

62019.02

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**REPORT
SUBSURFACE ENVIRONMENTAL INVESTIGATION**

at
**ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California**

62019.02

Prepared for
**ARCO Products Company
P.O. Box 5811
San Mateo, California**

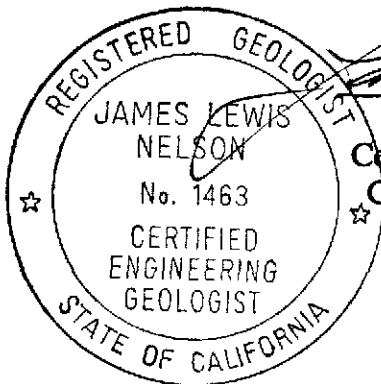
by
RESNA Industries Inc.

March 10, 1993

Erin McLucas

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March 10, 1993

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TRANSMITTAL

Scott

TO: Mr. Rob Weston
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Oakland, California 94621

DATE: March 10, 1993
PROJECT NUMBER: 62019.02
SUBJECT: Final - Subsurface
Environmental Investigation at ARCO
Station 2162, 15135 Hesperian Blvd.,
Oakland, California.

FROM: Erin McLucas
TITLE: Staff Geologist

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15135 Hesperian Boulevard
San Leandro, California

INTRODUCTION

At the request of ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) performed a subsurface environmental investigation at ARCO Station 2162, located at 15135 Hesperian Boulevard in San Leandro, California. This investigation was initiated in response to petroleum hydrocarbons encountered in the soil during a preliminary tank replacement assessment conducted by Roux Associates (Roux), of Concord, California (Roux, August 28, 1991). The objectives of this subsurface environmental investigation were to evaluate the extent of gasoline hydrocarbon-impacted soil and groundwater onsite, and to evaluate the groundwater gradient and flow direction beneath the site.

The work performed for this investigation included: drilling four soil borings; collecting and describing soil samples from the borings; installing and developing four 4-inch diameter groundwater monitoring wells in the borings; submitting selected soil samples for laboratory and sieve analysis; measuring depth-to-water (DTW) levels; sampling groundwater monitoring wells and submitting samples for laboratory analysis; surveying wellhead elevations; and preparing this report which summarizes field procedures, results, and conclusions. This work was performed as outlined in RESNA's Work Plan for Subsurface Investigation (RESNA, July 7, 1992).

SITE DESCRIPTION AND BACKGROUND

General

ARCO Station 2162 is an operating auto repair and self-service gasoline station located in a residential area on the southwestern corner of the intersection of Hesperian Boulevard and Ruth Court in San Leandro, California. The location of the site is shown on the Site Vicinity Map, Plate 1. The site is approximately 30 feet above mean sea level (msl), on a predominantly flat concrete- and asphalt-covered lot, which slopes gently (less than 1 percent) toward the southwest (U.S. Geological Survey, 1968). In December 1991, one 6,000-gallon steel gasoline underground storage tank (UST), two 8,000-gallon steel USTs, and one 12,000-gallon fiberglass UST (T1 through T4) were removed and replaced with four 10,000-gallon double-walled fiberglass USTs at the subject site. Product delivery lines were also removed and replaced with double-walled product delivery lines. A 560-gallon underground waste-oil-storage tank was also removed and replaced with a 600-gallon underground waste-oil-storage tank during the same period. The locations of the newly installed tanks and other pertinent facilities at the site are shown on the Generalized Site Plan, Plate 2.

Regional Geology and Hydrogeology

The subject site is located on the East Bay Plain, an area of generally low relief lying between the San Francisco Bay to the west and the hills of the Diablo Range to the east. The eastern boundary of the plain in the San Leandro area is marked by the active Hayward Fault, which is located along the base of the Diablo Range escarpment. The Hayward Fault is a well recognized groundwater barrier which locally influences groundwater flow near the base of the hills (Maslonkowski, 1984).

The East Bay Plain is underlain by about 1,000 feet. of unconsolidated Quaternary sediments, consisting mostly of sand and silt deposited by alluvial systems, and clay and silt deposited in shoreline and estuarine environments. The alluvial deposits consist of large coalescing fans (cones) formed by debris transported by streams and creeks that drained from the Diablo Range (Hickenbottom and Muir, 1988). The soils in the vicinity of the

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subject site have been mapped as younger alluvium deposits of The San Leandro Cone (Maslonkowski, 1984) and consist of unconsolidated clay, silt, sand and gravel (Helley, et al., 1979).

Recharge to the groundwater in the area occurs mainly as a result of direct precipitation that falls on the plain and the adjacent hills. Water reaches the groundwater reservoir through seepage from streams, infiltration through the soil, and subsurface inflow from adjacent areas and bedrock units.

PREVIOUS WORK

Preliminary Tank Replacement Assessment

A preliminary tank replacement assessment was conducted at the site by Roux on June 5, 1991 (Roux, August 28, 1991). This investigation included drilling and sampling five soil borings (B-1, B1A through B-4) and drilling and sampling two borings prior to installing vapor extraction wells (VW-1 and VW-2). Soil samples collected from the borings were monitored with an organic vapor meter (OVM) and selected soil samples were submitted to a State-certified laboratory for analysis under Chain of Custody protocol. The locations of the borings and vapor wells are shown on Plate 2.

The soil borings were drilled to total depths between 9½ and 15 feet and the vapor extraction wells VW-1 and VW-2 were installed at a depth of 9 feet. Soil encountered in the borings consisted of interbedded silt and silty clay from ground surface to depths between 7 and 9 feet. A sand and gravel unit was encountered beneath the silt and clay unit. Groundwater was encountered in the borings at depths between 9 and 10 feet. A silt unit underlying the sand and gravel unit was encountered in boring B-4 at a depth of 13 feet (Roux, August 28, 1991).

Analytical results of a soil sample collected from boring B-1, located in the tank pit, indicated nondetectable total petroleum hydrocarbons as gasoline (TPHg)(less than 1.0 part per million [ppm]) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) (less than 0.0050 ppm). Analytical results of soil samples collected from boring B-4, located in the

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tank pit, indicated concentrations of 2,400 ppm TPHg, 17 ppm benzene, 62 ppm toluene, 41 ppm ethylbenzene, and 260 ppm total xylenes at a depth of 7½ feet. Analytical results of soil samples collected from boring B-3, located directly southwest of the former USTs, indicated concentrations of 1,400 ppm TPHg, 2.5 ppm benzene, 4.4 ppm toluene, 29 ppm ethylbenzene, and 190 ppm total xylenes at a depth of 7½ feet. TPHg and BTEX were detected in soil samples collected from boring VW-1, located south of the pump islands, and in boring B-1A, located northeast of the former USTs at concentrations up to 100 ppm TPHg and 7.6 ppm total xylenes at depths of 7½ and 9 feet, just above first-encountered groundwater. Laboratory analytical data of soil samples from borings B-1, B-1A through B-4 and VW-1 are shown in Table 1, Cumulative Results of Laboratory Analyses of Soil Samples. No soil samples were analyzed from VW-2.

Limited Soil Performance Test

A "limited soil performance test" (LSPT) was performed onsite on June 6, 1991, by Roux (Roux, August 28, 1991). The LSPT was performed to evaluate the efficiency and practicality of vapor extraction as a soil and groundwater remediation alternative and to evaluate the most appropriate off-gas treatment alternative. During the LSPT, vapor extraction well VW-1 was used as the extraction well and well VW-2 was used as the observation well. No air samples were taken during the LSPT.

Based on the results of their LSPT, Roux evaluated the radius of vacuum impact to be less than 20 feet at a flow rate of 260 cubic feet per hour or 3.6 cubic feet per minute (CFM). No influence was recorded in vapor extraction well VW-2 after 70 minutes. Roux concluded that at the screened depth of the vapor extraction wells, the silty clays beneath the site are not amenable to vapor extraction remediation techniques.

Underground Storage Tank Removal and Replacement

The former gasoline and waste-oil USTs, and product lines were removed and replaced between December 1991 and February 1992 (Roux, July 7, 1992). The locations of the former UST and product line excavations are shown on Plate 2.

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Soil samples were collected from the tank pit side walls and beneath the product delivery lines and analyzed for TPHg and BTEX. Except for sample L-5, most of the seven product line trench bottom samples (L-1 through L-7) contained TPHg concentrations less than 20 ppm sample L-5 contained a TPHg concentration of 110 ppm at a depth of 3 feet. Sidewall samples in the former tank pit excavation (SW-1 through SW-5) contained TPHg concentrations ranging from 140 ppm (SW-2) on the southwest sidewall at a depth of 10 feet, to 1,000 ppm (SW-5) in the northeast sidewall at a depth of 10 feet. One soil sample (WO-1) was obtained at a depth of approximately 10 feet beneath the former waste-oil tank and analyzed for TPHg and total petroleum hydrocarbons as diesel (TPHd), BTEX, volatile organic compounds (VOCs), total oil and grease (TOG), and The Waste Extraction Test (WET) for cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), and zinc (Zn) as described in the California Administrative Code, Title 22. The analytical results of the sample WO-1 indicated concentrations of TPHg at 310 ppm, TPHd at 360 ppm, total BTEX at 17.48 ppm, TOG at 270 ppm, and WET constituents Cr at 49 ppm, Pb at 5.2 ppm, Ni at 59 ppm, and Zn at 58 ppm. VOCs and Cd were nondetectable.

As part of the tank replacement activities, piping for use in possible future remediation systems was also installed at the site.

FIELD WORK

Drilling

Well Construction Permit No. 92436 was acquired from the Alameda County Flood Control and Water Conservation District, Zone 7 (ACFCWCD) prior to drilling at the site. A copy of the permit is included in Appendix A, Permits. Field work at the site was conducted in accordance with RESNA's field protocol and the Site Safety Plan (RESNA, September 6, 1992). A summary of the field methods used by RESNA is included in Appendix B, Field Methods.

On September 8, 1992, a RESNA environmental scientist was at the site to observe the drilling of four onsite borings (B-5 through B-8). Borings B-5 through B-8 were drilled to total depths between approximately 18-1/2 and 21 feet to evaluate the vertical and lateral

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extent of gasoline hydrocarbons in soil. Groundwater monitoring wells MW-1 through MW-4 were installed in borings B-5 through B-8, respectively, to evaluate the lateral extent of gasoline hydrocarbons in groundwater beneath the site.

Soil Sampling and Description

A total of 16 soil samples were collected for description and possible laboratory analyses from the ground surface to the total depth of the borings. A soil sample was collected from boring B-5 for vertical delineation from a silty clay perching layer below shallowest groundwater. However, the sample was lost and could not be analyzed. Soil samples were described in accordance with the Unified Soil Classification System (Plate 3), and collected at the depths as indicated on the Logs of Borings B-5 through B-8 (Plates 4 through 7). Field measurements of organic vapors were monitored with an organic vapor meter (OVM) which provides order of magnitude field estimates of organic vapor content from selected soil samples. The organic vapor measurements are shown on the logs of boring in the column labeled P.I.D. (photoionization detector). A summary of the sampling methods used is presented in Appendix B.

The earth materials encountered during this investigation consisted primarily of silty clay and clayey silt interbedded with a silty sand to gravel. Graphic interpretations of the soil stratigraphy encountered in the borings are shown on Geologic Cross Sections A-A', B-B', and C-C' (Plates 9 through 11). The locations of these cross sections are shown on Plate 2.

Three lithologic units were encountered at the site. Beneath a section of asphalt and baserock covering the site, a clayey silt unit approximately 6 feet thick was encountered. Underlying the clayey silt was a sandy silt to sandy gravel water-bearing unit between the depths of approximately 8 and 18-1/2 feet. The water-bearing unit was underlain by a silty clay to clayey silt perching unit of unknown thickness. Groundwater was first encountered within the silty sand to gravel unit at depths between approximately 10 and 11 feet. The water table appears to be unconfined due to the absence of an upper confining layer and the apparent drop of static water levels below measured initial water levels in most of the completed wells.

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Soil cuttings generated from the borings were temporarily stored along the western boundary of the site and placed on and covered with plastic sheeting pending proper disposal. Following completion of drilling on September 8, 1992, four soil samples were collected from the stockpile and submitted for compositing and laboratory analyses. The field methods used to collect these samples are described in Appendix B.

Monitoring Well Construction and Development

As previously mentioned, four groundwater monitoring wells, MW-1 through MW-4, were constructed in borings B-5 through B-8, respectively. The wells were completed with 4-inch diameter, Schedule 40, polyvinyl chloride (PVC) casing and screened with 4-inch diameter, 0.020 inch-wide machine-slotted PVC. Well casings were set in wells MW-1 and MW-2 to a depth of 16 feet, in well MW-3 to a depth of 15 feet, and in well MW-4 to a depth of 18 feet. A complete description of field methods used is included in Appendix B.

The wells were developed on September 23, 1992, to remove fine-grained sediments and to allow better communication between the water-bearing zone and the groundwater monitoring well. Development was performed by a RESNA Technician as described in Appendix B.

Groundwater Level Measurements and Sampling

RESNA performed monitoring and sampling at the site on September 30, 1992, as a part of this subsurface investigation, and EMCON Associates of San Jose, California (EMCON) performed monitoring and sampling at the site on October 16, 1992, in conjunction with fourth quarter 1992 groundwater monitoring. During both monitorings, depth-to-water (DTW) levels were measured, water samples were visually inspected for the presence of floating product, the wells were purged, and water samples were collected for analysis. No evidence of floating hydrocarbon product was observed in wells MW-1 through MW-4 during either monitoring. Groundwater monitoring data is presented in Table 2.

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LABORATORY ANALYTICAL METHODS

Soil Samples

Thirteen soil samples collected from borings B-5 through B-8 were analyzed by Sequoia Analytical Laboratories of Redwood City, California, (State of California Hazardous Waste Testing Laboratory Certification No. 1210) for TPHg and BTEX using Environmental Protection Agency (EPA) Methods 5030/8015/8020. In addition, selected samples from depths of 8½ and 9 feet in boring B-5 and B-6 respectively, were analyzed by a geotechnical laboratory (Soil Foundation Systems, Inc., of Fremont, California) for grain size distribution, to obtain information for use in possible future recovery well construction. At the request of ARCO's contractor, Dillard Trucking, Inc. of Byron, California, the four samples collected from the soil stockpile were composited and analyzed by Sequoia Analytical for TPHg and BTEX using EPA Methods 5030/8015/8020, for corrosivity, ignitability, and reactivity (RCI), and for lead by solubility threshold limit concentration (STLC).

The soil samples were selected for laboratory analysis based on:

- Location above first-encountered groundwater;
- Location in a potential perching layer below first-encountered groundwater;
- Areas where the presence of gasoline hydrocarbons was suspected;

Groundwater Samples

Groundwater samples collected from wells MW-1 through MW-4 were preserved as required by the applicable analytical method and delivered with Chain of Custody Records to Sequoia Analytical for the September 30, 1992 sampling, and analyzed for TPHg and BTEX using EPA Methods 5030/8015/8020. The samples from the October 16, 1992 monitoring were sent to Columbia Analytical services, Inc., in San Jose, California (State of California Hazardous Waste Testing Laboratory Certification No. 1462) and analyzed for TPHg and BTEX using EPA Methods 5030/8020/California DHS LUFT Method.

