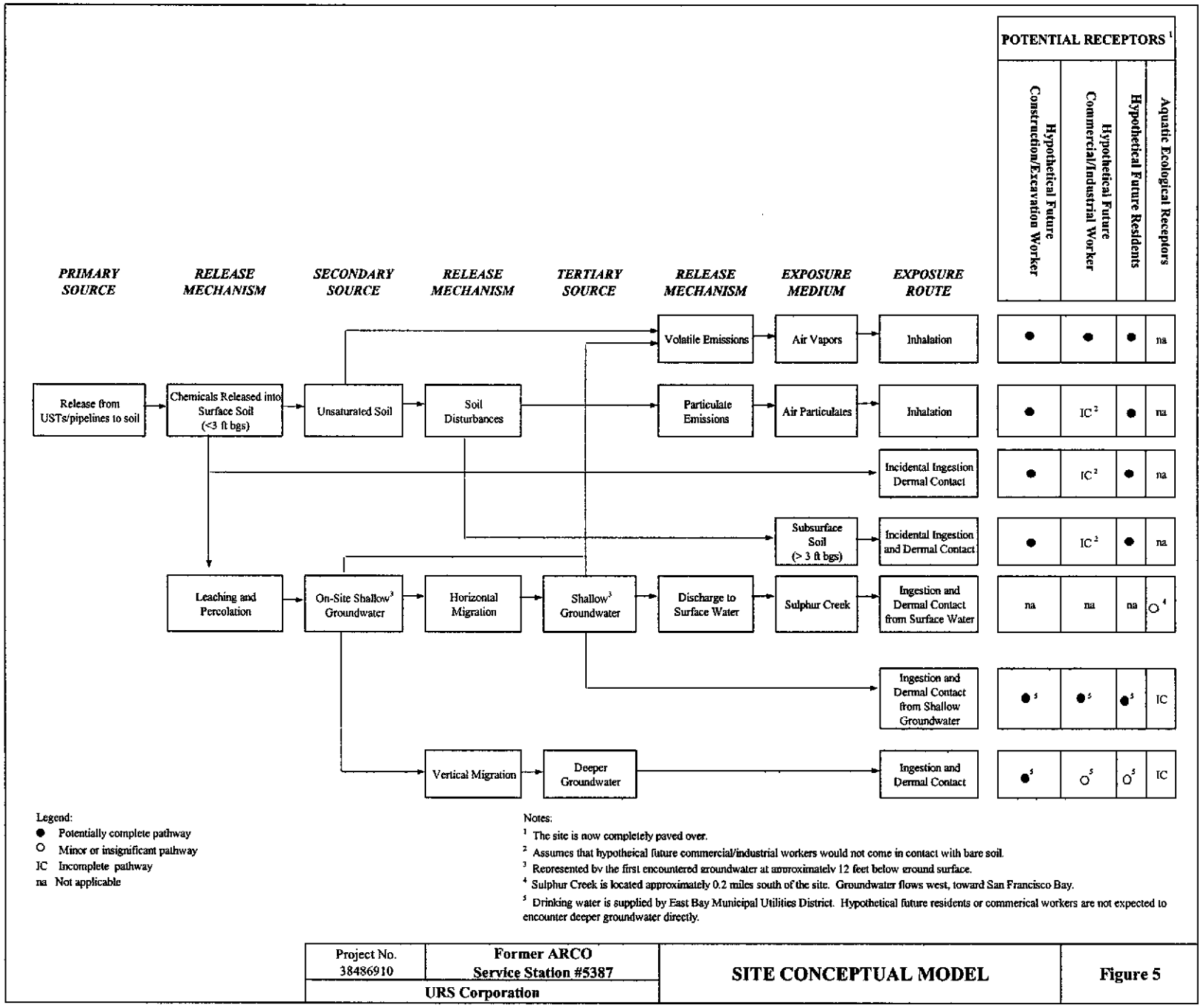
0 50 100

SCALE IN FEET

URS	Project No. 38486910 Former ARCO Service Station 5387 20200 Hesperian Boulevard Hayward, California	SOIL, GROUNDWATER AND DUAL PHASE EXTRACTION SAMPLE LOCATIONS	FIGURE 4

Conceptual Site Model

Former ARCO Service Station #5387
20200 Hesperian Blvd
Hayward, California



Legend:
- ● Potentially complete pathway
- ○ Minor or insignificant pathway
- IC Incomplete pathway
- na Not applicable

Notes:
1. The site is now completely paved over.
2. Assumes that hypothetical future commercial/industrial workers would not come in contact with bare soil.
3. Represented by the first encountered groundwater at approximately 12 feet below ground surface.
4. Sulphur Creek is located approximately 0.2 miles south of the site. Groundwater flows west, toward San Francisco Bay.
5. Drinking water is supplied by East Bay Municipal Utilities District. Hypothetical future residents or commerical workers are not expected to encounter deeper groundwater directly.

Project No. 38486910	Former ARCO Service Station #5387	SITE CONCEPTUAL MODEL	Figure 5
	URS Corporation		

Appendix A

Time vs. Concentration Maps for TPH-G, Benzene, and MTBE at Selected Well Location

Graph 1 – Concentration and Water Level Trends MW-1

Graph 2 – 3Q 2002 to 1Q 2004 Concentration and Water Level Trends MW-1

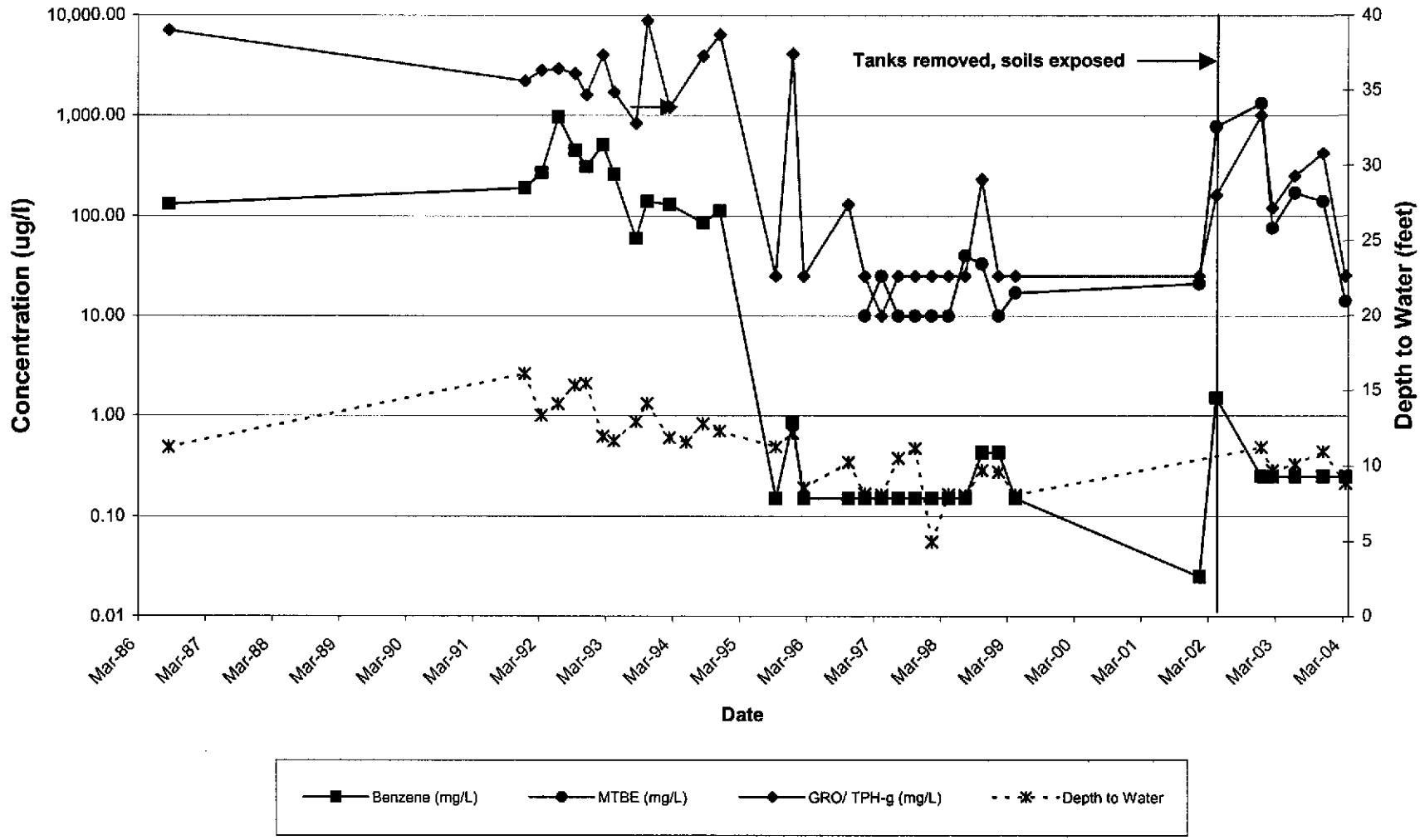
Graph 3 – Concentration and Water Level Trends MW-2

Graph 4 – 3Q 2002 to 1Q 2004 Concentration and Water Level Trends MW-2

Graph 5 – Concentration and Water Level Trends AR-1

Graph 6 – Concentration and Water Level Trends AR-7

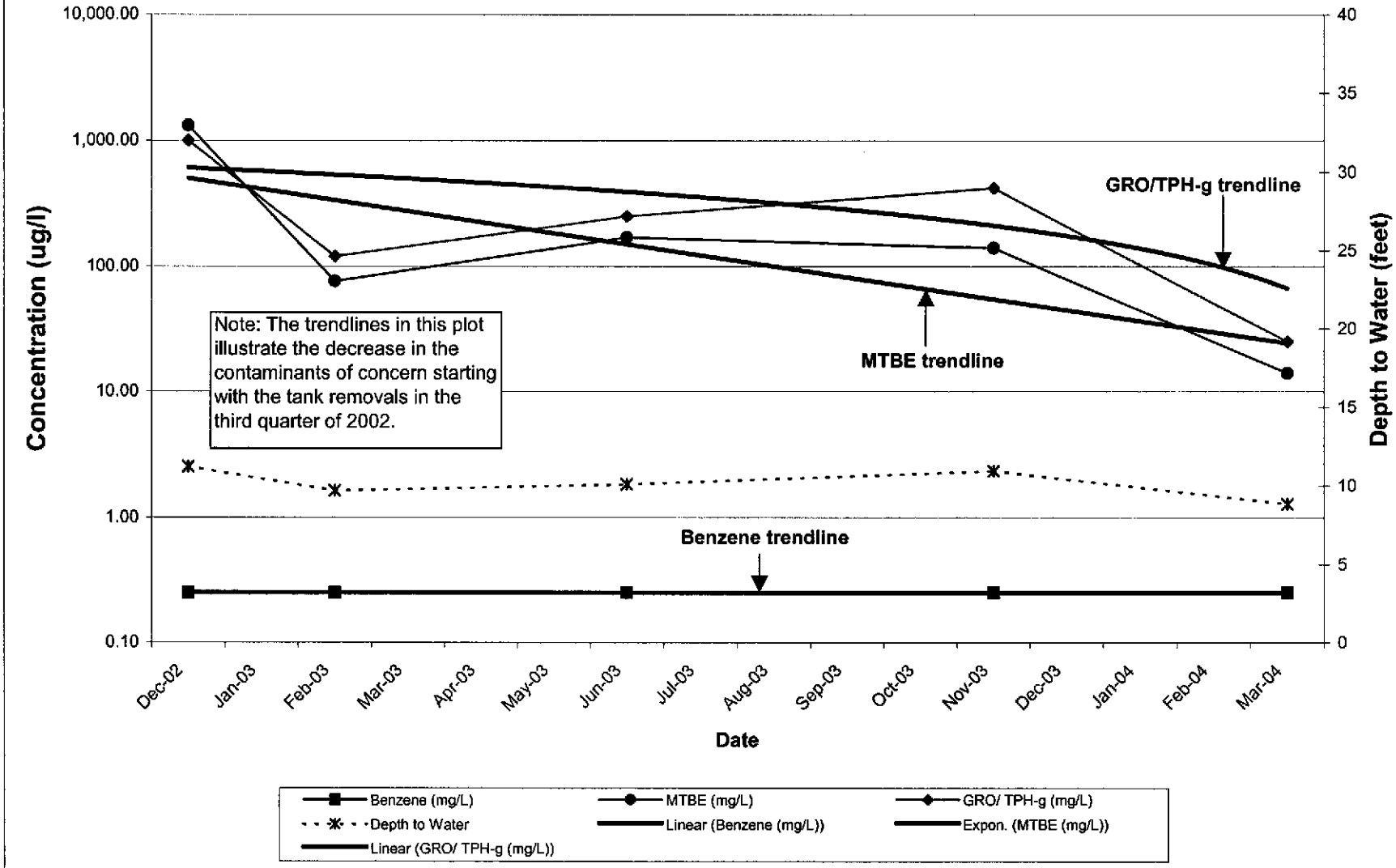
Concentration and Water Level Trends
Well MW-1



ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

Graph 1

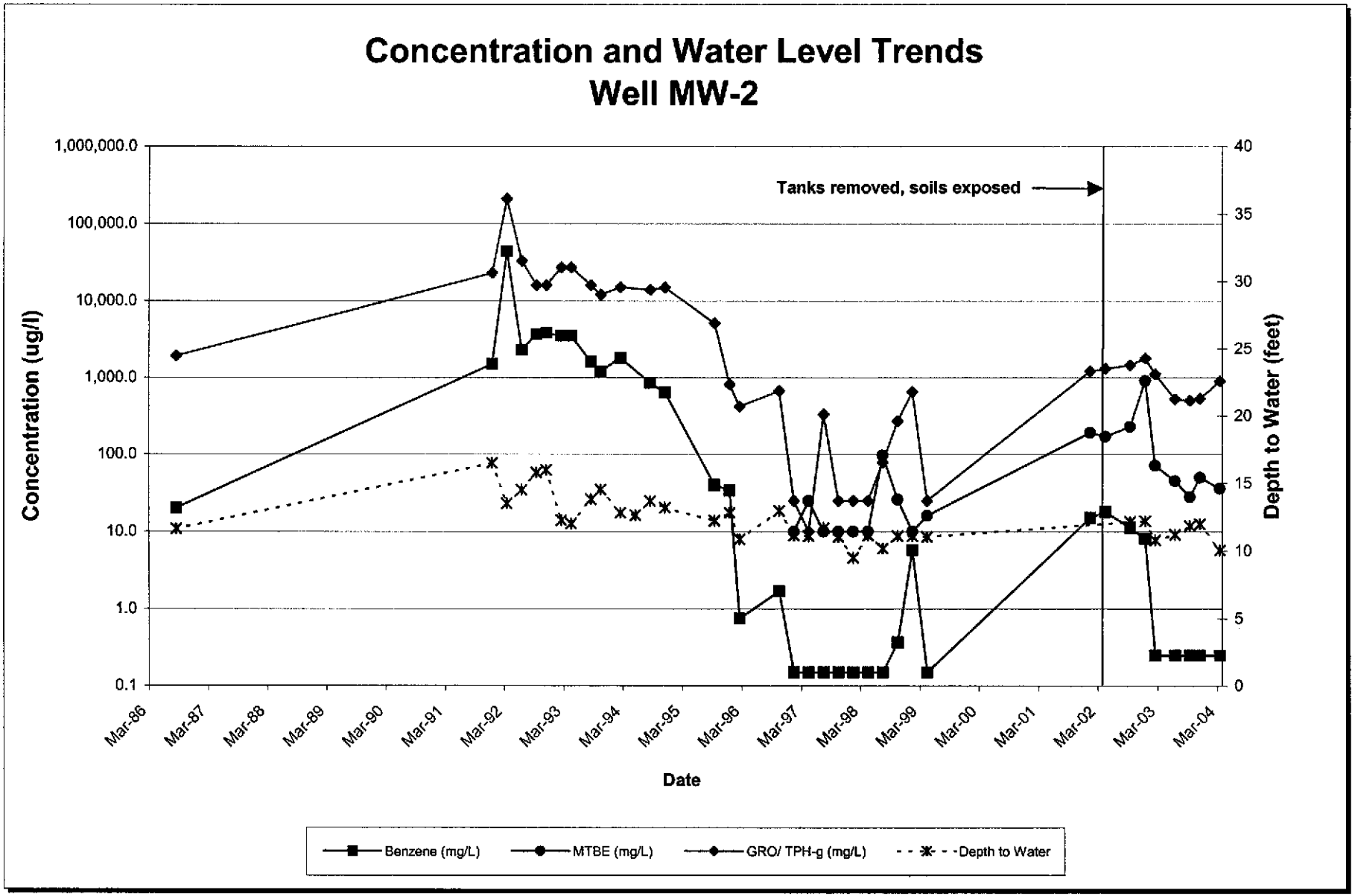
3Q 2002 to 1Q 2004
Concentration and Water Level Trends MW-1



X:\X_ENV_WASTE\BP GEM\SITES\SCOTT ROBINSON\PAUL SUPPLE\5387 \SITE CLOSURE\5387 CONCENTRATION PLOTS-SECOND RELEASE.XLS\5/19/04

ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

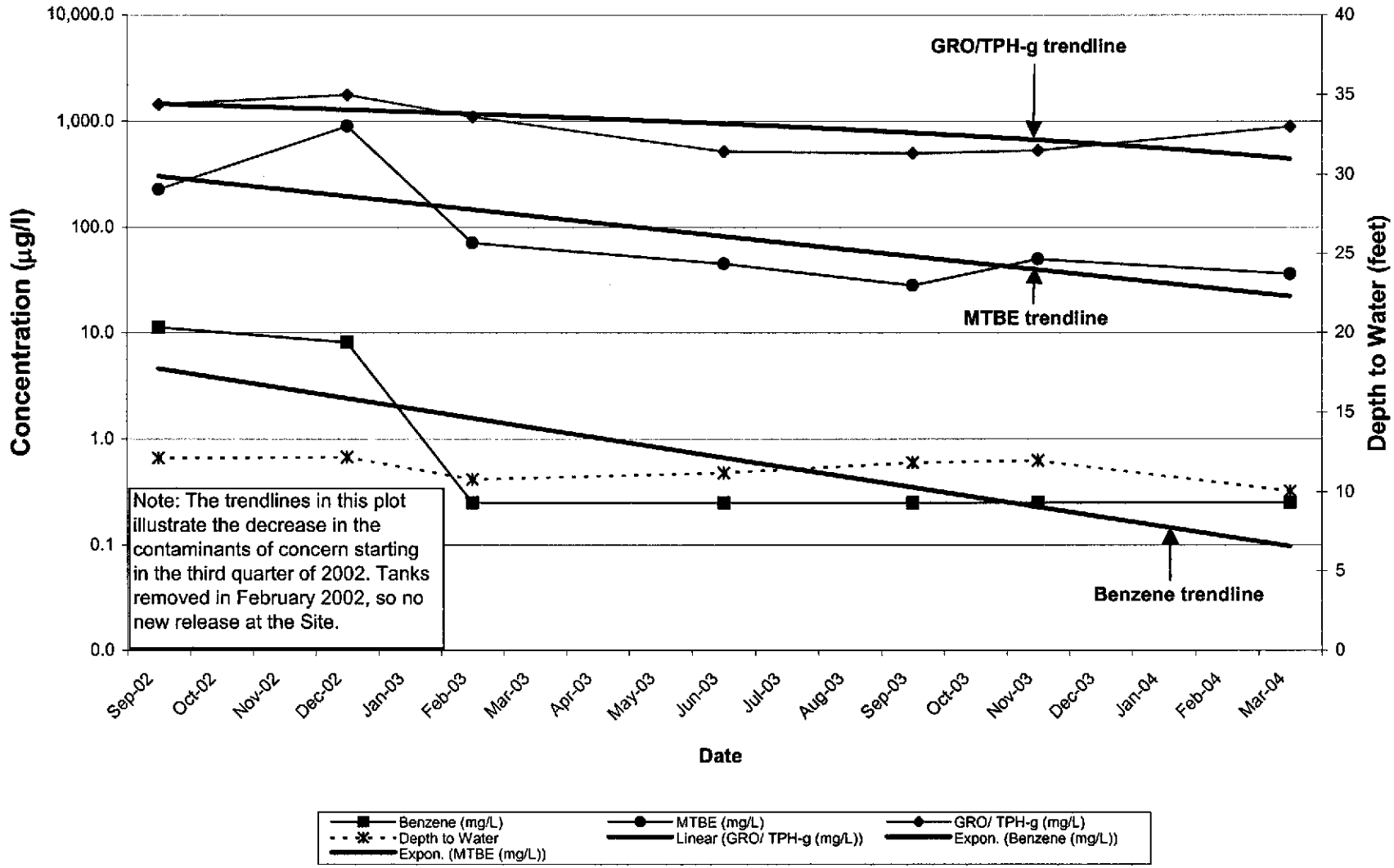
Graph 2



ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

Graph 3

3Q 2002 to 1Q 2004
Concentration and Water Level Trends MW-2

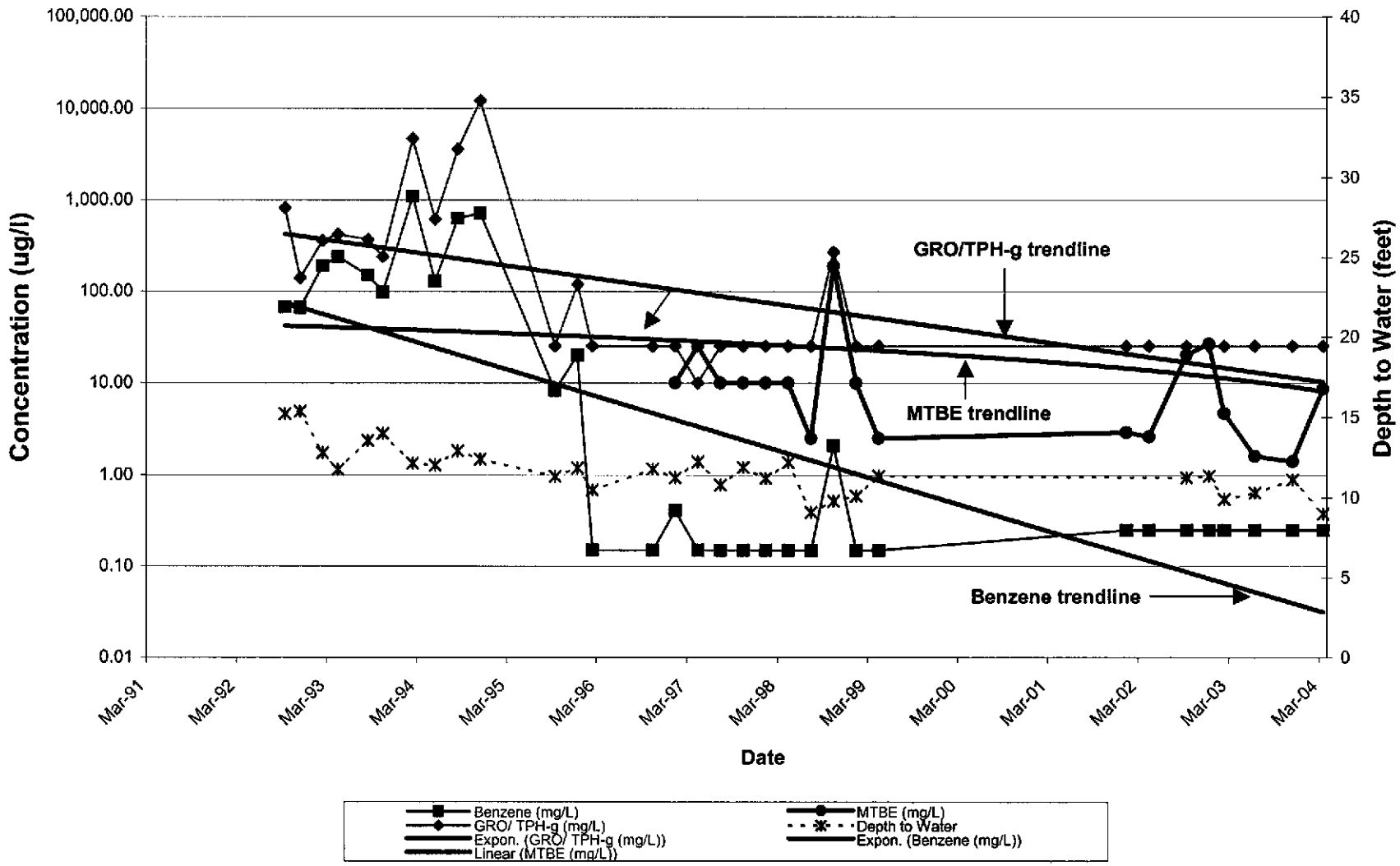


X:\X_ENV_WASTE\BP GEM\SITES\SCOTT ROBINSON\PAUL SUPPLE\5387\
SITE CLOSURE\5387 CONCENTRATION PLOTS-SECOND RELEASE.XLS\5/19/04

ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

Graph 4

Concentration and Water Level Trends
Well AR-1

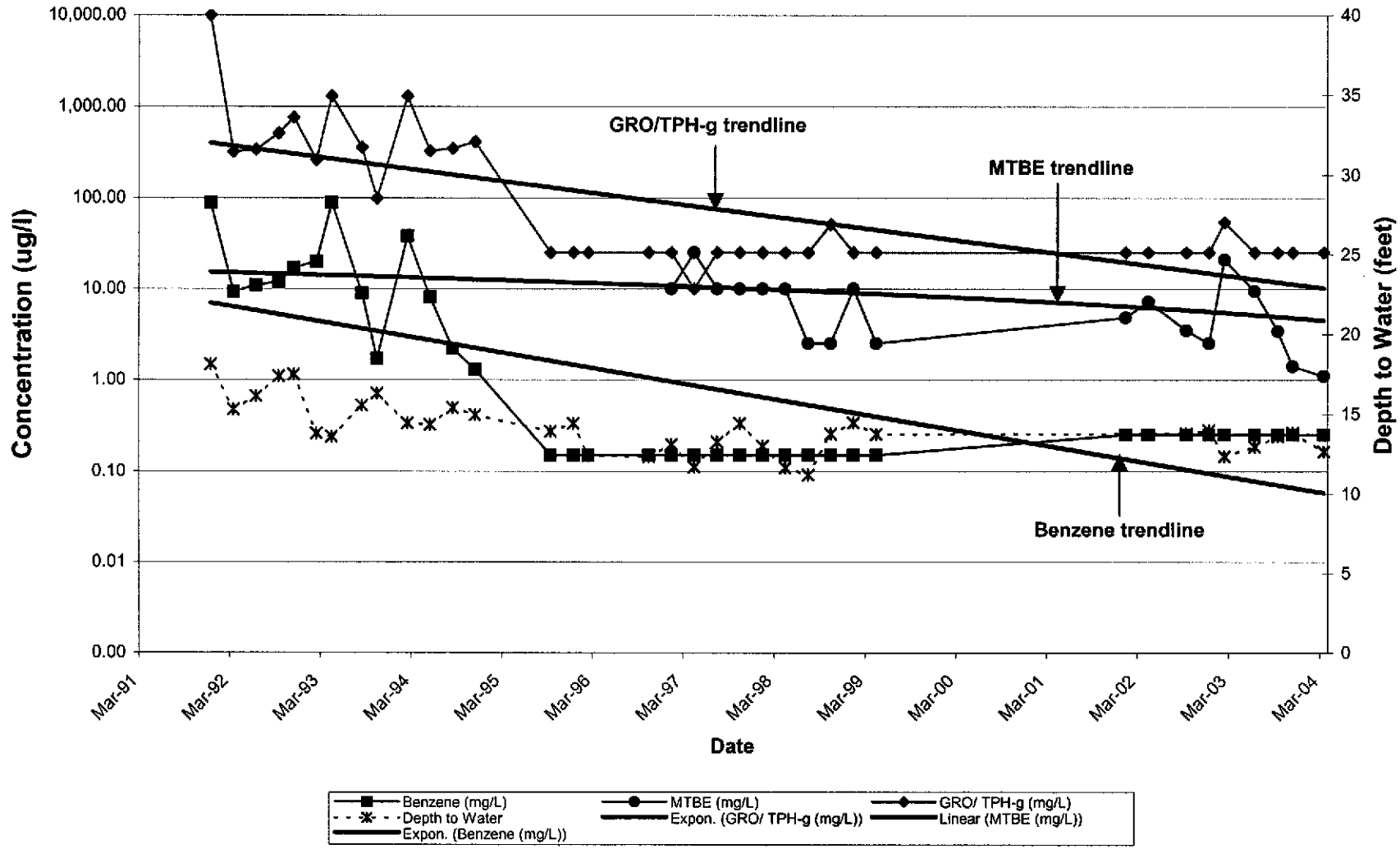


X:\X_ENV_WASTE\BP GEM\SITES\SCOTT ROBINSON\PAUL SUPPLE\5387\
SITE CLOSURE\5387 CONCENTRATION PLOTS-SECOND RELEASE.XLS\5/19/04

ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

Graph 5

Concentration and Water Level Trends
Well A-7



X:\X_ENV_WASTE\BP GEM\SITES\SCOTT ROBINSON\PAUL SUPPLE\5387\
SITE CLOSURE\5387 CONCENTRATION PLOTS-SECOND RELEASE.XLS\5/19/04

ARCO Service Station #5387
20200 Hesperian Boulevard in Hayward, California

Graph 6

Appendix B

Highlights of Relevant Documents

First Quarter 2004 Groundwater Monitoring Report, URS Corporation, April 6, 2004

Results of a Dual Phase Extraction Test, URS Corporation, April 2, 2003

Tank Basin, Product Line and Dispenser Island Sampling Results, Delta Environmental Consultants, Inc., March 1, 2002

Hand Auger Assessment Boring Results Report, Delta Environmental Consultants, Inc., August 25, 2000

Site Assessment Investigation Report, Groundwater Technology, August 21, 1986

URS

April 6, 2004

SENT TO: S. Seery
DATE: 4/7/04
COMMENTS: via reg. mail
ENTERED ON:

Mr. Scott Seery
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: First Quarter 2004 Groundwater Monitoring Report
ARCO Service Station #5387
20200 Hesperian Blvd
Hayward, California
URS Project #38486726

Dear Mr. Seery:

On behalf of Atlantic Richfield Company (ARCO – a BP affiliated company), URS Corporation (URS) is submitting the *First Quarter 2004 Groundwater Monitoring Report* for ARCO Service Station #5387, located at 20200 Hesperian Boulevard, Hayward, California.

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

Sincerely,

URS CORPORATION

Scott Robinson
Project Manager

James F. Durkin, C.Hg.
Senior Geologist

REGISTERED GEOLOGIST
JAMES F. DURKIN
No. 759
CERTIFIED HYDROGEOLOGIST
Exp. 2/28/05
STATE OF CALIFORNIA

Enclosure: First Quarter 2004 Groundwater Monitoring Report

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

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612-1924
Tel: 510.893.3600
Fax: 510.874.3268

Date: April 6, 2004

Quarter: 1Q 04

ATLANTIC RICHFIELD COMPANY QUARTERLY GROUNDWATER MONITORING REPORT

Former Facility No.:	5387	Address:	20200 Hesperian Boulevard, Hayward, California
ARCO Environmental Business Manager:			Paul Supple
Consulting Co./Contact Person:			URS Corporation / Scott Robinson
Consultant Project No.:			38486726
Primary Agency:			Alameda County Health Care Services Agency (ACHCSA)

WORK PERFORMED THIS QUARTER (First – 2004):

1. Performed first quarter groundwater monitoring event on March 1, 2004.
2. Prepared and submitted first quarter 2004 groundwater monitoring report.
3. Performed well survey at the site on February 23, 2004 (Attachment D).

WORK PROPOSED FOR NEXT QUARTER (Second – 2004):

1. Perform second quarter 2004 groundwater monitoring event.
2. Prepare and submit second quarter 2004 groundwater monitoring report.
3. Perform well repairs on A-5.

Current Phase of Project:	GW monitoring/sampling
Frequency of Groundwater Sampling:	Quarterly: Wells MW-1, MW-2, AR-1, AR-2, A-7 Semi-annually (1st and 3rd Quarters): Wells A-4, A-5, A-8, and A-9 Annually (3rd Quarter): Wells MW-3, A-6, and A-10
Frequency of Groundwater Monitoring:	Quarterly
Is Free Product (FP) Present On-Site:	No
Current Remediation Techniques:	Natural Attenuation
Approximate Depth to Groundwater:	7.95 ft (MW-3) to 12.65 ft (A-7)
Groundwater Gradient (direction):	West
Groundwater Gradient (magnitude):	0.008 feet per foot

DISCUSSION:

Gasoline range organics (GRO) was detected above the laboratory reporting limit in one of the nine wells sampled this quarter at a concentration of 890 µg/L (MW-2). Benzene was not detected above the laboratory reporting limit in any of the wells sampled this quarter. Methyl-tert-butyl ether (MTBE) was detected above the laboratory reporting limit in seven of the nine wells sampled this quarter at concentrations ranging from 0.50 µg/L (A-9) to 36 µg/L (MW-2). Tert-amyl methyl ether (TAME) was detected above the laboratory reporting limit in one well at a concentration of 6.2 µg/L (MW-2). Tert-butyl ether (TBA) was detected above the laboratory reporting limit in one well at a concentration of 49 µg/L (MW-2).

Hydrogen Peroxide Injections were conducted in wells AR-1, AR-2, MW-1, MW-2, and A-7 on December 16, 2003. Baseline Natural Attenuation Parameters for these wells were collected on November 17, 2003 and again on March 1, 2004 (Table 4). Peroxide injections were conducted under pressure for wells MW-1 and MW-2. Field notes for the injection event are presented as Attachment F.

Hydrogen peroxide injection did not have a uniform effect on contaminant concentrations in the injection wells:

- MW-1: GRO and MTBE decreased.
- MW-2: GRO increased, MTBE decreased, TBA increased and TAME did not change.
- AR-1: MTBE increased.
- AR-2: MTBE decreased slightly
- A-7: MTBE decreased slightly

Natural attenuation parameters did not exhibit any conclusive trends. Dissolved oxygen concentrations increased for AR-2 and MW-1, decreased for AR-1 and stayed constant for MW-2 and A-7. With the exception of AR-1 during the March 2004 monitoring event, aerobic conditions prevailed in all injection wells.

ATTACHMENTS:

- Figure 1 – Groundwater Elevation Contour and Analytical Summary Map – March 1, 2004
- Table 1 – Groundwater Elevation and Analytical Data
- Table 2 – Groundwater Flow Direction and Gradient
- Table 3 – Fuel Oxygenate Analytical Data
- Table 4 – Groundwater Analytical Data Bioremediation Parameters
- Attachment A – Field Procedures and Field Data Sheets
- Attachment B – Laboratory Procedures, Certified Analytical Reports and Chain-of-Custody Records
- Attachment C – EDCC Report and EDF/Geowell Submittal Confirmation
- Attachment D – Well Survey Data Sheets
- Attachment E – Hydrogen Peroxide Injection Field Notes

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
AR-1	09/14/92		38.11	10.0	35.0	15.21	22.90	820	67	ND<1.0	8.8	6.7	---	---	---
	11/12/92					15.36	22.75	140	66	ND<0.5	4.3	3.7	---	---	---
	02/11/93					12.81	25.30	360	190	ND<2.5	8.6	ND<2.5	---	---	---
	04/14/93					11.77	26.34	420	240	5.2	30	8.7	---	---	---
	08/12/93					13.55	24.56	370	150	ND<2	11	ND<2	---	---	---
	10/26/93					13.98	24.13	240	98	ND<2	11	ND<2	---	---	---
	02/17/94		37.46			12.15	25.31	4,700	1,100	ND<10	140	26	---	---	---
	05/03/94					12.03	25.43	620	130	1.3	48	4.3	---	---	---
	08/17/94		37.33			12.92	24.41	3,600	630	ND<5	200	12	---	---	---
	11/18/94					12.41	24.92	12,100	720	6.1	337	15	---	---	---
	09/26/95		37.46			11.34	26.12	ND	8.3	ND	ND	ND	---	---	---
	12/06/95					11.87	25.59	120	20	ND	20	0.6	---	---	---
	02/14/96					10.48	26.98	ND	ND	ND	ND	0.52	---	---	---
	10/29/96					11.80	25.66	ND	ND	0.99	ND	ND	---	---	---
	01/29/97					11.25	26.21	ND<50	0.41	ND<0.3	ND<0.3	ND<0.3	ND<20	---	---
	04/30/97					12.24	25.22	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					10.80	26.66	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					11.90	25.56	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					11.20	26.26	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					12.20	25.26	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					9.10	28.36	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					9.80	27.66	270	2.1	ND<0.3	3.6	ND<0.5	190	---	---
	01/13/99					10.10	27.36	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					11.35	26.11	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	1.1	2.9	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.6*	---	---
	09/23/02	P				11.26	26.20	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.50	20.2	1.6	6.9
	12/09/02	P				11.35	26.11	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	26.6	1.8	6.9
	02/11/03[e]	P				9.91	27.55	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	4.7	1.2	6.7
	06/27/03	NP				10.30	27.16	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.6	1.6	7.0
	09/04/03[f]					---	---	---	---	---	---	---	---	---	---
	11/17/03	P				11.13	26.33	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.4	1.8	6.7
	03/01/04[f]	**P**	**39.82**			**9.00**	**30.82**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**8.6**	**0.6**	**7.0**

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Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
AR-2	03/30/93		38.39	5.0	35.0	11.53	26.86	390	4.1	1.6	ND<0.5	47	---	---	---
	04/14/93					11.87	26.52	310	18	ND<0.5	0.67	36	---	---	---
	08/12/93					13.59	24.80	130	16	ND<0.5	1.7	0.57	---	---	---
	10/26/93					14.25	24.14	110	15	ND<0.5	1.8	ND<0.5	---	---	---
	02/17/94					12.76	25.22	130	2.9	ND<0.5	15	0.8	---	---	---
	05/03/94					12.60	25.38	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/17/94		38.18			13.86	24.32	3,000	140	140	220	91	---	---	---
	11/18/94					13.33	24.85	623	10.5	10.5	27.9	8.0	---	---	---
	09/26/95		37.98			11.67	26.31	ND	ND	ND	ND	ND	---	---	---
	12/06/95					12.32	25.66	320	12	12	23	2.1	---	---	---
	02/14/96					10.74	27.24	ND	ND	ND	ND	0.76	---	---	---
	10/29/96					11.95	26.03	ND	ND	ND	ND	ND	---	---	---
	01/29/97					11.35	26.63	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					12.15	25.83	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					11.20	26.78	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					12.14	25.84	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					10.05	27.93	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					12.10	25.88	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					9.50	28.48	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					10.45	27.53	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					10.50	27.48	ND<50	ND<0.3	0.40	ND<0.3	0.53	ND<20	---	---
	04/29/99					11.48	26.50	ND<50	ND<0.3	ND<0.3	ND<0.3	0.82	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	17	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	39*	---	---
	09/23/02	P				12.22	25.76	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.50	4.43	1.0	7.1
	12/09/02	P				12.30	25.68	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	1.1	7.0
	02/11/03[e]	P				10.80	27.18	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.75	1.8	6.9
	06/27/03	NP				11.14	26.84	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	6.0	0.9	6.4
	09/04/03[f]					---	---	---	---	---	---	---	---	---	---
	11/17/03	P				12.08	25.90	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.86	1.8	6.8
	03/01/04[i]	**P**	**40.68**			**10.01**	**30.67**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**4.2**	**6.9**

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Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
MW-1	08/08/86		38.36	5.0	30.0	11.25	27.11	7,040	132	8.7	439	230	---	---	---
	12/24/91					16.12	22.24	2,200	190	8.5	6.9	2.6	---	---	---
	03/10/92					13.34	25.02	2,800	270	29	56	39	---	---	---
	06/09/92					14.12	24.24	2,900	960	27	99	63	---	---	---
	09/14/92					15.34	23.02	2,600	450	ND<5.0	45	21	---	---	---
	11/12/92					15.46	22.90	1,600	310	7.2	22	8.9	---	---	---
	02/11/93					11.95	26.41	4,000	510	47	200	91	---	---	---
	04/14/93					11.65	26.71	1,700	260	20	100	70	---	---	---
	08/12/93					12.93	25.43	830	60	3.8	39	3.6	---	---	---
	10/26/93					14.13	24.23	8,800	140	ND<10	41	ND<10	---	---	---
	02/17/94		37.26			11.86	25.40	1,200	130	12	54	58	---	---	---
	05/03/94					11.58	25.68	---	---	---	---	---	---	---	---
	08/17/94		37.33			12.78	24.55	3,900	86	5.1	78	9.4	---	---	---
	11/18/94					12.31	25.02	6,350	112	8.4	107	35	---	---	---
	09/26/95		37.26			11.26	26.00	ND	ND	ND	ND	ND	---	---	---
	12/06/95					12.16	25.10	4,100	0.86	0.46	0.38	0.92	---	---	---
	02/14/96					8.53	28.73	ND	ND	0.56	ND	0.82	---	---	---
	10/29/96					10.23	27.03	130	ND	ND	ND	ND	---	---	---
	01/29/97					8.15	29.11	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					8.05	29.21	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					10.50	26.76	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					11.15	26.11	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					4.95	32.31	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					8.10	29.16	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					8.02	29.24	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	40	---	---
	10/22/98					9.70	27.56	230	0.43	1.9	0.99	0.99	33	---	---
	01/13/99					9.60	27.66	ND<50	0.43	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					8.05	29.21	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	^31/17	---	---
	01/15/02					---	---	ND<50	ND<0.05	ND<0.5	ND<0.5	ND<0.5	21	---	---
	04/24/02					---	---	160	1.5	ND<0.50	ND<0.50	ND<0.50	770*	---	---
	09/23/02[a]					---	---	---	---	---	---	---	---	---	---
	12/09/02	P				11.22	26.04	998	ND<0.50	ND<0.50	ND<0.50	1.37[b]	855(d)/ 1310*	2.2	7.0
	02/11/03[e]	P				9.70	27.56	120	ND<0.50	ND<0.50	ND<0.50	ND<0.50	76	1.6	6.7

Table 1
Groundwater Elevation and Analytical Data

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Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
MW-1	06/27/03	P				10.10	27.16	ND<500	ND<5.0	ND<5.0	ND<5.0	ND<5.0	170	0.8	6.8
(Cont'd)	09/04/03[f]					---	---	---	---	---	---	---	---	---	---
	11/17/03	P				10.94	26.32	420	ND<0.50	ND<0.50	ND<0.50	ND<0.50	140	1.7	6.7
	03/01/04[i]	**P**	**39.80**			**8.85**	**30.95**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**14**	**2.1**	**6.5**
MW-2	08/08/86		38.58	5.0	30.0	11.62	26.96	1,910	20.1	2.8	1.8	---	---	---	---
	12/24/91					16.50	22.08	23,000	1,500	1,100	480	1,400	---	---	---
	03/10/92					13.50	25.08	210,000	44,000	3,900	1,700	5,800	---	---	---
	06/09/92					14.52	24.06	33,000	2,300	370	780	2,600	---	---	---
	09/14/92					15.78	22.80	16,000	3,700	10	470	1,000	---	---	---
	11/12/92					15.98	22.60	16,000	3,800	86	470	910	---	---	---
	02/11/93					12.27	26.31	27,000	3,500	720	1,600	380	---	---	---
	04/14/93					12.01	26.57	27,000	3,500	220	2,200	5,100	---	---	---
	08/12/93					13.81	24.77	16,000	1,600	27	1,300	1,200	---	---	---
	10/26/93					14.53	24.05	12,000	1,200	ND<25	510	330	---	---	---
	02/17/94					12.81	25.77	15,000	1,800	21	850	540	---	---	---
	05/03/94					12.63	25.95	---	---	---	---	---	---	---	---
	08/17/94		37.99			13.69	24.30	14,000	850	13	640	270	---	---	---
	11/18/94		38.06			13.18	24.88	14,900	640	3.4	532	156	---	---	---
	09/26/95		37.99			12.23	25.76	5,100	40	25	2.5	18	---	---	---
	12/06/95					12.82	25.17	810	34	23	11	11	---	---	---
	02/14/96					10.87	27.12	420	0.75	0.54	0.64	0.53	---	---	---
	10/29/96					12.95	25.04	670	1.7	1.3	0.6	0.8	---	---	---
	01/29/97					11.15	26.84	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					11.09	26.90	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					11.70	26.29	330	ND<0.3	0.58	0.53	ND<0.5	ND<20	---	---
	10/22/97					11.05	26.94	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					9.50	28.49	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					11.15	26.84	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					10.20	27.79	78	ND<0.3	ND<0.3	ND<0.3	ND<0.5	97	---	---
	10/22/98					11.10	26.89	270	0.37	2.0	0.91	0.73	26	---	---
	01/13/99					11.10	26.89	650	5.8	1.0	1.4	1.1	ND<20	---	---
	04/29/99					11.05	26.94	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	^23/16	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
MW-2	01/15/02					---	---	1,200	15	4.5	ND<0.5	ND<0.5	190	---	---
(Cont'd)	04/24/02					---	---	1,300	18	ND<10	ND<10	ND<10	170*	---	---
	09/23/02	P				12.15	25.84	1,440	11.2	0.730	ND<0.500	ND<1.50	228	1.6	6.9
	12/09/02	P				12.20	25.79	1,770	8.08	0.694	2.47	3.79 (b)	529(d)/ 902*	6.2	6.7
	02/11/03[e]	P				10.79	27.20	1,100	ND<0.50	ND<0.50	ND<0.50	0.53	71	1.2	6.8
	06/27/03	P				11.20	26.79	520	ND<0.50	ND<0.50	ND<0.50	ND<0.50	45	0.8	6.8
	09/04/03	P				11.84	26.15	500	ND<0.50	ND<0.50	ND<0.50	ND<0.50	28	1.2	6.9
	11/17/03	P				11.98	26.15	530	ND<0.50	ND<0.50	ND<0.50	ND<0.50	50	3.1	6.7
	03/01/04[l]	**P**	**40.51**			**10.05**	**30.46**	**890**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**36**	**3.1**	**6.6**
MW-3	08/08/86		37.77	5.0	30.0	10.61	27.16	7,450	510	549	409	1,380	---	---	---
	12/24/91					15.60	22.17	6,800	450	10	610	45	---	---	---
	03/10/92					12.90	24.87	11,000	2,500	75	400	560	---	---	---
	06/09/92					13.60	24.17	16,000	2,000	69	1,300	2,600	---	---	---
	09/14/92					14.78	22.99	14,000	630	ND<50	1,500	2,400	---	---	---
	11/12/92					14.92	22.85	7,400	400	ND<25	860	330	---	---	---
	02/11/93					11.65	26.12	8,600	580	ND<20	710	300	---	---	---
	04/14/93					11.16	26.61	6,900	300	8.8	580	99	---	---	---
	08/12/93					12.82	24.95	3,400	56	ND<5	190	ND<5	---	---	---
	10/26/93					13.60	24.17	2,900	42	ND<10	76	ND<10	---	---	---
	02/17/94		36.80			11.53	25.27	3,100	160	ND<10	36	8.6	---	---	---
	05/03/94					11.36	25.44	2,300	44	ND<2.5	8.0	ND<2.5	---	---	---
	08/17/94		36.87			12.38	24.49	1,900	7.0	ND<9.5	4.4	ND<5	---	---	---
	11/18/94					11.93	24.94	909	1.1	ND<0.5	0.9	4.0	---	---	---
	09/26/95		36.80			10.96	25.84	410	1.3	1.9	2.3	3.3	---	---	---
	12/06/95					11.56	25.24	---	0.9	4.6	3.0	4.3	---	---	---
	02/14/96					7.47	29.33	99	ND	0.49	0.46	ND	---	---	---
	10/29/96					9.80	27.00	250	0.7	0.6	ND	ND	---	---	---
	01/29/97					7.50	29.30	170	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					12.10	24.70	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					9.90	26.90	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					12.10	24.70	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					7.50	29.30	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
MW-3	04/22/98					12.30	24.50	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
(Cont'd)	07/08/98					8.30	28.50	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					9.10	27.70	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					9.50	27.30	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					5.93	30.87	ND<50	ND<0.3	0.35	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	7.9	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50[x]	---	---
	09/23/02	P				10.30	26.50	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.50	ND<0.500	1.0	6.9
	12/09/02	P				10.38	26.42	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	1.7	6.7
	02/11/03[e]	P				8.85	27.95	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.6	6.7
	06/27/03	P				9.12	27.68	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.61	0.9	6.8
	09/04/03	P				9.85	27.05	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.0	6.9
	11/17/03[h]		36.63			9.93	26.70	---	---	---	---	---	---	---	---
	03/01/04[i]		**38.72**			**7.95**	**30.77**	---	---	---	---	---	---	---	---
A-4	03/06/91		39.46	10.0	35.0	13.22	26.24	34,000	11,000	870	2,500	2,100	---	---	---
	12/24/91		39.86			17.60	22.26	1,900	29	1.9	25	29	---	---	---
	03/10/92					14.76	25.10	7,400	37	ND<0.60	11	73	---	---	---
	06/09/92					15.63	24.23	4,500	3.2	1.5	37	16	---	---	---
	09/14/92					16.83	23.03	1,300	ND<2.5	2.5	61	6.8	---	---	---
	11/12/92					16.97	22.89	610	7.2	0.98	34	0.97	---	---	---
	02/11/93					13.43	26.43	740	2.4	ND<0.5	5.0	3.5	---	---	---
	04/14/93					13.06	26.80	380	ND<0.5	ND<0.5	10	1.6	---	---	---
	08/12/93					14.94	24.92	1,200	0.93	ND<0.5	0.91	ND<0.5	---	---	---
	10/26/93					15.52	24.34	160	ND<0.5	ND<0.5	1.0	ND<0.5	---	---	---
	02/17/94		39.46			14.02	25.44	320	0.5	ND<0.5	28	0.9	---	---	---
	05/03/94					13.85	25.61	130	ND<0.5	ND<0.5	1.1	ND<0.5	---	---	---
	08/17/94		39.53			14.95	39.53	62	34.58	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/18/94					14.46	25.07	98	1.3	0.6	ND<0.5	ND<0.5	---	---	---
	12/06/95					13.82	25.71	ND	0.6	ND	ND	ND	---	---	---
	02/14/96					11.24	28.29	ND	ND	2.3	ND	0.71	---	---	---
	10/29/96					13.50	26.03	140	ND	ND	ND	ND	---	---	---
	01/29/97					12.65	26.88	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-4	04/30/97					13.97	25.56	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
(Cont'd)	07/31/97					12.70	26.83	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					13.95	25.58	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					11.90	27.63	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					13.92	25.61	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					10.80	28.73	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					12.60	26.93	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					12.60	26.93	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					12.61	26.92	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	6.2	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50*	---	---
	09/23/02[a]					---	---	---	---	---	---	---	---	---	---
	12/09/02	P				13.36	26.17	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	2.4	6.6
	02/11/03[e]	P				11.82	27.71	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.53	1.8	6.6
	06/27/03	P				12.12	27.41	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.2	6.7
	09/04/03[a]					---	---	---	---	---	---	---	---	---	---
	11/17/03					13.09	26.44	---	---	---	---	---	---	---	---
	03/01/04[i]	**P**				**10.95**	**28.58**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**1.2**	**6.7**
A-5	12/24/91		38.94	10.0	31.5	16.85	22.09	1,600	21	ND<0.30	32	52	---	---	---
	03/10/92					13.83	25.11	1,000	1.6	ND<0.30	43	100	---	---	---
	06/09/92					14.91	24.03	680	34	ND<1.5	14	16	---	---	---
	09/14/92					16.14	22.80	770	12	ND<0.30	51	65	---	---	---
	11/12/92					16.35	22.59	520	3.0	ND<2.5	29	36	---	---	---
	02/11/93					13.21	25.73	150	1.6	0.96	5.1	1.5	---	---	---
	04/14/93					12.97	25.97	190	5.4	ND<0.5	1.5	0.97	---	---	---
	08/12/93					14.12	24.82	230	1.7	ND<0.5	5.3	0.94	---	---	---
	10/26/93					14.72	24.22	190	2.8	ND<0.5	5.5	2.0	---	---	---
	02/17/94		38.47			13.20	25.27	340	ND<0.5	ND<0.5	13	2.9	---	---	---
	05/03/94					13.08	25.39	170	1.4	ND<0.5	4.0	1.9	---	---	---
	08/17/94		38.54			14.18	24.36	270	0.6	ND<0.5	7.3	1.1	---	---	---
	11/18/94					13.73	24.81	338	---	ND<0.5	4.6	ND<0.5	---	---	---
	09/26/95		38.47			12.44	26.03	ND	0.63	1.1	ND	1.2	---	---	---

