GeoStrategies Inc.

LETTER REPORT
VAPOR EXTRACTION START UP
AND QUARTERLY GROUNDWATER MONITORING
SECOND QUARTER 1994

at

ARCO Station 2169
889 West Grand Avenue
Oakland, California

4927770-19

Prepared for

ARCO Products Company
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September 27, 1994

GeoStrategies Inc.

Mr. Michael Whelan
ARCO Products Company
Post Office Box 5811
San Mateo, California

September 27, 1994

Subject: Vapor Extraction/Air-sparging System Start Up and Quarterly Groundwater Monitoring Report - Second Quarter 1994 for ARCO Station 2169, 899 West Grand Avenue, Oakland, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), GeoStrategies Inc. (GSI) has prepared this letter report describing the vapor extraction/air-sparging system start up and summarizing the results of the second quarter 1994 groundwater monitoring at the above-referenced site. The objectives of this quarterly groundwater monitoring are to evaluate changes in the groundwater levels and changes in concentrations of petroleum hydrocarbons in the shallow groundwater beneath the site. Groundwater monitoring and sampling was performed by ARCO's contractor, Integrated Wastestream Management (IWM) of Milpitas, California, and included measuring depths to groundwater, subjectively analyzing groundwater for the presence of petroleum product, collecting groundwater samples from the wells for laboratory analyses, and directing a State-certified laboratory to analyze the groundwater samples. The field work associated with start-up, operation and maintenance of the soil and groundwater interim remediation system was performed by Gettler-Ryan Inc. (G-R) of Dublin, California.

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1.0 SITE BACKGROUND

The operating ARCO Station is located at the intersections of West Grand Avenue, Market Street and 22nd Street in Oakland, California, as shown on the Vicinity Map, Figure 1. In 1991, GSI conducted a limited site assessment which included drilling five exploratory soil borings (A-A through A-E) at the site. Four onsite (A-1 through A-4) and two offsite (A-5 and A-6) groundwater monitoring wells, two groundwater recovery wells (AR-1 and AR-2), and three vapor extraction wells (AV-1 through AV-3) were installed at the site by GSI between 1992 and 1993. These wells and borings were drilled to evaluate the horizontal and vertical extent of petroleum hydrocarbons in soil and groundwater beneath the site, and to provide extraction points for future soil and groundwater remediation systems. The former underground storage tanks (USTs) containing gasoline and diesel fuel were replaced in April 1992. The locations of the wells, former and existing tanks and other pertinent site features are shown on Figure 2.

In June 1992, GSI performed a vapor extraction test to determine the feasibility of vapor extraction as a remedial option for the site. In July 1992, GSI performed an aquifer pumping and recovery test to evaluate the feasibility of groundwater extraction as a groundwater remediation method for the site.

In September 1993, GSI installed air sparging wells AS-1 through AS-3 and additional vapor extraction wells AV-4 and AV-5 at the site and conducted air sparging/vapor extraction tests to evaluate the feasibility of vapor extraction/air sparging as a method for remediation of soil and groundwater at the site. In December 1993 and January 1994, an interim remediation system was constructed at the site, and GSI installed two additional air sparging wells (AS-4 and AS-5), two vapor extraction wells (AV-6 and AV-7), and two dual groundwater recovery/vapor extraction wells (ADR-1 and ADR-2). The operation of the interim remediation system was initiated on June 2, 1994.

Quarterly groundwater monitoring and sampling of the site wells began in April 1992. Groundwater samples are currently analyzed for Total Petroleum Hydrocarbons calculated as Gasoline (TPH-G) and gasoline

constituents benzene, toluene, ethylbenzene and xylenes (BTEX) using EPA Methods 5030/8020/California DHS LUFT Method; and total petroleum hydrocarbons calculated as diesel (TPH-D) using EPA Methods 3510/California DHS LUFT Method. Historical monitoring and sampling data are presented in Tables 1A and 2A included in Appendix A.

2.0 INTERIM VAPOR EXTRACTION REMEDIATION SYSTEM DESCRIPTION

The interim remediation system at the site consists of a vapor extraction (VE) system which utilizes air sparging (AS) for the remediation of hydrocarbon impacted soil and groundwater. Vapor treatment is accomplished using a thermal/catalytic oxidizer. The ThermTech unit is a skid mounted package equipped with a vapor extraction blower, moisture separator, oxidizer and controls. The system began operation in thermal oxidation mode on June 2, 1994. Specific components of the VE system are as follows:

VE wells (14):	A-1 through A-4, AV-1 through AV-7, AR-2, ADR-1 and ADR-2
T/C oxidizer (1):	ThermTech; Thermal/catalytic oxidizer; Model #VAC-25; 250 cfm
AS blower (1):	Conde Pumps; Rotary vane blower; Model #6; 3 HP, 25 cfm
Control panel (1):	Fabricated by Gettler-Ryan
Auto-dialer (1):	Silent Knight; Alarm auto-dialer; Model #1410

Soil vapor is extracted from the vapor extraction wells through the system piping and manifold and then passed through a moisture separator prior to entering the blower. After exiting the blower, the vapors are fed into the oxidizer where they are combusted using natural gas as a supplemental fuel. The products of combustion are discharged through the exhaust stack under the Bay Area Air Quality Management District (BAAQMD) Permit to Operate #12119. A Process Flow Diagram for the

vapor system is presented as Figure 3. A copy of the BAAQMD permit is included in Appendix B.

3.0 SECOND QUARTER 1994 ACTIVITIES

A summary of activities performed at the site during the second quarter 1994 is presented below.

- PG&E installed gas service at the site.

- Initiated operation of the vapor extraction system on June 2, 1994. Samples of the extracted vapor were collected from the influent and effluent ports of the ThermTech unit and vapor extraction wells on June 2, 1994. These vapor samples were analyzed for TPH-G and BTEX.

- Performed operation and maintenance of the interim remediation system. Influent and effluent samples were collected weekly (June 2, 7, 16, 22 and 30, 1994) and analyzed for TPH-G and BTEX per permit requirements.

- Depth-to-water (DTW) measurements were obtained by IWM in wells A-1 through A-6, AR-1, AR-2, ADR-1 and ADR-2; each well was inspected for the presence of floating product; and groundwater samples were collected from the wells on May 4, 1994. Groundwater samples were analyzed for TPH-G, BTEX and TPH-D. Additional samples were collected from wells AR-2 and ADR-2 and submitted for TPH-D analyses on May 13, 1994.

4.0 INTERIM REMEDIATION SYSTEM MONITORING

4.1 Interim Vapor Extraction Remediation System Start-up

Prior to start-up, a site specific protocol was developed to insure that all procedures used met the conditions in the Authority to Construct. Start-up was initially scheduled for May 11, 1994, however, difficulties in scheduling the replacement of a faulty valve on the ThermTech unit caused unforeseen delays. Once the unit was repaired, the proper

notifications were made to the BAAQMD and the system was brought on-line. Operation of the vapor extraction system was initiated on June 2, 1994.

An efficiency test was conducted on June 2, 1994 to confirm that system performance satisfied BAAQMD requirements. The results of this test were summarized in the GSI *Start-up Report* dated June 10, 1994. System monitoring and performance are discussed in the following sections.

4.2 Interim Vapor Extraction Remediation System Monitoring and Sampling

Monitoring of the vapor extraction system was conducted in order to satisfy the BAAQMD permit conditions and to provide data on system performance. System monitoring and sampling was conducted weekly during the second quarter of 1994 to insure maximum recovery as the hydrocarbon concentrations decline from initial values. Samples were collected from the system influent and effluent vapor streams on June 2, 7, 16, 22, and 30, 1994. These samples were submitted to GTEL Environmental Laboratories, Inc. of Concord, California (GTEL) or Sequoia Analytical of Redwood City, California (Sequoia), a California State-certified laboratories (Hazardous Waste Testing Laboratory #1075 and #1210, respectively) for analysis for TPH-G and BTEX compounds. The results of sampling activities are presented in the following section. In addition to sampling, monitoring of system operating parameters, including system flow rates, vacuum, and temperatures, was also conducted.

4.3 Interim Vapor Extraction Remediation System Performance

Between June 2 and June 30, 1994, the system operated approximately 566 hours, making it 84% operational during the second quarter. Average influent flow rates for the ThermTech unit ranged from 61 to 194 standard cubic feet per minute (scfm). Average effluent flow rates ranged from 252 to 290 scfm. During start-up and initial operation all 14 VE wells were utilized. As hydrocarbon concentrations dropped, some wells were closed off to maximize product recovery and insure efficient

operation of the vapor extraction system. By June 30, only nine VE wells (A-1, A-2, AV-2 through AV-5, AV-7, ADR-1 and ADR-2) were being utilized. Flow data are summarized in Table 1, Vapor Extraction System Performance Data. Current well status is presented in Table 2.

Sample analytical results for second quarter samples analyzed for TPH-G show influent concentrations ranging from 230 to 18,000 parts per million by volume (ppmv) and effluent concentrations ranging from nondetectable levels to 75 ppmv. The second quarter samples contained benzene at concentrations ranging from 3.8 to 420 ppmv in the influent, and from nondetectable levels to 0.78 ppmv in the system effluent.

Based on the flow rates and sample analytical results presented above, hydrocarbon recovery was calculated for the vapor extraction system. The recovery rates for TPH-G for the second quarter ranged from 0.41 to 21.26 pounds per operational hour (lbs/hr). Approximately 3191 pounds (532 gallons) of TPH-G were recovered during second quarter operations. Benzene recovery rates ranged from 0.008 to 0.67 lbs/hr during the second quarter, resulting in 96 pounds (13 gallons) recovered during the second quarter. Flow and recovery data are summarized in Table 1. Copies of the laboratory analytical reports, Chain-of-Custody Forms and field data sheets are contained in Appendix C.

4.4 Interim Vapor Extraction System Destruction Efficiency

Destruction efficiency of the vapor extraction system is regulated under the BAAQMD Permit to Operate issued for the site. According to the permit conditions, the system must maintain destruction efficiencies of 98.5% for hydrocarbon concentrations above 3000 ppmv, 95% for concentrations between 3000 and 1000 ppmv, and 90% for concentrations less than 1000 ppmv. System destruction efficiencies met permit requirements for all of the second quarter except June 30, 1994. Based on the monitoring and sample analytical data collected on this date, the destruction efficiency for TPH-G was 46.70% with an influent concentration of 230 ppmv. The BAAQMD was notified of this condition and corrective actions were taken to improve system performance. Based on a review of the sample analytical data, the most probable cause of the poor destruction efficiency was depleted oxygen content in the subsurface

vapors being extracted. The ambient dilution air into the system had been decreased in order to maximize vapor recovery from the well field. The lack of dilution air is believed to have caused a decrease in the influent vapor oxygen content resulting in incomplete combustion of the process stream. Destruction efficiencies are summarized in Table 1.