EVALUATION OF GROUNDWATER GRADIENT

On September 14, 1992, the wellheads of the new groundwater monitoring wells MW-1 through MW-4 were surveyed for top-of-casing (TOC) elevations to a local City of San Leandro Datum benchmark by John E. Koch, Licensed Land Surveyor, of Oakland, California. The results of this wellhead survey are included in Appendix F, Wellhead Survey. Groundwater elevations for each well were calculated by subtracting DTW level measurements from the TOC elevation. The groundwater gradient, as interpreted from the September 30, and October 16, 1992 DTW measurements, was approximately 0.01 with a flow direction to the southwest as depicted on Plates 11 and 12, Groundwater Gradient Maps. The DTW measurements, TOC elevations, and calculated groundwater elevations are presented in Table 2, Cumulative Groundwater Monitoring Data.

RESULTS OF LABORATORY ANALYSES

Soil

Results of laboratory analyses of soil samples from previously drilled borings and of the thirteen soil samples collected from borings B-5 through B-8 are summarized in Table 1, Cumulative Results of Laboratory Analyses of Soil Samples. Chain of Custody Records and Laboratory Analytical Reports of Soil Samples are included in Appendix C of this report.

Laboratory results of soil samples from these borings indicated that the greatest concentrations of TPHg and BTEX were at depths of approximately 10 to 11 feet, in the capillary fringe zone. At these depths concentrations of TPHg ranged from 51 ppm in B-8 located downgradient of the former USTs, to 550 ppm in B-6, located immediately adjacent to and upgradient of the former USTs, and BTEX ranged from 0.056 ppm ethylbenzene in B-8 to 48 ppm total xylenes in B-6.

Laboratory analytical data for boring B-7, located down- and slightly crossgradient of the former USTs in the southeastern corner of the site, indicated nondetectable TPHg (less than 1.0 ppm) and BTEX (less than 0.0050 ppm) in all samples analyzed.

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Sieve analysis results of the selected samples analyzed from borings B-5 and B-6 at depths of 8½ and 9 feet respectively, indicated that the soil was a silty clay. Gradation Test Results of the sieve analyses are included in Appendix D.

Groundwater

Results of laboratory analyses of water samples from MW-1 through MW-4 are presented in Table 3, Cumulative Results of Laboratory Analyses of Groundwater Samples. Chain of Custody Records and Laboratory Analytical Reports of Groundwater Samples are included in Appendix E.

Laboratory analytical results of groundwater samples collected on September 30, and October 16, 1992, from monitoring wells MW-1, MW-2, and MW-4, indicated that: well MW-1 had the greatest concentrations of TPHg, located relatively crossgradient; well MW-4 had the greatest concentrations of benzene, located roughly downgradient; and well MW-2 had the greatest concentrations of toluene, ethylbenzene, and total xylenes, located upgradient of the former USTs.

Laboratory analytical reports for samples collected on both September 30, and October 16, 1992, from well MW-3, located downgradient to slightly crossgradient of the former USTs, indicated nondetectable TPHg (less than 50 ppb) and BTEX (<0.50 ppb).

Stockpiled Soil Cuttings

Results of laboratory analyses of the composited stockpile soil samples indicated 11 ppm TPHg, 0.52 ppm ethylbenzene, 0.12 ppm total xylenes, a pH of 8.4, ignitability of >100 ° C, no reactivities, and 0.11 ppm lead. The results of composite soil samples analyses are included in Table 1. The soil stockpile was removed on September 22, 1992, by ARCO's contractor.

CONCLUSIONS

Based on the results of this and previous environmental investigations, RESNA concludes the following:

- The majority of gasoline hydrocarbons in the soil at the site appear to be located in the capillary fringe zone above first encountered groundwater the northern portion of the site, in the vicinity of, and crossgradient from, the former USTs. The greatest impacts are at approximate depths of 5 to 7½ feet as indicated by the presence of TPHg and BTEX in borings B-5 and B-6 and in previously drilled borings B1 through B4, in the vicinity of the former USTs.
- Gasoline hydrocarbons appear to have been laterally delineated in the soil to less than 1.0 ppm TPHg and less than 0.0050 ppm BTEX in the vicinity of boring B-7, located in the southeastern corner of the site.
- Gasoline hydrocarbons appear to have been vertically delineated in the soil to less than 1.0 ppm TPHg in the vadose zone (at depths between 0 and 5 feet) and in the aquitard underlying the water bearing zone (at depths between 16½ and 18½ feet) in the vicinity of borings B-6 through B-8. Gasoline hydrocarbons appear to have been vertically delineated in the vadose zone in boring B-5 to less than 1 ppm TPHg. A soil sample collected from a silty clay perching layer below the shallow water-bearing unit from boring B-5 was lost and could not be analyzed. However, the lack of odor and a zero OVM reading (subjective evidence) from a moist silty sand layer situated directly above the perching layer (see Plate 4, Log of Boring B-5/MW-1) suggests that gasoline hydrocarbons may not have impacted the aquitard underlying the water bearing zone.
- First groundwater was encountered beneath the site at depths between approximately 10 and 11 feet in wells MW-1 through MW-4. The groundwater gradient was estimated to be approximately 0.01, with a flow direction to the southwest.

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- The highest concentrations of gasoline hydrocarbons in the shallowest groundwater beneath the site appear to be in the northern portion of the site, in the vicinity of, the former USTs, as indicated by the presence of TPHg and BTEX in wells MW-1 and MW-2. Lesser concentrations appear in the groundwater in well MW-4, located in the southwestern corner of the site downgradient of the former USTs.
- Gasoline hydrocarbons in groundwater appear to have been delineated to less than 50 ppb TPHg and less than 0.50 ppb BTEX in monitoring well MW-3, located in the southeastern corner of the site crossgradient of the former USTs.

REPORT DISTRIBUTION

RESNA recommends that copies of this report be sent to the following agencies:

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LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating environmental conditions of the soil and groundwater with respect to gasoline-related hydrocarbons at the site. No soil engineering or geotechnical references are implied or should be inferred. Evaluation of the geologic conditions at the site for the purpose of this assessment is made from a limited number of observation points. Subsurface conditions may vary away from the data points available.

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- Roux Associates, July 7, 1992. Underground Storage Tank Replacement and Soil Sampling, ARCO Facility No. 2162, 15135 Hesperian Boulevard, San Leandro, California. #A117W01.1.8

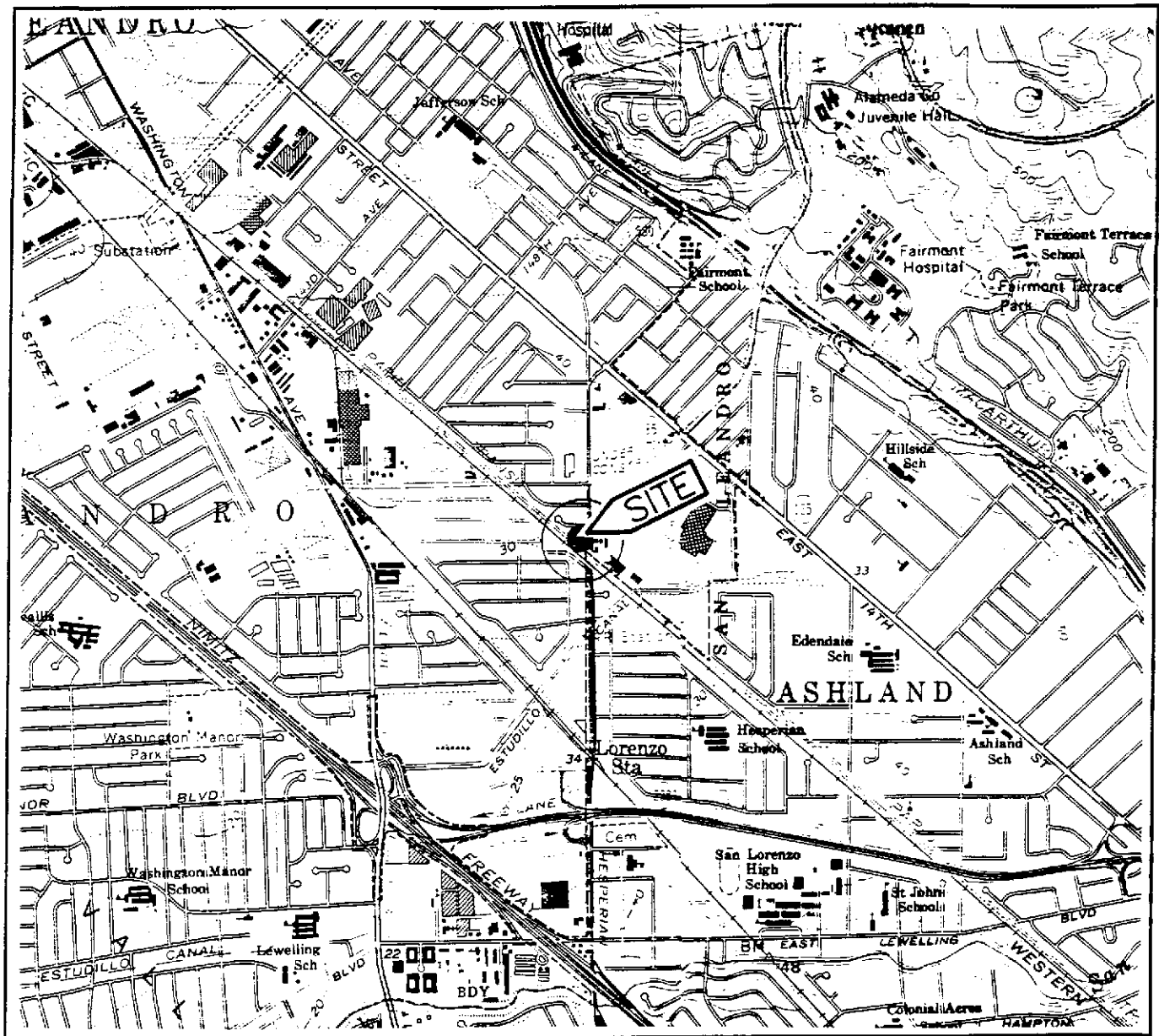
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Title 22, California Administrative Code, Section 66696. January 1988.

U.S. Geologic Survey, 1968, San Leandro, California, 7.5-minute topographic quadrangle map.



Base: U.S. Geological Survey
 7.5-Minute Quadrangles
 San Leandro/Hayward, California.
 Photorevised 1980

LEGEND

● = Site Location



Approximate Scale



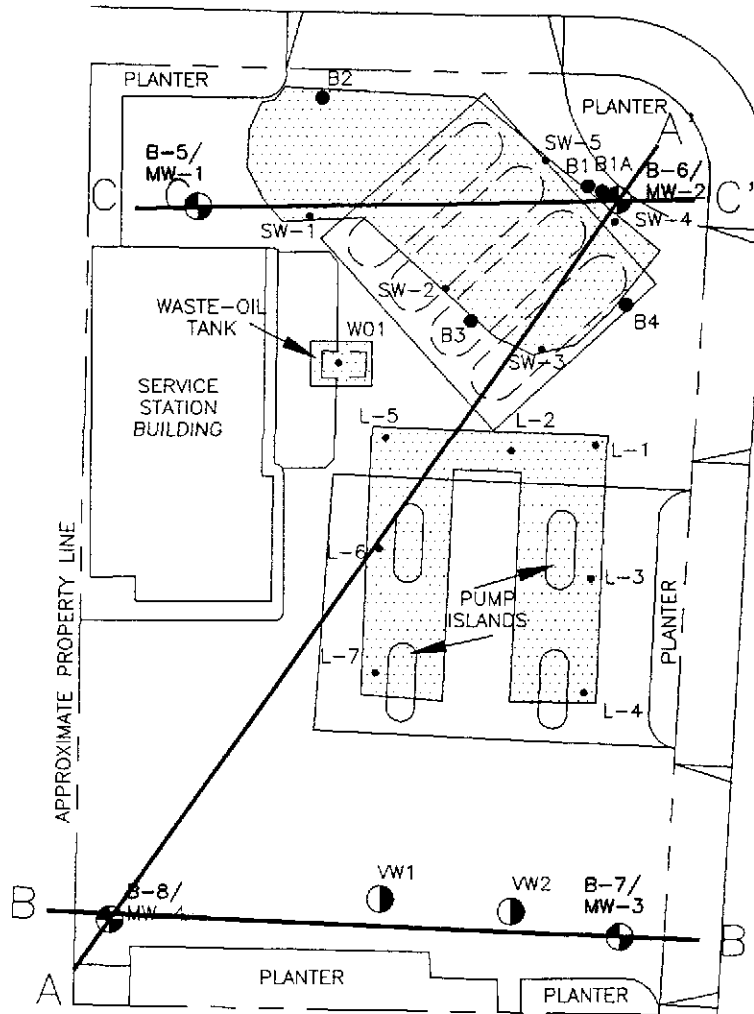
RESNA
 Working to Restore Nature

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SITE VICINITY MAP
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California

PLATE
1

RUTH COURT



HESPERIAN BOULEVARD

EXPLANATION


B-8/
MW-4 ● = Monitoring well RESNA September 1992

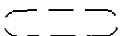
VW2 ● = Vapor extraction well
(Roux Associates, Inc., 1991)

B4 ● = Soil boring
(Roux Associates, Inc., 1991)

L-7 • = Product line sample

SW-5 • = Sidewall soil sample

 = Former underground storage tank
and product line excavations

 = Existing underground storage tank



Approximate Scale



Source: Modified from site plan provided by Roux Associates,
and survey data from John Koch, licensed
land surveyor (9/16/92)

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GENERALIZED SITE PLAN
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California












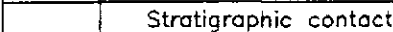


PLATE

2

PROJECT 62019.02

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION	LTR	DESCRIPTION	MAJOR DIVISION	LTR	DESCRIPTION		
COARSE- GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.	FINE- GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		GM	Silty gravels, gravel-sand-silt mixtures.			OL	Organic silts and organic silt-clays of low plasticity.
		GC	Clayey gravel, gravel-sand-clay mixtures.				
	SAND AND SANDY SOILS	SW	Well-graded sand or gravelly sands, little or no fines.		SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		SP	Poorly-graded sands or gravelly sands, little or no fines.			CH	Inorganic clays of high plasticity, fat clays.
		SM	Silty sands, sand-silt mixtures.			OH	Organic clays of medium to high plasticity, organic silts.
		SC	Clayey sands, sand-clay mixtures.			PT	Peat and other highly organic soils.
			HIGHLY ORGANIC SOILS				

 Depth through which sampler is driven  Relatively undisturbed sample  No sample recovered  Static water level observed in well/boring  Initial water level observed in boring S-10 Sample number	 Sand pack  Bentonite  Neat cement  Caved native soil  Blank PVC  Machine-slotted PVC P.I.D. Photoionization detector	 Stratigraphic contact  Gradational contact  Inferred contact
---	--	--

BLOWS REPRESENT THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH EACH 6 INCHES OF AN 18-INCH PENETRATION.

GRADATIONAL AND INFERRED CONTACT LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL. LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY.