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ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-5	12/06/95					12.92	25.55	ND	ND	ND	ND	ND	---	---	---
(Cont'd)	02/14/96					10.76	27.71	ND	ND	2.0	ND	1.1	---	---	---
	10/29/96					12.35	26.12	ND	ND	ND	ND	ND	---	---	---
	01/29/97					10.85	27.62	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					13.56	24.91	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					11.80	26.67	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					12.20	26.27	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					10.12	28.35	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					13.50	24.97	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					10.20	28.27	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					11.50	26.97	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					10.15	28.32	ND<50	0.32	0.38	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					11.50	26.97	ND<50	ND<0.3	ND<0.3	ND<0.3	0.58	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	5.0	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.2*	---	---
	09/23/02	P				12.55	25.92	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.50	1.30	1.0	6.7
	12/09/02	P				12.60	25.87	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	1.9	6.6
	02/11/03[e]	P				11.37	27.10	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.97	1.2	6.7
	06/27/03	P				11.55	26.92	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.98	1.5	6.8
	09/04/03	P				12.21	26.26	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.50	3.1	7.0
	11/17/03					12.37	26.10	---	---	---	---	---	---	---	---
	03/01/04[f]	**P**	**41.00**			**10.90**	**30.10**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**0.77**	**3.2**	**6.7**
A-6	12/24/91		39.07	NA	NA	16.88	22.19	ND<30	ND<0.3	ND<0.3	ND<0.3	ND<0.3	---	---	---
	03/10/92					13.73	25.34	ND<30	ND<0.3	ND<0.3	ND<0.3	ND<0.3	---	---	---
	06/09/92					14.95	24.12	ND<30	ND<0.3	ND<0.3	ND<0.3	ND<0.3	---	---	---
	09/14/92					16.20	22.87	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/12/92					16.35	22.72	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	02/11/93					13.04	26.03	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	04/14/93					12.23	26.84	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/12/93					14.18	24.89	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	10/26/93					14.85	24.22	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	05/03/94					13.66	25.41	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-6	08/17/94		38.78			14.34	24.44	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
(Cont'd)	11/18/94					13.76	25.02	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	09/26/95					12.56	26.22	ND	ND	ND	ND	ND	---	---	---
	12/06/95					13.18	25.60	ND	ND	ND	ND	ND	---	---	---
	02/14/96					12.46	26.32	ND	ND	ND	ND	ND	---	---	---
	10/29/96					12.40	26.38	50	ND	ND	ND	ND	---	---	---
	01/29/97					13.85	24.93	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					12.49	26.29	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					12.10	26.68	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					15.20	23.58	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					13.80	24.98	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					12.45	26.33	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					10.30	28.48	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					11.10	27.68	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					10.40	28.38	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					13.80	24.98	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	5.7	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50*	---	---
	09/23/02	P				12.61	26.17	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.50	ND<0.500	1.4	6.8
	12/09/02	P				12.67	26.11	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	2.6	6.7
	02/11/03[e]	P				11.21	27.57	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.0	6.7
	06/27/03	P				11.60	27.18	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	5.0	6.9
	09/04/03	P				12.29	26.49	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.8	6.9
	11/17/03					12.44	26.34	---	---	---	---	---	---	---	---
	03/01/04[i]		**41.25**			**10.45**	**30.80**	---	---	---	---	---	---	---	---
A-7	12/24/91		39.95	10.0	35.0	18.11	21.84	10,000	88	16	170	610	---	---	---
	03/10/92					15.30	24.65	320	9.3	0.54	8.8	34	---	---	---
	06/09/92					16.12	23.83	340	11	1.1	8.9	26	---	---	---
	09/14/92					17.35	22.60	510	12	ND<2.0	30	51	---	---	---
	11/12/92					17.47	22.48	760	17	0.83	50	73	---	---	---
	02/11/93					13.80	26.15	260	20	1.0	11	21	---	---	---
	04/14/93					13.60	26.35	1,300	89	2.1	48	87	---	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-7	08/12/93					15.54	24.41	360	9.0	ND<0.50	13	9.0	---	---	---
(Cont'd)	10/26/93					16.28	23.67	99	1.7	ND<0.50	4.0	3.0	---	---	---
	02/17/94		39.38			14.44	24.94	1,300	38	ND<1	35	25	---	---	---
	05/03/94					14.34	25.04	330	8.1	ND<0.5	7.8	3.7	---	---	---
	08/17/94		39.45			15.40	24.05	350	2.2	ND<0.5	9.6	3.6	---	---	---
	11/18/94					14.95	24.50	412	1.3	ND<0.5	6.2	2	---	---	---
	09/26/95		39.38			13.92	25.46	ND	ND	ND	ND	ND	---	---	---
	12/06/95					14.42	24.96	ND	ND	ND	ND	ND	---	---	---
	02/14/96					12.38	27.00	ND	ND	1.1	ND	0.59	---	---	---
	10/29/96					12.33	27.05	ND	ND	ND	ND	ND	---	---	---
	01/29/97					13.10	26.28	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					11.70	27.68	ND<20	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					13.25	26.13	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					14.42	24.96	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					13.00	26.38	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					11.65	27.73	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					11.20	28.18	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					13.75	25.63	51	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					14.45	24.93	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					13.74	25.64	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	4.8	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	7.2*	---	---
	09/23/02	P				13.78	25.60	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.50	3.48	0.8	6.7
	12/09/02	P				13.97	25.41	ND<50.0	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	2.2	6.8
	02/11/03[a]	P				12.35	27.03	54	ND<0.50	ND<0.50	ND<0.50	ND<0.50	21	1.7	6.3
	06/27/03	P				12.95	26.43	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	9.4	1.3	6.8
	09/04/03	P				13.59	25.79	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.4	2.6	6.9
	11/17/03	P				13.84	25.54	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.4	3.5	6.5
	03/01/04[l]	**P**	**41.94**			**12.65**	**29.29**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**1.1**	**3.5**	**6.7**
A-8	09/14/92		37.23	10.0	35.0	14.19	23.04	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/12/92					14.35	22.88	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	02/11/93					11.25	25.98	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-8	04/14/93					12.33	24.90	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
(Cont'd)	08/12/93					12.41	24.82	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	10/26/93					13.02	24.21	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	02/17/94		36.76			11.47	25.29	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	05/03/94					11.35	25.41	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/17/94		36.84			12.34	24.50	ND<50	ND<0.5	1.7	ND<0.5	1.4	---	---	---
	11/18/94					11.90	24.94	ND<50	1.0	ND<0.5	ND<0.5	ND<0.5	---	---	---
	09/26/95		36.76			10.94	25.82	ND<50	ND	ND	ND	ND	---	---	---
	12/06/95					11.42	25.34	ND<50	ND	ND	ND	ND	---	---	---
	02/14/96					8.80	27.96	ND<50	ND	0.48	ND	ND	---	---	---
	10/29/96					11.30	25.46	ND<50	ND	ND	ND	ND	---	---	---
	01/29/97					7.60	29.16	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					10.54	26.22	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					11.20	25.56	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					12.14	24.62	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					4.43	32.33	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					10.55	26.21	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					9.07	27.69	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					12.12	24.64	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					9.60	27.16	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					9.08	27.68	ND<50	ND<0.3	ND<0.3	ND<0.3	1.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	5.6	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50*	---	---
	09/23/02	P				10.75	26.01	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.50	ND<0.500	1.0	6.8
	12/09/02	P				10.81	25.95	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	2.1	6.6
	02/11/03[e]	P				9.90	26.86	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.4	6.5
	06/27/03	P				9.73	27.03	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.0	6.8
	09/04/03	P				10.32	26.44	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.1	6.9
	11/17/03					10.55	26.21	---	---	---	---	---	---	---	---
	03/01/04[l]	**P**	**39.29**			**8.51**	**30.78**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**0.76**	**3.6**	**6.8**
A-9	09/14/92		38.71	10.0	35.0	16.12	22.59	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/12/92					16.29	22.42	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-9	02/11/93					12.31	26.40	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
(Cont'd)	04/14/93					12.01	26.70	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/12/93					13.90	24.81	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	10/26/93					14.86	23.85	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	02/17/94		38.19			12.99	25.20	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/17/94					14.03	24.16	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/18/94		37.24			13.44	23.80	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	09/26/95					12.43	25.81	ND<50	ND<0.5	ND	ND	ND	---	---	---
	12/06/95		38.19			13.14	25.05	ND<50	ND<0.5	ND	ND	ND	---	---	---
	02/14/96					9.05	29.14	ND<50	ND	1.8	0.49	0.82	---	---	---
	10/29/96					12.85	25.34	ND<50	ND	ND	ND	ND	---	---	---
	01/29/97					9.02	29.17	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/30/97					12.05	26.14	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<50	---	---
	07/31/97					12.18	26.01	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	10/22/97					7.45	30.74	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	01/28/98					21.25	16.94	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					12.10	26.09	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					10.40	27.79	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					1.55	24.64	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					12.05	26.14	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					7.43	30.76	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	4.3	---	---
	04/24/02					---	---	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50*	---	---
	09/23/02	P				12.35	25.84	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.50	ND<0.500	1.6	6.8
	12/09/02	P				12.37	25.82	ND<50	ND<0.500	ND<0.500	ND<0.500	ND<1.00	ND<5.00	3.2	7.1
	02/11/03[e]	P				10.97	27.22	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	3.0	6.7
	06/27/03	P				11.41	26.78	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.9	6.7
	09/04/03	P				12.00	26.19	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	2.3	6.9
	11/17/03					12.18	26.01	---	---	---	---	---	---	---	---
	03/01/04[i]	**P**	**40.73**			**10.30**	**30.43**	**ND<50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**ND<0.50**	**0.50**	**3.1**	**6.7**
A-10	12/07/92		38.94	NA	NA	16.81	22.13	660	30	ND<2.5	ND<2.5	ND<2.5	---	---	---
	02/11/93					13.15	25.79	210	ND<0.5	0.97	ND<0.5	ND<0.5	---	---	---

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ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Purge/ Not Purged	Casing Elevation (ft, MSL)	Top of Screen (ft, bgs)	Bottom of Screen (ft., bgs)	Depth to Groundwater (ft)	Groundwater Elevation (ft, MSL)	GRO/TPH-g (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	DO[g] (mg/L)	pH[g]
A-10	04/14/93					12.19	26.75	770	ND<0.5	3.0	0.76	1.9	---	---	---
(Cont'd)	08/12/93					14.87	24.07	390	ND<0.5	ND<0.5	ND<0.5	0.84	---	---	---
	10/26/93					15.65	23.29	290	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	02/17/94		38.66			14.16	24.50	52	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	05/03/94					14.00	24.66	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	08/17/94		38.72			15.08	23.64	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	11/18/94					14.68	24.04	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	---	---	---
	09/26/95		38.66			13.58	25.08	ND	ND	ND	ND	ND	---	---	---
	12/06/95					14.24	24.42	ND	ND	ND	ND	ND	---	---	---
	02/14/96					6.70	31.96	ND	ND	ND	ND	ND	---	---	---
	10/29/96					14.10	24.56	ND	ND	ND	ND	1.1	---	---	---
	01/29/97					11.20	24.46	ND<50	0.41	4.8	0.6	4.4	37	---	---
	04/30/97					12.66	26.00	ND<20	0.40	4.2	0.5	3.8	50	---	---
	07/31/97					13.20	25.46	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/22/98					12.60	26.06	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	07/08/98					8.08	30.58	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	10/22/98					11.15	27.51	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/13/99					9.60	29.06	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<20	---	---
	04/29/99					11.15	27.51	ND<50	ND<0.3	ND<0.3	ND<0.3	ND<0.5	ND<5	---	---
	01/15/02					---	---	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5	17	---	---
	04/24/02					---	---	NS	NS	NS	NS	NS	NS	---	---
	09/23/02					DRY	DRY	NS	NS	NS	NS	NS	NS	NS	NS
	12/19/02	P				12.75	25.91	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<2.5 (c)	---	---
	02/11/03[g]	P				12.21	26.45	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.9	1.3	6.7
	06/27/03	P				12.66	26.00	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	0.99	0.8	7.2
	09/04/03	P				13.31	25.35	ND<50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	1.1	0.9	6.9
	11/17/03					13.27	25.39	---	---	---	---	---	---	---	---
	03/01/04[l]		**41.22**			**11.55**	**29.67**	---	---	---	---	---	---	---	---

Table 1
Groundwater Elevation and Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Notes: Please note that beginning in the Fourth Quarter 2003, the laboratory modified the reported analyte list. Total Petroleum Hydrocarbons as Gasoline (TPH-g) has been changed to Gasoline Range Organics (GRO). The resulting data may be impacted by the potential inclusion of non-TPH-g analytes within the requested fuel range resulting in a higher concentration being reported.

" --- "	= Not analyzed/Not Measured/Not available.
DO	= Dissolved oxygen.
GRO	= Gasoline Range Organics, C6 - C10 Range
µg/L	= Micrograms per liter.
MSL	= Mean Sea Level.
MTBE	= Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted (prior to 2/11/03).
ND <	= Not detected at or above the laboratory reporting limits.
NP	= No Purge.
P	= Purge.
TPH -g	= Total Petroleum Hydrocarbons quantified as gasoline and analyzed using EPA Method 8015B Modified (prior to 2/11/03).
*	= Analyzed by EPA Method 8260B.
^	= Analytical results as measured by EPA Methods 8020 / 8260.
(a)	= well inaccessible.
(b)	= The analyte concentration may be artificially elevated due to coeluting compounds or components.
(c)	= The closing calibration was outside acceptance limits by 2%. This should be considered in evaluating the results. The average % difference for all analytes. met the 15% requirement and the QC suggests that the calibration linearity is not a factor.
(d)	= Estimated value. The reported value exceeds the calibration range of the analysis.
(e)	= TPH-g, BTEX, and MTBE analyzed by EPA method 8260 B beginning first quarter monitoring event (2/11/03).
(f)	= Unable to gauge because the bolt was warped on the well head.
(g)	= DO and pH are field measurements.
(h)	= Well MW-3 top of casing was lowered by 0.17 feet during repairs on 11/14/03.
(i)	= Well Surveyed to NAVD'88 datum on 2/23/04.
Source	=The data in this table prior to September 2002 was provided to URS by ARCO and its previous consultants. URS has not verified the accuracy of this data.

April 2, 2003

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

Subject: Results of a Dual Phase Extraction Test
ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California
URS Project #38486037

Dear Mr. Supple:

On behalf of Atlantic Richfield Company (ARCO – an affiliated company of the Group Environmental Management Company), URS Corporation (URS) is submitting this report to document the results of a dual phase extraction (DPE) pilot test at ARCO Service Station #5387, located at 20200 Hesperian Boulevard in Hayward, California (the Site, Figure 1). The DPE pilot test was conducted on November 4 through November 9, 2002. The purpose of the pilot test was primarily to mitigate soil and groundwater impacted by hydrocarbons and methyl tertiary butyl ether (MTBE) at the site and secondarily to evaluate the applicability and effectiveness of DPE technology as a long term mitigation process if needed. A summary of previous investigations and the pilot test set-up and results are described below.

SITE HYDROGEOLOGY AND PREVIOUS INVESTIGATIONS

The dominant site lithology is a sequence of dark clays grading into sands and gravels at depth greater than 20 ft bgs. Groundwater flow is generally to the west, and groundwater depth is typically approximately 12 feet bgs (Groundwater Technology, 1986). The site is located 0.2 miles north of Sulphur Creek in San Lorenzo and approximately 2.5 miles east of San Francisco Bay.

An aquifer pumping and recovery test was performed at the site by GeoStrategies, Inc. on October 13 and 14, 1992 utilizing recovery well AR-1. GeoStrategies 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 transmissivity values from the field data plots ranged between 4,147 gallons per day per foot (gpd/ft) to 11,000 gpd/ft. Storativity ranged between 1.09×10^{-4} and 9.92×10^{-2}. Storativity values appear to represent an aquifer that is unconfined to semi-confined. The maximum 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).

GeoStrategies performed two vapor extraction tests (VET) and one vapor extraction/air sparging test (VEAT) at the site on March 24, 1993. A fourth VET was performed on August 13, 1993 at the site. 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 lbs/day to 60.7 lbs/day.

SYSTEM SET-UP

The DPE pilot test was conducted using a trailer mounted Solleco 400 ACFM Liquid Ring Thermal Oxidizer connected to extraction wells MW-2 and AR-2, and extraction pipe EP-1 (Figure 2). The DPE system is capable of generating flow rates up to 200 cubic feet per minute (cfm) and vacuums up to 27 inches of mercury (inHg). The thermal oxidizer was used to abate extracted soil vapors in accordance with permit conditions established by the Bay Area Air Quality Management District (BAAQMD).

Extracted groundwater was temporarily stored onsite in a 6,900 gallon Baker tank and later disposed of at Romic Environmental (groundwater waste manifests are located in Attachment E).

DPE PILOT TEST

The DPE pilot test was performed by extracting soil vapors and total fluids with a one inch hose placed inside of monitoring wells MW-2, AR-2 and extraction pipe EP-1 (Figure 2). Well MW-2 is a 2-inch diameter well installed 12 feet southwest of the northern dispenser island (dispenser one). Well MW-2 is screened from approximately 5 to 30 feet bsg. Well AR-2 is a 6-inch diameter well installed ten feet north of MW-2. Well AR-2 is screened from approximately 5 to 35 feet bsg. Soil boring and well construction logs are located in Attachment A. Extraction pipe EP-1 is 2 inch diameter T-shaped PVC pipe located to the southwest of dispenser one. EP-1 extends vertically 7 feet below ground surface and then connects to the screened horizontal T-section that is 5 feet long. EP-1 was installed in February 2002 during the over-excavation of 40 cubic yards of soil to the southwest of dispenser one.

The DPE test was conducted 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 November 4, the system was delivered to the site and hooked up to the three extraction points described above: MW-2, AR-2, and EP-1. On November 6, 2003 a URS technician shut the system down due to a high level of accumulated water in the holding tank. The system was started up again on

November 7, 2002 with all three extraction points operating after another Baker Tank was delivered.

Field data was collected from the extraction unit and from selected wells to assess influence from the system (see bullet items below). Vacuum data could not be collected for any of the extraction wells because well caps fitted with a magnehelic gauge did not fit inside the well boxes. Prior to the start of the pilot test, depth-to-groundwater measurements were collected in monitoring wells AR-2 and MW-2. No groundwater measurements were collected from extraction pipe EP-1 because the pipe runs horizontally above the groundwater table.

The following data were recorded periodically on field activity sheets (Attachment B) during the pilot test:

- Total system groundwater recovery rates in gallons.
- Total system operation in hours.
- Total influent system vacuums in inches of mercury (inHg).
- System influent hydrocarbon vapor concentrations in parts per million by volume (ppmv).
- Photo Ionization Detector (PID) readings on vapor from extraction points MW-2, AR-2, and EP-1.

Soil vapor influent samples were collected at the initial startup of the system and at the end of the test. Samples were not collected at the mid-point of the test because the system was not running. Samples were submitted to a California State Certified laboratory, Sequoia Analytical Laboratory in Morgan Hill, California for analysis. Vapor samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg) by EPA Method 8015B, benzene, toluene, ethylbenzene, total xylenes (BTEX), methyl tert-butyl ether (MTBE) by EPA Method 8020. A summary of the air analytical results are tabulated in Table 1. Laboratory analytical reports and chain-of-custody documentation are presented in Attachment B.

Groundwater analytical results from third and fourth quarters 2002 were used in an effort to provide a representative estimate of the hydrocarbon mass (including MTBE) removed from extracting groundwater. These results are tabulated in Table 2. Laboratory analytical reports and chain-of-custody documentation are presented in Attachment D.

Dillard Environmental removed a total of 12,300 gallons of water from the site and transported it to Romic Environmental Technologies Corporation in East Palo Alto, California for disposal. Copies of the waste manifests are located in Attachment E.

RESULTS AND DISCUSSION FOR DPE PILOT TEST

Based on a pump performance curve (Attachment F), the vapor flow rate was approximately 300 ACFM during the test. The total vacuum for the system ranged from 20 inHg to 22 inHg with an average system vacuum of 20.75 inHg. Based on the laboratory results, the influent TPHg vapor concentrations during the test ranged from 2.9 to 20 ppmv for well AR-2 and remained below the

detection limit of 2.5 ppmv for well MW-2 (Table 1). A vapor sample collected from EP-1 the end of the test reported 200 ppmv. Assuming the molecular weight for gasoline to be100 grams during the pilot test a total of 9.3 pounds of TPHg and 0.05 pounds of MTBE were removed as vapor.

During the pilot test, approximately 12,300 gallons of groundwater was extracted at an average rate of 1.71 gpm. Approximately 0.06 pounds of TPHg and 0.01 pounds of MTBE were removed from groundwater during the pilot test (Table 2). MTBE detections at AR-2 decreased from 4.43 µg/L to below the detection limit of 5.0 µg/L from third to fourth quarter (after the DPE test). Well MW-2 showed an increase in MTBE from 228 µg/L to 529 µg/L from third to fourth quarter 2002. The results from the pilot test are summarized below:

EP-1, MW-2 and AR-2
PILOT TEST RESULTS SUMMARY

Approximate Total Hours Operated (hours)	Total Water Discharge (gallons)	Average Water Flowrate (gpm)	Total TPHg Extracted in Groundwater (lbs)	Total MTBE Extracted in Groundwater (lbs)	Total TPHg Extracted as Vapor (lbs)	Total MTBE Extracted as Vapor (lbs)
120	12,300	1.71	0.07	0.01	9.36	0.060

CONCLUSIONS

In conclusion, the test results indicate limited success using DPE on wells MW-2 and AR-1 to mitigate soil and groundwater impacted by hydrocarbons and MTBE. The recent increase in concentrations of MTBE at AR-1, MW-1, and MW-2 may be the result of constituents from the vadose zone being flushed into the groundwater by increased infiltration of precipitation. Approximately 20 to 25 percent of the ground surface at the site is now dirt rather than asphalt and concrete allowing for increased infiltration. The dirt areas were left after the removal of four underground storage tanks, product lines, and dispensers in February 2002.

Possible future corrective action activities for this site could include 1) interim groundwater extraction by a vacuum truck, 2) Soil Vapor Extraction (SVE) or 3) the addition of a chemical oxidant to increase dissolved oxygen (DO) concentrations beneath the site and thus increase the biological degradation of contaminants. Wells to be considered in future corrective action activities are MW-1, MW-2, AR-1, and AR-2. Continued quarterly groundwater sampling is recommended to monitor MTBE and hydrocarbon concentration trends. Analysis of bioremediation parameters (DO, alkalinity, nitrate, sulfate and ferrous iron) could be added to the next quarterly groundwater monitoring event to better evaluate the affects of natural attenuation at the site.