5.0 FIRST QUARTER 1994 SAMPLING RESULTS

5.1 Groundwater Level Measurements and Gradient Evaluation

Depth to water-level measurements were obtained from monitoring wells A-1 through A-6 and recovery wells AR-1, AR-2, ADR-1 and ADR-2 on May 4, 1994, by IWM. Static groundwater levels were measured from the surveyed top of the well casing and recorded to the nearest $\pm$0.01 foot. Water-level data were referenced to Mean Sea Level (MSL) datum and were used to construct a potentiometric map (Figure 4). Shallow groundwater beneath the site is interpreted to flow to the northwest at an average hydraulic gradient of 0.004.

Each well was inspected for the presence of floating product. Floating product was not observed in any groundwater monitoring well this quarter. Floating product has not been observed in any well since quarterly monitoring began in April 1992. Depth to groundwater data for the current quarter are presented in Table 4, Current Groundwater Monitoring Data, and in the IWM sampling report (Appendix D). Current and historical water-level data and floating product measurements are summarized in Table 1A included in Appendix A.

5.2 Laboratory Analytical Results of Groundwater Samples

Groundwater samples were collected from wells A-1 through A-6, AR-1, AR-2, ADR-1 and ADR-2 on May 4, 1994, by IWM. Additional samples were collected from wells AR-2 and ADR-2 for TPH-D analyses on May 13, 1994. Samples were analyzed for TPH-G and BTEX using EPA Methods 5030/8020/California DHS LUFT Method. In addition, groundwater samples collected from wells A-1, AR-1, AR-2, ADR-1 and ADR-2 were analyzed for TPH-D using EPA Method 3510/California DHS LUFT Method. Groundwater samples were analyzed by Columbia

Analytical Services, Inc. of San Jose, California (Columbia), a California State-certified laboratory (Hazardous Waste Testing Laboratory #1426).

Current quarter chemical analytical data are presented in Table 4 and have also been added to the Historical Groundwater Quality Database presented in Table 2A included in Appendix A. Laboratory analyses reported nondetectable concentrations of TPH-G (less than 50 parts per billion [ppb]) and benzene (less than 0.5 ppb) in groundwater samples collected from wells A-2 through A-4 and AR-2. The highest concentrations of TPH-G (36,000 ppb), non-diesel mixture quantified as diesel (up to 7,200 ppb) and benzene (up to 4,600 ppb) were detected in groundwater samples collected from well AR-1, located within the former UST pit, and well ADR-2, located downgradient of the westernmost (diesel) service island. The groundwater samples collected from wells ADR-1 and A-1, located in the western portion of the site (downgradient of the former UST pit), contained up to 2,100 ppb of TPH-G, up to 2,100 ppb of non-diesel mixture quantified as diesel, and up to 490 ppb of benzene. Laboratory analyses of groundwater samples collected from offsite wells A-5 and A-6 indicated concentrations of TPH-G at 13,000 ppb and 260 ppb, respectively. Benzene was detected at 1000 ppb in well A-5 and was nondetectable in well A-6.

The IWM groundwater sampling report, laboratory analytical reports and the Chain-of-Custody form are presented in Appendix D. A chemical isoconcentration map for TPH-G and benzene is presented on Figure 5.

6.0 CONCLUSIONS

The interim vapor extraction remediation system began operation on June 2, 1994. During the second quarter of 1994, the system was approximately 84% operational, recovering 3191 pounds (532 gallons) of TPH-G and 96 pounds (13 gallons) of benzene. Destruction efficiencies met BAAQMD requirements for the second quarter except for June 30, 1994. The poor destruction efficiency for this monitoring event was attributed to insufficient oxygen content in the extracted vapors. Proper notifications were made to the BAAQMD and corrective actions were implemented to increase the oxygen content of vapors entering the oxidizer.

Groundwater elevations in the site wells have decreased an average of 0.6 feet since the first quarter 1994. The groundwater gradient and flow direction for this quarter is generally consistent with previously interpreted gradients and flow directions for this site.

Concentrations of TPH-G have remained nondetectable in wells A-3 and A-4; have not changed significantly in wells A-1, A-6, ADR-1 and ADR-2; and have increased in wells A-5 and AR-1 since the last quarter. Non-fuel component (quantified as TPH-G), which was present in wells A-2 and AR-2, was not detected during this quarter. Laboratory analytical results of groundwater samples collected from wells A-2 and AR-2 indicated nondetectable concentrations of TPH-G during this quarter. Concentrations of benzene have remained nondetectable in wells A-2 through A-4, A-6 and AR-2; have not changed significantly in wells A-1, ADR-1 and ADR-2; and have increased in wells A-5 and AR-1. Concentrations of gasoline hydrocarbons detected in well A-5 which is located crossgradient from the ARCO site may reflect an offsite source of gasoline hydrocarbons.

ACTIVITIES PLANNED FOR THE THIRD QUARTER 1994

- Initiate operation of air sparging at the site.
- Evaluate the initiation of oxidizer operation in catalytic mode.
- Perform operation and maintenance duties for the vapor extraction/air-sparging system.
- Perform quarterly monitoring and sampling of site wells.

If you have any questions, please call us at (510) 551 - 8777.

Attachments:

Table 1. Vapor Extraction System Performance Data
Table 2. Vapor Extraction Wells Status Data
Table 3. Laboratory Analysis Results of Air Samples
Table 4. Current Groundwater Monitoring Data

Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Vapor System Process Flow Diagram
Figure 4. Potentiometric Map
Figure 5. TPH-G/Benzene Concentration Map

Appendix A: Historical Data Tables
Table 1A. Historical Water-Level Data
Table 2A. Historical Groundwater Quality Database
Appendix B: BAAQMD Permit to Operate
Appendix C: G-R System Monitoring Data Sheets, Laboratory Analytical Reports and Chain-of-Custody Forms for Air Samples
Appendix D: IWM Groundwater Sampling Report

TABLES

Table 1

Vapor Extraction System Performance Data
ARCO Station 2169
Oakland, California

Beginning Date	2-Jun-94	2-Jun-94	7-Jun-94	16-Jun-94	22-Jun-94
Ending Date	2-Jun-94	7-Jun-94	16-Jun-94	22-Jun-94	30-Jun-94
Down-time (days)	0.00	0.00	0.93	0.00	3.57
Total Operation (days)	0.07	5.05	8.07	6.05	4.43
Total Operation (hours)	1.7	121.3	193.7	145.2	106.3
Operational Hours to Date	1.7	123.0	316.7	462.0	568.2
TPH Concentrations					
Average Influent (ppmv)	18,000	16,000	830	1,100	230
Average Effluent (ppmv)	ND	45.0	ND	4.9	75.0
Benzene Concentrations					
Average Influent (ppmv)	250	420	17	24	3.8
Average Effluent (ppmv)	ND	0.30	ND	0.08	0.78
Flow Rates					
Average Influent (scfm)	61.1	131.5	145.3	194.1	176.7
Average Dilution (scfm)	184.2	97.8	69.9	0.0	0.0
Average Effluent (scfm)	268.6	252.3	289.7	264.4	288.9
TPH-G Recovery Data					
Recovery Rate (lbs/hr)	11.12	21.26	1.22	2.16	0.41
Recovery Rate (lbs/day)	266.80	510.34	29.25	51.77	9.86
Destruction Efficiency (%)	100.00%	99.46%	100.00%	99.39%	46.70%
Product Recovered (lbs)	18.68	2,579.35	236.08	313.27	43.64
Product Recovered To Date (lbs)	18.68	2,598.02	2,834.10	3,147.37	3,191.01
Product Recovered To Date (gal)	3.11	433.00	472.35	524.56	531.83
Benzene Recovery Data					
Recovery Rate (lbs/hr)	0.185	0.670	0.030	0.056	0.008
Recovery Rate (lbs/day)	4.447	16.076	0.719	1.355	0.195
Destruction Efficiency (%)	100.00%	99.86%	100.00%	99.56%	66.45%
Product Recovered (lbs)	0.311	81.249	5.802	8.202	0.865
Product Recovered To Date (lbs)	0.311	81.561	87.363	95.565	96.430
Product Recovered To Date (gal)	0.043	11.250	12.050	13.181	13.301

ppmv = parts per million by volume
scfm = standard cubic feet per minute
lbs/hr = pounds per operational hour
lbs/day = pounds per day
lbs = pounds
gal = gallons
NS = Not Sampled; Recovery data calculated using most recent previous sample data
ND = None Detected; Recovery data calculated using laboratory detection limits

Notes: 1. Molecular weights used in recovery calculations are 65 for TPH and 78 for benzene
2 Densities used in recovery calculations are 6.0 lbs/gal for TPH and 7.25 lbs/gal for benzene

Table 2

Vapor Extraction Well Status
ARCO Station 2169
Oakland, California

Date	6/2/94	6/7/94	6/16/94	6/22/94	6/30/94
A-1					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	12	68	54	81	67
Initial HC Conc. (ppm)	12,300	8,200	3,600	1,800	2,800
Active on Departure	Y	Y	Y	Y	Y
A-2					
Active on Arrival	Y	N	N	Y	Y
Initial Vacuum (in WC)	10	off	0	6	14
Initial HC Conc. (ppm)	560	600	70	260	450
Active on Departure	N	N	Y	Y	Y
A-3					
Active on Arrival	Y	N	N	Y	Y
Initial Vacuum (in WC)	14	off	0	12	8
Initial HC Conc. (ppm)	90	10	0	0	10
Active on Departure	N	N	Y	Y	N
A-4					
Active on Arrival	Y	N	N	Y	N
Initial Vacuum (in WC)	9	off	0	2	0
Initial HC Conc. (ppm)	0	0	0	0	0
Active on Departure	N	N	Y	N	N
AV-1					
Active on Arrival	Y	N	N	Y	Y
Initial Vacuum (in WC)	8	off	40	80	56
Initial HC Conc. (ppm)	3,000	2,800	0	0	0
Active on Departure	N	N	Y	Y	N
AV-2					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	12	38	55	80	55
Initial HC Conc. (ppm)	13,470	4,100	1,250	750	1,000
Active on Departure	Y	Y	Y	Y	Y
AV-3					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	12	74	57	82	69
Initial HC Conc. (ppm)	13,670	12,600	2,400	1,100	900
Active on Departure	Y	Y	Y	Y	Y
AV-4					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	9	74	55	83	68
Initial HC Conc. (ppm)	13,680	14,110	9,000	4,400	6,300
Active on Departure	Y	Y	Y	Y	Y
AV-5					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	11	74	56	82	33
Initial HC Conc. (ppm)	13,680	13,400	1,250	600	1,180
Active on Departure	Y	Y	Y	Y	Y
AV-6					
Active on Arrival	Y	N	N	Y	Y
Initial Vacuum (in WC)	12	off	0	26	20
Initial HC Conc. (ppm)	13,650	40	240	70	10
Active on Departure	N	N	Y	Y	N
AV-7					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	10	74	56	82	69
Initial HC Conc. (ppm)	13,690	13,800	3,200	1,800	2,200
Active on Departure	Y	Y	Y	Y	Y
AR-2					
Active on Arrival	Y	N	N	Y	Y
Initial Vacuum (in WC)	11	off	0	22	13
Initial HC Conc. (ppm)	10	30	0	20	0
Active on Departure	N	N	Y	Y	N
ADR-1					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	11	73	54	80	67
Initial HC Conc. (ppm)	7,000	14,160	5,400	2,550	4,000
Active on Departure	Y	Y	Y	Y	Y
ADR-2					
Active on Arrival	Y	Y	Y	Y	Y
Initial Vacuum (in WC)	13	75	57	83	69
Initial HC Conc. (ppm)	460	11,910	5,400	2,700	4,300
Active on Departure	Y	Y	Y	Y	Y