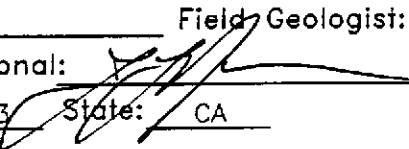


PROJECT 62019.02

**UNIFIED SOIL CLASSIFICATION SYSTEM PLATE
AND SYMBOL KEY
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California**

3

Depth of boring: 18-1/2 feet Diameter of boring: 12 inches Date drilled: 09/08/92
 Well depth: 16 feet Material type: Sch 40 PVC Casing diameter: 4 inches
 Screen interval: 8 to 16 feet Filter pack: #3 Sand Slot size: 0.020-inch
 Drilling Company: Exploration GeoServices Driller: John and Dennis
 Method Used: Hollow-Stem Auger Field Geologist: Lou Leet

Signature of Registered Professional: 

Registration No.: CEG 1463 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
				GW	Asphalt (4 inches).	
2				ML	Sandy gravel, fine to coarse gravel, fine- to coarse-grained sand, brown, damp, medium dense; shell fragments: baserock.	
4					Clayey silt with sand, fine- to medium-grained sand, black, damp, medium plasticity, very stiff.	
4.5	S-4.5	7				
		10				
6		18				
8	S-8.5	3	12	ML	Sandy silt with clay, fine- to medium-grained sand, gray-brown, very moist, low to medium plasticity, stiff; product odor	
		4				
		5				
10	S-10		126		Water at 10-1/2 feet.	
		2	3		Lost sample.	
12		4				
		6				
		3				
		4				
14		4				
		2		SM	Silty sand with gravel, fine- to medium-grained sand, fine to coarse gravel, brown, moist, medium dense.	
		3				
16		5	0			
		2				
		3				
		5				
18		6		CL	Silty clay, dark brown, damp, medium plasticity, very stiff	
		11				
					Total depth = 18-1/2 feet.	
20						



LOG OF BORING **B-5/MW-1**
 ARCO Station 2162
 15135 Hesperian Boulevard
 San Leandro, California

PLATE
 4

PROJECT 62019.02

Depth of boring: 18-1/2 feet Diameter of boring: 12 inches Date drilled: 09/08/92
 Well depth: 16 feet Material type: Sch 40 PVC Casing diameter: 4 inches
 Screen interval: 8 to 16 feet Filter pack: #3 Sand Slot size: 0.020-inch
 Drilling Company: Exploration GeoServices Driller: John and Dennis
 Method Used: Hollow-Stem Auger Field Geologist: Lou Leet

Signature of Registered Professional: _____

Registration No.: CEG 1463 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
				GW	Asphalt (4 inches).	
2				ML	Sandy gravel, medium to coarse gravel, medium- to coarse-grained sand, brown, damp, medium dense; glass fragments: baserock.	
4					Clayey silt, brown, damp, medium plasticity, stiff.	
6	S-5	7 10 12				
8	S-9	5 7 10	58	SM	Silty sand, fine-grained, brown, moist to wet, medium dense; obvious odor.	
10	S-10	3 5 7 4 6 7 3 2 3 3 6 7 5 7 8 5	203		Color change to gray.	
12						
14			0	SM	Silty sand with clay, fine-grained, moist, loose.	
16				SP-SM	Sand with silt, fine- to coarse-grained, brown, wet, medium dense.	
18	S-17	5 7 8 5 6 8		ML	Clayey silt with sand, fine- to medium-grained, brown, damp, medium plasticity, stiff.	
				CL/CH	Silty clay, dark brown, damp, medium to high plasticity, stiff.	
20					Total depth = 18-1/2 feet.	



LOG OF BORING B-6/MW-2
 ARCO Station 2162
 15135 Hesperian Boulevard
 San Leandro, California

PLATE
 5

PROJECT 62019.02

Depth of boring: 19 feet Diameter of boring: 12 inches Date drilled: 09/08/92
 Well depth: 15 feet Material type: Sch 40 PVC Casing diameter: 4 inches
 Screen interval: 8 to 15 feet Filter pack: #3 Sand Slot size: 0.020-inch
 Drilling Company: Exploration GeoServices Driller: John and Dennis
 Method Used: Hollow-Stem Auger Field Geologist: Lou Leet

Signature of Registered Professional: [Signature]
 Registration No.: CEG 1463 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
				SM	Asphalt (4 inches).	
2				ML	Silty sand, fine- to medium-grained, brown, damp, medium dense.	
					Clayey silt, black, moist, medium plasticity, very stiff.	
5	S-5	5 7 11	0		Color change to brown at 5-1/2 feet.	
8	S-7.5	5 5 10	0		Silty sand with clay, fine- to medium-grained, brown, very moist, medium dense.	
10	S-10	5 6 5 6 7	0	SM	Silty sand, fine- to medium-grained, brown, wet, medium dense.	
12		10 6 6 5	0	SM	Sandy gravel, fine to medium gravel, fine- to coarse-grained sand, brown, wet, medium dense.	
		4	0	SM	Silty sand, fine- to medium-grained, brown, wet, medium dense.	
14		4 4 3	0	GW	Sandy silt with clay, fine-grained, brown, wet, low plasticity, stiff.	
		3	0	SM	Silty sand, fine-grained, brown, very moist, loose.	
16	S-16.5	3 3 4 6	0	ML	Clayey silt with sand, fine-grained, brown, damp to moist medium stiff.	
		7	0		Silty sand, fine- to medium-grained, brown, damp, medium dense.	
18		10 12	0	SM	Clayey silt with sand, fine-grained, dark brown, damp, low plasticity, very stiff.	
20					Total depth = 19 feet.	



LOG OF BORING B-7/MW-3
 ARCO Station 2162
 15135 Hesperian Boulevard
 San Leandro, California

PLATE
 6

PROJECT 62019.02

Depth of boring: 21 feet Diameter of boring: 12 inches Date drilled: 09/08/92
 Well depth: 18 feet Material type: Sch 40 PVC Casing diameter: 4 inches
 Screen interval: 10 to 18 feet Filter pack: #3 Sand Slot size: 0.020-inch
 Drilling Company: Exploration GeoServices Driller: John and Dennis
 Method Used: Hollow-Stem Auger Field Geologist: Lou Leet
 Signature of Registered Professional: [Signature]
 Registration No.: CEG 1463 State: CA

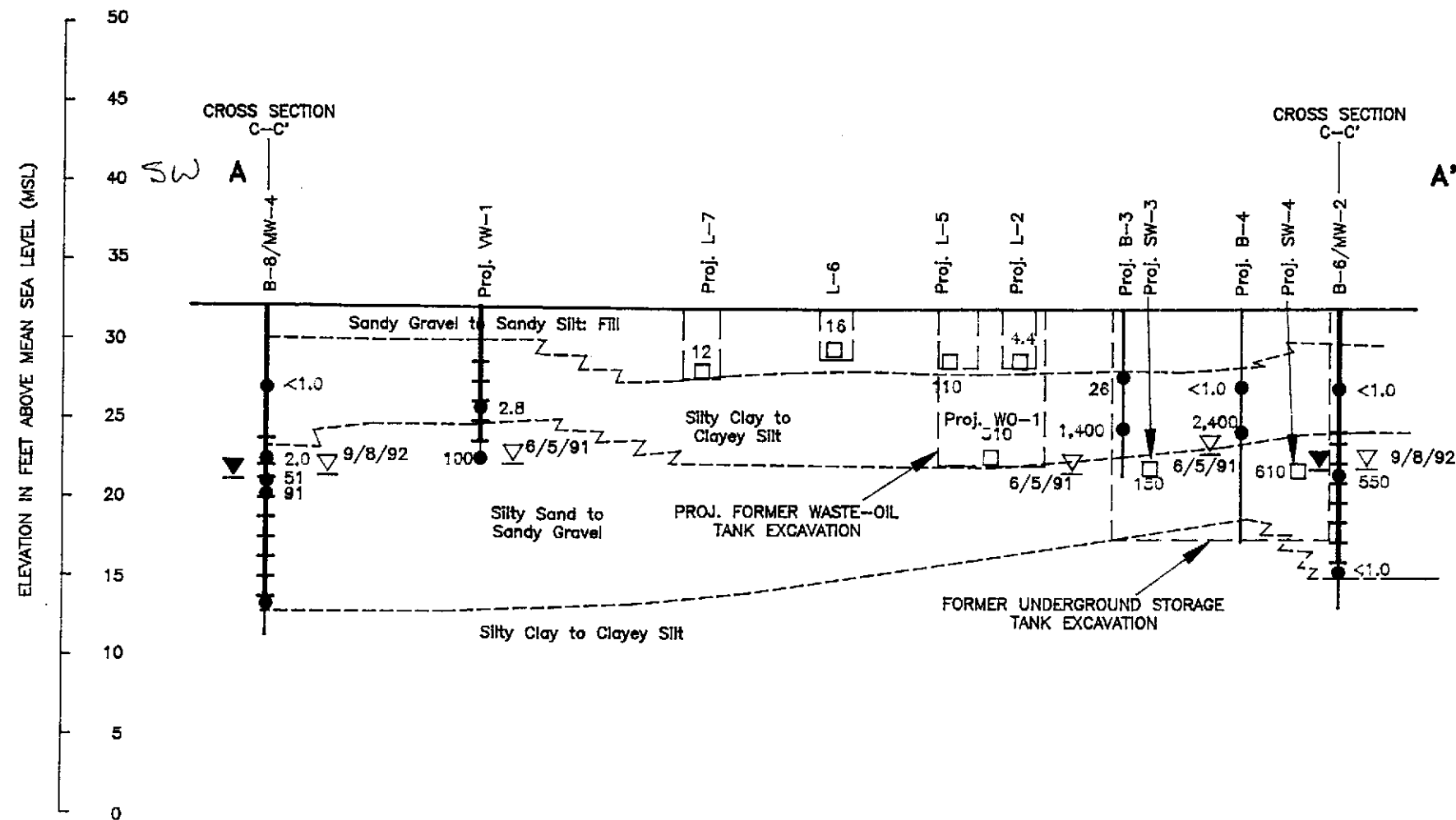
Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
				GW	Asphalt (4 inches).	
2				ML	Sandy gravel, fine to coarse gravel, medium- to coarse-grained sand, brown, damp, medium dense; glass fragments: baserock.	
4					Clayey silt, brown, damp, low to medium plasticity, very stiff.	
6	S-5	7 15 17	0		Color change to black.	
10	S-9.5	3 7 8	23	SM	Silty sand with clay, fine- to medium-grained sand, brown, moist to very moist, medium dense; rootlet void.	
12	S-11 S-11.5	3 4 7 3 3 3 3 3 2 3 10			Odor.	
14				GP-GM	Sandy gravel with silt, fine to coarse gravel, fine- to coarse-grained sand, dark brown, <u>wet</u> , loose.	
16				SM	Silty sand, fine-grained, brown, very moist.	
18			0	SM	With clay. Silty sand, fine- to coarse-grained, very moist, medium dense.	
20	S-18.5	3 7 8		ML	Clayey silt, dark gray-brown, damp, medium plasticity, very stiff.	
					Total depth = 21 feet.	



PROJECT 62019.02

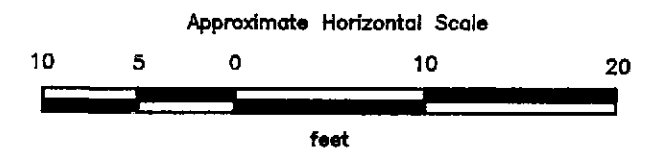
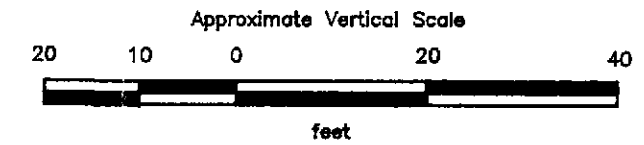
LOG OF BORING B-8/MW-4
 ARCO Station 2162
 15135 Hesperian Boulevard
 San Leandro, California

PLATE
 7



EXPLANATION

- = Product line and tank excavations
- = Laboratory analyzed product line excavation soil sample showing TPHg concentration in ppm
- = Laboratory analyzed soil sample showing TPHg concentration in ppm
- = Well casing
- = Well screen
- = Boring
- = Initial water level
- = Static water level (10/16/92)



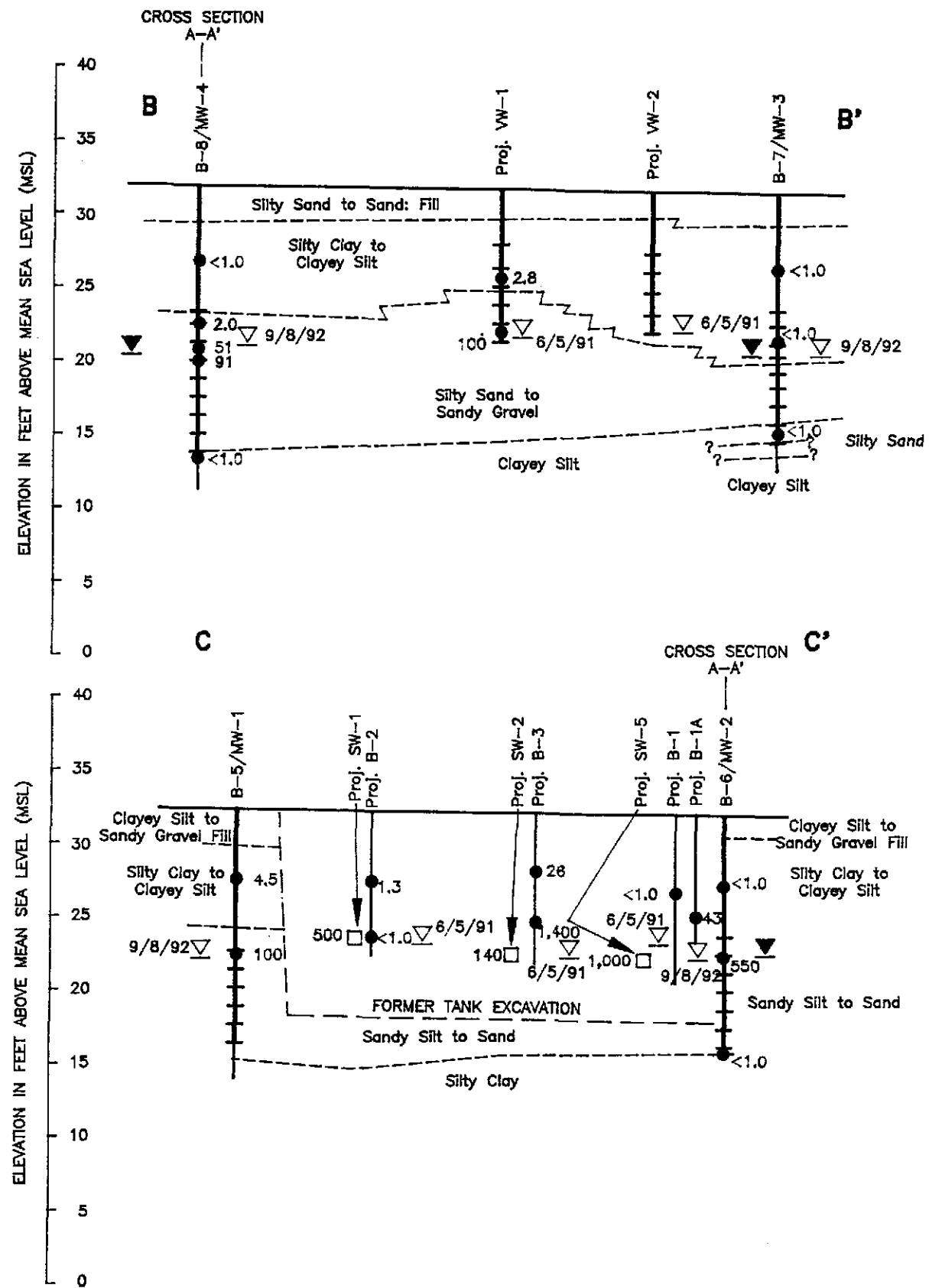
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PROJECT 62019.02

GEOLOGIC CROSS SECTION A-A'
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California