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

Sincerely,

URS Corporation

Scott Robinson
Project Manager

Erin Garner, CHG 0243
Project Director

Attachments: Figure 1 - Site Location Map
Figure 2 - Well Location Map
Table 1 - Pilot Test Air Analytical Data
Table 2 - Groundwater Analytical Data
Attachment A - Soil Boring/Well Construction Logs
Attachment B - Field Data Sheets
Attachment C - Air Sampling Certified Analytical Reports and Chain-of-Custody Records
Attachment D - Third & Fourth Quarter Certified Analytical Reports and Chain-of-Custody Records
Attachment E - Groundwater Waste Manifests
Attachment F – Pump Performance Curve

cc: Mr. Amir Gholami, Alameda County Health Care Services Agency, 1131 Harbor Bay Parkway, 2nd Floor, Alameda, CA 94502

Table 2
Groundwater Analytical Data

ARCO Service Station #5387
20200 Hesperian Blvd.
Hayward, California

Well Number	Date Sampled	Estimated Groundwater Extracted (gallons)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	TPH as Gasoline (µg/L)	MTBE (µg/L)
AR-2	07/08/98		<0.3	<0.3	<0.3	<0.5	<50	<5
	10/22/98		<0.3	<0.3	<0.3	<0.5	<50	<5
	01/13/99		<0.3	0.40	<0.3	0.53	<50	<20
	04/29/99		<0.3	<0.3	<0.3	0.82	<50	<5
	01/15/02		<0.5	<0.5	<0.5	<0.5	<50	17
	04/24/02		ND<0.50	ND<0.50	ND<0.50	ND<0.50	<50	39*
	09/23/02	**6,150**	**<0.5**	**<0.5**	**<0.5**	**<1.5**	**<50**	**4.43**
	12/09/02		**<0.5**	**<0.5**	**<0.5**	**<1.0**	**<50**	**<5.0**
Estimated Source Removal							**0.0 lbs.**	**0.0002 lbs.**
MW-2	07/08/98		<0.3	<0.3	<0.3	<0.5	78	97
	10/22/98		0.37	2.0	0.91	0.73	270	26
	01/13/99		5.8	1.0	1.4	1.1	650	<20
	04/29/99		<0.3	<0.3	<0.3	<0.5	<50	23
	01/15/02		15	4.5	<0.5	<0.5	1,200	190
	04/24/02		18	ND<10	ND<10	ND<10	1,300	170*
	09/23/02	**6,150**	**11.2**	**0.730**	**<0.5**	**<1.5**	**1,440**	**228**
	12/09/02		**8.08**	**0.694**	**2.47**	**3.79**	**1,770**	**529**
Estimated Source Removal							**0.07 lbs.**	**0.01 lbs.**
Total Estimated Source Removal							**0.07 lbs**	**0.01 lbs.**

TPH = Total Petroleum Hydrocarbons

MTBE = Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted

µg/L = Micrograms per liter

Note: The amount of groundwater extracted from each well was calculated by dividing the systems total groundwater extracted by the number of groundwater wells being extracted.

Table 1
Pilot Test Air Analytical Data

ARCO Service Station #5387
20200 Hesperian Boulevard
Hayward, California

Well Number	Date Sampled	Time	Benzene (ppmv)	Toluene (ppmv)	Ethyl-benzene (ppmv)	Total Xylenes (ppmv)	Gasoline Range Organics* (ppmv)	MTBE (ppmv)
MW-2	11/04/02	14:25	ND<0.031	ND<0.027	ND<0.023	0.11	ND<2.4	ND<0.14
	11/09/02	13:15	ND<0.031	ND<0.027	ND<0.023	0.069	ND<2.4	ND<0.14
AR-2	11/04/02	14:20	ND<0.031	ND<0.027	ND<0.023	0.17	2.9 [1]	0.26
	11/09/02	13:20	ND<0.031	ND<0.027	ND<0.023	0.13	20 [2]	0.28
EP-1	11/04/02	--	NA	NA	NA	NA	NA	NA
	11/09/02	13:25	0.59	1.4	0.48	2.0	200 [2]	1.0

Total Estimated TPHg Removal 9.36 lbs
Total Estimated MTBE Removal 0.060 lbs

* = Gasoline Range Organics (C6-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.

TPH = Total Petroleum Hydrocarbons

MTBE = Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted

µg/L = Micrograms per liter

NA = Not analyzed

ND = Not Detected at or above the reporting limit

Note: It was assumed that the molecular weight for TPHg is 100 grams. It was assumed that the average concentrations for each well contributed one third to the system influent concentration. The capacity for the system (300 ACFM) was extrapulated from the system vacuum curve.

Delta
Environmental
Consultants, Inc.

3164 Gold Camp Drive
Suite 200
Rancho Cordova, CA 95670-6021
U.S.A.
916/638-2085
FAX: 916/638-8385

March 1, 2002

Mr. Robert Weston
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502

Subject: *Tank Basin, Product Line and Dispenser Island Sampling Results*
ARCO Station No. 5387
20200 Hesperian Boulevard
Hayward, California
Delta Project No. D000-318

Dear Mr. Weston:

Delta Environmental Consultants, Inc. (Delta) has been authorized by Atlantic Richfield Company to conduct soil sampling during the removal of the underground storage tanks (USTs), product distribution lines, and product dispenser islands at ARCO Service Station No. 5387, located at 20200 Hesperian Boulevard, Hayward, California (Figure 1). Site details are illustrated in Figure 2. This report summarizes the sampling activities and analytical results for samples collected during the UST, product line and dispenser removal activities. Field activities were performed in accordance with Delta's field methods and procedures outlined in Enclosure A.

Underground Storage Tank Removal

On February 1, and 5 through 7, 2002, four USTs (12,000; 10,000; 8,000; and 6,000 gallon) were excavated and inspected upon removal. Paradiso Mechanical, Inc. was contracted by Atlantic Richfield Company to obtain all necessary tank removal permits, make all required preliminary notifications, and to clean, remove and dispose of the USTs. ECI Services transported the tanks to their facility in Richmond, California under a uniform hazardous waste manifest. Pertinent information concerning the UST removal activities is summarized below: Copies of the Uniform Hazardous Waste Manifests are included in Enclosure B.

Lead Agency:	Alameda County Health Care Services Agency
Agency Contact Name:	Robert Weston
Agency Phone Number:	(510) 567-6781
UST Cleaning Contractor:	Paradiso Mechanical, Inc. 2600 Williams Street, San Leandro, CA 94577
Final Disposition of Rinseate:	Romic Environmental, 2081 Bay Road, East Palo Alto, CA 94303
Final Disposition of USTs:	Ecology Control Industries, 255 Parr Blvd., Richmond, California

Due to the locations of sparging wells AS-5 and AS-8 and vapor extraction well AV-3 near the UST basin, the wells were permitted for and abandoned by grouting methods. A well abandonment completion letter is currently being prepared.

Product Lines and Dispenser Islands Soil Sampling Results

A Delta representative was on site March 1, 2002 to conduct soil sampling during product line and dispenser removal activities. A representative from Alameda County Health Care Services Agency (ACHCSA) was on site to observe the sampling. Soil samples were collected beneath the dispensers following their removal. Dispenser soil samples DP-1 through DP-4 were collected at depths ranging from 3.5 to 7.0 feet below surface grade (bsg). Product line soil samples PL-1 and PL-2 were collected within the product line trench at depths ranging from 4.5 to 5.0 feet bsg. The soil sample locations are shown in Figure 3.

Soil samples were submitted to Sequoia Analytical Laboratory (Sequoia) in Sacramento, California for chemical analyses of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons as gasoline (TPHg) using DHS LUFT method, tert-butyl alcohol (TBA), di-isopropyl ether (DIPE), ethyl tert-butyl ether (ETBE), ethanol, and methyl tertiary butyl ether (MTBE) using EPA Method 8260B, and total lead using EPA 6000/7000 Series Methods. Soil sample analytical results are summarized in Tables 1 and 2.

Total petroleum hydrocarbon as gasoline concentrations were reported in soil samples DP-1-3.5 at 16 milligrams per kilogram (mg/kg) and DP-1-7 at 1,800 mg/kg. Benzene concentrations ranged from 0.0060 mg/kg in soil sample PL-2-5 to 0.19 mg/kg in soil sample DP-1-3. Methyl tertiary butyl ether concentrations ranged from 0.033 mg/kg in soil sample PL-2-5 to 19 mg/kg in soil sample DP-1-7. A copy of the laboratory analytical reports with chain-of-custody documentation is included in Enclosure C.

Underground Storage Tanks Sampling Results

A Delta representative was on site February 1 and 5, 2002 to conduct soil sampling following the removal of the USTs. A representative from ACHCSA was on site to observe the sampling. Soil samples were collected at approximately one foot beneath the USTs following their removal. Tank samples UST-1-14 through UST-8-14 were collected at a depth of approximately 14.0 feet bsg. The soil samples were submitted to Sequoia for analyses of TPHg, BTEX, MTBE, TBA, DIPE, ETBE, ethanol, and total lead using the previously described methods. The soil sample analytical results are summarized in Tables 1 and 2. The sample locations are shown on Figure 3.

Total petroleum hydrocarbon as gasoline concentrations ranged from 0.76 mg/kg in soil sample UST-3-14 to 110 mg/kg in soil sample UST-8-4. The laboratory did not detect benzene concentrations at or above the laboratory reporting limits. Methyl tertiary butyl ether concentrations ranged from 0.50 mg/kg in UST-2-14 to 2.0 mg/kg in UST-8-14. A copy of the laboratory analytical reports with chain-of-custody documentation is included in Enclosure C.

Over-excavation and Sampling

Following receipt of the analytical results from the February 1, 2002, sampling event, Delta was on site February 6 and 7, 2002, to observe and direct the over-excavation of the upper two feet of soil from beneath the former 6,000 and 8000-gallon USTs and limited over-excavation of soil in the area of dispenser one (DP-1). Approximately 60 and 40 cubic yards of soil were over-excavated from the tank basin area and around DP-1, respectively. Following completion of the over-excavation activities, confirmation soil samples UST-5-15 through UST-8-15, OE-DP-1-12 and OE-DP-1-12.3 were collected from the base of the over-excavations. The soil samples were submitted to Sequoia for analyses of

TPHg, BTEX, MTBE, TBA, DIPE, ETBE, ethanol, and total lead using the previously described methods. Soil sample analytical results are summarized in Tables 1 and 2. A copy of the laboratory analytical reports with chain-of-custody documentation is included in Enclosure C. The soil sample locations and the extent of the over-excavations are shown on Figure 4.

Total petroleum hydrocarbon as gasoline concentrations ranged from 16 mg/kg in soil sample OE-DP-1-12.3 to 360 mg/kg in soil sample OE-DP-1-12. A benzene concentration of 0.13 mg/kg was detected in soil sample OE-DP-1-12.3. Methyl tertiary butyl ether concentrations ranged from 0.22 mg/kg in soil sample UST-6-15 to 1.3 mg/kg in soil sample UST-8-15.

Disposal of Soil Stockpile

The excavated overburden from the gasoline UST basin, dispensers, and lines was stockpiled on site for disposal profile analysis. Two composite soil samples were collected and submitted to Sequoia for chemical analyses of BTEX, TPHg, and lead using the previously described methods. Upon verbal approval of the ACHCSA, the soil was re-used as backfill.

The impacted soil from the over-excavation activities was stockpiled and covered with visqueen separately from the re-usable stockpile. On February 14 and 15, 2002, Dillard Environmental Services removed 184.54 tons of over-excavated soil and transported it to Forward landfill in Manteca, California. A copy of the soil stockpile analytical reports with chain-of-custody documentation is included in Enclosure C. A copy of the completion letter for soil removed is included in Enclosure D.

Remarks/Signatures

The interpretations contained in this document represent our professional opinions and are based, in part, on information supplied by the client. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydro-geologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions regarding this project, please contact Steven W. Meeks at (916) 536-2613.

DELTA ENVIRONMENTAL CONSULTANTS, INC.

for

Brett A. Bardsley
Staff Geologist

Steven W. Meeks, P.E.
Project Manager
California Registered Civil Engineer No. C057461

REGISTERED PROFESSIONAL ENGINEER
STEVEN WHITTEN MEEKS
C 057461
Exp. 12/31/02
CIVIL
STATE OF CALIFORNIA
3/1/02

BAB (Lrp003.318)
Enclosures

cc: Mr. Paul Supple – Atlantic Richfield Company
Mr. Amir Gholami – Alameda County Health Care Services

TABLE 1

SOIL SAMPLE LABORATORY ANALYTICAL RESULTS

ARCO Service Station No. 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)	TPHg (mg/kg)	MTBE (mg/kg)	Lead (mg/kg)
Dispenser Island Samples									
DP-1-3.5	02/01/02	3.5	0.19	1.6	0.47	2.8	16	0.27	<10
DP-1-7	02/01/02	7.0	<1.0	36	25	140	1800	19	<10
DP-2-4	02/01/02	4.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.50	<0.0050	<10
DP-3-3.5	02/01/02	3.5	<0.0050	<0.0050	<0.0050	<0.0050	<0.50	<0.0050	<10
DP-4-4	02/01/02	4.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.50	<0.0050	<10
Product Line Samples									
PL-1-4.5	02/01/02	4.5	<0.0050	<0.0050	<0.0050	<0.0050	<0.50	<0.0050	<10
PL-2-5	02/01/02	5.0	0.0060	0.014	<0.0050	0.0080	<0.050	0.033	130
Tank Basin Samples									
UST-1-14	02/01/02	14.0	<0.025	<0.025	<0.025	0.029	8.1	<0.0050	<10
UST-2-14	02/01/02	14.0	<0.50	<0.0050	<0.0050	0.025	1.4	0.50	<12
UST-3-14	02/01/02	14.0	<0.025	0.041	<0.025	<0.025	0.76	0.67	<12
UST-4-14	02/01/02	14.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.50	<0.0050	<10
UST-5-14	02/05/02	14.0	<0.050	0.099	0.23	0.050	56	1.2	<10
UST-6-14	02/05/02	14.0	<0.050	0.28	0.70	2.2	100	0.74	20
UST-7-14	02/06/02	14.0	<0.050	<0.050	0.18	<0.050	42	1.5	<10
UST-8-14	02/06/02	14.0	<0.050	0.18	0.49	0.073	110	2.0	<10
Over-excavation Results									
OE-DP-1-12	12/06/02	12.0	<0.50	0.76	2.1	2.5	360	0.85	<10
OE-DP-1-12.3	12/06/02	12.3	0.13	0.42	0.15	0.12	16	0.59	<12
UST-5-15	02/07/02	15.0	<0.050	0.080	<0.050	<0.050	45	0.47	<10
UST-6-15	02/07/02	15.0	<0.050	0.87	0.80	0.70	270	0.22	<10
UST-7-15	02/07/02	15.0	<0.050	0.065	0.23	0.12	50	0.53	<10
UST-8-15	02/07/02	15.0	<0.050	0.081	0.086	0.28	43	1.3	<10
Soil Stockpile Results									
SP-(1,2,3,4)	02/01/02	---	<0.0050	0.012	<0.0050	0.011	0.66	NA	17
SP-(5,6,7,8)	02/01/02	---	<0.0050	<0.0050	<0.0050	<0.0050	<0.5	NA	660[1]/14
SP-(9,10,11,12)	02/01/02	---	0.23	2.9	3.2	14	250	NA	<10

[1] Sample result was believed to be anomolous based on other lead results from same stockpile and site soil samples. The exact same sample was re-run with a result of 14 mg/kg.

TPHg = Total petroleum hydrocarbons as gasoline

MTBE = Methyl tertiary butyl ether

NA = Not analyzed

--- = Not applicable

TABLE 2

SOIL SAMPLE OXYGENATES LABORATORY ANALYTICAL RESULTS

ARCO Service Station No. 5387
20200 Hesperian Blvd. Hayward,California

Sample ID	Date	Depth (ft)	TBA (mg/kg)	MTBE (mg/kg)	DIPE (mg/kg)	ETBE (mg/kg)	TAME (mg/kg)	Ethanol (mg/kg)
Dispenser Island Samples								
DP-1-1-3.5	02/01/02	3.5	<0.050	0.27	<0.0050	<0.0050	0.0050	NA
DP-1-7	02/01/02	7.0	4.1	19	<0.050	<0.050	21	NA
DP-2-4	02/01/02	4.0	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
DP-3-3.5	02/01/02	3.5	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
DP-4-4	02/01/02	4.0	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
Product Line Samples								
PL-1-4.5	02/01/02	4.5	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
PL-2-5	02/01/02	5.0	<0.050	0.033	<0.0050	<0.0050	<0.0050	NA
Tank Basin Samples								
UST-1-14	02/01/02	14.0	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
UST-2-14	02/01/02	14.0	<0.25	0.50	<0.025	<0.025	<0.025	NA
UST-3-14	02/01/02	14.0	<0.25	0.67	<0.025	<0.025	<0.025	NA
UST-4-14	02/01/02	14.0	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	NA
UST-5-14	02/05/02	14.0	<1.0	1.2	<0.10	0.10	<0.10	<10
UST-6-14	02/05/02	14.0	<5.0	0.74	<0.50	<0.50	<0.50	<50
UST-7-14	02/06/02	14.0	<2.0	1.5	<0.20	<0.20	<0.20	20
UST-8-14	02/06/02	14.0	<1.0	2.0	<0.10	<0.10	<0.10	<10
Over-excavation Results								
OE-DP-1-12	12/06/02	12.0	<5.0	<0.50	<0.50	<0.50	0.85	<50
OE-DP-1-12.3	12/06/02	12.3	<2.0	0.59	<0.20	<0.20	<20	<20
UST-5-15	02/07/02	15.0	<1.0	0.47	<0.10	<0.10	<0.10	<10
UST-6-15	02/07/02	15.0	<1.0	0.22	<0.10	<0.10	<0.10	<10
UST-7-15	02/07/02	15.0	<1.0	0.53	<0.10	<0.10	<0.10	<10
UST-8-15	02/07/02	15.0	<1.0	1.3	<0.10	<0.10	<0.10	<10

TBA = Tert-butyl alcohol

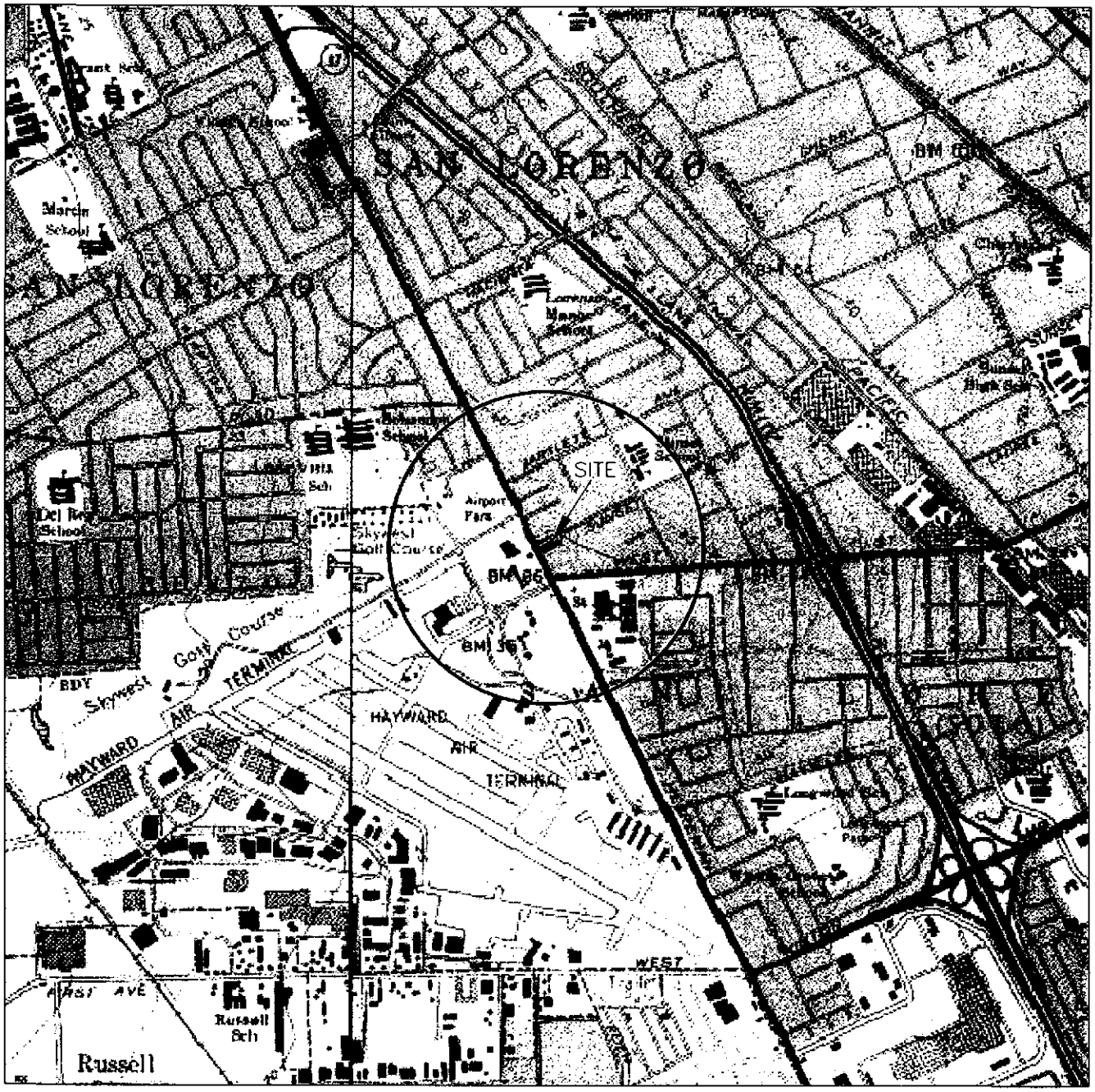
MTBE = Methyl tertiary butyl ether (analyzed by DHS LUFT)

DIPE = Di-isopropyl ether

ETBE =Ethyl ter-butyl ether

TAME = Tert-amyl methyl ether

NA = Not Analyzed



North

GENERAL NOTES:
BASE MAP FROM U.S.G.S.
SAN LEANDRO & HAYWARD, CA.
7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1980

QUADRANGLE LOCATION

0 2000 FT

SCALE 1:24,000

FIGURE 1

SITE TOPOGRAPHIC MAP

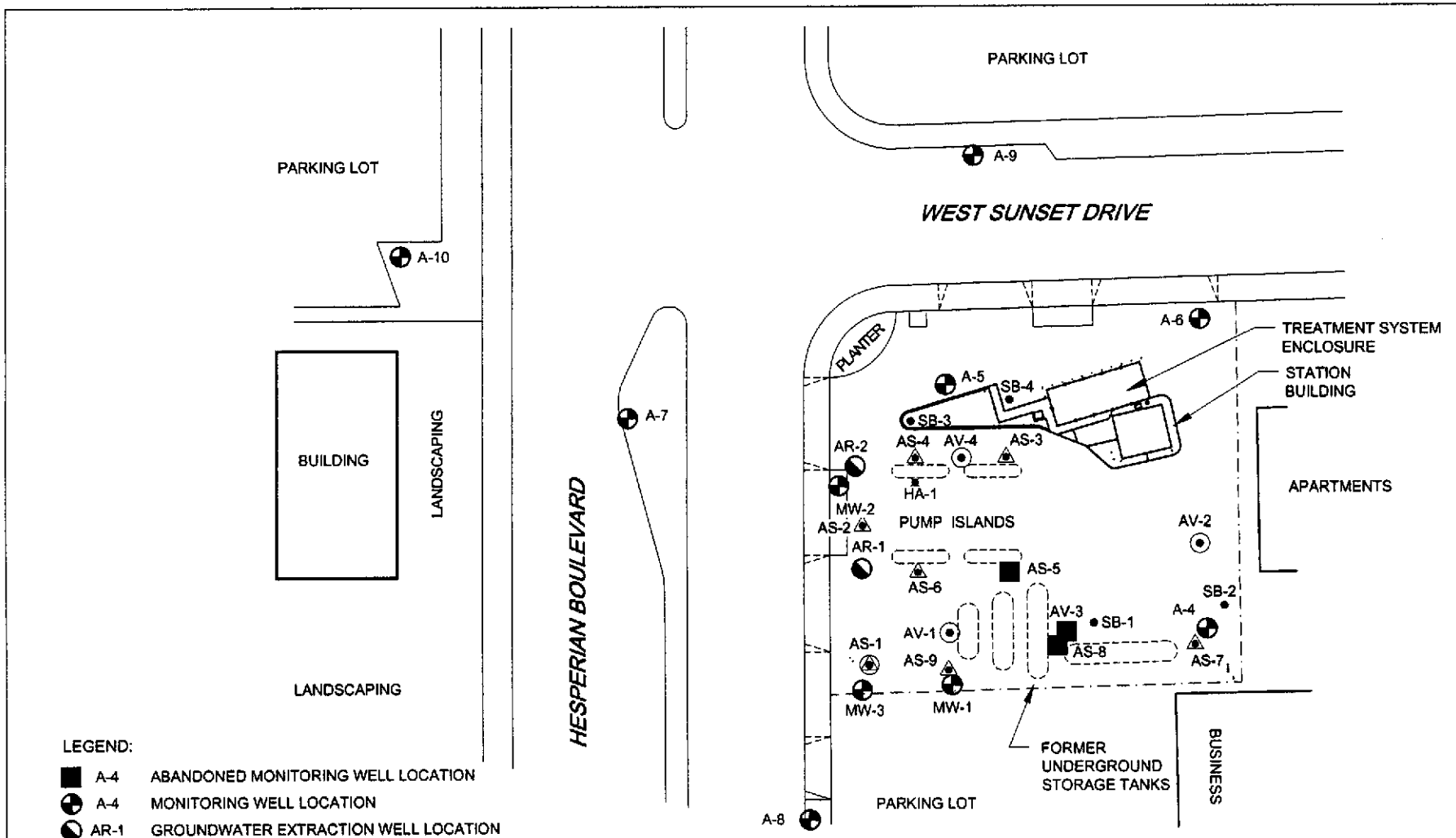
ARCO SERVICE STATION NO. 05387

20200 HESPERIAN BOULEVARD

HAYWARD, CA.

PROJECT NO. 0000-318	DRAWN BY M.L. 8/8/00
FILE NO. D000318A	PREPARED BY JWS
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.