Note: Vapor extraction wells A-2 and A-7 were off-line first quarter 1994.
in WC = inches of water column
ppm = parts per million
Y = yes
N = no
NM = Not Measured

TABLE 3

LABORATORY ANALYTICAL RESULTS FOR AIR SAMPLES
ARCO Station 2169
Oakland, California

SAMPLE POINT	SAMPLE DATE	TPH-G (PPMV)	BENZENE (PPMV)	TOLUENE (PPMV)	ETHYLBENZENE (PPMV)	XYLENES (PPMV)
Inf	02-Jun-94	18,000	250	150	30	89
Eff	02-Jun-94	<4	<0.15	<0.13	<0.11	<0.11
A-1	02-Jun-94	8,500	130	130	9.9	64
A-2	02-Jun-94	630	12	21	4.9	42
A-3	02-Jun-94	20	<0.15	<0.13	<0.11	<0.11
AV-1	02-Jun-94	1,400	12	12	1.8	8.5
AV-2	02-Jun-94	9,400	140	120	16	69
AV-3	02-Jun-94	30,000	350	180	27	120
AV-4	02-Jun-94	30,000	370	250	21	150
AV-5	02-Jun-94	31,000	330	220	19	130
AV-6	02-Jun-94	43,000	590	350	32	200
AV-7	02-Jun-94	17,000	230	170	16	140
ADR-1	02-Jun-94	5,400	53	61	12	100
ADR-2	02-Jun-94	530	6.8	12	2.9	22
Inf	07-Jun-94	16,000	420	430	46	170
Eff	07-Jun-94	45	0.3	1.1	0.4	3.8
Inf	16-Jun-94	830	17	19	3.0	11
Eff	16-Jun-94	<2.3	<0.019	<0.016	<0.014	<.014
Inf	22-Jun-94	1,100	24	29	1.9	7.2
Eff	22-Jun-94	4.9	0.078	0.25	0.048	0.28
Inf	30-Jun-94	230	3.8	6.9	1.5	7.4
Eff	30-Jun-94	75	0.78	3.7	0.90	4.8

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
PPMV = Parts Per Million by Volume.
Inf = Influent Sample.
Eff = Effluent Sample.

TABLE 4

CURRENT GROUNDWATER MONITORING DATA
ARCO Station 2169
Oakland, California

WELL NO.	SAMPLE DATE	ANALYZED DATE*	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-D (PPB)	WELL ELEV. (FT)	STATIC WATER ELEV. (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
A-1	04-May-94	06-May-94	1300	250	61	27	110	2100**	14.16	3.48	0.00	10.68
A-2	04-May-94	06-May-94	<50	<0.5	<0.5	<0.5	<0.5	N/A	14.55	3.30	0.00	11.25
A-3	04-May-94	06-May-94	<50	<0.5	<0.5	<0.5	<0.5	N/A	15.75	3.76	0.00	11.99
A-4	04-May-94	06-May-94	<50	<0.5	<0.5	<0.5	<0.5	N/A	15.25	4.17	0.00	11.08
A-5	04-May-94	06-May-94	13000	1000	1500	490	2000	N/A	13.51	3.51	0.00	10.00
A-6	04-May-94	06-May-94	260	<0.5	<1.5	<1.5	<0.5	N/A	13.51	3.44	0.00	10.07
AR-1	04-May-94	06-May 94	36000	3400	360	1400	3700	7200**	15.61	3.78	0.00	11.83
AR-2	04-May-94	06-May-94	<50	<0.5	<0.5	<0.5	<0.5	<50	15.28	3.40	0.00	11.88
ADR-1	04-May-94***	06-May-94	2100	490	93	68	140	60**	13.95	3.45	0.00	10.50
ADR-2	04-May-94***	06-May-94	36000	4600	2600	930	4500	4200**	14.64	3.33	0.00	11.31

Current Regional Water Quality Control Board Maximum Contaminant Levels:
Benzene 1.0 ppb Xylenes 1750. ppb Ethylbenzene 680. ppb

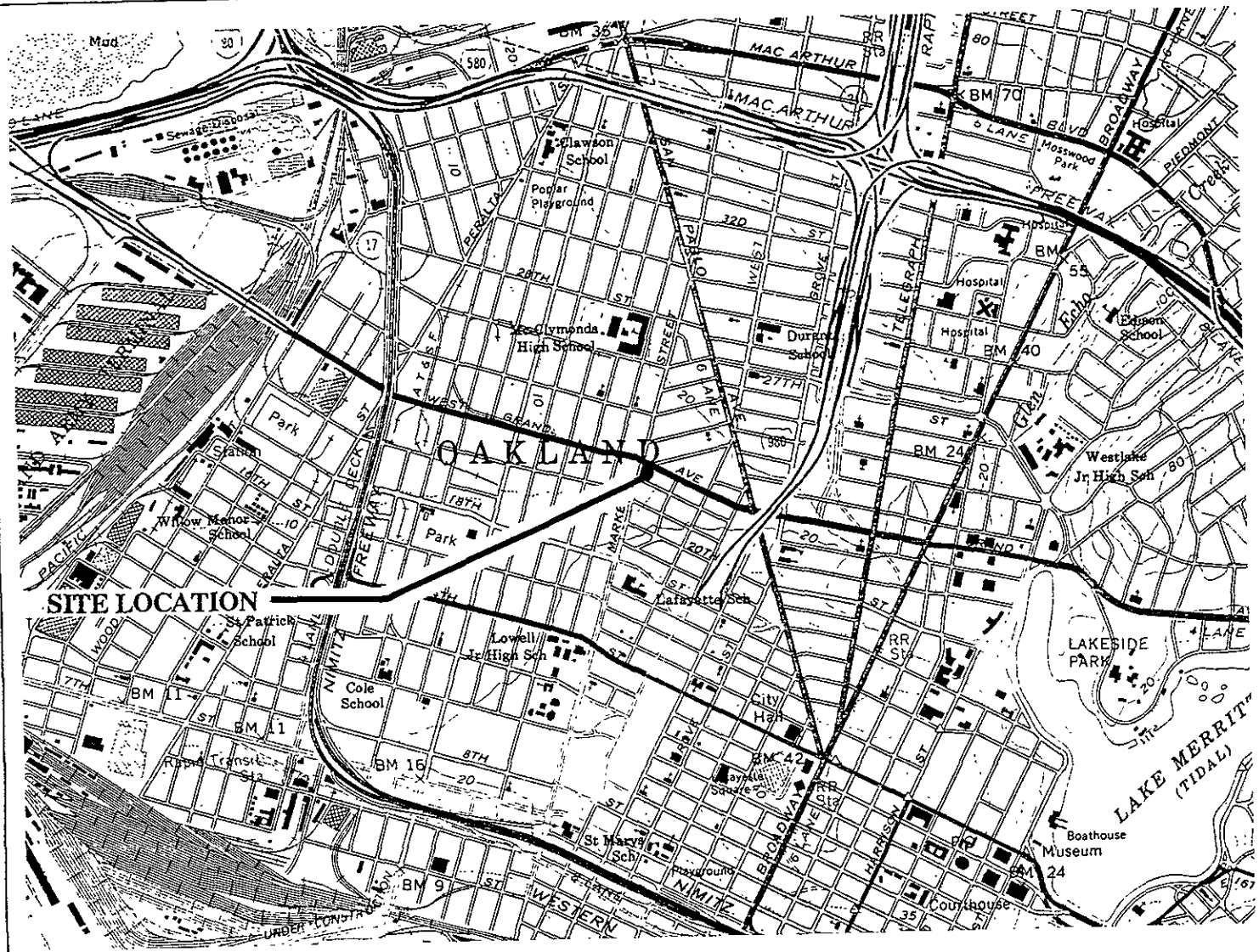
Current Cal EPA Action Levels: Toluene 100.0 ppb

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
TPH-D = Total Petroleum Hydrocarbons calculated as Diesel.
PPB = Parts Per Billion.

* = Analyses for TPH-D were performed between May 17 and 23, 1994.
** = Reported as a non-diesel mix.
*** = Samples for TPH-D analyses were collected on May 13, 1994.

Notes: 1. All data shown as <x are reported as ND (none detected).
2. Water level elevations referenced to Mean Sea Level (MSL).

FIGURES



Base Map: USGS Topographic Map

PLATE

1

GeoStrategies Inc.