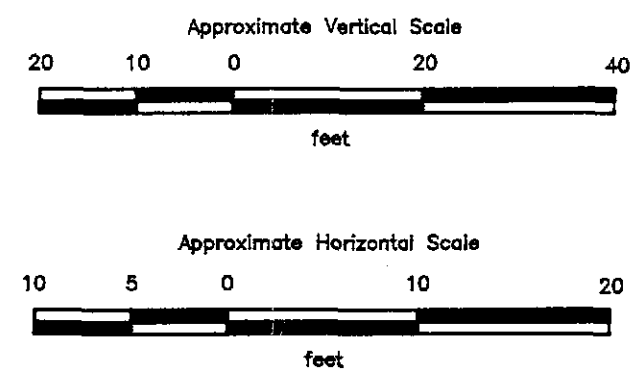
PLATE

8



EXPLANATION

- 2,400 ● = Laboratory analyzed soil sample showing TPHg concentration in ppm
- = Well casing
- = Well screen
- = Boring
- ▽ = Initial water level
- ▼ = Static water level (10/16/92)



PROJECT 62019.02

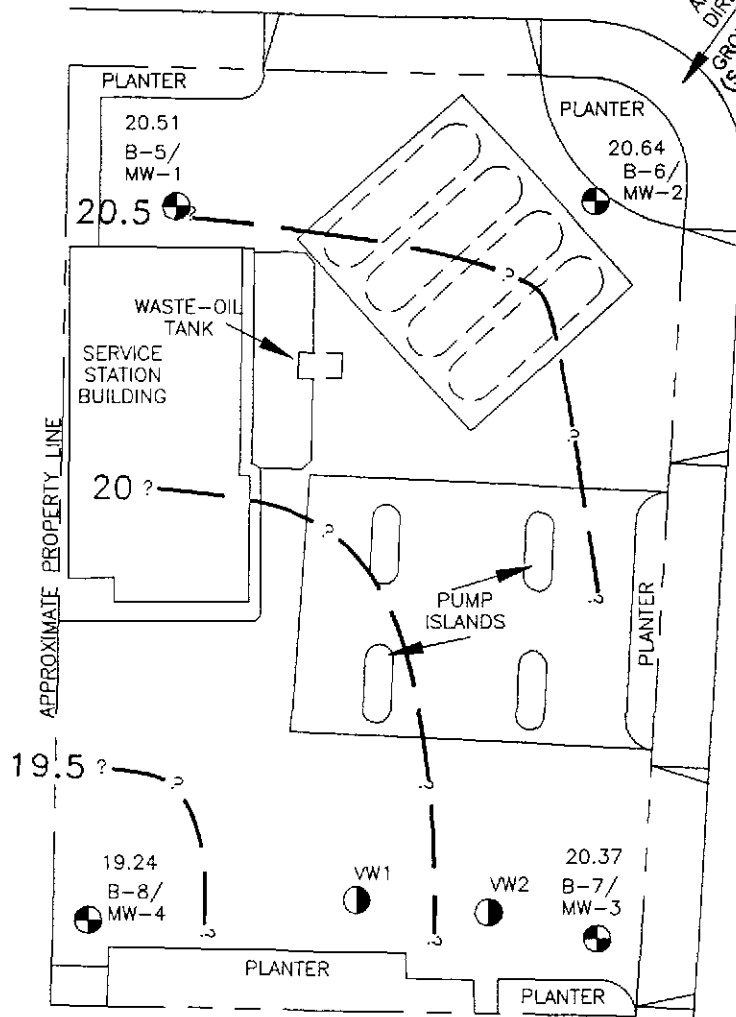
**GEOLOGIC CROSS SECTION B-B' & C-C'
 ARCO Station 2162
 15135 Hesperian Boulevard
 San Leandro, California**

PLATE

9



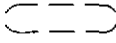

RUTH COURT

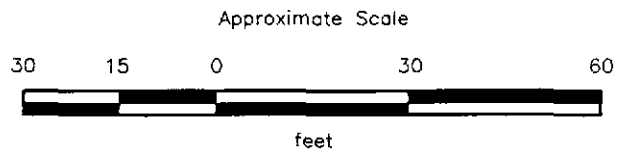
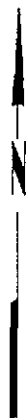
APPROXIMATE
DIRECTION OF
GROUNDWATER FLOW
(September 30, 1992)



HESPERIAN BOULEVARD

EXPLANATION

- B-8/MW-4  = Monitoring well RESNA September 1992
- VW2  = Vapor extraction well (Roux Associates, Inc., 1991)
-  = Existing underground storage tank
- 20.5 —  = Line of equal elevation of groundwater in feet above mean sea level (MSL)
- 20.64 = Elevation of groundwater in feet above MSL September 30, 1992



Source: Modified from site plan provided by Roux Associates and survey data from John Koch, licensed land surveyor (9/16/92)



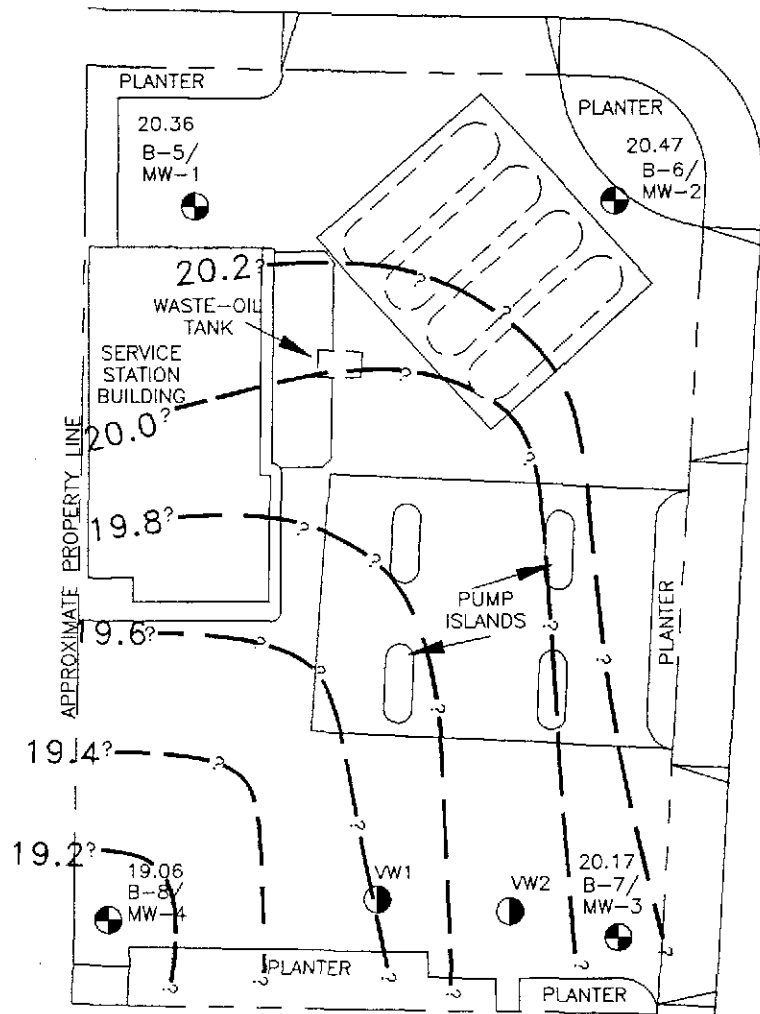
GROUNDWATER GRADIENT MAP
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California

PLATE
10

PROJECT 62019.02

RUTH COURT

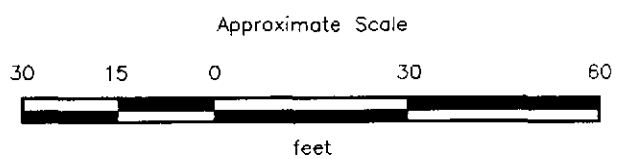
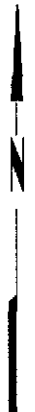
APPROXIMATE
DIRECTION OF
GROUNDWATER FLOW
(October 16, 1992)



HESPERIAN BOULEVARD

EXPLANATION

- B-8/
MW-4 = Monitoring well RESNA September 1992
- VW2 = Vapor extraction well
(Roux Associates, Inc., 1991)
- = Existing underground storage tank
- 20.2 — = Line of equal elevation of groundwater
in feet above mean sea level (MSL)
- 20.47 = Elevation of groundwater in feet above MSL
October 16, 1992



Source: Modified from site plan provided by Roux Associates,
and survey data from John Koch, licensed
land surveyor (9/16/92)

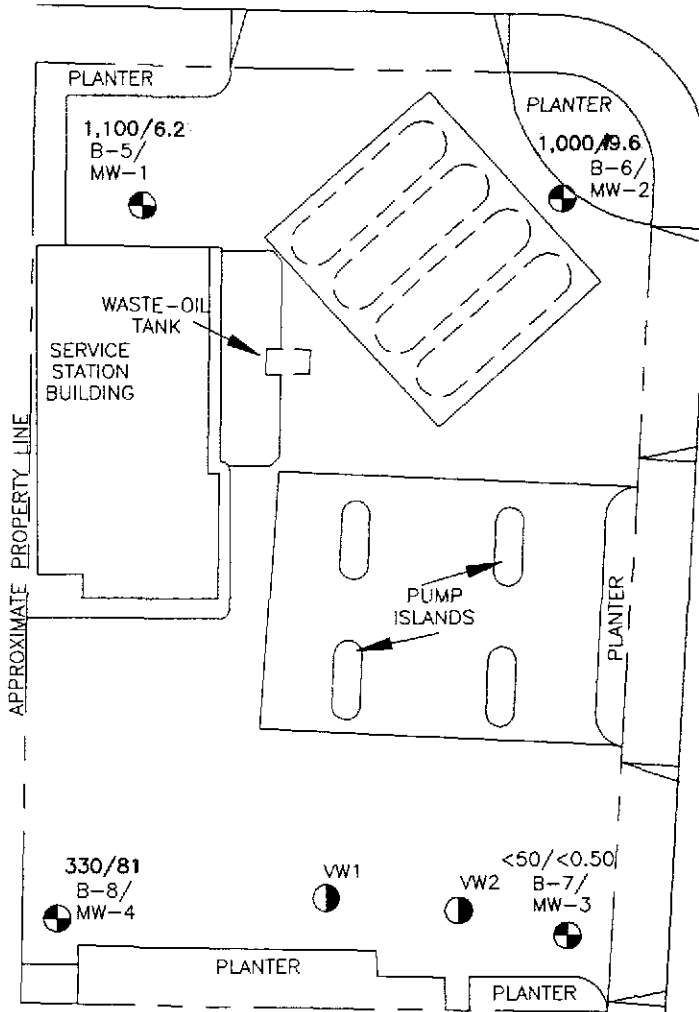


GROUNDWATER GRADIENT MAP
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California

PLATE
11


PROJECT 62019.02


RUTH COURT

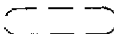


HESPERIAN BOULEVARD

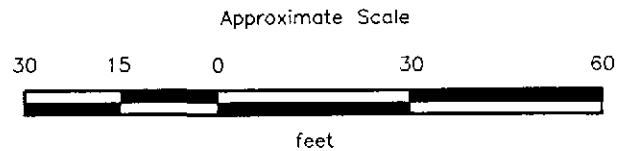
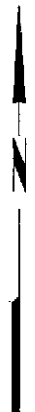
EXPLANATION

B-8/
MW-4  = Monitoring well RESNA September 1992

VW2  = Vapor extraction well
(Roux Associates, Inc., 1991)

 = Existing underground storage tank

1,100/6.2 = Concentration of TPHg/Benzene in groundwater,
in ppb, September 30, 1992



Source: Modified from site plan provided by Roux Associates,
and survey data from John Kach, licensed
land surveyor (9/16/92)

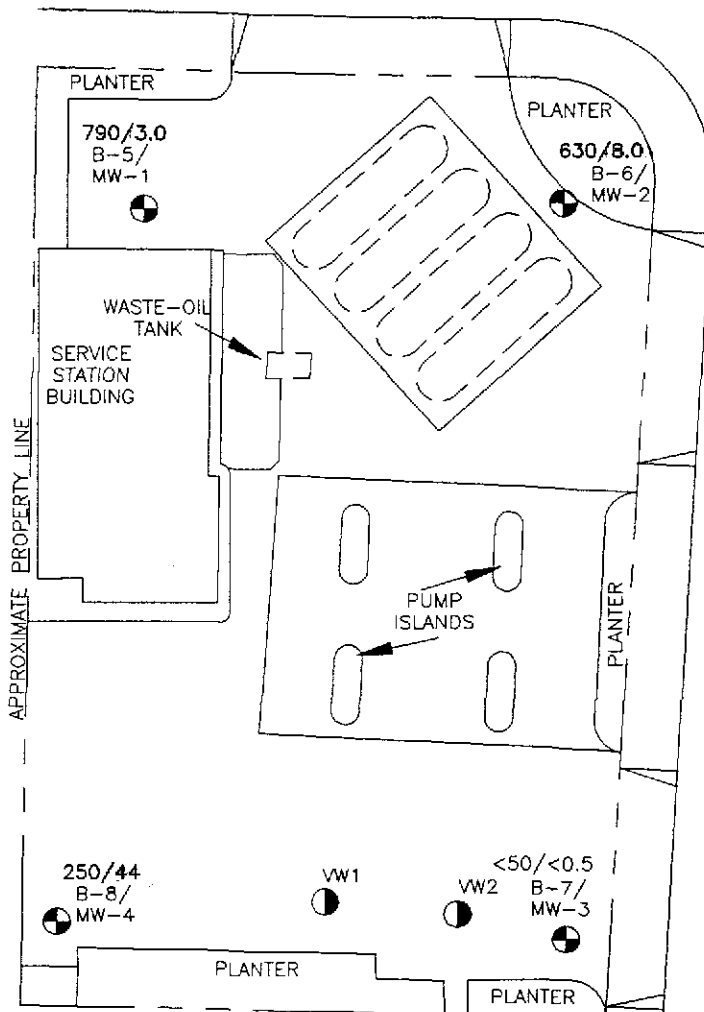


**TPHg/ [REDACTED] CONCENTRATIONS
IN GROUNDWATER
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California**

**PLATE
12**



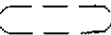
PROJECT 62019.02

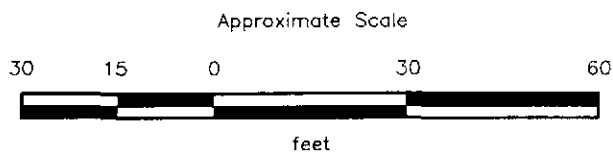
RUTH COURT



HESPERIAN BOULEVARD

EXPLANATION

- B-8/MW-4  = Monitoring well RESNA September 1992
- VW2  = Vapor extraction well (Roux Associates, Inc., 1991)
-  = Existing underground storage tank
- 790/30 = Concentration of TPHg/Benzene in groundwater, in ppb, October 16, 1992



Source: Modified from site plan provided by Roux Associates, and survey data from John Koch, licensed land surveyor (9/16/92)

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**TPHg [REDACTED] CONCENTRATIONS
IN GROUNDWATER
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California**

**PLATE
13**

PROJECT 62019.02

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California
(Page 1 of 3)

Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
<u>June 1991</u>					
<u>Borings</u>					
S-B1-5	<1.0	<0.0050	<0.0050	<0.0050	0.016
S-B1A-7.5	43	0.14	0.93	1.1	7.6
S-B2-5	1.3	<0.0050	<0.0050	<0.0050	<0.018
S-B2-9	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
S-B3-4	26	0.024	0.029	0.16	1.1
S-B3-7.5	1,400	2.5	4.4	29	190
S-B4-4.5	<1.0	0.025	0.013	0.0085	0.042
S-B4-7.5	2,400	17	62	41	260
S-VW1-6	2.8	0.033	0.0073	0.079	0.055
S-VW1-9	100	0.48	1.4	2.7	4.1
<u>December 1991</u>					
<u>Tank Pit Sidewall</u>					
SW-1 at 9	500	<0.0050	0.40	3.5	8.4
SW-2 at 10	140	0.10	0.38	3.0	7.2
SW-3 at 10	150	0.26	0.11	2.1	2.0
SW-4 at 10	610	0.47	7.1	11	82
SW-5 at 10	1,000	2.3	9.2	25	220
<u>Waste-oil Sidewall</u>					
WO-1 at 10	310	0.78	0.8	2.9	13

Sample Number	TPHd	TOG	VOC's	Cd	Cr	Pb	Ni	Zn
WO-1 at 10	360	270	ND	ND	49	5.2	59	58

Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
<u>December 1991</u>					
<u>Soil Stockpile</u>					
CS-1	1,300	0.98	3.7	5.0	110
CS-2	1,000	5.6	39	14	130
CS-3	200	0.36	0.91	1.5	20
CS-4	86	0.077	0.11	0.36	2.8

See notes on page 3 of 3

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California
(Page 2 of 3)

Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
CS-5	100	0.14	0.27	0.65	4.8
CS-6	140	0.032	0.085	0.47	3.7
CS-7	110	ND	0.082	0.074	1.9
CS-8	270	0.12	0.1	0.22	13
CS-9	54	ND	ND	ND	0.24
CS-10	480	0.44	0.36	3.8	26
<u>January 1992</u>					
<u>Soil Stockpile</u>					
CS-11	51	0.11	ND	0.18	0.95
CS-12	6.2	0.016	0.013	0.016	0.16
CS-13	23	0.028	0.066	0.11	0.82
<u>February 1992</u>					
<u>Product Lines</u>					
L-1 at 3	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
L-2 at 3.5	4.4	0.082	0.013	0.21	0.30
L-3 at 3	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
L-4 at 3	<1.0	0.0063	0.0076	<0.0050	0.029
L-5 at 3	110	0.65	0.17	1.2	0.14
L-6 at 2.5	16	1.0	0.20	0.96	4.0
L-7 at 4	12	0.28	0.018	0.35	0.78
<u>September 1992</u>					
<u>Borings</u>					
<i>MW-1</i> S-4.5-B5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
S-10-B5	100	<0.0050	<0.0050	0.46	0.36
S-5-B6	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
<i>MW-2</i> S-10-B6	550	0.79	1.3	10	48
S-17-B6	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
S-5-B7	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
<i>MW-3</i> S-10-B7	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
S-16.5-B7	<1.0	<0.0050	<0.0050	<0.0050	<0.0050

See notes on page 3 of 3

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

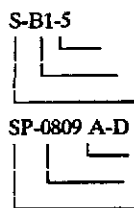
TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California
(Page 3 of 3)

Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
S-5-B8	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
S-9.5-B8	2.0	<0.0050	<0.0050	<0.0050	<0.0050
<i>mw-4</i> S-11-B8	51	0.18	<0.0050	0.056	0.11
S-11.5-B8	91	1.4	0.11	0.22	0.86
S-18.5-B8	<1.0	<0.0050	<0.0050	<0.0050	<0.0050

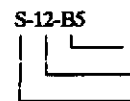
Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes	pH	I	R	Pb
<u>September 1992</u>									
<u>Soil Stockpile</u>									
SP-0809 A-D	11	<0.0050	<0.0050	0.52	0.12	8.4	>100	None	0.11

All results in parts per million (ppm).
TPHg = Total petroleum hydrocarbons as gasoline.
I = Ignitability in °C
R = Reactivity to sulfide, cyanide, or water
Pb = lead
<: Below the reporting limits of the analytical method.

Sample designations:



Sample depth
Boring number
Soil sample



Boring number
Sample depth in feet
Soil sample

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

TABLE 2
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2162
15135 Hesperian Boulevard
San Leandro, California
(Page 1 of 1)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
<u>MW-1</u>				
09/30/92	31.19	10.68	20.51	None
10/16/92		10.83	20.36	None
<u>MW-2</u>				
09/30/92	30.38	9.74	20.64	None
10/16/92		9.91	20.47	None
<u>MW-3</u>				
09/30/92	30.30	9.93	20.37	None
10/16/92		10.13	20.17	None
<u>MW-4</u>				
09/30/92	30.39	11.15	19.24	None
10/16/92		11.33	19.06	None

All measurements in feet.

Well elevation datum is mean sea level. Datum is City of San Leandro = 1973 Adj., NGVD.

Wells surveyed by John Koch, Licensed Surveyor, on 9/14/92.

APPENDIX A

PERMITS



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

LOCATION OF PROJECT ARCO 2162
135 HESPERIAN BOULEVARD
SAN LEANDRO, CA

PERMIT NUMBER 92436
LOCATION NUMBER

CLIENT
Name ARCO PRODUCTS COMPANY
Address P.O. Box 5811 Phone (415) 571-2435
City SAN MATEO Zip 94402

PERMIT CONDITIONS

Circled Permit Requirements Apply

APPLICANT
Name RESNA INDUSTRIES INC.
LOU LEET CHIEF
Address 3315 ALMADEN EXPWY. Phone (408) 264-7723
City SAN JOSE Zip 95118

A. GENERAL

- 1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS

- 1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

TYPE OF PROJECT
Well Construction Geotechnical Investigation
Cathodic Protection General
Water Supply Contamination
Monitoring Well Destruction

PROPOSED WATER SUPPLY WELL USE
Domestic Industrial Other MONITORING
Municipal Irrigation

DRILLING METHOD:
Mud Rotary Air Rotary Auger
Cable Other

DRILLER'S LICENSE NO. CS 7-484288

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 30 ft.
Surface Seal Depth 5 ft. Number 4

GEOTECHNICAL PROJECTS
Number of Borings Maximum
Hole Diameter in. Depth ft.

ESTIMATED STARTING DATE 9-2-92
ESTIMATED COMPLETION DATE 9-3-92

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

APPLICANT'S SIGNATURE L. J. Leet Date 8-26-92

Approved Wyman Hong Date 2 Sep 92
Wyman Hong

APPENDIX B
FIELD METHODS

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

FIELD METHODS

The following presents RESNA's protocol for a typical site investigation involving gasoline hydrocarbon-impacted soil and/or groundwater.

Site Safety Plan

The Site Safety Plan describes the safety requirements for the evaluation of gasoline hydrocarbons in soil, groundwater, and the vadose-zone at the site. The Site Safety Plan is applicable to personnel of RESNA and its subcontractors. RESNA personnel and subcontractors of RESNA scheduled to perform work at the site are briefed on the contents of the Site Safety Plan before work begins. A copy of the Site Safety Plan is available for reference by appropriate parties during the work. A Site Safety Officer is assigned to the project.

Soil Borings

Prior to the drilling of borings and construction of monitoring wells, permits are acquired from the appropriate regulatory agency. In addition to the above-mentioned permits, encroachment permits from the City or State are acquired if drilling of borings offsite in the City or State streets is necessary. Copies of the permits are included in the appendix of the project report. Prior to drilling, Underground Services Alert is notified of our intent to drill, and known underground utility lines and structures are approximately marked.

The borings are drilled by a truck-mounted drill rig equipped with 8- or 10-inch-diameter, hollow-stem augers. The augers are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. After drilling the borings, monitoring wells are constructed in the borings, or neat-cement grout with bentonite is used to backfill the borings to the ground surface.

Borings for groundwater monitoring wells are drilled to a depth of no more than 20 feet below the depth at which a saturated zone is first encountered, or a short distance into a stratum beneath the saturated zone which is of sufficient moisture and consistency to be judged as a perching layer by the field geologist, whichever is shallower. Drilling into a deeper aquifer below the shallowest aquifer can begin only after a conductor casing is properly installed and allowed to set, to seal the shallow aquifer.

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

Drill Cuttings

Drill cuttings subjectively evaluated as having hydrocarbon contamination at levels greater than 100 parts per million (ppm) are separated from those subjectively evaluated as having hydrocarbon contamination levels less than 100 ppm. Evaluation is based either on subjective evidence of soil discoloration, or on measurements made using a field calibrated OVM. Readings are taken by placing a soil sample into a ziplock type plastic bag and allowing volatilization to occur. The intake probe of the OVM is then inserted into the headspace created in the plastic bag immediately after opening it. The drill cuttings from the borings are placed in labeled 55-gallon drums approved by the Department of Transportation; or on plastic at the site, and covered with plastic. The cuttings remain the responsibility of the client.

Soil Sampling in Borings

Soil samples are collected at no greater than 5-foot intervals from the ground surface to the total depth of the borings. The soil samples are collected by advancing the boring to a point immediately above the sampling depth, and then driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. The sampler and brass sleeves are laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox® and water, prior to each use. The sampler is driven with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler each successive six inches are counted and recorded to evaluate the relative consistency of the soil.

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum foil, plastic caps, and aluminized duct tape. The samples are then be labeled, promptly placed in iced storage, and delivered to a laboratory certified by the State of California to perform the analyses requested.

One of the samples in brass sleeves not selected for laboratory analysis at each sampling interval is tested in the field using an OVM that is field calibrated at the beginning of each day it is used. This testing is performed by inserting the intake probe of the OVM into the headspace created in the plastic bag containing the soil sample as described in the Drill Cuttings section above. The OVM readings are presented in Logs of Borings included in the project report.

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

Logging of Borings

A geologist is present to log the soil cuttings and samples using the Unified Soil Classification System. Samples not selected for chemical analysis, and the soil in the sampler shoe, are extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include subjective evidence for the presence of hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

Monitoring Well Construction

Monitoring wells are constructed in selected borings using clean 2- or 4-inch-diameter, thread-jointed, Schedule 40 polyvinyl chloride (PVC) casing. No chemical cements, glues, or solvents are used in well construction. Each casing bottom is sealed with a threaded end-plug, and each casing top with a locking plug. The screened portions of the wells are constructed of machine-slotted PVC casing with 0.020-inch-wide (typical) slots for initial site wells. Slot size for subsequent wells may be based on sieve analysis and/or well development data. The screened sections in groundwater monitoring wells are placed to allow monitoring during seasonal fluctuations of groundwater levels.

The annular space of each well is backfilled with No. 2 by 12 sand, or similar sorted sand, to approximately two feet above the top of the screened casing for initial site wells. The sand pack grain size for subsequent wells may be based on sieve analysis and/or well development data. A 1- to 2-foot-thick bentonite plug is placed above the sand as a seal against cement entering the filter pack. The remaining annulus is then backfilled with a slurry of water, neat cement, and bentonite to approximately one foot below the ground surface.

An aluminum utility box with a PVC apron is placed over each wellhead and set in concrete placed flush with the surrounding ground surface. Each wellhead cover has a seal to protect the monitoring well against surface-water infiltration and requires a special wrench to open. The design discourages vandalism and reduces the possibility of accidental disturbance of the well.

Groundwater Monitoring Well Development

The monitoring wells are developed by bailing or over-pumping and surge-block techniques. The wells are either bailed or pumped, allowed to recharge, and bailed or pumped again until the water removed from the wells is determined to be clear. Turbidity measurements

Subsurface Environmental Investigation
ARCO Station 2162, San Leandro, California

March 10, 1993
62019.02

(in NTUs) are recorded during well development and are used in evaluating well development. The development method used, initial turbidity measurement, volume of water removed, final turbidity measurement, and other pertinent field data and observations are included in reports. The wells are allowed to equilibrate for at least 48 hours after development prior to sampling. Water generated by well development will be stored in 17E Department of Transportation (DOT) 55-gallon drums onsite and will remain the responsibility of the client.

Sample Labeling and Handling

Sample containers are labeled in the field with the job number, sample location and depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record is initiated by the field geologist and updated throughout handling of the samples, and accompanies the samples to a laboratory certified by the State of California for the analyses requested. Samples are transported to the laboratory promptly to help ensure that recommended sample holding times are not exceeded. Samples are properly disposed of after their useful life has expired.

APPENDIX C

**LABORATORY ANALYTICAL REPORTS AND CHAIN OF CUSTODY
RECORDS FOR SOIL SAMPLES**



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RECEIVED

SEP 23 1992

RESNA
SAN JOSE

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Project: ARCO 2162, San Leandro

Enclosed are the results from 11 soil samples received at Sequoia Analytical on September 9, 1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2091695	Soil, S-5-B8	9/8/92	EPA 5030/8015/8020
2091696	Soil, S-9.5-B8	9/8/92	EPA 5030/8015/8020
2091697	Soil, S-11-B8	9/8/92	EPA 5030/8015/8020
2091698	Soil, S-11.5-B8	9/8/92	EPA 5030/8015/8020
2091699	Soil, S-18.5-B8	9/8/92	EPA 5030/8015/8020
2091700	Soil, S-5-B7	9/8/92	EPA 5030/8015/8020
2091701	Soil, S-10-B7	9/8/92	EPA 5030/8015/8020
2091702	Soil, S-16.5-B7	9/8/92	EPA 5030/8015/8020
2091703	Soil, S-5-B6	9/8/92	EPA 5030/8015/8020
2091704	Soil, S-10-B6	9/8/92	EPA 5030/8015/8020
2091705	Soil, S-17-B6	9/8/92	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL


Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix: Soil	Received: Sep 9, 1992
San Jose, CA 95118	Analysis Method: EPA 5030/8015/8020	Reported: Sep 21, 1992
Attention: Joel Coffman	First Sample #: 209-1695	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 209-1695 S-5-B8	Sample I.D. 209-1696 S-9.5-B8	Sample I.D. 209-1697 S-11-B8	Sample I.D. 209-1698 S-11.5-B8	Sample I.D. 209-1699 S-18.5-B8	Sample I.D. 209-1700 S-5-B7
Purgeable Hydrocarbons	1.0	N.D.	2.0	51	91	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	0.18	1.4	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	0.11	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	0.056	0.22	N.D.	N.D.
Total Xylenes	0.0050	N.D.	N.D.	0.11	0.86	N.D.	N.D.
Chromatogram Pattern:		--	Non-Gas Mix > C9	Gas & Non-Gas Mix > C10	Gas	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	5.0	10	1.0	1.0
Date Analyzed:	9/15/92	9/15/92	9/17/92	9/17/92	9/15/92	9/15/92
Instrument Identification:	GCHP-4	GCHP-4	GCHP-2	GCHP-2	GCHP-4	GCHP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	103	102	102	120	103	104

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager

2091695.RES <1>



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix: Soil	Received: Sep 9, 1992
San Jose, CA 95118	Analysis Method: EPA 5030/8015/8020	Reported: Sep 21, 1992
Attention: Joel Coffman	First Sample #: 209-1701	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 209-1701 S-10-B7	Sample I.D. 209-1702 S-16.5-B7	Sample I.D. 209-1703 S-5-B6	Sample I.D. 209-1704 S-10-B6	Sample I.D. 209-1705 S-17-B6
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	550	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	0.79	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	1.3	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	10	N.D.
Total Xylenes	0.0050	N.D.	N.D.	N.D.	48	N.D.
Chromatogram Pattern:		--	--	--	Gas	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	100	1.0
Date Analyzed:	9/15/92	9/15/92	9/15/92	9/15/92	9/15/92
Instrument Identification:	GCHP-4	GCHP-4	GCHP-4	GCHP-4	GCHP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	105	107	105	100	103