LEGEND:

■	A-4	ABANDONED MONITORING WELL LOCATION
◕	A-4	MONITORING WELL LOCATION
◔	AR-1	GROUNDWATER EXTRACTION WELL LOCATION
⊙	AV-1	SOIL VAPOR EXTRACTION WELL LOCATION
▲	AS-2	AIR SPARGE WELL LOCATION
◈	AS-1	DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION
✱	HA-1	AIR SPARGE WELL LOCATION
•	SB-3	DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION

North

0 50 FT

SCALE

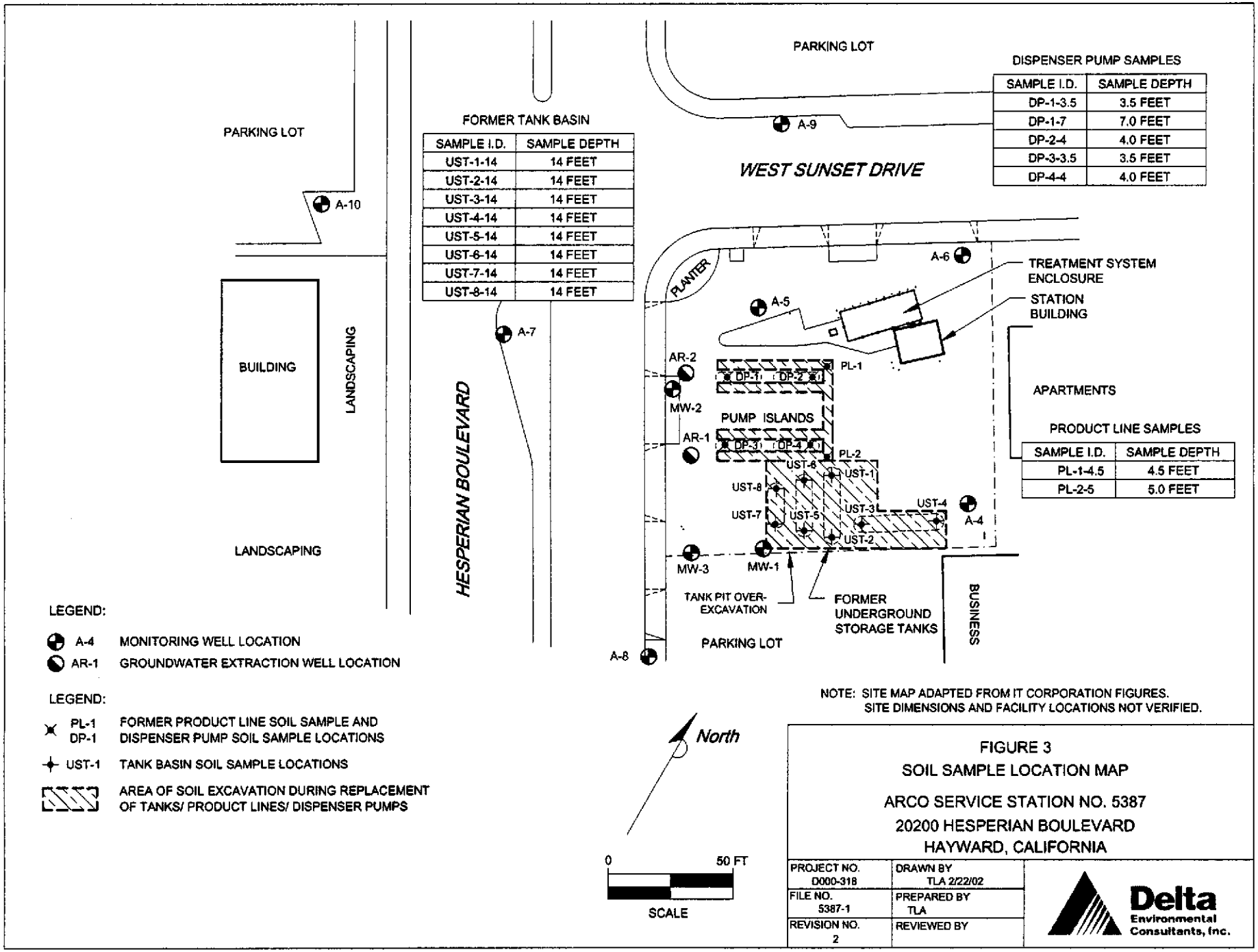
NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FIGURE 2
SITE MAP

ARCO SERVICE STATION NO. 5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

PROJECT NO. D000-318	DRAWN BY TLA 2/22/02
FILE NO. 5387-1	PREPARED BY TLA
REVISION NO. 3	REVIEWED BY

Delta Environmental Consultants, Inc.

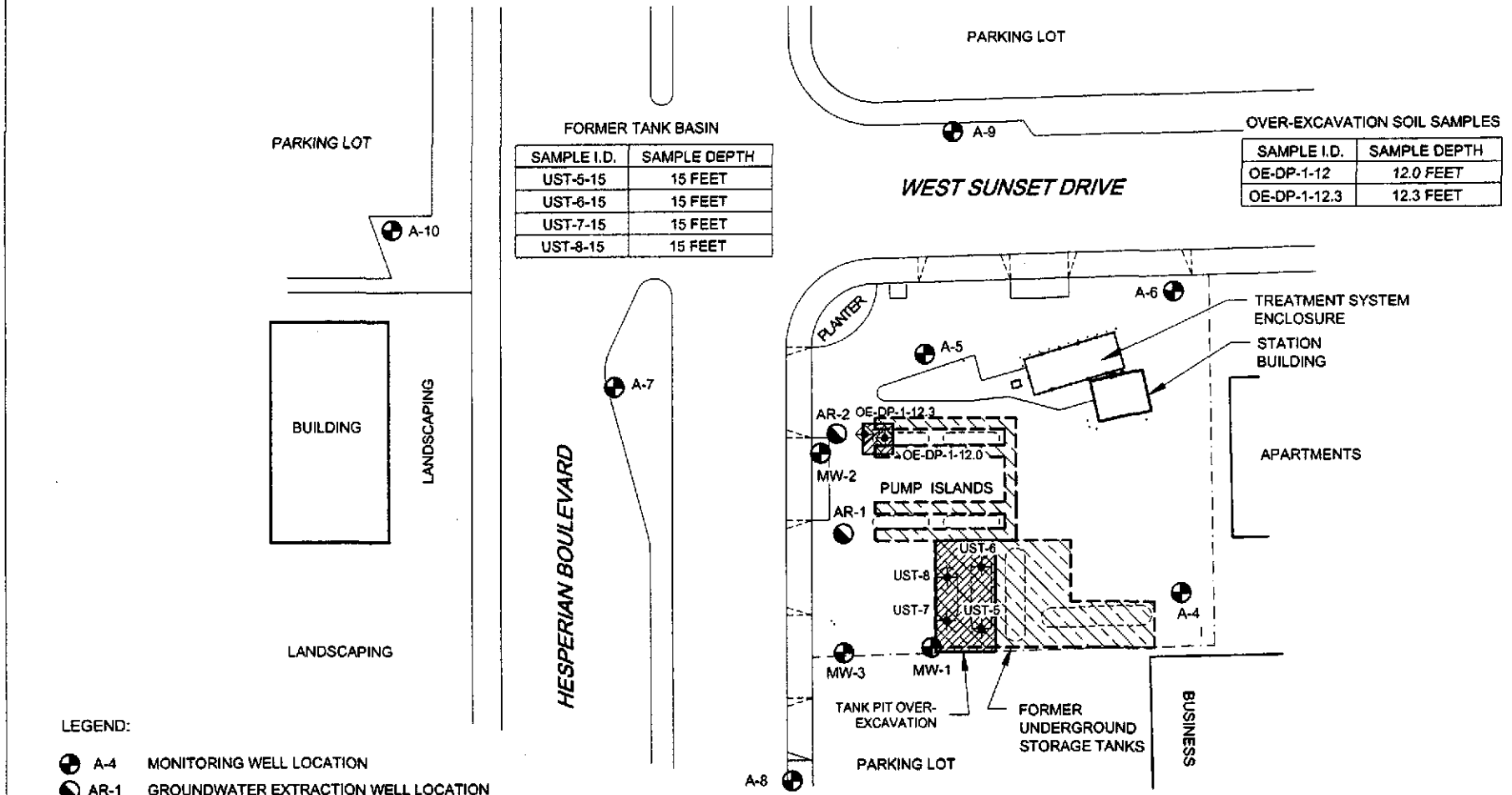


NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FIGURE 3
SOIL SAMPLE LOCATION MAP
ARCO SERVICE STATION NO. 5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

PROJECT NO. D000-318	DRAWN BY TLA 2/22/02
FILE NO. 5387-1	PREPARED BY TLA
REVISION NO. 2	REVIEWED BY

Delta Environmental Consultants, Inc.



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

FIGURE 4
OVER-EXCAVATION SOIL SAMPLE LOCATION MAP
ARCO SERVICE STATION NO. 5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

PROJECT NO. D000-318	DRAWN BY TLA 2/17/02
FILE NO. 5387-1	PREPARED BY TLA
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.

ENCLOSURE A
Field Methods and Procedures

FIELD METHODS AND PROCEDURES

ARCO Station No. 5387
20200 Hesperian Boulevard, Hayward, California

1.1 Health and Safety Plan

Delta personnel performed fieldwork in accordance with a Health and Safety Plan developed for the site. This plan described the basic safety requirements for the subsurface investigation at the site. The Health and Safety Plan was applicable to personnel and subcontractors of Delta. Personnel at the site were informed of the contents of the Health and Safety Plan prior to beginning work. A copy of the Health and Safety Plan was kept at the work site and was available for reference by appropriate parties during the work. The Delta geologist acted as the Site Safety Officer.

1.2 Soil Sampling and Contamination Reduction

Soil sampling was performed under the direction of Delta geologists. To reduce the chances of cross-contamination between samples, all sampling equipment was either steam-cleaned or washed with a non-phosphatic detergent between each sample location. To reduce cross-contamination between samples, the sampler was washed in a soap solution and double-rinsed between each sampling event.

1.3 Soil Sample Collection

Soil at the sample location was excavated to a depth of approximately 6 inches above the sampling depth. At this depth, a hand operated impact sampler lined with a 6-inch clean brass sampling tube was used to collect the soil sample. Soil cuttings collected immediately above the soil sample were placed into a Ziploc® bag and sealed for later screening with a PID. That part of the soil sample collected in the brass tube within the impact sampler was sealed with Teflon® sheeting and plastic caps, labeled and stored on ice at approximately 4° C for transport to the laboratory.

1.4 Soil Sample Screening/hNu Portable Photoionization Detector Method

After the soil sample Ziploc® bags had been brought to ambient temperature, the headspace vapors of the soil sample in the bag were screened with a PID equipped with a 10.2 eV lamp. The corner of the sample bag was opened and the detector probe immediately placed within the headspace. The highest observed reading was recorded. Field instruments such as the PID are useful for indicating relative levels of hydrocarbon vapors, but do not detect concentrations with the same precision as laboratory analyses.

1.5 Product Distribution Lines and Dispenser Sampling

Soil samples were collected following the removal of the product distribution lines and dispensers. Samples were collected approximately 2 feet below the backfill/native soil interface within the product line trench. If groundwater was encountered above the base of the excavation, soil samples were collected from the sidewalls of the excavations immediately above the groundwater. Following removal of the dispensers, one soil sample was collected approximately 2 feet below the backfill/native soil interface beneath each dispenser.

1.6 Soil Stockpile Sampling

Four soil samples will be collected from each 50 cubic yards of stockpiled soil, with each set of four samples to be composited in the laboratory prior to analyses. Soil samples will be collected in 2-inch diameter brass tubes that will be sealed with Teflon sheeting and plastic caps. The samples will be labeled, stored in an ice chest and cooled to approximately 4°C for transport to the laboratory.

2.0 ANALYTICAL PROCEDURES

Selected soil samples submitted to the laboratory were analyzed for BTEX, TPHg and MTBE using EPA Method 8260 and total lead using EPA Method 6010.

3.0 QUALITY ASSURANCE PLAN

This section describes the field and analytical procedures followed throughout the investigation.

3.1 General Sample Collection and Handling Procedures

Proper collection and handling are essential to ensure the quality of a sample. Each sample was collected in a suitable container, preserved correctly for the intended analysis, and stored prior to analysis for no longer than the maximum allowable holding time. Details on the procedures for collection and handling of soil samples used on this project can be found in Section 1.0 (Methods).

3.2 Sample Identification and Chain-of-Custody Procedures

Sample identification and chain-of-custody procedures ensure sample integrity and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis had a label affixed to identify the job number, sampler, date and time of sample collection, and a sample number unique to that sample. This information, in addition to a description of the sample, field measurements made, sampling methodology, names of on-site personnel, and any other pertinent field observations, was recorded on the borehole log or in the field records. A California-certified laboratory analyzed samples.

A chain-of-custody form was used to record possession of the sample from time of collection to its arrival at the laboratory. When the samples were shipped, the person in custody of them relinquished the samples by signing the chain-of-custody form and noting the time. The sample-control officer at the laboratory verified sample integrity and confirmed that the samples were collected in the proper container, preserved correctly, and that there was an adequate volume for analysis.

If these conditions were met, the sample was assigned a unique log number for identification throughout analysis and reporting. The log number was recorded on the chain-of-custody form and in the legally-required logbook maintained by the laboratory in the laboratory. The sample description, date received, client's name, and other relevant information was also recorded.

ENCLOSURE B

Uniform Hazardous Waste Manifests

Delta
Environmental
Consultants, Inc.

3164 Gold Camp Drive
Suite 200
Rancho Cordova, CA 95670-6021
U.S.A.
916/638-2085
FAX: 916/638-8385

August 25, 2000

Mr. Paul Supple
ARCO Products Company
P.O. Box 6459
Moraga, CA 94570

Subject: *Hand Auger Assessment Boring Results Report*
ARCO Service Station No. 5387
20200 Hesperian Boulevard
Hayward, California
Delta Project No. D000-318

Dear Mr. Supple:

Delta Environmental Consultants, Inc. (Delta) has been authorized by ARCO Products Company (ARCO) to conduct additional environmental investigative work at ARCO Service Station No. 5387, located at 20200 Hesperian Boulevard, Hayward, Alameda County, California. The investigation is being conducted to further assess the distribution of petroleum hydrocarbons in soil beneath the site. The location of the site is shown in Figure 1. A site map is shown in Figure 2.

Additional work was proposed in *Work Plan to Evaluate Hydrocarbon Impacted Soil at ARCO Station 5387* dated December 15, 1999 prepared by the IT Group, and a revision to the work plan dated June 12, 2000. Alameda County Health Care Services (ACHCS) issued a letter dated June 12, 2000 agreeing to the revision to the work plan. A copy of the June 12, 2000 letter from ACHCS is included in Enclosure A.

Project Background

In December 1998, an ACHCS representative observed a leak from the impact valve of dispenser No. 8 while overseeing the re-booting of the dispenser piping. Consequently, on May 27, 1999, a Thrifty Oil geologist, under the direction of Ms. Juliet Shin and Mr. Robert Weston of ACHCS, collected two soil samples from beneath dispenser No. 8 (samples identified as 8E and 8N). Additionally, one soil sample was collected from beneath dispensers No. 6 identified as sample 6E and beneath dispenser No. 7 identified as 7E to assess whether or not prior fuel leaks had occurred at the other dispenser locations. Petroleum hydrocarbon constituents were detected only in the soil samples identified as 8N and 8E. As a result, the ACHCS requested further assessment under dispenser No. 8.

Work Performed

On June 13, 2000, a Delta geologist was on site to advance one hand auger soil boring (HA-1) to a total depth of approximately 13 feet below surface grade (bsg) at an angle approximately 60^0 off horizontal. Soil samples were collected at 3-feet, 6-feet, 9-feet, and 12.5-feet bsg for chemical analysis. Soil samples collected were submitted to Columbia Analytical Services, Inc. in Santa Clara, California for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), and methyl tertiary butyl ether (MTBE) by EPA Method 8021B, and total petroleum hydrocarbons (TPH) as gasoline by EPA Method 5030/Ca-LUFT. Detected concentrations of MTBE were confirmed by EPA Method 8260 by the laboratory. The location of the hand auger boring is illustrated in Figure 2.

Laboratory analysis reported detectable concentrations of petroleum hydrocarbon constituents in each sample analyzed. Benzene was not detected at or above the laboratory reporting limits in the soil samples. Concentrations of TPH as gasoline were reported in soil samples collected at depths of 3-feet, 6-feet, 9-feet, and 12.5-feet ranging from 2 milligrams per kilogram (mg/kg) to 820 mg/kg. Concentrations of MTBE were reported in samples collected at 3-feet, 6-feet, 9-feet, and 12.5-feet ranging from 0.15 mg/kg to 0.97mg/kg. Soil sample analytical results are summarized in Table 1. A copy of the laboratory analytical report with chain of custody documentation is included in Enclosure B.

At the completion of the boring, it was backfilled with neat cement grout from the base of the boring to within six inches of surface. The surface was then capped with concrete to match the existing grade.

Soil Stockpile

Soil and debris generated from advancement of the hand auger boring was placed inside a 55-gallon DOT drum. A field composite soil sample was collected from the drum for chemical analyses to evaluate disposal options. The soil was subsequently accepted for disposal by Republic-Vasco landfill in Livermore, California and, on July 6, 2000, Dillard Trucking, Inc. removed the drum from the site and transported it to the Republic-Vasco landfill. A copy of the soil removal completion letter with waste manifest is included in Enclosure C.

Conclusions/Recommendations

Based on the analytical results, it appears that the soil beneath dispenser No. 8 was not significantly impacted. Benzene concentrations were not detected at or above the laboratory reporting limits and MTBE was reported at less than 1 milligram per kilogram. The data indicates that no further action is required at this site.

Remarks/Signatures

The interpretations contained in this report represent our professional opinions and are based, in part, on information supplied by the client. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions concerning this project, please contact Steven Meeks at (916) 536-2613.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

J. William Speth
Project Geologist

Steven W. Meeks, P.E.
Project Manager
California Registered Civil Engineer No. C057461

JWS (LRP001.318)

Enclosures

cc: Mr. Amir Gholami - Alameda County Health Care Services, Environmental Protection

North

GENERAL NOTES:
BASE MAP FROM U.S.G.S.
SAN LEANDRO & HAYWARD, CA.
7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1980

QUADRANGLE LOCATION

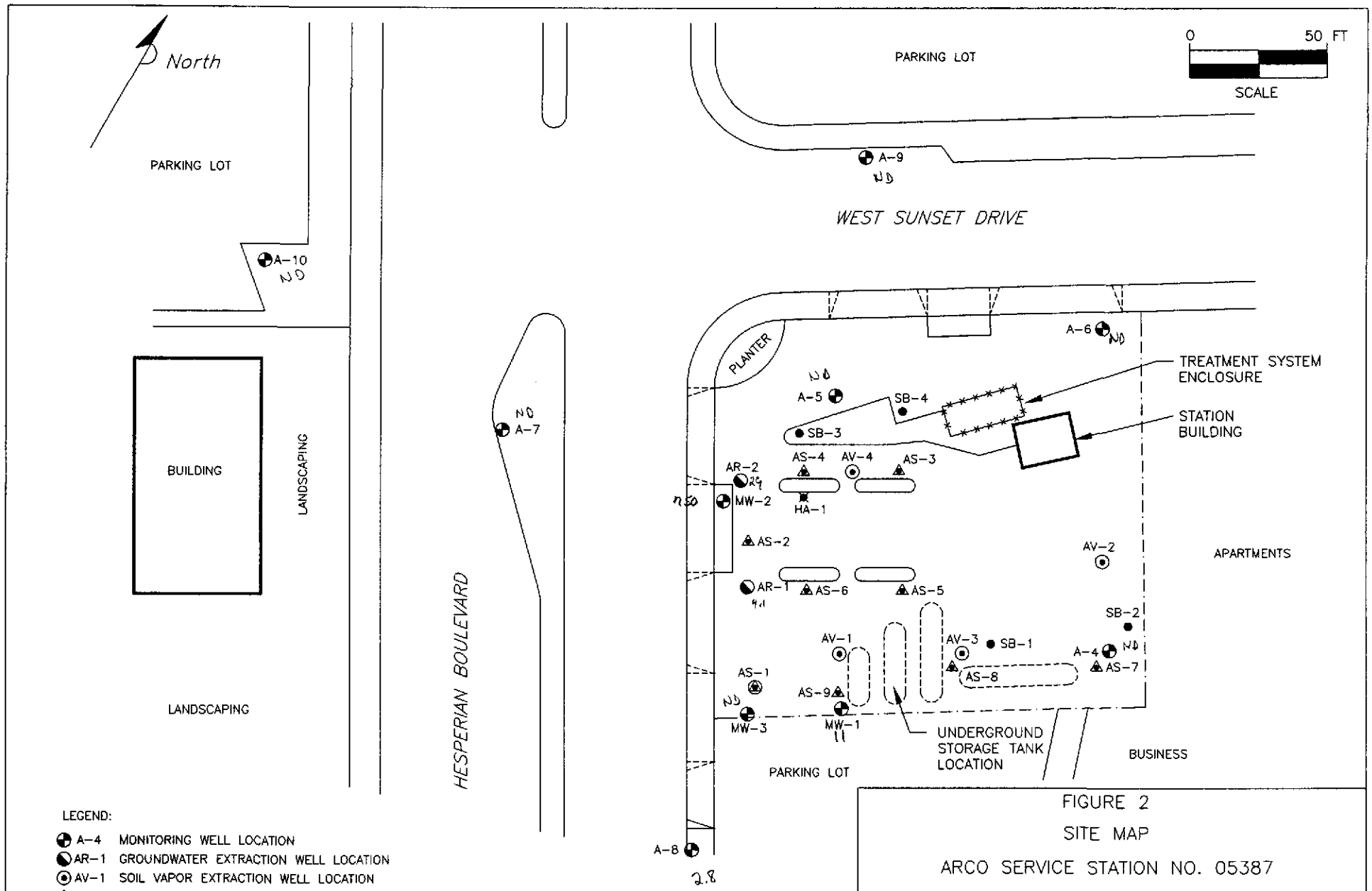
0 2000 FT

SCALE 1:24,000

FIGURE 1
SITE TOPOGRAPHIC MAP
ARCO SERVICE STATION NO. 05387
20200 HESPERIAN BOULEVARD
HAYWARD, CA.

PROJECT NO. D000-318	DRAWN BY M.L. 8/8/00
FILE NO. D000318A	PREPARED BY JWS
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.



LEGEND:

- A-4 MONITORING WELL LOCATION
- AR-1 GROUNDWATER EXTRACTION WELL LOCATION
- AV-1 SOIL VAPOR EXTRACTION WELL LOCATION
- AS-2 AIR SPARGE WELL LOCATION
- AS-1 DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION
- SB-1 SOIL BORING LOCATION
- HA-1 HAND AUGER LOCATION

NOTE: FIGURE ADAPTED FROM IT CORPORATION DRAWING. SITE DIMENSIONS AND FEATURES NOT VERIFIED.

FIGURE 2

SITE MAP

ARCO SERVICE STATION NO. 05387

20200 HESPERIAN BOULEVARD

HAYWARD, CA.

PROJECT NO. D000-318	DRAWN BY M.L. 8/8/00
FILE NO. D000318B	PREPARED BY JWS
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.

TABLE 1

SOIL SAMPLE ANALYTICAL RESULTS

ARCO Station No. 5387
20200 Hesperian Boulevard
Hayward, California

Sample ID	Date Sampled	Depth (ft)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	TPH as Gasoline (mg/kg)	MTBE (mg/kg)
6E	05/27/99	2.5	<0.005	<0.005	<0.005	<0.01	<1.0	<0.02
7E	05/27/99	2.5	<0.005	<0.005	<0.005	<0.01	<1.0	<0.02
8N	05/27/99	2.5-3.0	<0.005	<0.005	<0.005	0.038	8.4	8.1/2.2[a]
8E	05/27/99	2.5-3.0	0.38	9.8	18	210	2,400	13/10[a]
HA-1-3	06/13/00	3.0	<0.012	0.18	2.1	12	170	0.65
HA-1-6	06/13/00	6.0	<0.025	<0.025	9.4	31	820	0.66
HA-1-9	06/13/00	9.0	<0.012	<0.012	1.1	4.1	190	0.97
HA-1-125	06/13/00	12.5	<0.005	<0.005	0.016	0.069	2.0	0.15

[a] MTBE by EPA Method 8260B

TPH = Total petroleum hydrocarbons
mg/kg = Milligrams per kilogram
MTBE = Methyl-tertiary-butyl ether

ENCLOSURE A

Alameda County Health Care Services Letter Dated June 12, 2000

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

COPY

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

Stid 817

June 12, 2000

RECEIVED
JUN 15 2000
By

Mr. Paul Supple
P.O. Box 6459
Moraga, CA 94570

Re: Arco Station at 20200 Hesperian Blvd. Hayward, CA 94541

Dear Mr. Supple:

This office received a request, dated June 12, 2000, for a revision of a workplan to evaluate Hydrocarbon Impacted Soil regarding the above referenced site dated December 15, 1999. In my letter dated February 25th, 2000, I concur with the proposal made by Mr. Glen VanderVeen of The IT Group In regard to the above workplan to investigate contamination in areas below dispensers #6, #7, and #8. However, I had a recent discussion with Mr. Steven Meeks of Delta Environmental, Inc., your recent consultant, who requested to investigate under dispenser #8 only. This is due to the fact that this area has been the only area under dispensers with hydrocarbon contaminated soil underneath.

Per our previous communication and the letter dated September 3, 1999, by Juliet Shin, formerly of our office, the concentrations of contaminants in most monitoring wells have generally decreased to acceptable levels. Therefore, the groundwater monitoring at the site was to be discontinued until further notice.

I will be looking forward for the result of this investigation.

If you have any questions, please call me at (510)-567-6876.