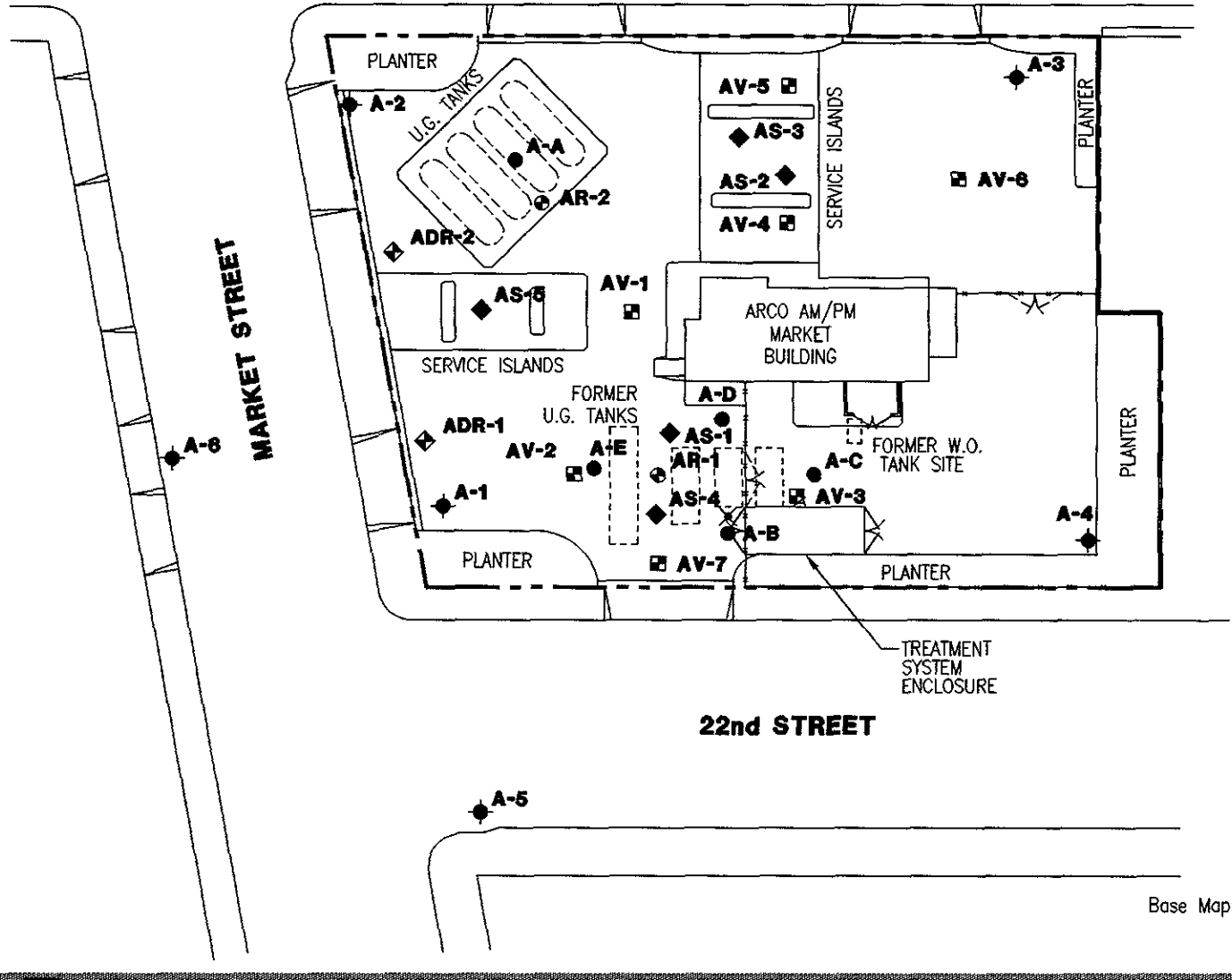
VICINITY MAP
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

JOB NUMBER
4927

REVIEWED BY

DATE
8/94

REVISED DATE



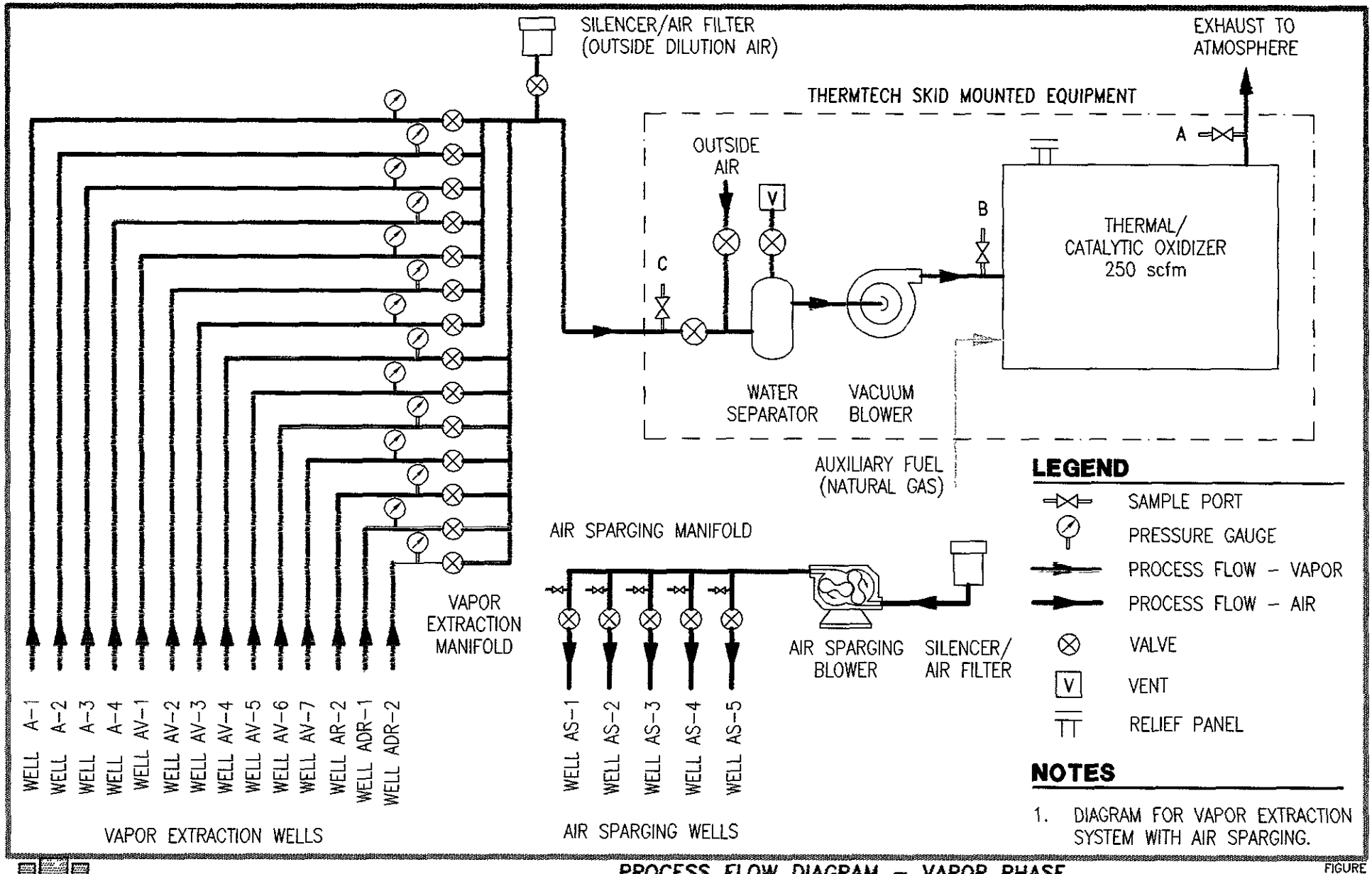
Base Map: ARCO Tank & Line Replacement Site Plan dated 4-22-91 and Field Observations performed on 2-2-93.

GeoStrategies Inc.

SITE PLAN
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

FIGURE
2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4927770-19		8/94	

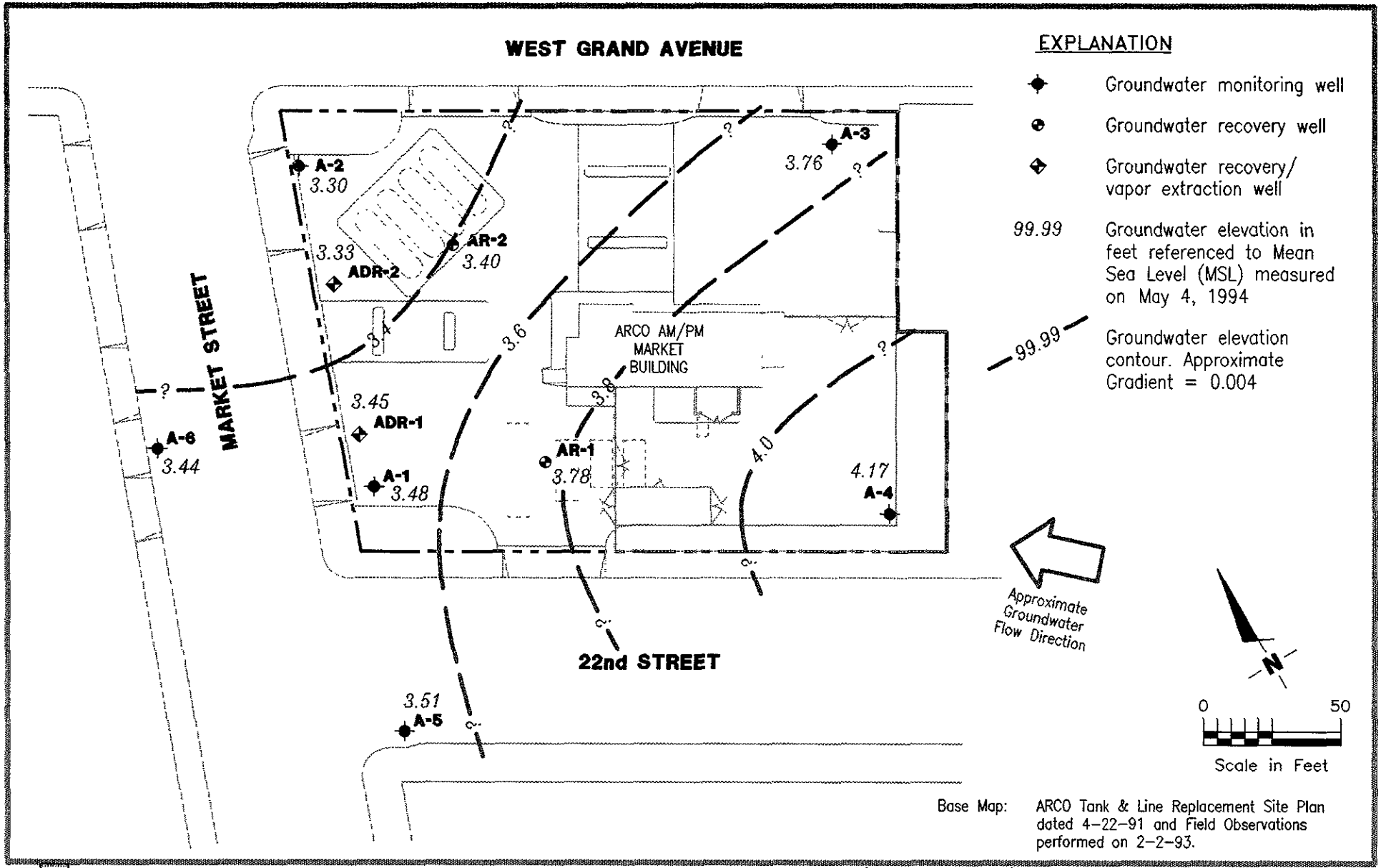


GeoStrategies Inc.