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 2091695-1705

Reported: Sep 21, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. F.	J. F.	J. F.	J. F.
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Sep 15, 1992	Sep 15, 1992	Sep 15, 1992	Sep 15, 1992
QC Sample #:	Blank	Blank	Blank	Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.40	0.40	0.40	1.2
Conc. Matrix Spike:	0.36	0.36	0.38	1.2
Matrix Spike % Recovery:	90	90	95	100
Conc. Matrix Spike Dup.:	0.37	0.38	0.39	1.3
Matrix Spike Duplicate % Recovery:	95	95	98	108
Relative % Difference:	2.7	5.4	2.6	8.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

ARCO Products Company

Division of AtlanticRichfieldCompany

Task Order No. 2162-92-2A

Chain of Custody

ARCO Facility no. <u>2162-62019.02</u>	City (Facility) <u>SAN LEANDRO</u>	Project manager (Consultant) <u>JOEL COFFMAN / LOU LEET</u>	Laboratory name <u>SEQUOIA</u>
ARCO engineer <u>MIKE WHELAN</u>	Telephone no. (ARCO)	Telephone no. (Consultant) <u>(408) 264-7723</u>	Contract number <u>07-073</u>
Consultant name <u>RESNA</u>	Address (Consultant) <u>3315 ALMADEN EXPRESSWAY, SUITE 34 SAN JOSE, CA 95118</u>		Fax no. (Consultant) <u>(408) 264-2435</u>

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX EPA 802	BTEX/TPH EPA M602/802/8015	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	TCMP Metals VOA VOA	Semi Metals VOA VOA	CAM Metals EPA 601/7000 TTLC STLC	Lead Org./DHS Lead EPA 7420/7421	Method of shipment	Special detection Limit/reporting	Special QA/QC	Remarks	
			Soil	Water	Other	Ice	Acid																			
1 S-4 1/2-B8								9-8-92	11:45	X													2091695			
1 S-9 1/2-B8								9-8-92	11:50	X													2091696			
1 S-11-B8								9-8-92	12:00	X													2091697			
1 S-11 1/2-B8								9-8-92	12:01	X													2091698			
1 S-18 1/2-B8								9-8-92	12:40	X													2091699			
1 S-5-B7								9-8-92	8:50	X													2091700			
1 S-7 1/2-B7								9-8-92	9:00																	
1 S-10-B7								9-8-92	9:10	X													2091701			
1 S-16 1/2-B7								9-8-92	9:55	X													2091702			
1 S-4 1/2-B76								9-8-92	5:30	X													2091703			
1 S-10-B76								9-8-92	5:40	X													2091704			
1 S-9-B6								9-8-92	5:35																	
1 S-17-B6								9-8-92	6:10	X													2091705			

Condition of sample: <u>good</u>		Temperature received: <u>cool</u>	
Relinquished by sampler <u>J. J. Leet</u>	Date <u>9-9-92</u>	Time <u>2:27</u>	Received by <u>Patricia Wick</u>
Relinquished by <u>Patricia Wick</u>	Date <u>9-9-92</u>	Time <u>1:30</u>	Received by
Relinquished by <u>Patricia Wick</u>	Date	Time	Received by laboratory
			Date <u>9/9/92</u>
			Time <u>15:20</u>
Turnaround time			Standard 10 Business Days <input checked="" type="checkbox"/>
Priority Rush 1 Business Day <input type="checkbox"/>			
Rush 2 Business Days <input type="checkbox"/>			
Expedited 5 Business Days <input type="checkbox"/>			



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RECEIVED

SEP 11 1992

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

RESNA
SAN JOSE

Project: ARCO 2162, San Leandro

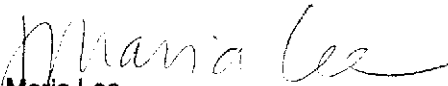
Enclosed are the results from 2 soil samples received at Sequoia Analytical on September 9, 1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2091725	Soil, S-4.5-B5	9/8/92	EPA 5030/8015/8020
2091726	Soil, S-10-B5	9/8/92	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL


Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix: Soil	Received: Sep 9, 1992
San Jose, CA 95118	Analysis Method: EPA 5030/8015/8020	Reported: Sep 18, 1992
Attention: Joel Coffman	First Sample #: 209-1725	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 209-1725 S-4.5-B5	Sample I.D. 209-1726 S-10-B5
Purgeable Hydrocarbons	1.0	N.D.	100
Benzene	0.0050	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	0.46
Total Xylenes	0.0050	N.D.	0.36
Chromatogram Pattern:		--	Non-Gas Mix > C8

Quality Control Data

Report Limit Multiplication Factor:	1.0	10
Date Analyzed:	9/15/92	9/15/92
Instrument Identification:	GCHP-7	GCHP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	91	101

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 2091725-6

Reported: Sep 18, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
	Method:	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Lee	R. Lee	R. Lee	R. Lee
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Sep 15, 1992	Sep 15, 1992	Sep 15, 1992	Sep 15, 1992
QC Sample #:	GBLK091492	GBLK091492	GBLK091492	GBLK091492
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.18	0.18	0.17	0.51
Matrix Spike % Recovery:	90	90	85	85
Conc. Matrix Spike Dup.:	0.18	0.18	0.17	0.50
Matrix Spike Duplicate % Recovery:	90	90	85	83
Relative % Difference:	0.0	0.0	0.0	2.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

2091725.RES <2>



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RECEIVED

SEP 11 1992

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

RESNA
SAN JOSE

Project: ARCO 2162, San Leandro

Enclosed are the results from 1 soil sample received at Sequoia Analytical on September 9, 1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2090911	Soil, SP-0809 A-D	9/8/92	Corrosivity, Ignitability, and Reactivity STLC/Lead EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix: Soil	Received: Sep 9, 1992
San Jose, CA 95118	Analysis Method: EPA 5030/8015/8020	Reported: Sep 11, 1992
Attention: Joel Coffman	First Sample #: 209-0911	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 209-0911 SP-0809 A-D
Purgeable Hydrocarbons	1.0	11
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	0.52
Total Xylenes	0.0050	0.12
Chromatogram Pattern:		Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	9/10/92
Instrument Identification:	GCHP-6
Surrogate Recovery, %: (QC Limits = 70-130%)	114

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Christine Middleton
Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Descript: Soil, SP-0809 A-D	Received: Sep 9, 1992
San Jose, CA 95118		Analyzed: 9/10-11/92
Attention: Joel Coffman	Lab Number: 209-0911	Reported: Sep 11, 1992

CORROSIVITY, IGNITABILITY, AND REACTIVITY

Analyte	Detection Limit	Sample Results
Corrosivity:		
pH.....	N.A.	8.4
Ignitability:		
Flashpoint (Pensky-Martens), °C.....	N.A.	> 100 °C
Reactivity:		
Sulfide, mg/kg.....	10	N.D.
Cyanide, mg/kg.....	0.50	N.D.
Reaction with water.....	N.A.	Negative

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Christine Middleton
 Maria Lee
 Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 209-0911

Reported: Sep 11, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
---------	---------	---------	-------------------	---------

Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Lee	R. Lee	R. Lee	R. Lee
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Sep 10, 1992	Sep 10, 1992	Sep 10, 1992	Sep 10, 1992
QC Sample #:	GBLK091092	GBLK091092	GBLK091092	GBLK091092
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.20	0.20	0.20	0.60
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	0.23	0.22	0.22	0.67
Matrix Spike Duplicate % Recovery:	115	110	110	112
Relative % Difference:	14	9.5	9.5	11

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Christine Madditer
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 209-0911

Reported: Sep 11, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	pH	Reactive Sulfide	Flashpoint	Cyanide
---------	----	------------------	------------	---------

Method:	EPA 9040	EPA 9030	EPA 1010	EPA 9010
Analyst:	Y. Arteaga	K. Follett	K. Follett	A. Savva
Reporting Units:	N.A.	mg/kg	°C	mg/kg
Date Analyzed:	Sep 10, 1992	Sep 10, 1992	Sep 11, 1992	Sep 9, 1992
QC Sample #:	209-0911	209-0744	209-0911	208-4951

Sample Conc.:	8.4	N.D.	> 100	N.D.
Spike Conc. Added:	N.A.	1300	N.A.	2.9
Conc. Matrix Spike:	N.A.	1500	N.A.	3.0
Matrix Spike % Recovery:	N.A.	115	N.A.	103
Conc. Matrix Spike Dup.:	8.4	1600	> 100	3.0
Matrix Spike Duplicate % Recovery:	N.A.	123	N.A.	103
Relative % Difference:	0.0	6.5	0.0	0.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Christine Madson
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

2090911.RES <4>



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 8, 1992
3315 Almaden Expwy., Suite 34	Sample Descript: Soil, SP-0809 A-D	Received: Sep 9, 1992
San Jose, CA 95118		Analyzed: see below
Attention: Joel Coffman	Lab Number: 209-0911	Reported: Sep 14, 1992

LABORATORY ANALYSIS by STLC

Analyte	Date Analyzed	Detection Limit mg/L	Sample Result mg/L
Lead.....	9/14/92	0.0050	0.11

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Christina Middleton
Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 209-0911

Reported: Sep 14, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Lead STLC
----------------	--------------

Method: EPA 239.2
 Analyst: S. Chin
 Reporting Units: mg/L
 Date Analyzed: Sep 14, 1992
 QC Sample #: 209-1184

Sample Conc.: 0.11

Spike Conc. Added: 1.0

Conc. Matrix Spike: 1.0

Matrix Spike % Recovery: 89

Conc. Matrix Spike Dup.: 1.0

Matrix Spike Duplicate % Recovery: 89

Relative % Difference: 0.0

SEQUOIA ANALYTICAL

Christene Middleton
 Maria Lee
 Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

ARCO Products Company

Division of AtlanticRichfieldCompany

Task Order No. 2162-92-2A

Chain of Custody

ARCO Facility no. 2162-62019-02

City (Facility) SAN LEANORO

Project manager (Consultant) JOEL COFFMAN/LOU LEET

Laboratory name

SEQUOIA

ARCO engineer MIKE WHELAN

Telephone no. (ARCO)

Telephone no. (Consultant) (408) 264-7723

Fax no. (Consultant) (408) 264-2435

Contract number

07-073

Consultant name RESNA

Address (Consultant) 3315 ALMADEN EXPRESSWAY, SUITE 34
SAN JOSE, CA 95008

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SMS603E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOA <input type="checkbox"/>	CAM Metals EPA 6010/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>	RCI	Pb STLC	
			Soil	Water	Other	Ice	Acid																	
SP-0809-A			X					09-08-92 08-09-92	8:05		X												X	X
SP-0809-B			X						8:10		X												X	X
SP-0809-C			X						8:15		X												X	X
SP-0809-D			X						8:20		X												X	X

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

Priority Rush 1 Business Day

Rush 2 Business Days

Expedited 5 Business Days

Standard 10 Business Days

Condition of sample: good

Temperature received: cool

Relinquished by sampler L. J. Leet

Date 9-9-92 Time 2:27

Received by Patrick With

Relinquished by Patrick With

Date 9-9-92 Time 1570

Received by

Relinquished by

Date

Received by laboratory 1111

Date 9/9/92

Time 1570

Dillard Trucking, Inc.

ENVIRONMENTAL SERVICES
P.O. BOX 218 BYRON, CALIFORNIA 94514
(510) 634-6850 FAX (510) 634-0569

August 26, 1992

RESNA
3315 Almaden Expressway #34
San Jose, CA 94118

Fax# (408)264-2435

Attn: Lou

Re: Arco Station #2162 - 15135 Hesperian Blvd., San Leandro - 1 yard of drill cuttings

Dear Lou:

Please be advised that the drill cuttings from the above referenced site have been removed. They were taken to BFI Landfill, Livermore on September 22, 1992.

I trust that you will find everything in order. If you have any questions, please do not hesitate to call.

Sincerely,

DILLARD TRUCKING, INC.



Donna L. Pedersen
Estimator

DLP/st

cc: file

APPENDIX D
GRADATION TEST RESULTS



SOIL FOUNDATION SYSTEMS, INC.

Geotechnical Engineers • Engineering Geologists
Soil Mechanics Laboratories

326 E. WARREN AVENUE, FREMONT, CA 94539, (415) 226-9394, FAX: (415) 226-9396

File No. S22-RESNA-2

September 25, 1992

RECEIVED
SEP 25 1992
13800

RESNA
3315 Almaden Expressway, Suite 34
San Jose, California 95118

Attention: Mr. Ken Mateik

Subject: RESNA #62019-02; ARCO facility #2162,
San Leandro, California
SIEVE ANALYSES

Gentlemen:

Transmitted herewith are the results of our sieve analyses on the soil samples delivered to our soils laboratory on September 18, 1992, for the subject project.

The sieve analyses were performed in accordance with ASTM test specification D422-90. A copy of the Chain of Custody pertaining to the soil samples is attached herewith.

If you have any questions, please give us a call.

Very truly yours,

SOIL FOUNDATION SYSTEMS, INC.

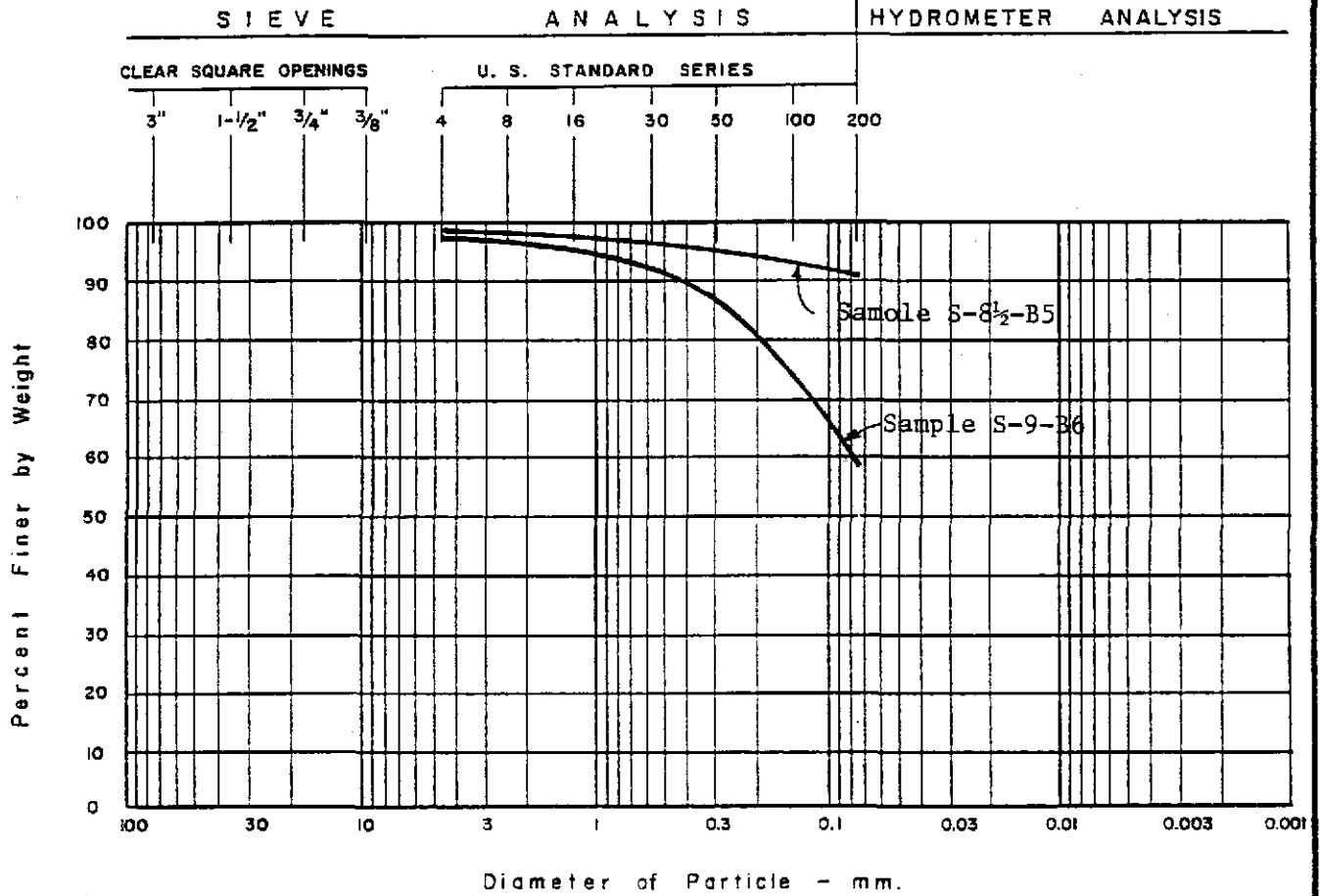
R. Patrick Fain

RPF;ls

GRADATION TEST RESULTS

ASTM D422

Client: RESNA 62019-02		Project: ARCO 2162-San Leandro		
				Date
Sample No.	Depth	Physical Description	Sample Received	Test Completed
S-8½-B5		Medium gray silty Clay	9/18/92	9/24/92
S-9-B6		Medium gray silty Clay, slightly sandy	9/18/92	9/24/92
COMMENTS: Both samples were received in 2½" dia. x 6" long brass liners.				