Sincerely,

Amir K. Gholami, REHS
Hazardous Materials Specialist

C: Steven Meeks, Delta Environmental Inc., 3164 Gold Camp Drive, Rancho Cordova, CA 95670
files

ENCLOSURE B

Soil Sample Laboratory Analytical Report

Columbia Analytical Services INC.
An Employee-Owned Company

June 29, 2000

Service Request No.: S2001749

Mr. Steve Meeks
Delta Environmental Consultants
3164 Gold Camp Dr. Suite 200
Rancho Cordova, CA 95670

RE: **26107.00 RAT#8/5387 Hayward**

Dear Mr. Meeks:

Enclosed are the results of the sample(s) submitted to our laboratory on June 15, 2000. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 10, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 2352, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Manager

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	6/13/00
Sample Matrix:	Soil	**Date Received:**	6/15/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	HA-1-3FT	Units:	mg/Kg (ppm)
Lab Code:	S2001749-001	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	1	5	6/15/00	6/19/00	170	
Benzene	EPA 5030	8021B	0.005	2.5	6/15/00	6/25/00	<0.012	C1
Toluene	EPA 5030	8021B	0.005	5	6/15/00	6/19/00	0.18	
Ethylbenzene	EPA 5030	8021B	0.005	5	6/15/00	6/19/00	2.1	
Xylenes, Total	EPA 5030	8021B	0.10	5	6/15/00	6/19/00	12	
Methyl tert-Butyl Ether	EPA 5030	8021B	0.05	2.5	6/15/00	6/25/00	0.65	

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 06/29/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	6/13/00
Sample Matrix:	Soil	**Date Received:**	6/15/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	HA-1-6FT	Units:	mg/Kg (ppm)
Lab Code:	S2001749-002	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	1	12.5	6/15/00	6/25/00	820	
Benzene	EPA 5030	8021B	0.005	5	6/15/00	6/19/00	<0.025	C1
Toluene	EPA 5030	8021B	0.005	5	6/15/00	6/19/00	<0.025	C1
Ethylbenzene	EPA 5030	8021B	0.005	12.5	6/15/00	6/25/00	9.4	
Xylenes, Total	EPA 5030	8021B	0.10	12.5	6/15/00	6/25/00	31	
Methyl tert-Butyl Ether	EPA 5030	8021B	0.05	12.5	6/15/00	6/25/00	0.66	

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 06/29/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	6/13/00
Sample Matrix:	Soil	**Date Received:**	6/15/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	HA-1-9FT	Units:	mg/Kg (ppm)
Lab Code:	S2001749-003	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	1	5	6/15/00	6/19/00	190	
Benzene	EPA 5030	8021B	0.005	2.5	6/15/00	6/25/00	<0.012	C1
Toluene	EPA 5030	8021B	0.005	2.5	6/15/00	6/25/00	<0.012	C1
Ethylbenzene	EPA 5030	8021B	0.005	5	6/15/00	6/19/00	1.1	
Xylenes, Total	EPA 5030	8021B	0.10	5	6/15/00	6/19/00	4.1	
Methyl tert-Butyl Ether	EPA 5030	8021B	0.05	2.5	6/15/00	6/25/00	0.97	

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 06/29/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	6/13/00
Sample Matrix:	Soil	**Date Received:**	6/15/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	HA-1-12.5FT	Units:	mg/Kg (ppm)
Lab Code:	S2001749-004	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	1	1	6/15/00	6/25/00	2	
Benzene	EPA 5030	8021B	0.005	1	6/15/00	6/25/00	ND	
Toluene	EPA 5030	8021B	0.005	1	6/15/00	6/25/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	6/15/00	6/25/00	0.016	
Xylenes, Total	EPA 5030	8021B	0.10	1	6/15/00	6/25/00	0.069	
Methyl tert-Butyl Ether	EPA 5030	8021B	0.05	1	6/15/00	6/25/00	0.15	

Approved By: _____ Date: 06/29/00

1822/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	S200615-SB1	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	1	1	6/15/00	6/16/00	ND	
Benzene	EPA 5030	8021B	0.005	1	6/15/00	6/16/00	ND	
Toluene	EPA 5030	8021B	0.005	1	6/15/00	6/16/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	6/15/00	6/16/00	ND	
Xylenes, Total	EPA 5030	8021B	0.10	1	6/15/00	6/16/00	ND	
Methyl tert-Butyl Ether	EPA 5030	8021B	0.05	1	6/15/00	6/16/00	ND	

Approved By: _____ Date: 06/29/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S2001749
Project:	26107.00 RAT#8/5387 Hayward	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	6/15/00
		Date Analyzed:	6/16/00

Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline

Sample Name:	BATCH QC	Units:	mg/Kg (ppm)
Lab Code:	S2001719-001MS, S2001719-001DMS	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Benzene	EPA 5030	8021B	0.005	0.5	0.5	ND	0.49	0.50	98	100	57-154	2	
Toluene	EPA 5030	8021B	0.005	0.5	0.5	ND	0.48	0.51	96	102	60-142	6	
Ethylbenzene	EPA 5030	8021B	0.005	0.5	0.5	ND	0.49	0.50	98	100	46-150	2	
Gasoline	EPA 5030	CA/LUFT	1	10	10	ND	9.8	9.9	98	99	67-121	1	

Approved By: _____ Date: 06/29/00

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 26107.00 RAT#8/5387 Hayward
LCS Matrix: Soil

Service Request: S2001749
Date Collected: NA
Date Received: NA
Date Extracted: 6/15/00
Date Analyzed: 6/16/00

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S200615-LCS
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	EPA 5030	8021B	0.5	0.48	96	57-154	
Toluene	EPA 5030	8021B	0.5	0.48	96	60-142	
Ethylbenzene	EPA 5030	8021B	0.5	0.47	94	46-150	
Gasoline	EPA 5030	CA/LUFT	10	9.8	98	67-121	

Approved By: _____ Date: 06/29/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 26107.00.RAT#8/5387 Hayward
Sample Matrix: Soil

Service Request: S2001749
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8021B CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery a,a,a-Trifluorotoluene	Percent Recovery a,a,a-Trifluorotoluene
HA-1-3FT	S2001749-001		109	116
HA-1-6FT	S2001749-002		109	113
HA-1-9FT	S2001749-003		108	114
HA-1-12.5FT	S2001749-004		107	106
Method Blank	S200615-SB1		108	111
Lab Control Sample	S200615-LCS		107	118
BATCH QC	S2001719-001MS		107	120
BATCH QC	S2001719-001DMS		108	122

CAS Acceptance Limits: 70-130% 70-130%

Approved By: _____ Date: 06/29/00

SUR2/020397p

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 26107.00 S2001749 Hand Auger Boring

Chain of Custody

ARCO Facility no. 5387	City (Facility) Hayward	Project manager (Consultant) Steve Meeks	Laboratory name Columbia
ARCO engineer Paul Supple	Telephone no. (ARCO) (925) 299-8891	Telephone no. (Consultant) (916) 536-2613	Fax no. (Consultant) (916) 638-8385
Consultant name Delta Env. Consultants, Inc.	Address (Consultant) 3164 Gold Camp Drive, Suite 200 Rancho Cordova, Ca		Contract number

Method of shipment: ~~Laboratory~~ ~~Courier~~ UPS

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Water	Other	Preservation: Ice	Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
HA-1-3'	(1)	1	X			X		6/13/00	0835		X											
HA-1-6'	(2)	1	X			X		〃	0855		X											
HA-1-9'	(3)	1	X			X		〃	0920		X											
HA-1-12.5'	(4)	1	X			X		6/13/00	1000		X											
			X			X																

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number: R2

Turnaround time: 6/29/0

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample:

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler	6/14/00	1400	Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory		

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

ENCLOSURE C

Soil Removal Completion Letter

Dillard Trucking, Inc. dba

Dillard Environmental Services

P.O. Box 579 - Byron, CA 94514
Phone (925) 634-6850 -- Fax (925) 634-0569
EPA #CAD981692809 - D.T.S.C. #1715 - CA LIC #624665-A HAZ

July 31, 2000

Mr. Steve Meeks
Delta Environmental Consultants, Inc.
3164 Gold Camp Drive, Ste. 200
Rancho Cordova, CA 95670

RE: **ARCO #05387**
20200 Hesperian Blvd.
Hayward, CA

Dear Mr. Meeks:

Please be advised that the petroleum hydrocarbon contaminated soils from the referenced site has been removed. The 1 drum of material was transported for disposal to Republic-Vasco Landfill in Livermore, CA on July 7, 2000.

Should you have any questions, please do not hesitate to call.

Sincerely,

Dillard Trucking, Inc. dba,
DILLARD ENVIRONMENTAL SERVICES

Lynette Smith
Customer Service Representative

/Enclosure

Republic Services
Vasco Road Landfill

WASTE APPROVAL FORM/NON-HAZARDOUS WASTE MANIFEST

WASTE STREAM INFORMATION

Date	Friday, June 30, 2000		
Generator	Arco #05387		
Generator Location	20200 Hesperan Blvd	Hayward	CA
SWIC Number	02619		
Bill To	Dillard-Arco		
Approval Date	06/30/2000		
Expiration Date	06/30/2001		
Waste Description	Soil		
Management	Direct Burial		

The above is a recommendation of the Vasco Road Landfill. It must be understood that management of the waste for disposal must be in compliance with the facility's permit and applicable federal, state and local regulations. The approval is based upon a review of the information provided by the generator and is contingent upon the receipt at the disposal facility of a waste material essentially equivalent in chemical composition and physical properties to that as defined above.

AT THE REQUEST OF ARCO PRODUCTS CO.

A MINIMUM OF ONE SIGNED AND COMPLETED COPY OF THIS FORM MUST ACCOMPANY EACH LOAD. ONE COPY WILL BE RETAINED BY THE VASCO ROAD LANDFILL.

Generator Signature — Date: 7/6/00

TRANSPORTER INFORMATION

DTI Job # 1007/188
PO # 09-30471

Transporter to complete this section

Transporter Name	DILLARD ENVIRONMENTAL SERVICES
Transporter Address	P.O. Box 579
Transporter City, State, Zip	BYRON, CA 94514
Transporter Phone Number	(925) 634-6850
Driver Name	FRANK STANICH
Truck Number	TK60
Vehicle License Number/State	4P09499

Driver Signature — Date: 7-8-00

DESTINATION INFORMATION

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Signature of Vasco Road Landfill employee — Date: 7-7-00

4001 North Vasco Road, Livermore - Phone: 925-447-0491 - Fax: 925-447-3086 or 925-447-0498

REPUBLIC SERVICES VASCO ROAD, LLC
4001 N. Vasco Road, Livermore, California 94550 • (925) 447-0491

No: 0034369

TICKET: 43975
CUSTOMER: DILL ARC / DILLARD TRUCKING / ARC
TRUCK: 1 P.O.:
ACCT#: 5006661
PROFILE #: 02619

DATE: 07/07/2008
TIME: 13:34 - 13:54

All children must remain in vehicles.
Absolutely no salvaging allowed.

GENERATOR: AR 05387 / ARCO 05387
ORIGIN: 0005 / HAYWARD
LICENSE:
COMMENT:

GROSS: 0 LBS
TARE: 0 LBS
NET: 0 LBS

WASTE	QUANTITY	UNIT	RATE		AMOUNT
CONTSOILU / CONTAMINATED SOIL DRUMS	1.00	U	50.00	$	50.00

I certify that I have not disposed of any liquid or hazardous waste

Totals $ 50.00

Weighmaster:

DRIVER

RECYCLING

WARNING: Transporting any unauthorized hazardous waste to this facility for disposal is prohibited by law. Persons violating this prohibition are subject to civil and criminal prosecution.

GROUNDWATER TECHNOLOGY
A DIVISION OF OIL RECOVERY SYSTEMS, INC.
5047 Clayton Road, Concord, CA 94521, (415) 671-2387, telex 358867

SITE ASSESSMENT INVESTIGATION REPORT
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA
August 21, 1986

Prepared for:

Chris Winsor
ARCO Petroleum Products
515 S. Flower St., Room 1811
Los Angeles, CA 90071

Robert Juncal
Project Geologist

Prepared by:

Groundwater Technology, Inc.
4080 Pike Lane Suite D
Concord, California 94520

Gary B. Taggart
District Manager
Certified Engineering
Geologist #1061

20-8127

TABLE OF CONTENTS

SITE ASSESSMENT INVESTIGATION REPORT
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

INTRODUCTION

This report presents the results of Groundwater Technology, Inc.'s Site Assessment Investigation conducted at the Thrifty Oil Gasoline Station located at 20200 Hesperian Boulevard, Hayward, California. Groundwater Technology was retained by ARCO Petroleum Products Company to conduct the assessment with the consent of the present property owner, the Thrifty Oil Company. The investigation was to serve as a preliminary assessment of subsurface contamination resulting from inadvertant loss of gasoline type hydrocarbons from the underground tanks and product lines at the facility.

WORK SCOPE

The purpose of this investigation was to evaluate the actual and potential impacts of a gasoline spill at the study site. The scope of work included the following activities:

1. Research reported subsurface fuel leaks for the site.

2. Drilling, geologically logging, and soil sampling borings using a hollow stem auger.

3. Field analyses of soil samples for presence of volatile organic vapors using a photoionization detector (PID).

4. Construction of 2-inch diameter monitoring wells (where applicable).

5. Measurement of water levels and field description of water quality in all monitoring wells.

6. Laboratory analysis of selected soil samples for total petroleum hydrocarbons.

7. Laboratory analysis of groundwater samples for total petroleum hydrocarbon.

8. Preparation of a Site Assessment Report.

SITE CONDITIONS

SITE SETTING

The site under investigation is a small self service gasoline station which lies on an eastwardly sloping alluvial plain between the San Francisco Bay to the west and the Diablo Range to the east. The station has four existing pump islands which dispence regular, unleaded and super unleaded products. The properties surrounding the site are predominantly residential with some commercial which includes 3 properties with underground fuel storage facilities approximately 50 yards south and southwest of the site. The station location is shown on the Site Location Map (Figure 1) and station details are depicted on the Site Location Map (Figure 2).

AREA WATER SUPPLY

According to California Department of Water Resources records there are a minimum of 20 permitted wells within a one

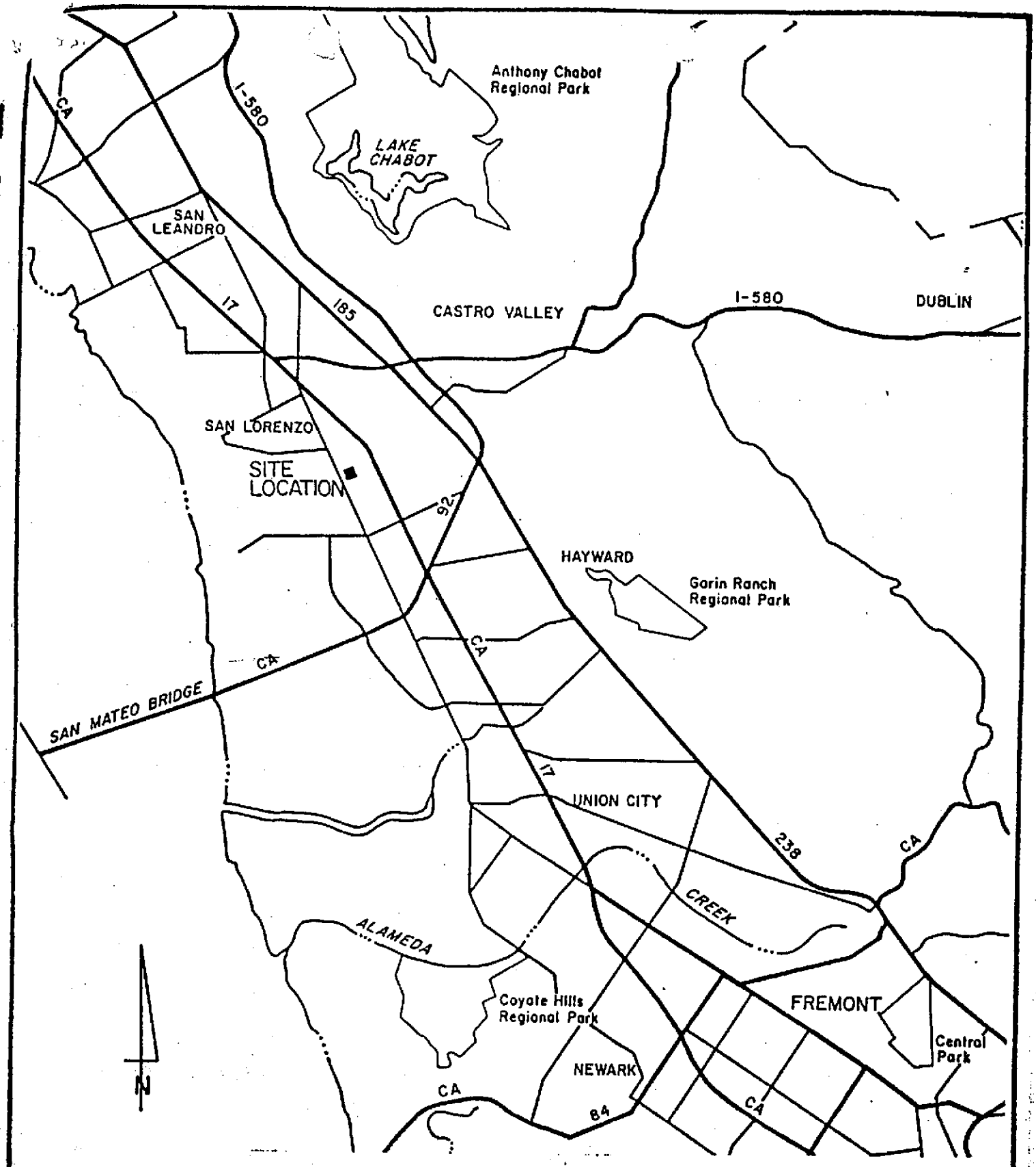


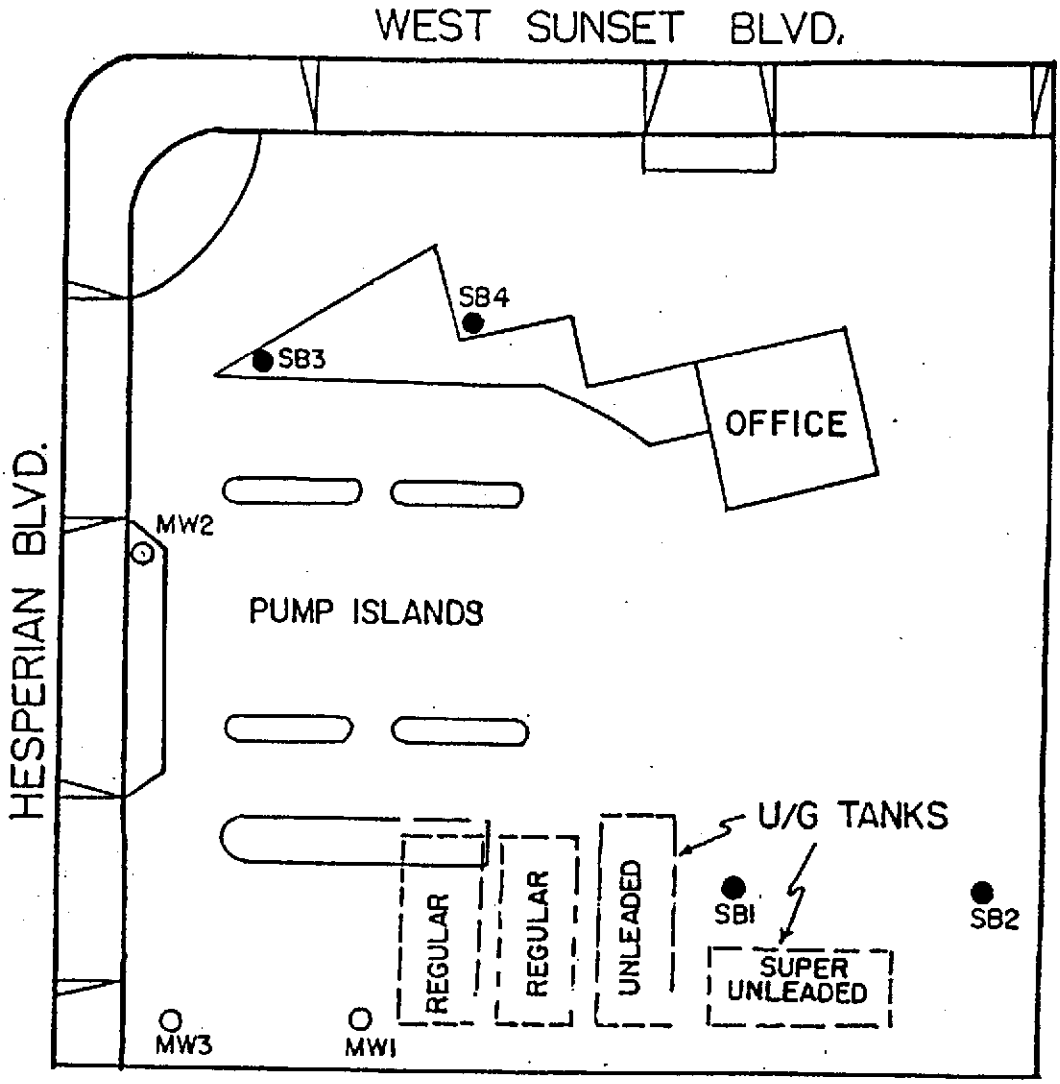
FIGURE 1

SITE LOCATION MAP

0 MILES 2

ARCO/HESPERIAN
HAYWARD, CALIFORNIA

GROUNDWATER TECHNOLOGY



EXPLANATION

O MWI- MONITORING WELL

● SBI- SOIL BORING

FIGURE 2

SITE PLAN

0 25

FEET

ARCO/HESPERIAN
HAYWARD, CALIFORNIA

GROUNDWATER

mile radius of the site. Six of these have pump rates between 1 and 250 gallons per minute (gpm) and the remaining 20 wells are not currently pumping. Municipal Water Supply is by the East Bay Municipal Utilities District which derives water from the Mokelumne River in the San Joaquin Valley.

HYDROGEOLOGY

The site lies within the hydrogeologic feature known as the Bay Plains Basin. Groundwater occurs in mostly confined aquifers consisting of unconsolidated Tertiary to Quaternary age deposits. Some unconfined water bearing deposits of Quaternary age are present 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 Bay Plains Gorundwater Basin. These water bearing deposits are interfingered with finer grained tideland deposits which resulted from accumulations of flood stage silts and clays deposited by rivers and marine clays properly deposits resulting from marine inundations. Where these deposits are laterally extensive and/or thick enough they form confining layers which are impervious to groundwater flow and seperate the sand and gravel deposits forming individual aquifers. These aquifers do not correlate at depths over any appreciable distance and could represent more northerly equivalents of the more studied, Neward, Centerville, and Fremont aquifers located farther south in the adjacent Niles Cone Basin.

The materials found in borings at this location are a sequence of dark clays grading into sands and gravels at depths greater than 20 feet. Groundwater occurs at a depth of 12 feet below the ground surface. The assume groundwater flow direction is to the west, toward San Francisco Bay. Sulphur Creek, the most prominent surficial water feature, flows from east to west about .2 miles to the south.

INVESTIGATION PROCEDURES

Prior to on-site investigative studies, research was conducted to provide background information on area hydrogeology, reported leaks, and permitting agency requirements. The hydrogeologic information was discussed in the previous section. Communication with the California Regional Water Quality Control Board, San Francisco Bay Region, Alameda County Health Department and the City of Hayward Fire Prevention District indicated no reported fuel loss from this site. Permitting and installation of groundwater monitoring wells and soil borings was conducted in accordance with Alameda County Water and Flood Control District Zone 7 guidelines.

One August 7 & 8, 1986, Groundwater Technology drilled a total of seven borings at the project site. The borings were drilled adjacent to the underground fuel storage tanks and product lines using a truck mounted 8 inch diameter hollow stem auger. Soil sampling was conducted at five foot intervals and field analysis for volatile organic vapors, using a photoionization detector, was conducted in accordance with Groundwater Technology's Standard Operating Procedures SOP 11, 14, 15 and 19 (See Appendix I). Because the water table was encountered at a depth of less than 40 feet below grade, three of the borings were converted into groundwater monitoring wells. The location of the soil borings and monitoring wells is graphically depicted on the site plan (See Figure 2). The drilling logs contain information

on the following parameters: description of soils encountered; location of soil sample points; field PID readings; and well construction specifications (See Appendix II).

The monitoring wells were developed by hand bailing in order to remove silts and improve well performance. Groundwater monitoring to determine the presence of gasoline and the depth of the liquid interface was conducted in accordance with Groundwater Technology's Standard Operating Procedure SOP 8 (See Appendix I). Groundwater samples obtained for laboratory analyses were collected, preserved and transported under Chain of Custody as per guidelines outlined in Groundwater Technology's Standard Operating Procedures SOP 9, 10 and 11 (See Appendix II).

ANALYTICAL RESULTS

GROUNDWATER MONITORING

The three on-site wells were monitored on August 8 & 11 and 18, 1986 (See Table 1). The monitoring determined that depth to water was approximately 12 feet below grade. Inspection of bailer samples indicated that slight to strong gasoline odor was present in groundwater.

GROUNDWATER SAMPLE ANALYSES

On August 8, 1986, water samples were collected from the three monitoring wells for analysis of dissolved gasoline type hydrocarbon concentrations. Analyses were performed by purge and trap gas chromatography with photoionization and flame ionization detection as per EPA Method 602. The laboratory test results and method detection limits for the analyses performed are presented in Appendix III. The analyses indicated dissolved petroleum hydrocarbon concentrations of 14 parts per million (ppm) in both

monitoring wells 1 and 2. Monitoring well 3 had a concentration of 2.9 ppm.