PROCESS FLOW DIAGRAM - VAPOR PHASE
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

FIGURE
3

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4927770-19		8/94	



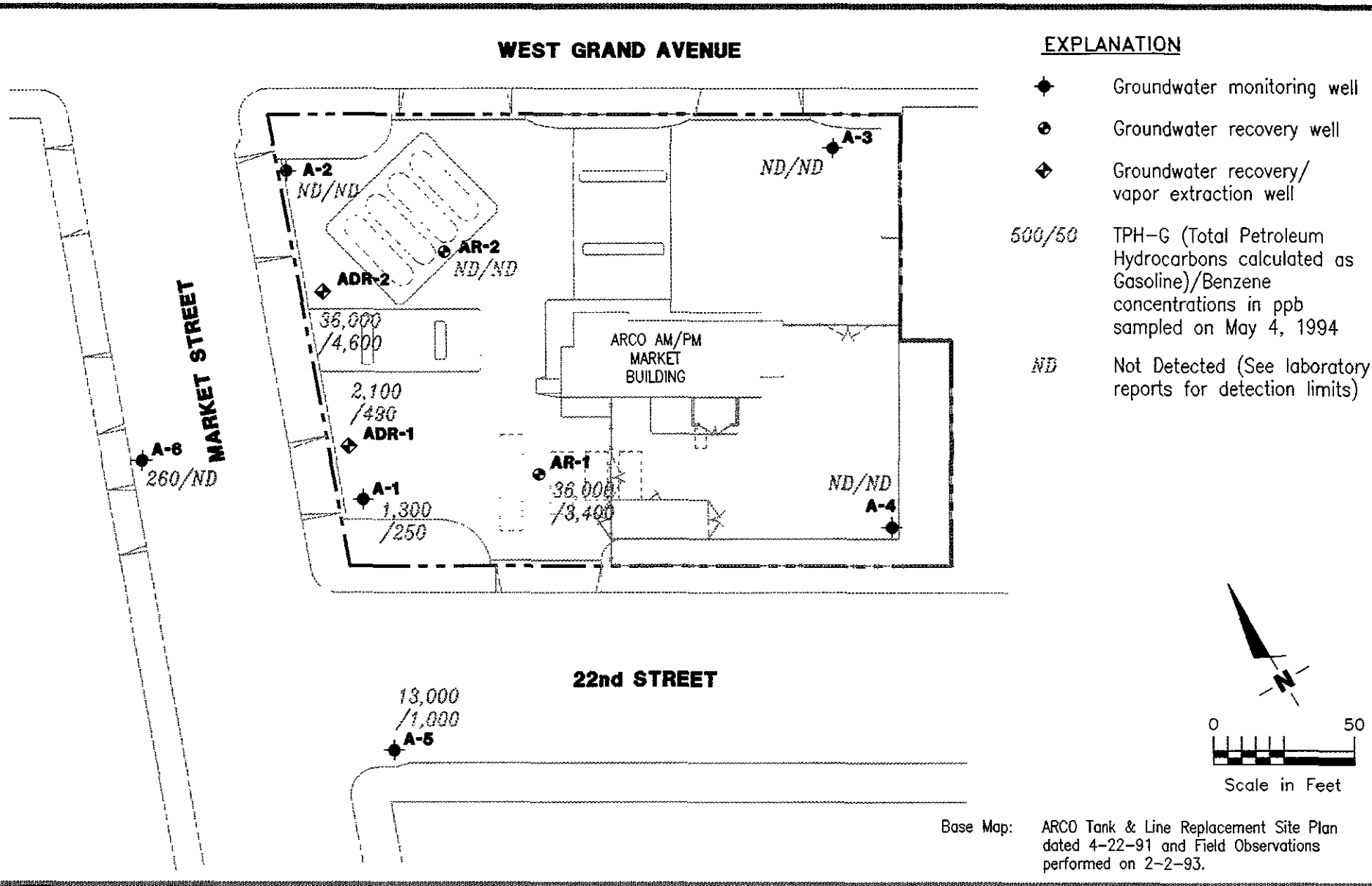
Base Map: ARCO Tank & Line Replacement Site Plan dated 4-22-91 and Field Observations performed on 2-2-93.

GeoStrategies Inc.

POTENTIOMETRIC MAP (MAY 4, 1994)
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

FIGURE
4

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4927770-19		8/94	



Base Map: ARCO Tank & Line Replacement Site Plan dated 4-22-91 and Field Observations performed on 2-2-93.

GeoStrategies Inc.

TPH-G/BENZENE CONCENTRATION MAP
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

FIGURE
5

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4927770-19		8/94	

APPENDIX A

HISTORICAL DATA TABLES

TABLE 1A

HISTORICAL WATER-LEVEL DATA
ARCO Station 2169
Oakland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (ft)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
03-Apr-92	A-1	10.35	14.75	4.40	0.00
20-May-92	A-1	11.66	14.75	3.09	0.00
16-Jun-92	A-1	11.95	14.75	2.80	0.00
17-Jul-92	A-1	12.23	14.75	2.52	0.00
07-Aug-92	A-1	12.16	14.75	2.59	0.00
22-Sep-92	A-1	12.42	14.75	2.33	0.00
13-Oct-92	A-1	12.47	14.75	2.28	0.00
23-Nov-92	A-1	11.83	14.75	2.92	0.00
16-Dec-92	A-1	11.03	14.75	3.72	0.00
28-Jan-93	A-1	9.08	14.75	5.67	0.00
22-Feb-93	A-1	9.46	14.75	5.29	0.00
25-Mar-93	A-1	10.02	14.75	4.73	0.00
15-Apr-93	A-1	10.50	14.75	4.25	0.00
22-May-93	A-1	11.33	14.75	3.42	0.00
16-Jun-93	A-1	11.51	14.75	3.24	0.00
27-Jul-93	A-1	11.91	14.75	2.84	0.00
26-Aug-93	A-1	12.11	14.75	2.64	0.00
27-Sep-93	A-1	12.21	14.75	2.54	0.00
08-Oct-93	A-1	12.21	14.75	2.54	0.00
09-Feb-94	A-1	10.09	14.16	4.07	0.00
04-May-94	A-1	10.68	14.16	3.48	0.00
03-Apr-92	A-2	10.97	15.16	4.19	0.00
20-May-92	A-2	12.17	15.16	2.99	0.00
16-Jun-92	A-2	12.43	15.16	2.73	0.00
17-Jul-92	A-2	12.64	15.16	2.52	0.00
07-Aug-92	A-2	12.75	15.16	2.41	0.00
22-Sep-92	A-2	12.88	15.16	2.28	0.00
13-Oct-92	A-2	12.92	15.16	2.24	0.00
23-Nov-92	A-2	12.18	15.16	2.98	0.00
16-Dec-92	A-2	11.52	15.16	3.64	0.00
28-Jan-93	A-2	9.73	15.16	5.43	0.00
22-Feb-93	A-2	9.28	15.16	5.88	0.00
25-Mar-93	A-2	10.57	15.16	4.59	0.00

TABLE 1A

HISTORICAL WATER-LEVEL DATA
ARCO Station 2169
Oakland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (ft)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
15-Apr-93	A-2	11.20	15.16	3.96	0.00
22-May-93	A-2	11.91	15.16	3.25	0.00
16-Jun-93	A-2	12.04	15.16	3.12	0.00
27-Jul-93	A-2	12.41	15.16	2.75	0.00
25-Aug-93	A-2	12.54	15.16	2.62	0.00
27-Sep-93	A-2	12.66	15.16	2.50	0.00
08-Oct-93	A-2	12.65	15.16	2.51	0.00
09-Feb-94	A-2	10.67	14.55	3.88	0.00
05-May-94	A-2	11.25	14.55	3.30	0.00
03-Apr-92	A-3	11.70	16.38	4.68	0.00
20-May-92	A-3	13.00	16.38	3.38	0.00
16-Jun-92	A-3	13.46	16.38	2.92	0.00
17-Jul-92	A-3	13.45	16.38	2.93	0.00
07-Aug-92	A-3	12.37	16.38	4.01	0.00
22-Sep-92	A-3	13.71	16.38	2.67	0.00
13-Oct-92	A-3	13.76	16.38	2.62	0.00
23-Nov-92	A-3	13.60	16.38	2.78	0.00
16-Dec-92	A-3	12.31	16.38	4.07	0.00
28-Jan-93	A-3	10.33	16.38	6.05	0.00
22-Feb-93	A-3	10.44	16.38	5.94	0.00
25-Mar-93	A-3	11.27	16.38	5.11	0.00
15-Apr-93	A-3	11.98	16.38	4.40	0.00
22-May-93	A-3	12.70	16.38	3.68	0.00
16-Jun-93	A-3	12.84	16.38	3.54	0.00
27-Jul-93	A-3	13.22	16.38	3.16	0.00
25-Aug-93	A-3	13.35	16.38	3.03	0.00
27-Sep-93	A-3	13.50	16.38	2.88	0.00
08-Oct-93	A-3	13.48	16.38	2.90	0.00
09-Feb-94	A-3	11.32	15.75	4.43	0.00
04-May-94	A-3	11.99	15.75	3.76	0.00
03-Apr-92	A-4	10.84	15.89	5.05	0.00
20-May-92	A-4	12.13	15.89	3.76	0.00
16-Jun-92	A-4	12.33	15.89	3.56	0.00
17-Jul-92	A-4	12.60	15.89	3.29	0.00