Gravel		Sand			Clay & Silt	
Coarse	Fine	Coarse	Medium	Fine		

APPENDIX E

**LABORATORY ANALYTICAL REPORTS AND CHAIN OF CUSTODY
RECORDS FOR GROUNDWATER SAMPLES**



EMCON
ASSOCIATES

Consultants in Wastes
Management and
Environmental Control

RECEIVED

NOV 9 - 1992

RESNA
SAN JOSE

Date November 5, 1992
Project OG70-055.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

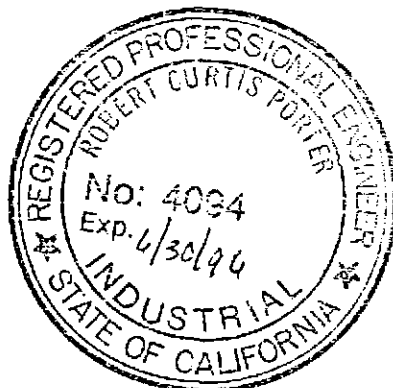
Copies	Description
<u>1</u>	<u>Depth To Water / Floating Product Survey Results</u>
<u>1</u>	<u>Summary of Groundwater Monitoring Data</u>
<u>1</u>	<u>Certified Analytical Reports with Chain-of-Custody</u>
<u>4</u>	<u>Water Sample Field Data Sheets</u>

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the fourth quarter 1992 monitoring event at ARCO service station 2162, 15135 Hesperian Blvd, San Lorenzo, CA. Groundwater monitoring is conducted consistent with applicable regulatory guidelines. Please call if you have any questions: (408) 453-2266.

Reviewed by:



Jim Butera JB

Robert H. Porter
Robert Porter, Senior Project
Engineer.

Accu



Summary of Groundwater Monitoring Data
 Fourth Quarter 1992
 ARCO Service Station 2162
 15135 Hesperian Boulevard, San Leandro, California
 micrograms per liter ($\mu\text{g/l}$) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH ¹ as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl- benzene (ppb)	Total Xylenes (ppb)
MW-1(15)	10/16/92	10.83	ND. ²	790.	3.0	0.8	5.6	2.9
MW-2(15)	10/16/92	9.91	ND.	630.	8.0	<1.	37.	64.
MW-3(14)	10/16/92	10.13	ND.	<50.	<0.5	<0.5	<0.5	<0.5
MW-4(16)	10/16/92	11.33	ND.	250.	44.	<0.5	<0.5	0.7

1. TPH. = Total petroleum hydrocarbons
 2. ND. = Not detected



October 30, 1992

Jim Butera
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

Re: EMCON Project No. OG70-055.01
Arco Facility No. 2162

Dear Mr. Butera:

Enclosed are the results of the water samples submitted to our lab on October 19, 1992. For your reference, our service request number for this work is SJ92-1287.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

A handwritten signature in black ink, appearing to read "Keoni A. Murphy".

Keoni A. Murphy
Laboratory Manager

A handwritten signature in black ink, appearing to read "Annelise J. Bazar".

Annelise J. Bazar
Regional QA Coordinator

KAM/ajb

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-055.01
 ARCO Facility No. 2162

Date Received: 10/19/92
 Work Order No.: SJ92-1287
 Sample Matrix: Water

BTEX and TPH as Gasoline
 EPA Methods 5030/8020/California DHS LUFT Method
 µg/L (ppb)

Sample Name:	<u>MW-1 (15)</u>	<u>MW-2 (15)</u>	<u>MW-3 (14)</u>
Date Analyzed:	10/23/92	10/22/92	10/21/92

<u>Analyte</u>	<u>MRL</u>			
Benzene	0.5	3.0	8.0	ND
Toluene	0.5	0.8	<1. *	ND
Ethylbenzene	0.5	5.6	37.	ND
Total Xylenes	0.5	2.9	64.	ND
TPH as Gasoline	50	790.	630.	ND

TPH Total Petroleum Hydrocarbons
 MRL Method Reporting Limit
 ND None Detected at or above the method reporting limit
 * Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: K. O. Murphy Date: October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-055.01
 ARCO Facility No. 2162

Date Received: 10/19/92
 Work Order No.: SJ92-1287
 Sample Matrix: Water

BTEX and TPH as Gasoline
 EPA Methods 5030/8020/California DHS LUFT Method
 µg/L (ppb)

Sample Name: MW-4 (16) Method Blank Method Blank
 Date Analyzed: 10/23/92 * 10/21/92 10/22/92

<u>Analyte</u>	<u>MRL</u>			
Benzene	0.5	44.	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	0.7	ND	ND
TPH as Gasoline	50	250.	ND	ND

TPH Total Petroleum Hydrocarbons

MRL Method Reporting Limit

ND None Detected at or above the method reporting limit

* This sample was part of the analytical batch started on October 23, 1992. However, it was analyzed after midnight so the actual date analyzed is October 24, 1992.

Approved by: _____

K. O. Murphy

Date: _____

October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-055.01
ARCO Facility No. 2162

Date Received: 10/19/92
Work Order No.: SJ92-1287
Sample Matrix: Water

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
 $\mu\text{g/L}$ (ppb)

Sample Name: Method Blank
Date Analyzed: 10/23/92

<u>Analyte</u>	<u>MRL</u>	
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
TPH as Gasoline	50	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by: Kevin Murphy

Date: October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-055.01
 ARCO Facility No. 2162

Date Received: 10/19/92
 Work Order #: SJ92-1287

Initial Calibration Verification
 BTEX and TPH as Gasoline
 EPA Methods 5030/8020/DHS LUFT Method
 Nanograms

Date Analyzed: 10/21/92

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Benzene	250.	262.	105.	85-115
Toluene	250.	269.	108.	85-115
Ethylbenzene	250.	260.	104.	85-115
Total Xylenes	750.	751.	100.	85-115
TPH as Gasoline	2,500.	2,412.	96.	90-110

Date Analyzed: 10/22/92

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Benzene	250.	268.	107.	85-115
Toluene	250.	274.	109.	85-115
Ethylbenzene	250.	264.	106.	85-115
Total Xylenes	750.	760.	101.	85-115
TPH as Gasoline	2,500.	2,454.	98.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: K. Edmund Murphy

Date: October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. OG70-055.01
ARCO Facility No. 2162

Date Received: 10/19/92
Work Order #: SJ92-1287

Initial Calibration Verification
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
Nanograms

Date Analyzed: 10/23/92

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Benzene	250.	267.	107.	85-115
Toluene	250.	272.	109.	85-115
Ethylbenzene	250.	261.	104.	85-115
Total Xylenes	750.	750.	100.	85-115
TPH as Gasoline	2,500.	2,509.	100.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: Keon Murphy

Date: October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-055.01
ARCO Facility No. 2162

Date Received: 10/19/92
Work Order No.: SJ92-1287
Sample Matrix: Water

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> <i>o,o,o</i> -Trifluorotoluene
MW-1 (15)	10/23/92	124.*
MW-2 (15)	10/22/92	114.
MW-3 (14)	10/21/92	108.
MW-4 (16)	10/23/92	111.
MS	10/21/92	118.
DMS	10/21/92	121.
Method Blank	10/21/92	108.
Method Blank	10/22/92	106.
Method Blank	10/23/92	100.

CAS Acceptance Criteria 70-130

TPH Total Petroleum Hydrocarbons
* The surrogate used for this sample was 4-Bromofluorobenzene.

Approved by:

Keon A. Murphy

Date:

October 30, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-055.01
 ARCO Facility No. 2162

Date Received: 10/19/92
 Work Order No.: SJ92-1287
 Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
 TPH as Gasoline
 EPA Methods 5030/California DHS LUFT Method
 µg/L (ppb)

Date Analyzed: 10/21/92

Percent Recovery

<u>Analyte</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>CAS Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
TPH as Gasoline	250.	ND	265.	265.	106.	106.	70-130

TPH Total Petroleum Hydrocarbons
 ND None Detected at or above the method reporting limit

Approved by:

Keon Murphy

Date:

October 30, 1992



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

PROJECT NO: 0670-055-01

SAMPLE ID: MW-1

PURGED BY: J. Williams

CLIENT NAME: ARCO 2167

SAMPLED BY: J. Williams

LOCATION: 15135 Hesperian Blvd
San Leandro CA

TYPE: Ground Water Surface Water Treatment Effluent Other

CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): WR VOLUME IN CASING (gal.): 2.39

DEPTH TO WATER (feet): 10.83 CALCULATED PURGE (gal.): 16.95

DEPTH OF WELL (feet): 16.0 ACTUAL PURGE VOL (gal.): 17.0

DATE PURGED: 10-16-92 Start (2400 Hr) 1035 End (2400 Hr) 1050

DATE SAMPLED: 10-16-92 Start (2400 Hr) 1055 End (2400 Hr) -

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	EC. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1039</u>	<u>3.5</u>	<u>6.94</u>	<u>916</u>	<u>70.9</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1042</u>	<u>7</u>	<u>6.95</u>	<u>924</u>	<u>70.3</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1045</u>	<u>10.5</u>	<u>7.00</u>	<u>920</u>	<u>70.2</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1047</u>	<u>14</u>	<u>7.02</u>	<u>922</u>	<u>70.3</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1050</u>	<u>17</u>	<u>7.01</u>	<u>921</u>	<u>70.3</u>	<u>GREY</u>	<u>HEAVY</u>

D. O. (ppm): WR ODOR: STROVE NR (COBALT 0 - 100) NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): WR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailor (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailor (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input checked="" type="checkbox"/> Bailor (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailor (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailor (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
- Other: _____ Other: _____

WELL INTEGRITY: OK LOCK #: 3059

REMARKS: _____

Meter Calibration: Date: 10-16-92 Time: 10:00 Meter Serial #: 9111 Temperature °F: 16.9
(EC 1000 1086 / 1000) (DI _____) (pH 7 7.00 / 7.00) (pH 10 10.10 / 10.00) (pH 4 3.98 / _____)

Location of previous calibration: MW-1

Signature: [Signature] Reviewed By: [Signature] Page 1 of 4



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

PROJECT NO: 0670-055-01

SAMPLE ID: MW-2

PURGED BY: J. Williams

CLIENT NAME: ARCO 2167

SAMPLED BY: J. Williams

LOCATION: 15135 Hesperian Blvd
San Leandro CA

TYPE: Ground Water Surface Water Treatment Effluent Other

CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 4.00

DEPTH TO WATER (feet): 9.90 CALCULATED PURGE (gal.): 20.00

DEPTH OF WELL (feet): 16.0 ACTUAL PURGE VOL (gal.): 20.0

DATE PURGED: 10-16-92

Start (2400 Hr) 1112

End (2400 Hr) 1130

DATE SAMPLED: 10-16-92

Start (2400 Hr) 1137

End (2400 Hr) 1135

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	EC. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (Visual)	TURBIDITY (Visual)
<u>1116</u>	<u>4</u>	<u>7.21</u>	<u>843</u>	<u>70.3</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1119</u>	<u>8</u>	<u>7.31</u>	<u>841</u>	<u>70.4</u>	<u>GREY</u>	<u>HEAVY</u>
<u>1123</u>	<u>12</u>	<u>7.37</u>	<u>831</u>	<u>70.3</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1126</u>	<u>16</u>	<u>7.41</u>	<u>819</u>	<u>70.2</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1130</u>	<u>20</u>	<u>7.47</u>	<u>812</u>	<u>70.2</u>	<u>BROWN</u>	<u>HEAVY</u>

D. O. (ppm): NR

ODOR: STRONG

NR NR
(COBALT 0 - 100) (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- 2" Bladder Pump
- Centrifugal Pump
- Submersible Pump
- Well Wizard™
- Bailer (Teflon®)
- Bailer (PVC)
- Bailer (Stainless Steel)
- Dedicated

- 2" Bladder Pump
- Bailer (Teflon®)
- Bailer (Stainless Steel)
- Submersible Pump
- Dedicated
- DDL Sampler
- Dipper
- Well Wizard™

Other: _____

Other: _____

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-16-92 Time: 1000 Meter Serial #: 9111 Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)

Location of previous calibration: MW-1

Signature: [Signature]

Reviewed By: JB Page 2 of 4



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

PROJECT NO: 0670-055-01

SAMPLE ID: MW-3

PURGED BY: J Williams

CLIENT NAME: ARCO 2167

SAMPLED BY: J Williams

LOCATION: 15135 Hesperian Ave
SAN LEANDRO CA

TYPE: Ground Water Surface Water Treatment Effluent Other

CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): <u>NR</u>	VOLUME IN CASING (gal.): <u>3.18</u>
DEPTH TO WATER (feet): <u>10.14</u>	CALCULATED PURGE (gal.): <u>16.94</u>
DEPTH OF WELL (feet): <u>15.0</u>	ACTUAL PURGE VOL (gal.): <u>16.0</u>

DATE PURGED: <u>10-16-19</u>	Start (2400 Hr) <u>1157</u>	End (2400 Hr) <u>1216</u>
DATE SAMPLED: <u>10-16-82</u>	Start (2400 Hr) <u>1218</u>	End (2400 Hr) <u>1221</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1202</u>	<u>9.5</u>	<u>7.11</u>	<u>736</u>	<u>72.2</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1206</u>	<u>7</u>	<u>7.21</u>	<u>719</u>	<u>72.8</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1209</u>	<u>10</u>	<u>7.27</u>	<u>702</u>	<u>73.0</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1213</u>	<u>13</u>	<u>7.37</u>	<u>690</u>	<u>72.8</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1216</u>	<u>16</u>	<u>7.40</u>	<u>689</u>	<u>72.8</u>	<u>BROWN</u>	<u>HEAVY</u>
D. O. (ppm): <u>NR</u>	ODOR: <u>None</u>				<u>NR</u> (COBALT 0 - 100)	<u>NR</u> (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input checked="" type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> ODL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-16-82 Time: 10:00 Meter Serial #: 9111 Temperature °F: _____
 (EC 1000 1) (DI 1) (pH 7 1) (pH 10 1) (pH 4 1)
 Location of previous calibration: MW-1