SOIL SAMPLE ANALYSES

On August 7 and 8, 1986, soil samples collected during soil borings were field analyzed for volatile organic vapor concentrations. The field analyses were conducted using an HNU photoionization detector (PID) which has a detection limit of 1 ppm. The measured vapor concentration for each soil sample is plotted adjacent to the sample point on the drilling logs (See Appendix II). Measured concentrations ranged from 1 to 160 ppm between the ground surface and 40 feet below grade. The highest concentrations were recorded between 14 and 24 feet below the ground surface.

Selected soil samples were laboratory analyzed to determine total petroleum hydrocarbon concentrations. Analyses were performed by a Modified EPA Method 418.1 procedure which has a detection limit of 10 ppm (mg/kg). The laboratory test results for the samples analyzed are contained in Appendix IV. Concentrations above the detection limit were recorded in samples from soil borings 2, 3 and 4. Soil Boring 2 contained 49 parts per million (ppm) at a depth of 9.0 - 9.5 feet below grade surface. Soil Boring 3 and 4 contained concentrations of 42 and 20 parts per million total petroleum hydrocarbons respectively. All other select soil samples were below method detection limits.

SUMMARY

Groundwater Technology was contacted to provide a site assessment investigation of subsurface contamination at the Thrifty Gasoline Service Station at 20200 Hesperian Boulevard,

Hayward, California. The investigation consisted of drilled seven borings, installation of monitoring wells in three of the seven borings, soil sampling and analyses, and water sampling and analyses. A summary of the findings of this investigation include the following:

- Subsurface soils consist mainly of dark clays, and minor sands.
- Groundwater was encountered at a depth of 12 feet below the surface and exists under water table conditions.
- No measurable free floating product is present.
- Gasoline odors were noted by field inspection and field PID analyses of soil samples.
  - Field inspection of samples indicated slight to moderate gasoline odor to a depth of 8 to 16 feet below grade.
  - The highest field PID readings were in sample obtained between 9 and 15 feet below grade.
- Adsorbed petroleum hydrocarbons exist in the soils.
  - Soil Boring 2 had 49 ppm (mg/kg) total petroleum hydrocarbons at 9.0 - 9.5 feet below grade.

- Soil Boring 3 had 42 ppm (mg/kg) total petroleum hydrocarbons at 9.0 - 9.5 feet below grade.

- Soil Boring 4 had 20 ppm (mg.kg) total petroleum hydrocarbons at 9.0 - 9.5 feet below grade.

° Dissolved gasoline hydrocarbons exist in the groundwater.

- Well 1 had 14.3 ppm total dissolved hydrocarbons.

- Well 2 had 2.9 total dissolved hydrocarbons.

- Well 3 had 14.1 ppm total dissolved hydrocarbons.

CLOSURE

Groundwater Technology would like to thank ARCO Petroleum Products for the opportunity to conduct this site assessment investigation. Should you have any questions or comments regarding this report, please feel free to contact us.

TABLE 1

GROUNDWATER MONITORING DATA
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

Date	Well #	Depth to Water (ft.)	Depth to Water (ft.)	Product Thickness (ft.)	Comments
08/08/86	1	11.25	-	0	Strong Gas Odor
	2	11.62	-	0	Strong Gas Odor
	3	10.61	-	0	Strong Gas Odor
08/11/86	1	11.22	-	0	Strong Gas Odor
	2	11.64	-	0	Slight Gas Odor
	3	10.65	-	0	Slight Gas Odor
08/19/86	1	11.31	-	0	No Gas Odor
	2	11.69	-	0	No Gas Odor
	3	10.72	-	0	No Gas Odor

GROUNDWATER TECHNOLOGY
STANDARD OPERATING PROCEDURE
CONCERNING GROUNDWATER MONITORING
SOP 8

Groundwater monitoring of wells at the site shall be conducted using an ORS Interface Probe and Surface Sampler. The Interface Probe is a hand held, battery operated device for measuring depth to petroleum product and depth to water as measured from an established datum (i.e., top of the well casing which has been surveyed). Product thickness is then calculated by subtracting the depth to product from the depth to water. In addition, water elevations are adjusted for the presence of fuel with the following calculation:

(Product Thickness)(.8)+(Water Elevation)
= Corrected Water Elevation

Note: The factor of 0.8 accounts for the density difference between water and petroleum hydrocarbons.

The Interface Probe consists of a dual sensing probe utilizing an optical liquid sensor and electrical conductivity to distingish between water and petroleum products. A coated steel measuring tape transmits the sensor's signals to the reel assembly, where an audible alarm sounds a continuous tone when the sensor is immersed in petroleum product and an oscillating tone when immersed in water. The Interface Probe is accurate to 1/16-inch.

A Surface Sampler shall be used for visual inspection of the groundwater to note sheens (difficult to detect with the Interface Probe), odors, microbial action, etc.

The Surface Sampler used consists of a 12-inch long cast acrylic tube with a Delrin ball which closes onto a conical surface creating a seal as the sampler is pulled up. The sampler is calibrated in inches and centimeters for visual inspection of product thickness.

To reduce the potential for cross contamination between wells the monitorings shall take place in order from the least to most contaminated wells. Wells containing free product should be monitored last. Between each monitoring the equipment shall be washed with laboratory grade detergent and double rinsed with distilled water.

GROUNDWATER TECHNOLOGY
STANDARD OPERATING PROCEDURE
CONCERNING WATER SAMPLING METHODOLOGY
SOP 9

Prior to water sampling, each well shall be purged by pumping a minimum of four well volumes or until the discharge water indicates stabilization of temperature, conductivity,and pH. If the well is evacuated before four well volumes are removed or stabilization is achieved, the sample should be taken when the water level in the well recovers to 80% of its initial level.

Retrieval of the water sample, sample handling and sample preservation shall be conducted in accordance with Groundwater Technology Laboratory Standard Operating Procedure (GTL SOP 10) concerning Sampling For Volatiles in Water". The sampling equipment used shall consist of a teflon and/or stainless steel samplers, which meets EPA regulations. Glass vials with teflon lids should be used to store the collected samples.

To insure sample integrity, each vial shall be filled with the sampled water such that the water stands above the lip of the vial. The cap should then be quickly placed on the vial and tightened securely. The vial should then be checked to ensure that air bubbles are not present prior to labeling of the sample. Label information should include a sample identification number, job identification, date, time, type of analysis requested and the sampler's name. Chain-of-Custody forms shall be completed as per Groundwater Technology Laboratory Standard Operating Procedure (SOP 11) concerning Chain of Custody.

The vials should be immediately placed in high quality coolers for shipment to the laboratory. The coolers should be packed with sufficient ice or freezer packs to ensure that the samples are kept below 4C. Samples which are received at the Groundwater Technology Laboratory above 10 C. will be considered substandard. To minimize sample degradation the prescribed analysis shall take place within seven days of sample collection unless specially prepared acidified vials are used.

To minimize the potential for cross contamination between wells, all the well development and water sampling equipment which contacts the groundwater shall be cleaned between each well sampling. As a second precautionary measure, the wells shall be sampled in order of increasing contaminant concentrations as established by previous analysis.

GROUNDWATER TECHNOLOGY, IN
CONSULTING GROUNDWATER GEOLOGI

GROUNDWATER TECHNOLOGY LABORATORY (GTL)
STANDARD OPERATING PROCEDURE
CONCERNING SAMPLING FOR VOLATILES IN WATER (DISSOLVED GASOLINE, SOLVENTS, ETC.).
SOP 10

1. Use only vials properly washed and baked, available from GTL or Pierce Chemical.

2. Use clean sampling equipment. Scrub with Alconox or equivalent laboratory detergent and water followed by a thorough water rinse. Complete with a distilled water rinse.

   Sampling equipment which has come into contact with liquid hydrocarbons (free product) should be regarded with suspicion. Such equipment should have tubing and cables replaced and all resilient parts washed with laboratory detergent solution, as above. Visible deposits may have to be removed with hexane, breath methanol fumes. Solvent washing should be followed be detergent washing as above.

   This procedure is valid for volatile organics analysis only. For extractable organics (for example, pesticides, or base neutrals for EPA method 625) a final rinse with pesticide grade isopropyl alcohol, followed by overnight or oven drying, will be necessary.

3. Take duplicate samples for GTL. Mark on forms as a single sample with two containers to avoid duplication of analysis.

4. Take a site blank using distilled water or known uncontaminated source. This sample will be run at the discretion of the project manager.

5. Fill out labels and forms as much as possible ahead of time. Use an indelible laundry marker or a Space pen.

6. Preservatives are required for some types of samples. Use specially prepared vials from GTL, marked as indicated below, or use the appropriate field procedure (SOP 12 for acidification). Make note on forms that samples were preserved. Always have extra vials in case of problems. For samples from dissolved gasoline sites or other samples shoudl be acidified below pH 2 with sulfuric acid. Use vials with care and keep them upright. Eye protection, foot protection, and disposable vinyl golves are required for handling. Samples designated for expedited service and analyzed within seven (7) days of sampling will be acceptable without preservation.

   Acid causes burns. Glasses or goggles (not contacts) are necessary for protection of the eyes. Wash eyes with fresh water for 15 minutes if contact occurs and seek medical attention. Rinse off hands frequently with water during handling.

   For sampling chlorinated drinking water supplies for chlorinated volatiles, samples shall be preserved with sodium thiosulfate. Use vials labeled "CONTAINS THIOSULFATE". No particular cautions are necessary.

7. Fill vial to overflowing with water, avoiding turbulence and bubbling as much as possible. Water should stand above lip of vial.

8. Carefully but quickly slip cap onto vial. Avoid dropping the teflon disc from cap by not inverting cap until in contact with vial. Disc should have teflon face toward the water. Also avoid touching white teflon face with dirty fingers.

9. Tighten cap securely, invert vial and tap against hand to see that there are no bubbles inside.

10. Label vial using indelible ink as follows:

    a) Sample I.D. No. (and "Groundwater Technology" if not on preprinted label).
    b) Job I.D. No.
    c) Date and Time.
    d) Type of analysis requested.
    e) Your name.

11. Unless the fabric type label is used, place scotch tape over the label to preserve its integrity.

12. For Chain of Custody reasons, sample vial should be wrapped end-for-end with scotch tape or evidence tape and signed with indelible ink where the end of the tape seals on itself. The septum needs to be covered.

13. Chill samples immediately. Samples to be stored should be kept at 4°C (39°F). Samples received at the laboratory above 10°C (as measured at glass surface by a thermocouple probe), after overnight shipping will be considered substandard, so use a high quality cooler with sufficient ice or freezer packs. (Coolers are available from GTL).

14. Fill out Chain of Custody and Analysis Request form. (See Chain of Custody Procedures SOP11).

GROUNDWATER TECHNOLOGY LABORATORY (GTL)
STANDARD OPERATING PROCEDURE
CONCERNING CHAIN OF CUSTODY
SOP 11

1. Samples must be maintained under custody until shipped or delivered to the laboratory. The laboratory will then maintain custody. A sample is under custody if:

    a) It is in your possession
    b) It is in your view after being in your possession
    c) You locked it up after being in your possession
    d) It is in a designated secure area

2. Custody of samples may be transferred from one person to the next. Each transferee and recipient must date, sign and note the time on the chain of custody form.

3. In shipping, the container must be sealed with tape, bearing the sender's signature across the area of bonding at the ends of the tape in order to prevent undetected tampering. Each sampling jar should be taped and signed as well. Scotch tape works well.

4. Write "sealed by" and sign in the Remarks box at the bottom of the form before sealing up the box. Place form in a plastic bag and seal inside the box.

5. The "REMARKS" section in the upper right part of the form is for documenting details such as:

    a) correlation of sample numbers if samples are split between labs.
    b) QC numbers when lab is logging in the samples.
    c) sample temperature and condition when received by lab.
    d) Preservation notation.
    e) pH of samples when opened for analysis (if acidified).

6. The chain of custody form should be included inside the shipping container. A copy should be sent to the project coordinator.

7. When the samples are received by the lab, the chain of custody form will be dated, signed, and a note of the time made by a laboratory representative. The form along with shipping bills and receipts will be retained in the laboratory files.

8. At the time of receipt of samples by the laboratory, the shipping container will be inspected and the sealing signature will be checked, the samples will be inspected for condition and bubbles and the temperature of a representative sample container will be measured externally by a thermocouple probe (held tightly between two samples) and recorded. The laboratory QC numbers will be placed on the labels, in the accession log, and on the chain of custody form. If samples are acidified their pH will be measured by narrow range pH papre at the time of opening fir analysis. All comments concerning procedures requiring handling of the samples will be dated and initialed on the form by the laboratory person performing the procedure. A copy of the completed chain of custody form with the comments on sample integrity will be returned to the sampler.

GROUNDWATER TECHNOLOGY
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLING METHODOLOGY
SOP 14

Soil samples should be collected and preserved in accordance with Groundwater Technology Laboratory's Standard Operating Procedure (GTL SOP 15) concerning Soil Sample Collection and Handling when Sampling for Volatile Organics. A hollow stem soil auger should be used to drill to the desired sampling depth. A standard 2 inch diameter split spoon sampler 18 inches in length shall be used to collect the samples. The samples are contained in 2 inch diameter by 6 inch long thin walled brass tube liners fitted into the split spoon sampler (three per sampler).

The split spoon sampler should be driven the full depth of the spoon into the soil using a 140 pound hammer. The spoon shall then be extracted from the borehole and the brass tube liners containing the soil sample removed from the sampler. The ends of the liner tubes should be immediately covered with aluminum foil, sealed with a teflon or plastic cap, and then taped with duct tape. After being properly identified with sample data entered on a standard chain of custody form the samples shall be placed on dry ice (maintained below 4°C) and transported to the laboratory within 24 hours.

One of the three soil samples retreived at each sample depth shall be analyzed in the field using a photoionization detector and/or explosimeter. The purpose of the field analysis is to provide a means to choose samples to be laboratory analyzed for hydrocarbon concentrations and to enable comparisions between the field and laboratory analyses. The soil sample shall be sealed in a plastic bag and placed in the sun to accelerate the vaporization of volatile hydrocarbons from the soil. One of the two field vapor instruments shall be used to quantify the amount of hydrocarbon released to the air from the soils. The data shall be recorded on the drill logs at the depth corresponding to the sample point.

GROUNDWATER TECHNOLOGY
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLE COLLECTION AND
HANDLING WHEN SAMPLING FOR VOLATILE ORGANICS
SOP 15

1. Use a sampling means which maintains the physical integrity of the samples. The project sampling protocol will designate a preferred sampling tool. A split spoon sampler with liners or similar tube sampler which can be sealed is best.

2. At the discretion of the project manager, the samples should be either.

   A. sealed in liner with teflon plugs (The "California Sampler") or

   B. field prepped for sample analysis.

   Projects using method (A) will incur a separate sample preparation charge of $ 10.00 per sample in the laboratory. For method (B), prepared and pre-weighed vials, and sample coring syringes must be ordered at least 2 weeks ahead of time from the laboratory before sampling. (Vials are free if samples will be sent to Groundwater Technology Laboratory).

3. For sending whole-core samples (2A above):

   A. Seal ends of liner with teflon plugs leaving no free air space inside.

   B. Tape with duct tape.

   C. Cover with a non-contaminating sealant (paraffin).

   D. Place in plastic bag labeled with indelible marker. Use Well #, depth, date, and job #.

   E. Place inside a second bag and place a labelling tag inside outer bag.

   F. Enclose samples in a cooler with sufficient ice or dry ice to maintain samples at 4 degrees during shipment.

   G. Seal cooler with a lock or tape with samplers signature so tampering can be detected.

H. Package cooler in a box with insulating material. Chain of custody forms can be placed in a plastic bag in this outer box.

I. If dry ice is used, a maximum of 5 pounds is allowed by Federal Express without special documents (documents are easy to obtain but just not necessary for under 5 pounds). Simply write "ORM-A dry ice," "_____ pounds, for research" on outside packaging and on regular airbill under classification. UPS does not accept dry ice.

J. Make yourself a supplies list necessary before going into the field.

K. Soil cores kept a 4 degrees C are only viable for up to 7 days when aromatic hydrocarbons are involved. The lab will prepare them in methanol as above once in the lab, but we will need a call ahead of time to schedule personnel.

4. For field-prepping (Step 2B above):

A. Obtain prepared sample containers from the laboratory. Order for # of samples intended and add 50%. This should be sufficient for QA requirements (below), breakage, and additional samples taken by discretion of sampler.

B. Organize containers consecutively - they are all numbered and pre-weighed. Make a necessary supplies list before going into the field.

C. For a 6" liner section retrieved from the spoon sampler, spread a 12" square piece of broiler (heavy) aluminum foil and slice it lengthwise with a clean stainless steel spatula.

D. Immediately sample with a coring syringe with plunger removed. Poke tube into mid-section of core (into undisturbed soil) to capture a 1/2 to 1 inch plug.

E. Immediately transfer to the sample vial with methanol by using plunger. Clean around lip of vial to remove soil with clean laboratory paper towelling

CAUTION: WORK ONLY IN WELL VENTILATED AREA. DO NOT BREATH METHANOL VAPOR. IT IS TOXIC. SEE MSDS ATTACHED.

and seal septum onto the vial with lid, teflon side (shiny) toward the sample. shake sample enough to break it up so that whole sample is immersed in methanol. The rapid progression of steps indicated here is necessary to prevent loss of volatiles from the soil. Do not leave vials unopened for any extended period - the methanol evaporates quickly. Grit left on threads of vial can cause vial to break.

F. * If required (see 5 below). Take a duplicate sample from the other half directly across from the first sample, or where ever undisturbed, yet representative soil occurs.

G. Label vial with legible information as follows:

1. Job name or number.

2. Date.

3. Time.

4. Depth and well number.

5. Samplers initials.

H. Tape vial across septum with scotch tape and around cap and sign on the tape with indelible ink to prevent tampering.

I. Wrap up a representative section of the core equivalent in volume to cube 3 cm on a side in the aluminum foil square, discarding the rest appropriately. Seal in saran wrap. This section is for dry weight determination. Close it in plastic bag with a tag or write on the bag with an indelible marker. These samples go into a separate cooler or box and not with the vials. The cooler for dry weight samples need not be iced, but overnight delivery is requested.

J. Discard plastic coring syringe, clean the spatula, and get clean equipment ready for next sample.

K. Ice the sample vials immediately and keep them iced through shipment.

L. Fill out chain of custody form. SOP 11 gives major details. Make sure sample requests is for proper analysis type.

M. Shipping of hazardous materials (methanol) requires special documents from Federal Express and UPS. Have this all arranged ahead of time (once set up with documents, the actual process will be little different than normal). Briefly you will need to add following to outside of package and on documents:

1. Flammable liquid label (some will come from lab with the vials).

2. "UN1230 methyl alcohol".

3. For UPS, a "Hazardous Material" label.

N. Ship overnight delivery to the lab. If dry ice is available, up to 5 pounds per package can be sent via Federal Express by simply writing "ORM-A dry ice", "_____ pounds, for research" on outside of package and on shipping document. UPS does not accept dry ice shipments.

5. Good sampling practice would include preparing 1 out of 5 samples to be prepared in duplicates for analysis. These 4 out of 20 samples will be for the following purposes.

A. One in every 20 samples should be analyzed as a field replicate to evaluate the precision of the sampling technique. A minimum of 1 sample per data set is suggested.

B. An additional 1 in 20 samples should be selected by sampler to be prepared in duplicate as alternative to Step (A). Choose a different soil type if available.

C. The lab does spiking with reference materials for internal QC so additionally a minimum of 2 in 20 samples need to be prepared in duplicate.

6. Other QC procedures can be specified at the project manager's discretion. See Table 3-2 (reference 2) attached.

7. Decontamination of equipment in the field requires a detergent wash, a water rinse, and spectrographic quality acetone rinse followed by distilled water.

REFERENCES

1. Soil Sampling Quality Assurance Users Guide, U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-84-043, May 1984.

2. Preparation of Soil Sampling Protocol. Techniques and Strategies, U.S. EPA, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-83-020, August 1983 (PB83-206979).

3. Test Methods for Evaluating Solid Waste, U.S. EPA, Office of Solid Waste and Emergency Response, Washington, D.C., SW 846, July 1982.

GROUNDWATER TECHNOLOGY
STANDARD OPERATING PROCEDURE
CONCERNING OPERATION/CALIBRATION OF
PHOTOIONIZATION ANALYZER
SOP 19

The HNU Model 101 Photoionization Analyzer shall be used to measure the concentration of trace gases over a range of less than 1 ppm to 2,000 ppm by employing the principle of photoionization for detection. The specific instrument used for investigations related to hydrocarbon contamination should be calibrated for direct readings in parts per million (ppm) volume/volume of benzene. This portable field analyzer consists of two components (1) probe which contains a fan for moving air into the sensor, an ultraviolet light (provides ionization energy), an ionization chamber and signal amplifer (2) readout assembly which contains a battery, ion chamber bias, meter readout and control panel. Specifics of the detection principle/theory and functions of various components can be found in the manufactures instruction manual (HNU Systems, Inc.).

To assure optimum performance, the photoionization analyzer should be calibrated with a standard gas mixture of known concentration from a pressurized container. A daily procedure for calibration involves bringing the probe and readout in close proximity to the calibration gas, cracking the valve on the tank and checking the instrument reading. This provides a useful spot check for the instrument.

A procedure conducted weekly for more accurate calibration of the instrument from a pressurized container is to connect one side of a "T" to the pressurized container of calibration gas, another side of the "T" to a rotameter and the third side of the "T" directly to the 8" extension to the photoionization probe (see Figure 2). Crack the valve of the pressurized container until a slight flow is indicated on the rotameter. The instrument draws in the volume of sample required for detection, and the flow in the rotameter indicates an excess of sample. Now adjust the span pot so that the instrument is reading the exact value of the calibration gas. (If the instrument span setting is changed, the instrument should be turned back to the standby position and the electronic zero should be readjusted, if necessary).

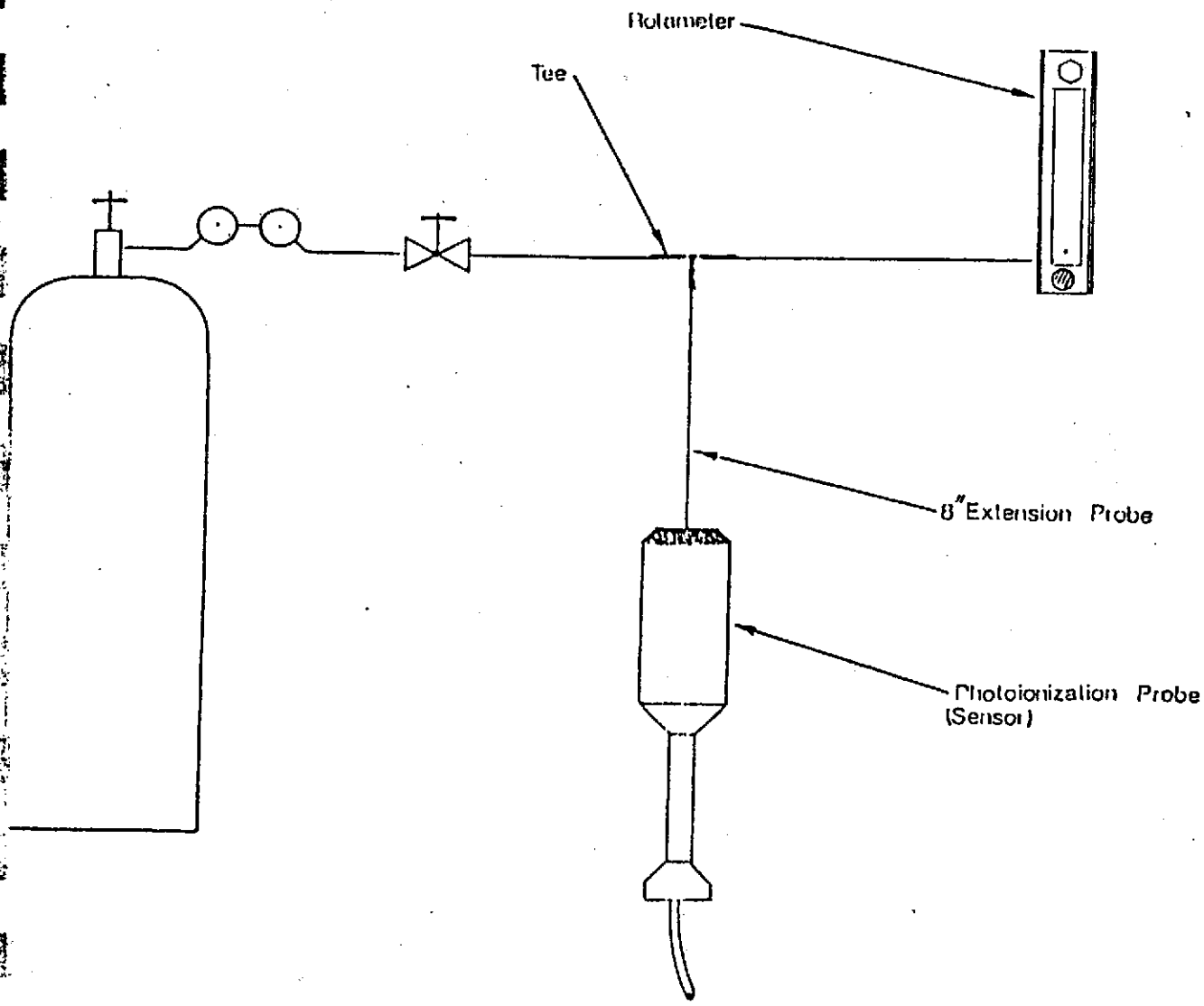


Figure 2

GROUNDWATER
TECHNOLOGY
Consulting Groundwater Geologists

TECHNOLOGY
Division of C[illegible]covery Systems, Inc.