TABLE 1A

HISTORICAL WATER-LEVEL DATA
ARCO Station 2169
Oakland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (ft)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
07-Aug-92	A-4	12.56	15.89	3.33	0.00
22-Sep-92	A-4	12.87	15.89	3.02	0.00
13-Oct-92	A-4	12.87	15.89	3.02	0.00
23-Nov-92	A-4	12.63	15.89	3.26	0.00
16-Dec-92	A-4	11.34	15.89	4.55	0.00
28-Jan-93	A-4	9.40	15.89	6.49	0.00
22-Feb-93	A-4	9.35	15.89	6.54	0.00
25-Mar-93	A-4	10.32	15.89	5.57	0.00
15-Apr-93	A-4	11.15	15.89	4.74	0.00
22-May-93	A-4	11.84	15.89	4.05	0.00
16-Jun-93	A-4	12.01	15.89	3.88	0.00
27-Jul-93	A-4	12.33	15.89	3.56	0.00
25-Aug-93	A-4	12.48	15.89	3.41	0.00
27-Sep-93	A-4	12.60	15.89	3.29	0.00
08-Oct-93	A-4	12.57	15.89	3.32	0.00
09-Feb-94	A-4	10.01	15.25	5.24	0.00
05-May-94	A-4	11.08	15.25	4.17	0.00
11-Feb-93	A-5	9.15	14.14	4.99	0.00
25-Mar-93	A-5	9.33	14.14	4.81	0.00
15-Apr-93	A-5	10.11	14.14	4.03	0.00
22-May-93	A-5	10.71	14.14	3.43	0.00
16-Jun-93	A-5	10.84	14.14	3.30	0.00
27-Jul-93	A-5	11.22	14.14	2.92	0.00
26-Aug-93	A-5	11.44	14.14	2.70	0.00
27-Sep-93	A-5	11.51	14.14	2.63	0.00
08-Oct-93	A-5	11.68	14.14	2.46	0.00
09-Feb-94	A-5	9.44	13.51	4.07	0.00
04-May-94	A-5	10.00	13.51	3.51	0.00
11-Feb-93	A-6	9.35	14.17	4.82	0.00
25-Mar-93	A-6	Not measured			
16-Apr-93	A-6	9.36	14.17	4.81	0.00
22-May-93	A-6	10.86	14.17	3.31	0.00
16-Jun-93	A-6	10.98	14.17	3.19	0.00
27-Jul-93	A-6	Not measured			

TABLE 1A

HISTORICAL WATER-LEVEL DATA
ARCO Station 2169
Oakland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (ft)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
25-Aug-93	A-6	Not measured			
27-Sep-93	A-6	11.65	14.17	2.52	0.00
08-Oct-93	A-6	11.80	14.17	2.37	0.00
09-Feb-94	A-6	9.48	13.51	4.03	0.00
04-May-94	A-6	10.07	13.51	3.44	0.00
03-Apr-92	AR-1	11.07	15.71	4.64	0.00
20-May-92	AR-1	12.37	15.71	3.34	0.00
16-Jun-92	AR-1	12.47	15.71	3.24	0.00
17-Jul-92	AR-1	13.00	15.71	2.71	0.00
07-Aug-92	AR-1	12.87	15.71	2.84	0.00
22-Sep-92	AR-1	12.99	15.71	2.72	0.00
13-Oct-92	AR-1	13.05	15.71	2.66	0.00
23-Nov-92	AR-1	12.80	15.71	2.91	0.00
16-Dec-92	AR-1	11.49	15.71	4.22	0.00
28-Jan-93	AR-1	9.46	15.71	6.25	0.00
22-Feb-93	AR-1	10.05	15.71	5.66	0.00
25-Mar-93	AR-1	10.75	15.71	4.96	0.00
15-Apr-93	AR-1	11.26	15.71	4.45	0.00
22-May-93	AR-1	12.07	15.71	3.64	0.00
16-Jun-93	AR-1	12.21	15.71	3.50	0.00
27-Jul-93	AR-1	12.60	15.71	3.11	0.00
25-Aug-93	AR-1	12.78	15.71	2.93	0.00
27-Sep-93	AR-1	12.89	15.71	2.82	0.00
08-Oct-93	AR-1	12.84	15.71	2.87	0.00
09-Feb-94	AR-1	11.08	15.61	4.53	0.00
04-May-94	AR-1	11.83	15.61	3.78	0.00
17-Jul-92	AR-2	13.14	15.79	2.65	0.00
07-Aug-92	AR-2	13.25	15.79	2.54	0.00
22-Sep-92	AR-2	13.58	15.79	2.21	0.00
13-Oct-92	AR-2	13.65	15.79	2.14	0.00
23-Nov-92	AR-2	Not measured			
16-Dec-92	AR-2	12.16	15.79	3.63	0.00
28-Jan-93	AR-2	10.26	15.79	5.53	0.00
22-Feb-93	AR-2	10.52	15.79	5.27	0.00

TABLE 1A

HISTORICAL WATER-LEVEL DATA
ARCO Station 2169
Oakland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (ft)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
25-Mar-93	AR-2	11.18	15.79	4.61	0.00
15-Apr-93	AR-2	11.81	15.79	3.98	0.00
22-May-93	AR-2	12.46	15.79	3.33	0.00
16-Jun-93	AR-2	12.53	15.79	3.26	0.00
27-Jul-93	AR-2	12.77	15.79	3.02	0.00
26-Aug-93	AR-2	13.23	15.79	2.56	0.00
27-Sep-93	AR-2	13.16	15.79	2.63	0.00
08-Oct-93	AR-2	13.32	15.79	2.47	0.00
09-Feb-94	AR-2	11.33	15.28	3.95	0.00
04-May-94	AR-2	11.88	15.28	3.40	0.00
09-Feb-94	ADR-1	9.90	13.95	4.05	0.00
04-May-94	ADR-1	10.50	13.95	3.45	0.00
09-Feb-94	ADR-2	10.73	14.64	3.91	0.00
04-May-94	ADR-2	11.31	14.64	3.33	0.00

Notes:
1. Static water elevations referenced to Mean Sea Level (MSL).
2. Well elevations and depths-to-water were referenced to the top of the well box in 1992 and 1993. After installation of a remediation system, site wells except offsite well A-6 were resurveyed by Virgil D. Chavez, licensed land surveyor, on February 11, 1994. Starting first quarter 1994, depths-to-water have been referenced to the top of the well box using February 1994 survey data for wells A-1 through A-5, AR-1, AR-2, ADR-1 and ADR-2, and previous survey data for well A-6 (survey performed by Kier & Wright Civil Engineers & Surveyors, Inc., on February 25, 1993).
3. Well AR-2 could not be located on November 23, 1992.
4. Well A-6 was not accessible on March 25, July 27 and August 25, 1993.

TABLE 2A

HISTORICAL GROUNDWATER QUALITY DATABASE
ARCO Station 2169
Oakland, California

SAMPLE DATE	WELL NO.	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-D (PPB)
03-Apr-92	A-1	34000	6200	3900	410	3100	6100
17-Jul-92	A-1	5600	3000	500	<100	<100	N/A
13-Oct-92	A-1	5600	980	590	85	910	N/A
28-Jan-93	A-1	3700	780	360	130	460	620*
15-Apr-93	A-1	210	34	11	7.1	20	420*
26-Aug-93	A-1	2000	370	35	50	220	1500*
08-Oct-93	A-1	2600	430	65	64	99	1200*
09-Feb-94	A-1	3000	560	150	66	190	650*
04-May-94	A-1	1300	250	61	27	110	2100*
03-Apr-92	A-2	<30	<0.3	<0.3	<0.3	<0.3	<50
17-Jul-92	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
13-Oct-92	A-2	<50	0.57	<0.5	<0.5	<0.5	N/A
28-Jan-93	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
15-Apr-93	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
25-Aug-93	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
08-Oct-93	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
09-Feb-94	A-2	260**	<0.6	<0.5	<0.5	<0.5	N/A
04-May-94	A-2	<50	<0.5	<0.5	<0.5	<0.5	N/A
03-Apr-92	A-3	200	0.79	0.65	4.4	<0.3	130
17-Jul-92	A-3	<50	<0.5	<0.5	1.3	2.3	N/A
13-Oct-92	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
28-Jan-93	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
15-Apr-93	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
25-Aug-93	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
08-Oct-93	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
09-Feb-94	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
04-May-94	A-3	<50	<0.5	<0.5	<0.5	<0.5	N/A
03-Apr-92	A-4	35	<0.3	<0.3	<0.3	<0.3	85
17-Jul-92	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
13-Oct-92	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
28-Jan-93	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
15-Apr-93	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
25-Aug-93	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
08-Oct-93	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A

TABLE 2A

HISTORICAL GROUNDWATER QUALITY DATABASE
ARCO Station 2169
Oakland, California

SAMPLE DATE	WELL NO.	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-D (PPB)
09-Feb-94	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
04-May-94	A-4	<50	<0.5	<0.5	<0.5	<0.5	N/A
11-Feb-93	A-5	4900	380	640	140	970	N/A
15-Apr-93	A-5	27000	3100	4000	1100	4600	N/A
26-Aug-93	A-5	13000	1100	1400	480	1800	N/A
08-Oct-93	A-5	6800	490	620	280	980	N/A
09-Feb-94	A-5	2200	190	130	130	310	N/A
09-May-94	A-5	13000	1000	1500	490	2000	N/A
11-Feb-93	A-6	990	1.8	5.1	17	7.2	N/A
16-Apr-93	A-6	390	1.3	1.6	1.7	7.7	N/A
25-Aug-93	A-6	Not	Sampled				
08-Oct-93	A-6	220	0.73	<0.5	0.82	0.65	N/A
09-Feb-94	A-6	640	<2.9	<3.7	<2.4	<8.2	N/A
04-May-94	A-6	260	<0.5	<1.5	<1.5	<0.5	N/A
03-Apr-92	AR-1	17000	310	1400	320	3000	12000
17-Jul-92	AR-1	44000	4300	1800	1800	10000	N/A
13-Oct-92	AR-1	32000	310	730	570	3100	22000*
28-Jan-93	AR-1	15000	1200	510	510	2600	5300*
15-Apr-93	AR-1	17000	1800	360	520	1600	5400*
25-Aug-93	AR-1	2900	260	54	80	160	2800*
08-Oct-93	AR-1	3500	200	85	120	290	4100*
09-Feb-94	AR-1	26000	2900	450	920	3000	4200*
04-May-94	AR-1	36000	3400	360	1400	3700	7200*
17-Jul-92	AR-2	150	6.6	24	6.6	39	N/A
13-Oct-92	AR-2	<50	2.0	0.86	0.51	3.8	58*
28-Jan-93	AR-2	2000	570	13	<10	380	290*
15-Apr-93	AR-2	85	15	<0.5	<0.5	2.4	<50
26-Aug-93	AR-2	<50	<0.5	<0.5	<0.5	<0.5	<50
08-Oct-93	AR-2	<50	<0.5	<0.5	<0.5	<0.5	<50
09-Feb-94	AR-2	82**	<0.5	<0.5	<0.5	<0.5	<50
04-May-94	AR-2	<50	<0.5	<0.5	<0.5	<0.5	<50
09-Feb-94	ADR-1	3000	380	140	59	240	110*
04-May-94	ADR-1	2100	490	93	68	140	60*
09-Feb-94	ADR-2	83000	6300	6100	2000	11000	12000

TABLE 2A

HISTORICAL GROUNDWATER QUALITY DATABASE
ARCO Station 2169
Oakland, California

SAMPLE DATE	WELL NO.	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-D (PPB)
04-May-94	ADR-2	36000	4600	2600	930	4500	4200*

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS:
Benzene 1. ppb Xylenes 1750. ppb Ethylbenzene 680 ppb

CURRENT CAL EPA ACTION LEVELS: Toluene 100

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
TPH-D = Total Petroleum Hydrocarbons calculated as Diesel.
PPB = Parts Per Billion.
N/A = Not Analyzed.
* = Reported as a non-diesel mix.
** = Sample contains a single non-fuel component eluting in the gasoline range, and quantified as gasoline.