Signature: J Williams Reviewed By: JB Page 3 of 4



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

PROJECT NO: 0670-055-01

SAMPLE ID: MW-4

PURGED BY: J.Williams

CLIENT NAME: ARCO 2162

SAMPLED BY: J.Williams

LOCATION: 15135 Hesperian Blk
SAN LINDRO CA

TYPE: Ground Water Surface Water Treatment Effluent Other

CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 3.85

DEPTH TO WATER (feet): 11.32 CALCULATED PURGE (gal.): 19.28

DEPTH OF WELL (feet): 17.2 ACTUAL PURGE VOL (gal.): 20.0

DATE PURGED: 10-16-92 Start (2400 Hr) 1249 End (2400 Hr) 1304

DATE SAMPLED: 10-16-92 Start (2400 Hr) 1306 End (2400 Hr) 1308

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1251</u>	<u>4</u>	<u>7.16</u>	<u>926</u>	<u>72.3</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1254</u>	<u>8</u>	<u>7.27</u>	<u>942</u>	<u>71.3</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1257</u>	<u>12</u>	<u>7.43</u>	<u>937</u>	<u>71.2</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1301</u>	<u>16</u>	<u>7.32</u>	<u>934</u>	<u>71.1</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1304</u>	<u>20</u>	<u>7.32</u>	<u>934</u>	<u>71.1</u>	<u>BROWN</u>	<u>HEAVY</u>

D. O. (ppm): NR ODOR: NR COLOR: NR TURBIDITY: NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailor (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailor (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input checked="" type="checkbox"/> Bailor (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailor (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailor (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
- Other: _____ Other: _____

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-16-92 Time: 1000 Meter Serial #: 9111 Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)

Location of previous calibration: MW-1

Signature: Jac Williams Reviewed By: JB Page 4 of 4

12019.02



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Project: ARCO 2162, San Leandro

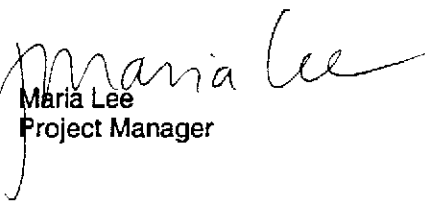
Enclosed are the results from 4 water samples received at Sequoia Analytical on October 1, 1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2100079	Water, W-10-MW1	9/30/92	EPA 5030/8015/8020
2100080	Water, W-9-MW2	9/30/92	EPA 5030/8015/8020
2100081	Water, W-9-MW3	9/30/92	EPA 5030/8015/8020
2100082	Water, W-11-MW4	9/30/92	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL


Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: ARCO 2162, San Leandro	Sampled: Sep 30, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix: Water	Received: Oct 1, 1992
San Jose, CA 95118	Analysis Method: EPA 5030/8015/8020	Reported: Oct 9, 1992
Attention: Joel Coffman	First Sample #: 210-0079	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 210-0079 W-10-MW1	Sample I.D. 210-0080 W-9-MW2	Sample I.D. 210-0081 W-9-MW3	Sample I.D. 210-0082 W-11-MW4
Purgeable Hydrocarbons	50	1,100	1,000	N.D.	330
Benzene	0.50	6.2	9.6	N.D.	81
Toluene	0.50	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.50	6.9	45	N.D.	N.D.
Total Xylenes	0.50	N.D.	110	N.D.	N.D.
Chromatogram Pattern:		Gas	Gas	--	Gas & Discrete Peaks

Quality Control Data

Report Limit Multiplication Factor:	10	5.0	1.0	5.0
Date Analyzed:	10/8/92	10/7/92	10/7/92	10/7/92
Instrument Identification:	GCHP-2	GCHP-3	GCHP-3	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	113	100	105	107

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 2162, San Leandro

QC Sample Group: 2100079-82

Reported: Oct 9, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Villar	J. Villar	J. Villar	J. Villar
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Oct 7, 1992	Oct 7, 1992	Oct 7, 1992	Oct 7, 1992
QC Sample #:	GBLK100792	GBLK100792	GBLK100792	GBLK100792
	MS/MSD	MS/MSD	MS/MSD	MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	10	10	10	30
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	11	11	11	33
Matrix Spike Duplicate % Recovery:	110	110	110	110
Relative % Difference:	9.5	9.5	9.5	9.5

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

2100079.RES <2>



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA

Client Project ID: ARCO 2162, San Leandro

3315 Almaden Expwy., Suite 34
San Jose, CA 95118

Attention: Joel Coffman

QC Sample Group: 2100079-82

Reported: Oct 9, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
---------	---------	---------	-------------------	---------

Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Lee	R. Lee	R. Lee	R. Lee
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Oct 8, 1992	Oct 8, 1992	Oct 8, 1992	Oct 8, 1992
QC Sample #:	GBLK100892	GBLK100892	GBLK100892	GBLK100892

Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	10	10	10	31
Matrix Spike % Recovery:	100	100	100	103
Conc. Matrix Spike Dup.:	10	10	10	30
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	0.0	0.0	0.0	3.3

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Maria Lee
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

WELL PURGE DATA SHEET

Project Name: ARCO Station 2162

Job No. 62019.02

Date: September 30, 1992

Page 1 of 1

Well No. MW-1

Time Started 12:52

Time	Gallons	Temperature	pH	Conductivity
12:52	Started pumping.			
12:56	5	73.9	7.85	0.77
1:00	10	73.6	7.49	0.83
1:05	15	72.8	7.45	0.82
1:10	20	72.1	7.47	0.81
1:15	25	72.3	7.47	0.82
1:20	30	72.1	7.46	0.81
1:20	Stopped pumping.			
Notes:				
Well Diameter (inches) : 4"				
Depth to Bottom (feet) : 16.0				
Depth to Water - initial (feet) : 10.68				
Depth to Water - final (feet) : 10.68				
% recovery : 100				
Time Sampled : 2:45				
Gallons per Well Casing Volume : 4				
Gallons Purged : 30				
Well Casing Volume Purged : 7				
Approximate Pumping Rate (gpm) : 1				

WELL PURGE DATA SHEET

Project Name: ARCO Station 2162

Job No. 62019.02

Date: September 30, 1992

Page 1 of 1

Well No. MW-2

Time Started 1:25

Time	Gallons	Temperature	pH	Conductivity
1:25	Started pumping.			
1:30	5	73.9	8.28	0.77
1:35	10	73.4	7.39	0.77
1:40	15	72.9	7.59	0.76
1:45	20	73.0	7.76	0.74
1:50	25	72.8	7.73	0.76
1:55	30	72.9	7.74	0.76
1:55	Stopped pumping.			
Notes:				
Well Diameter (inches) : 4"				
Depth to Bottom (feet) : 16.0				
Depth to Water - initial (feet) : 9.74				
Depth to Water - final (feet) : 9.74				
% recovery : 100				
Time Sampled : 3:00				
Gallons per Well Casing Volume : 4				
Gallons Purged : 30				
Well Casing Volume Purged : 7				
Approximate Pumping Rate (gpm) : 1				

WELL PURGE DATA SHEET

Project Name: ARCO Station 2162

Job No. 62019.02

Date: September 30, 1992

Page 1 of 1

Well No. MW-3

Time Started 12:15

Time	Gallons	Temperature	pH	Conductivity
12:15	Started pumping.			
12:20	5	79.6	7.31	0.79
12:24	10	77.6	7.30	0.65
12:29	15	74.9	7.49	0.66
12:34	20	73.7	7.62	0.63
12:38	25	73.2	7.61	0.62
12:45	30	73.1	7.62	0.62
12:45	Stopped pumping.			
Notes:				
Well Diameter (inches) : 4"				
Depth to Bottom (feet) : 15.0				
Depth to Water - initial (feet) : 9.93				
Depth to Water - final (feet) : 9.93				
% recovery : 100				
Time Sampled : 2:30				
Gallons per Well Casing Volume : 3				
Gallons Purged : 30				
Well Casing Volume Purged : 10				
Approximate Pumping Rate (gpm) : 1				

WELL PURGE DATA SHEET

Project Name: ARCO Station 2162

Job No. 62019.02

Date: September 30, 1992

Page 1 of 1

Well No. MW-4

Time Started 2:00

Time	Gallons	Temperature	pH	Conductivity
2:00	Started pumping.			
2:05	5	73.6	7.66	0.84
2:10	10	73.1	7.17	0.84
2:15	15	73.3	7.21	0.83
2:20	20	73.3	7.20	0.84
2:25	25	73.2	7.21	0.83
2:30	30	73.3	7.21	0.84
2:30	Stopped pumping.			

Notes:

Well Diameter (inches) : 4"
Depth to Bottom (feet) : 17.2
Depth to Water - initial (feet) : 11.15
Depth to Water - final (feet) : 11.15
% recovery : 100
Time Sampled : 3:15
Gallons per Well Casing Volume : 4
Gallons Purged : 35
Well Casing Volume Purged : 8
Approximate Pumping Rate (gpm) : 1

APPENDIX F
WELLHEAD SURVEY

JOHN E. KOCH
Land Surveyor
CA. State Lic. No. LS4811
5427 Telegraph Ave., Suite A
Oakland, CA 94609
(510)655-9956
FAX(510)655-9745



RESNA
3315 Almaden Expressway, Suite 34
San Jose, CA 95118
(408) 264-7723
FAX (408) 264-2435

Tabulation of Elevations as of
01:00 p.m. 09/14/92

Job #92075
RESNA Project Job # 69021.02
Project Geologist: Joel Coffman
Site: Arco Station #2162
15135 Hesperian Boulevard
@ Ruth Court
San Leandro, CA

BENCHMARK: Cinch nail on curb at Storm Water Inlet at SE
corner of the intersection of Hesperian and Bay Fair
(El.=29.307').

MONITOR WELL DATA TABLE

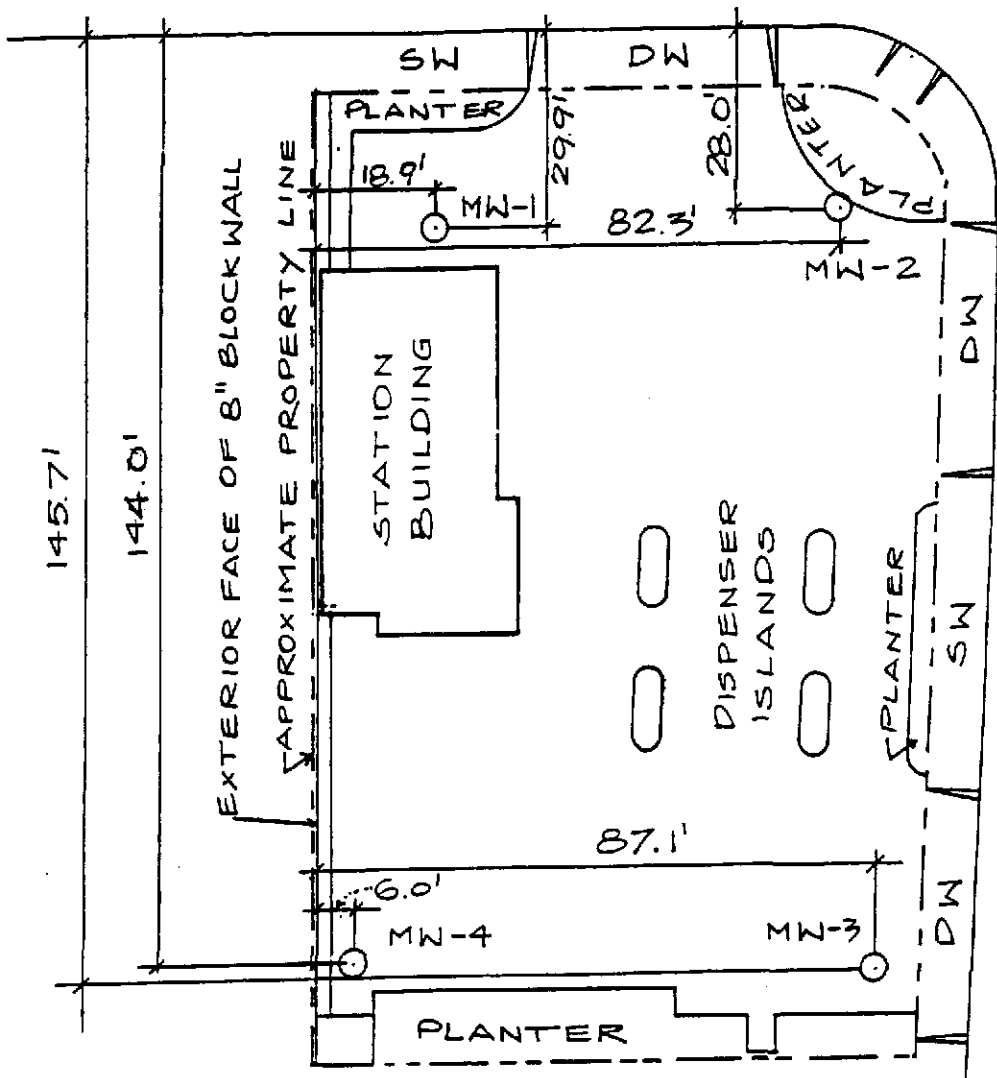
Well Designation	Elevation	Description
MW-1	31.19	Top of P.V.C. Casing
	31.41	Top of Box
MW-2	30.38	Top of P.V.C. Casing
	30.73	Top of Box
MW-3	30.30	Top of P.V.C. Casing
	30.51	Top of Box
MW-4	30.39	Top of P.V.C. Casing
	31.63	Top of Box

NOTES:

1. Datum is City of San Leandro = 1973 Adj., NGVD
2. Top of PVC Casing elevation was taken at set notch bearing north for all wells.
3. Top of Box elevation was taken at set notch bearing north for all wells.



RUTH COURT
 WEST
 CITY MONUMENT CITY MONUMENT



HESPERIAN BOULEVARD

ELEVATIONS

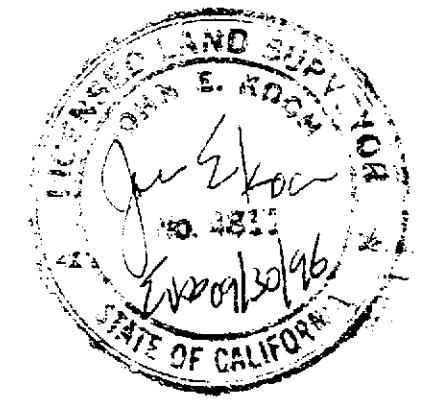
WELL NUMBER	TOPOF CASING	TOPOF BOX
MW-1	31.19'	31.41'
MW-2	30.38'	30.73'
MW-3	30.30'	30.51'
MW-4	30.39'	31.63'



SCALE: 1" = 30'

LEGEND:

- DW - DRIVEWAY
- SW - SIDEWALK



SITE:
 ARCO STATION 2162
 15135 HESPERIAN BLVD.
 0 RUTH COURT
 SAN LEANDRO, CA
 RESNA PROJECT 69021.02

CLIENT:
 RESNA
 3315 ALMADEN EXPRESSWAY
 SUITE 34
 SAN JOSE, CA. 95118

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 LAND SURVEYOR
 CA. STATE LIC. NO. LS 4811
 5427 TELEGRAPH AVE, SUITE A
 OAKLAND, CA. 94609
 (510) 655-9956
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JOB #	DRAWN BY	DATE
92075	T. ROSU	09.16.92