MW-1

Drilling Log

Project: Arco/ Hesperian Owner: Arco Petroleum

Location: Hayward, Calif Project Number: 20-8127

Date Drilled: 8/07/86 Total Depth of Hole: 30 ft Diameter: 7.5 in

Surface Elevation: _____ Water Level, Initial: 12.0' 24-hrs.: 11.3'

Screen: Dia. 2 in. Length: 25 ft Slot Size: .020 in.

Casing: Dia. 2 in. Length: 5 ft Type: P.V.C

Drilling Company: Sierra Pacific Drilling Method: h. s. auger

Driller: I. Pera Log by: S. Gable

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Asphalt, gravel fine
2				CL	Black, blue mottled silty clay, stiff, dry no odor
4		o PID 2	A 5 8		
6					Brown-green, silty clay, firm, damp, moderate product odor
8				ML	
10		o PID 10	B 3 4		Green, fine sand-silty clay, soft, damp, moderate odor
12					8/7/86
14		o PID 50	C 3 4	ML	Green-gray, silty clay, soft, damp, moderate odor
16					
18					
20		o PID 30	D 3 4	SM	
22					
24		o PID 130	E 8 12	SW	Light brown, coarse sand, loose, wet, slight odor

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Page _____ of _____

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number MW-1

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
26					
28		o PID 130	F 10 12	SP	Lightcolored, coarse, sand & pebbles, loose, wet, slight odor
30					

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number MW 2

Project Arco/Hesperian Owner Arco Petroleum

Location Hayward, Calif. Project Number 20-8127

Date Drilled 8/8/86 Total Depth of Hole 25 ft. Diameter .020 in.

Surface Elevation — Water Level, Initial 12.0 ft 24-hrs.

Screen: Dia. 2 in. Length 25 ft. Slot Size .020 in.

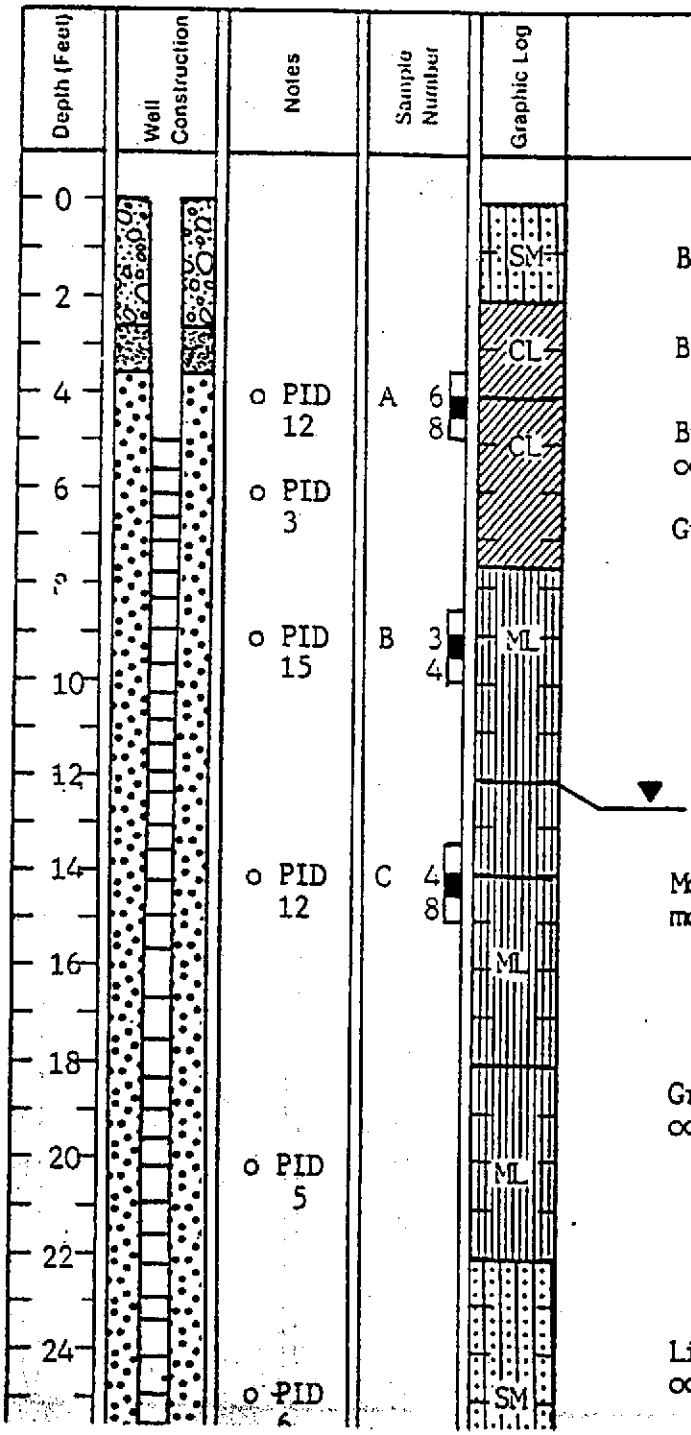
Casing: Dia. 2 in. Length 5 ft. Type P.V.C.

Drilling Company Sierra Pacific Drilling Method h.s. auger

Driller L. Pera Log by S. Gable

Sketch Map

Notes



Description/Soil Classification (Color, Texture, Structures)

Brown, sandy silt, very loose, dry, no odor

Black, silty clay, stiff, dry, no odor

Brown, fine sandy clay, firm, damp, slight odor

Green-gray, clay, soft, damp, moderate odor

8/8/86

Mottled green brown, silty clay, stiff, wet, moderate odor

Gray brown, silty clay, stiff, wet, moderate odor

Light brown, silty sand, loose, wet, moderate odor

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number MW-2

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
26					
28				SC	Brown, fine sandy clay, medium dense, firm, wet, moderate odor
30		o PID 5			bottom of hole

GROUNDWATER TECHNOLOGY

Division of Oil Recovery Systems, Inc.

Well Number MW 3

Drilling Lo

Project Arco/Hesperian Owner Arco Petroleum

Location Hayward, Calif. Project Number 20-8127

Date Drilled 8/8/86 Total Depth of Hole 30 ft. Diameter 7.5 in.

Surface Elevation — Water Level, Initial 12.0 ft 24-hrs.

Screen: Dia. 2 in. Length 25 ft. Slot Size .020

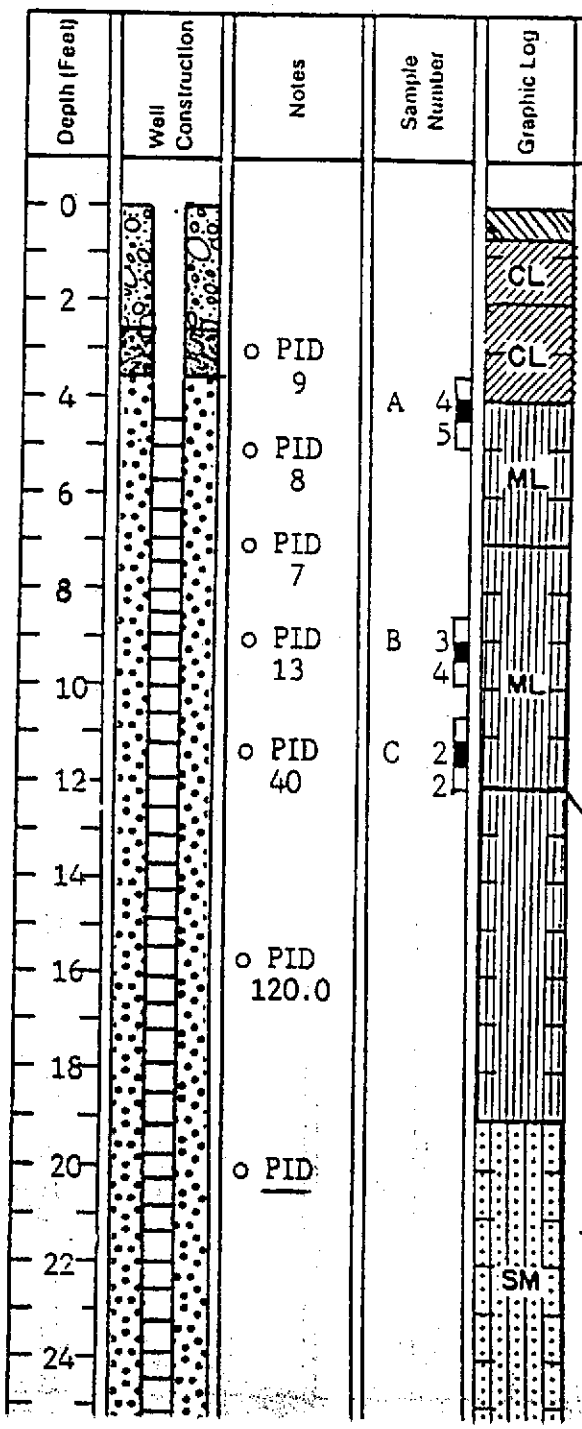
Casing: Dia. 2 in. Length 5 ft. Type P.V.C.

Drilling Company Sierra Pacific Drilling Method h.s. auger

Driller L. Pera Log by S. Gable

Sketch Map

Notes



Description/Soil Classification (Color, Texture, Structures)

Asphalt, gravel fill

Black, silty clay, stiff, dry, no odor

Brown, silty clay, stiff, dry, no odor

Green, sandy silty clay, firm, damp, mild odor

Green, clay, soft, moist, strong odor

Green brown, fine sandy clay, soft, wet; mild odor
8/8/86

Mottled brown green, silty clay, stiff, wet, strong odor

Brown, silty sand, loose, wet, mild odor

GROUND WATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number MW 3

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
26					
28				SM	Brown silty sand, loose, wet, mild odor
30		o PID 4			

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GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc

SOIL BORING SB 1

Drilling Log

Project: Arco/Hesperian Owner: Arco Petroleum

Location: Hayward, Calif. Project Number: 20-8127

Date Drilled: 8-8-86 Total Depth of Hole: 40 ft. Diameter: 7.5 in.

Surface Elevation: - Water Level, Initial: 12.0. 24-hrs.: -

Screen: Dia. - Length - Slot Size -

Casing: Dia. - Length - Type -

Drilling Company: Sierra Pacific Drilling Method: h. s. auger

Driller: L. Pera Log by: S. Gable

Sketch Map

Notes

Depth (Feet)	Well Construction	Blow Counts / Notes	PID / Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Asphalt, gravel fill, green sand
2					
4		o PID 1	4 9	CL	Black, silty clay, stiff, dry, no odor
6					
8					
8		o PID 30	4 4	CL	Brown, silty clay, firm, damp, moderate odor
10					
12				ML	Green, clay, soft, damp, moderate odor 8/8/86
14		o PID	2 3		Brown green, mottled clay, stiff, moist, strong odor
16				CH	High organic content
18					
20		o PID 20.0	3 4		Brown, green mottled, sandy silt, firm, wet moderate odor
22				SM	
24			8 10		Green, medium sand, loose, wet, strong odor
		o PID 30			

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GROUNDWATER TECHNOLOGY
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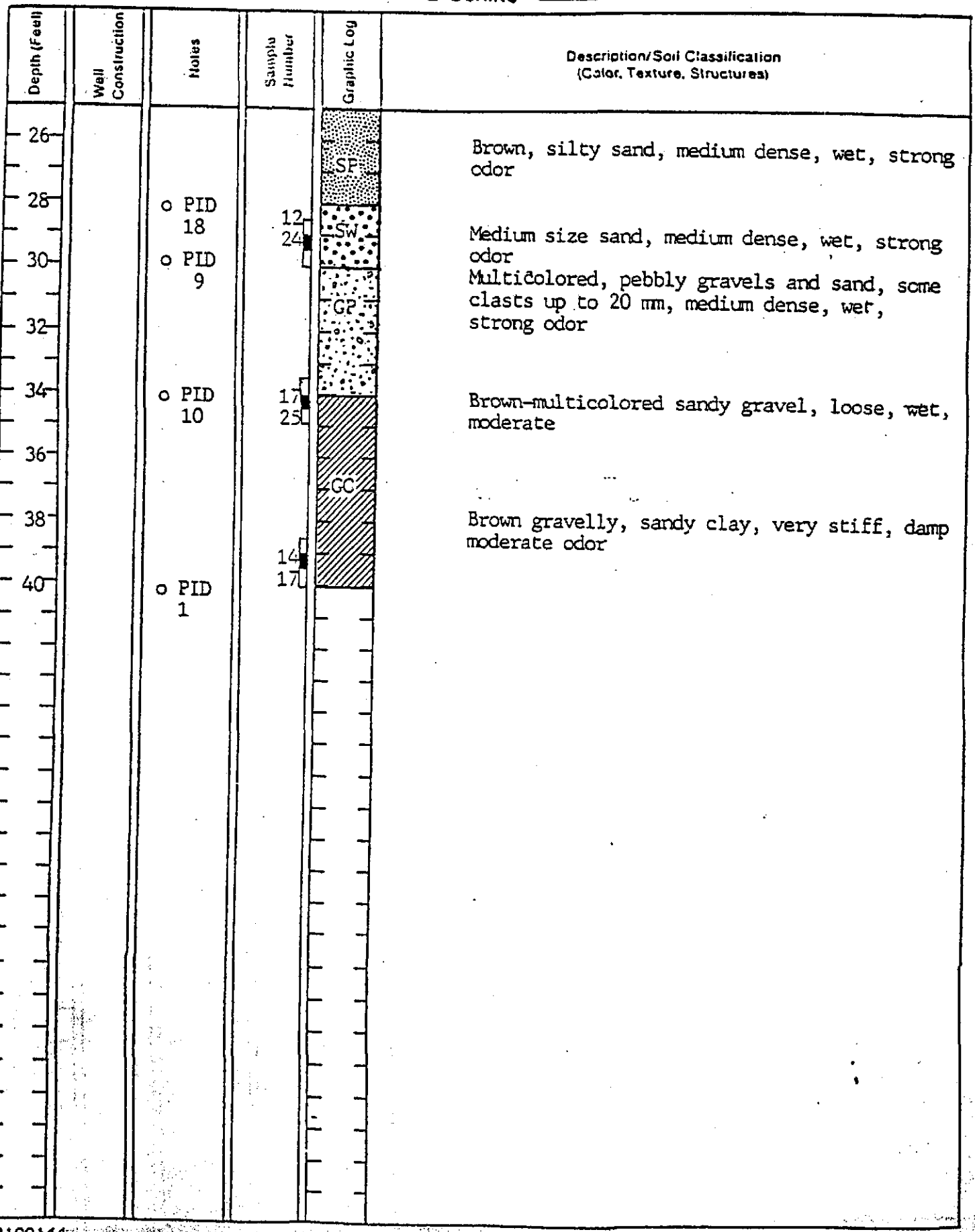
SOIL BORING SB 1

Drilling Log



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GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc

Drilling Log

SOIL BORING SB2

Project Arco/Hesperian Owner Arco Petroleum

Location Hayward, Calif. Project Number 20-8127

Date Drilled 8-8-86 Total Depth of Hole 20 ft. Diameter 7.5 in.

Surface Elevation - Water Level, Initial 12.0 ft 24-hrs. -

Screen: Dia. - Length - Slot Size -

Casing: Dia. - Length - Type -

Drilling Company Sierra Pacific Drilling Method h. s. auger

Driller L. Pera Log by S. Gable

Sketch Map

Notes

Depth (Feet)	Well Construction	Blow Notes Counts	Sample Number PID	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0				SM	Asphalt, gravel fill Brown sandy silt, dry, loose, no odor
2					Black silty clay, stiff, dry, strong odor
4		o PID 25	A 4 8	CL	
6					
8					Green clay, firm, moist, moderate odor
10		o PID 50	B 4 4	CH	
12					8/8/86
14		o PID 160		ML	Green clay, firm, wet, moderate odor
16					
18				SM	Light brown sandy silt, soft, wet, moderate odor
20		o PID 90			
22					
24					

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc

SOIL BORING SB3 — Drilling Lo

Project Arco/Hesperian — Owner Arco Petroleum
Location Hayward, Calif. — Project Number 20-8127
Date Drilled 8-8-86 — Total Depth of Hole 20 ft. — Diameter 7.5 in.
Surface Elevation - — Water Level, Initial 12.5 ft. — 24-hrs. -
Screen: Dia. - — Length - — Slot Size -
Casing: Dia. - — Length - — Type -
Drilling Company Sierra Pacific — Drilling Method h. s. auger
Driller L. Pena — Log by S. Gable

Sketch Map

Notes

Depth (Feet)	Well Construction	Blow Counts / Notes	Sample Number / PID	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Topsoil
2				CL	Black silty clay, stiff, dry, no odor
4		o PID 25	A 3 6		
6				MH	Brown, fine sandy clay, firm, damp, slight odor
8					
10		o PID	B 2 3	CH	Green clay, soft, damp, slight odor
12					▼ 8/8/86
14					
16		o PID 9		ML	Green brown sandy clay, firm, wet, slight odor
18					
20		o PID 160			Green brown sandy clay, firm, wet, slight odor
22					
24					

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GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc

Drilling Log

SOIL BORING SB 4

Project Arco/Hesperian Owner Arco Petroleum

Location Hayward, Calif Project Number 20-8127

Date Drilled 8-8-86 Total Depth of Hole 20 ft Diameter 7.5 in

Surface Elevation – Water Level, Initial 12.5 ft 24-hrs. –

Screen: Dia. – Length – Slot Size –

Casing: Dia. – Length – Type –

Drilling Company Sierra Pacific Drilling Method h. s. auger

Driller L. Pera Log by S. Gable

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes PID	Blow Count / Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Asphalt, gravel fill
2				SM	Brown sandy silt, dry, soft, no odor
4		o PID 40	6 8	CL	Black sandy silt, dry, stiff, dry, no odor
6		o PID 100		CL	
8		o PID 100	4 5		Brown silty clay, firm, damp, slight odor
10				ML	Green brown mottled, silty clay, soft, damp, slight odor
12					▼ 8/8/86
14		o PID 18			Dark brown sandy clay, firm, wet, slight odor
16					
18				CL	
20		o PID 18			
22					
24					

GT ENVIRONMENTAL LABORATORY

ANALYTICAL & CONSULTING SERVICES
Division of Oil Recovery Systems, Inc.
P. O. Box 541, Greenville, NH 03048
Tel: (603) 878-2500

8/13/86
Report No. 20-8127-1
Submitted to:

Robert Juncal
Groundwater Technology
4080 Pike Lane
Concord, CA. 94520

Sample Identification:
The attached report covers water samples #29172-29174 taken by S. Thompson using 40mL septum-capped glass vials at site #20-8127, Heywood, California.

Method:
Analysis was performed for purgeable aromatic priority pollutants and xylenes by purge and trap gas chromatography with photoionization and flame ionization detection as per EPA Method 602. Quantification was performed on a very polar column which fractionates aliphatics (up to C12) away from volatile aromatics. Chromatographic conditions are referenced in GTL Method Code 110. Hexane is used as a calibration standard for the aliphatic hydrocarbons and miscellaneous aromatics, if reported.

Minimum Detection Limit (MDL) at 5 times background is 0.5 ppb for all parameters. The level for reliable quantitation for the summed groups such as aliphatics is 20 ppb. Samples diluted in order to maintain the calibrated range are so indicated by a footnote giving the factor by which the HDL is raised.

Sampling and sample handling and preservation are specified by this laboratory to be as per EPA Method 602. Any irregularities are referenced in the attached quality assurance report.

Results:
Results are reported in ppb (ug/l)

Prepared by:
Bob Edwards
GC Manager

E.S.L.
Analyst

GT ENVIRONMENTAL LABORATORY

ANALYTICAL & CONSULTING SERVICES
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HYDROCARBONS IN WATER ug/L (ppb)
REPORT NO. 20-8127-1

Sample I.D.		DATE SAMPLED	DATE RUN	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	TOTAL BTEX
29172	MW-1	8/8/86	8/12/86	132	8.7	439	230	810
29173	MW-2	8/8/86	8/12/86	20.1	2.8	1.8	ND	24.7
29174	MW-3	8/8/86	8/12/86	510	549	409	1380	2850

*NOTES:

ND = BELOW DETECTION LIMIT

TOTAL BTEX = THE SUM OF BENZENE, TOLUENE, ETHYL BENZENE, AND XYLENES, ROUNDED TO THREE SIGNIFICANT FIGURES.

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HYDROCARBONS IN WATER ug/l
REPORT NO. 20-8127-1

SAMPLE NO.	I.D.	C4-C12 ALIPHATIC HYDROCARBONS	MISC AROMATICS C8-C12	TOTAL
29172	MW-1	7040	6440	14300 *5
29173	MW-2	1910	999	2930 *5
29174	MW-3	7450	3800	14100 *4

*NOTES:

TOTAL = THE SUM OF THE TOTAL BTEX AND THE ABOVE PARAMETERS.

ND = BELOW DETECTION LIMIT
MW = MONITORING WELL
4 = SAMPLE DILUTED; MDL TIMES 52
5 = UNCATEGORIZED COMPOUNDS PRESENT AT LESS THAN 10 PPB.

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Division of Oil Recovery Systems, Inc.
P. O. Box 541, Greenville, NH 03048
Tel: (603) 878-2500

Quality Assurance Documentation

Statement of Sample Integrity:
The samples in this data set meet the Groundwater Technology Laboratory criteria for physical integrity as per GTL Method Code 103 throughout the sampling, handling and analytical process.

Quality Assurance Specifications:
The data in this set conforms to the GTL Quality Assurance program and provisions specified in EPA Method 602 including, daily calibration with freshly made standards, blanks before trace level samples, surrogate spikes, spikes in untested matrices, a minimum of 10% duplicates and a minimum of 6% reference samples traceable to the U.S. EPA.

Certification:
The data in this report have been checked for accuracy and completeness.

Respectfully Submitted,

Michael D. Webb

Michael D. Webb
Technical Director

REPORT OF ANALYTICAL RESULTS

PROJECT: 20200 Hesperian Blvd., Hayward
PROJECT NO: 20-8127
DATE SAMPLED: August 8, 1986
METHOD: RPA Method 418.1

Parameter	Sample Description	Result
Hydrocarbon by IR mg/kg (ppm)	MW1 (9-9.5 ft.)	<10
	MW2 (9-9.5 ft.)	<10
	MW3 (11-11.5 ft.)	<10
	SB1 (9-9.5 ft.)	<10
	SB2 (9-9.5 ft.)	49
	SB3 (9-9.5 ft.)	42
	SB4 (9-9.5 ft.)	20

* Verbal Results Received from Brown & Caldwell Laboratories August 15, 1986.

Appendix C

E-Mail Dated 10/29/2004 From Mr. Seery, Alameda County Environmental Health Services Agency

"Seery, Scott, Env. Health" <scott.seery@acgov.org>

To: "'scott_robinson@urscorp.com'" <scott_robinson@urscorp.com>
cc:
Subject: ARCO #5397, 20200 Hesperian Blvd., Hayward

10/29/2003 04:03 PM

Hi Scott

Thanks for speaking to me today. As I mentioned, I will provide a few items, here, for you to consider with Paul Supple regarding this project.

* Based on current sampling data, and assuming said data are truly reflective of groundwater conditions, I don't see a clear need at this time to engage in the proposed H2O2 injection, for many reasons, actually. If ARCO would still prefer pursuing this remediation effort as a business decision, that will be up to them, and so will not be directed by this office.

* All monitoring well screens are quite long - most are in the range
of 25' with some as long as 30! Hence, I'm not certain that the sampling data reported to date are so confidence inspiring. Long screens present sample dilution problems, as well as problems with determining from which distinct zone of the formation contaminants are not found, and what the concentrations may be in the vertical sense along the thickness of the water bearing formation. Perhaps these wells should be replaced with wells with short screens (1 -3' long), strategically constructed so that only the high-K portions of the formation are exposed to the screens, with, perhaps, multiple screen depth intervals in each general location. This will facilitate depth-discrete data collection and evaluation. Another idea would be to perform depth-discrete sampling within the current wells, at ambient conditions, with no purge. Just some ideas, here.

* I'm not so convinced that well A-10 is telling the story it was intended to tell, or even A-7, for that matter. I'm not certain that we should rely on A-10 as a marker of the distal end of the plume, even though GW flow has been shown graphically to flow towards it. Sediments encountered in well A-7 are certainly more similar to those of A-10 - sandy silt and silt The higher K value sands and gravels encountered at depths ranging roughly between 20 and 35' in most other monitoring wells located east of the Hesperian Blvd. center median are missing in the sediments encountered in A-7 and A-10. I'm not sure what to interpret from this; A-7 and A-10 could reflect the terminus of an areally limited sand/gravel lens seen elsewhere at the site, or it could be that the sand/gravel body is actually a bit to the south or north. Or it could mean something else entirely. I think this should be looked at critically.

* This all leads me to ask ARCO to put together a "Site Conceptual Model", or SCM. There is some good guidance out there for this: "Strategies for Characterizing Subsurface Releases of Gasoline Containing MtBE", API publication No. 4699, Feb. 2000; the SWRCB "Guidelines for Investigation and Cleanup of MtBE and Other Ether-Based Oxygenates, Final Draft", dated March 27, 2000; and, the June 2002 "Mass Flux Estimates to Assist Decision Making", ChevronTexaco Energy Research and Technology.

* Good cross sections are a must component of the SCM. The ones I've
seen so far really aren't very good at helping the reader to interpret the subsurface.