Notes: 1. All data shown as <x are reported as ND (not detected above the reporting limit).

APPENDIX B

BAAQMD PERMIT TO OPERATE

ENOIK

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

July 11, 1994

ARCO Products Company
c/o GeoStrategies Inc
6747 Sierra Court, Suite #G
Dublin CA 94568

JUL 15 1994

GeoStrategies Inc.

Attention: Miguel Bordallo

Application Number: 12119
Equipment Location:
889 West Grand Avenue, Oakland CA

Dear Applicant:

Attached are your Permits to Operate for the following:

S-10 Soil Vapor Extraction System consistin gof a vacuum blower not toe xceed 250 max scfm, and ancillary equipment, abated by A-1, A-2 or A-3, A-4 and A-5 arranged in series:
A-1 ThermTech Cat Vac 25 Oxidizer, Thermal Mode.
A-2 ThermTech Cat Vac 25 Oxidizer, Catalytic Mode.
A-3 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel
A-4 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel
A-5 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel

All Permits should be posted in a clearly visible and accessible place on or near the equipment to be operated, or kept available for inspection at any time.

Operation of this equipment in violation of District Regulations or any permit conditions is subject to penalty action.

In the absence of specific permit conditions to the contrary, the throughputs, fuel and material consumptions, capacities and hours of operation described in your permit application will be considered maximum allowable limits. A new permit will be required before any increase in these parameters, or change in raw material handled may be made.

Please include your permit number with any correspondence with the District. If you have any questions on this matter, please call Scottt A. Owen, Supervising Air Quality Engineer, at (415) 749-4693.

Very truly yours,

Milton Feldstein
Air Pollution Control Officer

by _____
Permit Services Division

JAS:SAO:es

939 ELLIS STREET • SAN FRANCISCO, CALIFORNIA 94109 • (415) 771-6000 • FAX (415) 928-8560

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE No. 12119

PLANT No. 9199

SOURCE No. 10

ARCO PRODUCTS COMPANY

IS HEREBY GRANTED A PERMIT TO OPERATE THE FOLLOWING EQUIPMENT:

Soil Vapor Extraction System consisting of a vacuum blower not to exceed 250 max scfm, and ancillary equipment, abated by A-1, A-2 or A-3, A-4 and A-5 arranged in series:

A-1 ThermTech Cat Vac 25 Oxidizer, Thermal Mode.
A-2 ThermTech Cat Vac 25 Oxidizer, Catalytic Mode.
A-3 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel
A-4 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel
A-5 Westates VSC-2000, 2,000 lb capacity Carbon Adsorption Vessel

LOCATED AT: 889 West Grand Avenue
Oakland, CA

CONDITIONS: [X] YES [ ] NO *(All permit conditions must be complied with at all times *)*

If YES, See Attached *Condition No.* 10803

MILTON FELDSTEIN
AIR POLLUTION CONTROL OFFICER

Date July 11, 1994

By _____
Permit Services Division

EXPIRATION DATE July 11, 1995

THIS PERMIT DOES NOT AUTHORIZE ANY VIOLATION OF THE RULES AND REGULATIONS OF THE BAAQMD OR THE HEALTH AND SAFETY CODE OF THE STATE OF CALIFORNIA. THIS PERMIT IS NOT TRANSFERABLE TO ANOTHER PERSON WITHOUT APPROVAL FROM THE DISTRICT.

* *Compliance with conditions contained in this permit does not mean that the permittee is currently in compliance with District Rules and Regulations. It is the responsibility of the permittee to have knowledge of and be in compliance with all District Rules and Regulations.*

1. Precursor Organic Compound (POC) emissions from Source S-10 shall be abated by either Abatement device A-1, Thermal Oxidizer, or A-2, Catalytic Oxidizer, or A-3, A-4, and A-5, three 2,000 pound activated carbon vessels arranged in series, during all periods of operation.
2. The POC destruction efficiency of Abatement devices A-1, and A-2 shall be maintained at a minimum of 98.5% by weight for inlet POC concentrations greater than or equal to 3000 ppmv (measured as C1). For inlet concentrations below 3000 ppmv and greater than or equal to 1000 ppmv, a minimum destruction efficiency of 97% shall be maintained. For inlet concentrations below 1000 ppmv, a minimum destruction efficiency of 90% shall be maintained. The minimum destruction efficiency of 90% shall be waived if total emissions from the operation are less than 1 pound per day POC and benzene emissions are less than 0.02 pounds per day.
3. A-1, and A-2 shall be properly maintained and kept in good operating condition at all times. While operating in the Thermal Mode, the minimum operating temperature of A-1 shall not be less than 1400 degrees Fahrenheit. While operating in the Catalytic Mode, the minimum operating temperature of A-2 shall not be less than 600 degrees Fahrenheit. At no time shall Benzene emissions to the atmosphere exceed 0.093 #/day
4. To determine compliance with Condition Number 3, A-1, and A-2 shall be equipped with continuous measuring and temperature recording instrumentation consisting of at least 1 temperature probe in A-1, A-2 and at least one recording device, which will continuously record temperature.
5. The measuring and recording instrumentation to be installed and the specific placement within A-1, and A-2 in condition number 4, is subject to the prior approval of the Source Test Section of the District Technical Division.
6. The temperature data collected from the temperature recorder shall be maintained in a file which shall be available for District inspection for a period of at least 2 years following the date on which such data are recorded.
7. Within ten days of startup, the operator of this source, shall conduct an efficiency test to determine the weight percent reduction of Precursor Organic Compound (POC) emissions through A-1 while it is operating in the Thermal Mode. As part of this test the inlet and outlet exhaust to A-1 shall be analyzed to determine the Total POC and Benzene concentrations. These results shall be used to calculate the Benzene emission rate in pounds per day. All test results and calculations shall be provided to the District within 30 days after testing has occurred. All source test methods used shall be subject to the prior approval of the Source Test Section of the District Technical Division.

8. Once influent concentrations fall below 3000 ppmv, the abatement device may be changed from A-1, Thermal Mode to A-2, Catalytic Mode. Such changeover shall take place only after written notification of same has been received by the District.
9. Within ten days of conversion to A-2, the Catalytic Mode of operation, the operator of this source, shall conduct a second efficiency test to determine the weight percent reduction of Precursor Organic Compound (POC) emissions through A-2 while it is operating in the Catalytic Mode. As part of this test the inlet and outlet exhaust to A-2 shall be analyzed to determine the Total POC and Benzene concentrations. These results shall be used to calculate the Benzene emission rate in pounds per day. All test results and calculations shall be provided to the District within 30 days after testing has occurred. All source test methods used shall be subject to the prior approval of the Source Test Section of the District Technical Division.
10. The operator of this source shall maintain the following records for each day of operation of the source:
    a. Hours and time of operation.
    b. Each emission test, analysis or monitoring results logged in for the day of operation they were taken.
    c. Analysis results for any catalyst plugs removed from the bed to determine remaining life of the catalyst.

    Such records shall be retained and made available for inspection by the District for two years following the date the data is recorded.
11. Once influent concentrations fall below 1000 ppmv, the abatement device may be changed from A-2, Catalytic Oxidizer to A-3, A-4, & A-5, carbon canisters arranged in series. Such changeover shall take place only after written notification of same has been received by the District. Operation of the source shall then be subject to the conditions which follow.
12. The second to last carbon bed, A-4, shall be changed out with unspent carbon upon breakthrough, defined as the detection at the outlet of the higher of the following:
    a. 10 % of the inlet stream concentration to the carbon bed.
    b. 10 ppmv (measured as C1).

    This shall be measured by a flame ionization detector (OVA-FID) or other method approved in writing by the APCO.
13. The last carbon bed, A-5, shall be changed out with unspent carbon upon detection of 10 ppmv (measured as C1) as measured with a flame ionization detector (OVA-FID) or other method approved in writing by the APCO.
14. The limits set forth in Conditions # 12 and # 13 shall apply to non-methane hydrocarbon emissions. To determine the presence of methane in the exhaust stream, a reading shall be taken with and without a carbon filter tip fitted on the OVA-FID probe. Concentrations measured with the carbon filter tip in

place shall be considered methane for the purpose of these permit conditions.

15. The operator of this source shall monitor with an OVA-FID or other method approved in writing by the APCO at the following locations:
    a. At the inlet to carbon bed A-4.
    b. At the exhaust of A-4; the inlet to carbon bed A-5.
    c. At the outlet of carbon bed A-5; the carbon bed that is last in series prior to venting to the atmosphere.
16. These monitor readings shall be recorded in a monitoring log at the time they are taken. The monitoring results shall be used to estimate the frequency of carbon change out necessary to maintain compliance with conditions number 12 and 13.
17. To maintain compliance with conditions number 12 and 13, the monitoring shall be conducted on a daily basis. The operator of this source may propose for District review, based on actual measurements taken at the site during operation of the source, that the monitoring schedule be changed based on the decline in organic emissions and/or the demonstrated breakthrough rates of the carbon vessels. Written approval by the District must be received by the applicant prior to a change to the monitoring schedule.
18. The operator of this source shall maintain the following information in a District approved log for each month of operation of the source:
    a. The hours of operation.
    b. Each monitor reading or analysis result for the day of operation they are taken.
    c. The number of carbon beds removed from service.

    Any exceedance of conditions number 2, 3, 12, and/or 13 shall be reported to the Permits Division with the log as well as the corrective action taken. In addition, an exceedance of conditions number 2, 3, 12, and/or 13 shall be submitted to the District Enforcement Section at the time it occurs. The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well at the time of occurrence.
19. The operator shall maintain a file containing all measurements, records and other data that are required to be collected pursuant to the various provisions of this conditional Authority to Construct/Permit to Operate. All measurements, records and data required to be maintained by the applicant shall be retained for at least two years following the date the data is recorded.
20. Upon final completion of the remediation project, the operator of Source S-10 shall notify the district within two weeks of decommissioning the operation.

APPENDIX C

G-R SYSTEM MONITORING DATA SHEETS, LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS FOR AIR SAMPLES

1042

THERM-TECH SYSTEM MONITORING DATA SHEET

GSI

Client: Arco #2169
Site: 889 Corvano' Carlano' CA
Job#: 9927
Field Technician: F. Cline
Date: 6-2-94

EXTRACTION WELL #	A-4	AR-2	A-3	AV-1	AV-6	A-2	AV-
Time							
Pipe ID @ Influent (in)	2"						
Differential Pressure (in WC)	0"	0.019	0"	0"	0"	0"	0"
Vacuum (in WC)	9"	11"	14"	8"	12	10"	11"
Temperature (F)	67.0	70.6	68.0	67.0	68.6	67.0	68.2
HC Concentration (ppm)	0	10	90	3000	13650	560	1364
Sampled (Y/N) / ID#	No	No	Y A-3	Y AV-1	Y AV-6	Y A-2	Y AV-

INFLUENT		
Time	12:33	14:30
Pipe ID @ Influent (in)	3"	3"
Differential Pressure (in WC)	0.10	0.12
Vacuum (in WC)	15"	36"
Temperature (F)	68.5	68.0
HC Concentration (ppm)	>13840	>13840
Sampled (Y/N) / ID#	Yes Inf	No
DILUTION AIR		
Pipe ID @ Dilution Intake (in)	3"	3"
Differential Pressure (in WC)	0.90	0.78
Temperature (F)	84°F	84°F
TOTAL INTAKE		
Differential Pressure (in WC)	0.38	0.38
Total Pressure (in WC)	2.8	3.8
EFFLUENT		
Stack Dimensions (inXin)	12x12" 12:40	12x12
Differential Pressure (in WC)	0.032	0.034
Temperature (F)	1362	1364
HC Concentration (ppm)	0ppm	0ppm
Sampled (Y/N) / ID#	Yes Eff	N
SYSTEM		
Hour Meter	1.68	
Electric Meter	00074	
Gas/Propane Meter	815400	
Set Point (F)	1420/ 1500	
Operating Temperature (F)	1418 -1422	1468 - 1479
High Temperature Shutoff (F)	1423 - 1428	1468 1479
Filter Pressure (in WC)	0	

STATUS

Active on Arrival (circle one): Y (N) — circled: N
Active on Departure (circle one): (Y) N — circled: Y
Restart Date
Monitoring Device (circle one): FID PID (IR) — circled: IR
Mode (circle one): (Therm) Cat — circled: Therm

Comments: SYSTEM START-UP !!

Supplies Used: 14 Bag.

1-9 20th

GSI

THERM-TECH SYSTEM MONITORING DATA SHEET

Client: Arco #2164 Job#: 9927

Site: 889 Evans Field Technician: F. Cline

Oakland. Date: 6-2-94

EXTRACTION WELL #	~~AV-5~~	~~AV-3~~	~~AV-6~~	~~AV-7~~	~~AV-8~~		
Time	AV-2	AV-4	AV-1	AV-7	A-1	AV-3	AV-2
Pipe ID @ Influent (in)	2"						
Differential Pressure (in WC)	0	0	0	0	0	0	0.02
Vacuum (in WC)	~~9"~~ 13"	~~#"~~ 9"	~~#"~~ 11"	~~8"~~ 10"	12~~11~~"	12"	12"
Temperature (F)	67.4	68.0	67.2	68.2	70.0	67.0	73.8
HC Concentration (ppm)	460	13680	7000	13690	12300	13670	13412
Sampled (Y/N) / ID#	Y AV-2	Y AV-4	Y AV-1	Y AV-7	Y A-1	Y AV-5 (Labeled wrong)	Y AV-3
INFLUENT							
Time							
Pipe ID @ Influent (in)							
Differential Pressure (in WC)							
Vacuum (in WC)							
Temperature (F)							
HC Concentration (ppm)							
Sampled (Y/N) / ID#							
DILUTION AIR							
Pipe ID @ Dilution Intake (in)							
Differential Pressure (in WC)							
Temperature (F)							
TOTAL INTAKE							
Differential Pressure (in WC)							
Total Pressure (in WC)							
EFFLUENT							
Stack Dimensions (inXin)							
Differential Pressure (in WC)							
Temperature (F)							
HC Concentration (ppm)							
Sampled (Y/N) / ID#							
SYSTEM							
Hour Meter							
Electric Meter							
Gas/Propane Meter							
Set Point (F)							
Operating Temperature (F)							
High Temperature Shutoff (F)							
Filter Pressure (in WC)							

STATUS

Active on Arrival (circle one): Y N Monitoring Device (circle one): FID PID IR

Active on Departure (circle one): Y N Mode (circle one): Therm Cat

Restart Date _____

Comments: _____

Supplies Used: _____

9927.18

THERM-TECH SYSTEM MONITORING DATA SHEET

GSI

Client: Arco 2169
Site: 889 W. Grand
Oakland CA

Job#: ~~9908.76~~
Field Technician: F Cline
Date: 6-7-94

EXTRACTION WELL #	4	R-2	3	V-1	V-6	2	V-5	DR-2	V-4	DR-1	V-7	1
Time	2"	←										2"
Pipe ID @ Influent (in)	2"	←										
Differential Pressure (in WC)							0.06	0.07	0.05	.08	0.22	.09
Vacuum (in WC)	off	off	off	off	off	off	74	75	74	73	2.4	6.8
Temperature (F)							74.3	75.0	74.0	75	75.0	73.6
HC Concentration (ppm)	0	30	10	2800	40	600	13400		14110		13860	.
Sampled (Y/N) / ID#	✓	✓	✓	✓	9?	✓		11910		14160	.	8200

INFLUENT			V-3	V-2
Time	Initial 15:18	19:00	2"	2"
Pipe ID @ Influent (in)	3"	3"	2"	2"
Differential Pressure (in WC)	.28	0.56	.07	.65
Vacuum (in WC)	33"	78"	74	~~38~~
Temperature (F)	80.4	76.4	72.6	77.0
HC Concentration (ppm)	9670	10460	2600	4100
Sampled (Y/N) / ID#		Yes Inf	.	

DILUTION AIR		
Pipe ID @ Dilution Intake (in)	3"	3"
Differential Pressure (in WC)	0.46	0.25
Temperature (F)	86°F	76°F
TOTAL INTAKE		
Differential Pressure (in WC)	~~.40~~ .90	0.38
Total Pressure (in WC)	4.0	3.5
EFFLUENT		
Stack Dimensions (inXin)	12x12	12x12
Differential Pressure (in WC)	0.030	0.03
Temperature (F)	1475°F	1475
HC Concentration (ppm)	0 ppm	0 ppm
Sampled (Y/N) / ID#	Yes Eff	No
SYSTEM		
Hour Meter	168	Meter not working
Electric Meter	01664	
Gas/Propane Meter	844500	
Set Point (F)	1420/1500	1420/1500
Operating Temperature (F)	1428	1406 – 1431
High Temperature Shutoff (F)	1407-1424	1450 ~~1466~~ 1470
Filter Pressure (in WC)	0 PSI	

STATUS

Active on Arrival (circle one): (Y) N
Active on Departure (circle one): (Y) N
Restart Date

Monitoring Device (circle one): FID PID IR
Mode (circle one): Therm Cat

Comments: Trap temp Machine kept over temping

Supplies Used: 2 Bags.

THERM-TECH SYSTEM MONITORING DATA SHEET

Client: Avco #2169 — Job#: 9927
Site: 889 W. Grand, Oakland CA — Field Technician: F. Ciz
Date: 6-14-94

EXTRACTION WELL #	4	R-2	3	V-1	V-6	2	V-5	DR-2	V-4	ER-1	V-7	1	V-3	V-8
Time	15:24													
Pipe ID @ Influent (in)	2"													
Differential Pressure (in WC)	0	.12	.025	.045	.055	.035	.06	.065	.043	.055	.245	.073	.07	.69
Vacuum (in WC) Initial Vac	0	0	0	40"	0	0	56"	57"	55"	54"	56	54	57	55
Temperature (F)	78.6	84	71.8	72.0	70.0	72.0	73.0	75.0	74.0	74.6	77.8	71.3	68.8	78
HC Concentration (ppm)	0	0	0	0	240	70	1250	5400	9000	6900	3200	3600	2400	128
Sampled (Y/N) / ID#	N													
INFLUENT Final Vac ~~116~~	0	35	20	70	74	36	76	77	77	75	78	76	78	74
Time	15:26						10:52							
Pipe ID @ Influent (in)	3"						3"							
Differential Pressure (in WC)	0.64						1.42"							
Vacuum (in WC)	60"						86"							
Temperature (F)	69.8						78.8							
HC Concentration (ppm)	3000						2000							
Sampled (Y/N) / ID#	Yes Inf						No							
DILUTION AIR														
Pipe ID @ Dilution Intake (in)	3"						3"							
Differential Pressure (in WC)	0.13						0.0							
Temperature (F)	86°F						86°F							
TOTAL INTAKE														
Differential Pressure (in WC)	0.34						0.34							
Total Pressure (in WC)	3.3						3.0							
EFFLUENT														
Stack Dimensions (inXin)	12x12"						12x12"							
Differential Pressure (in WC)	0.038						0.037							
Temperature (F)	1400						1395							
HC Concentration (ppm)	~~20ppm~~ 0ppm						0ppm							
Sampled (Y/N) / ID#	Yes EFF						No							
SYSTEM														
Hour Meter	195.43						196.80							
Electric Meter	04492						044936							
Gas/Propane Meter							885700							
Set Point (F)	1420-1500						~~1405~~ ~~1430~~ 1420/1500							
Operating Temperature (F)	1407-1430						~~1415~~ 1432 1405-1430							
High Temperature Shutoff (F)	1406-1421						1413 1432							
Filter Pressure (in WC)	0						0							

STATUS

Active on Arrival (circle one): (Y) N
Active on Departure (circle one): (Y) N
Monitoring Device (circle one): (PID) PID IR
Mode (circle one): (Therm) Cat
Restart Date
Comments: Blower @ 250°F
Shut dilution Air ~~open~~ open main valve ¼
close recirculation ¼
Supplies Used: ~~opened up~~ A-4 A-3 AR-2 AV-1 AV-6 A-2
to pull Dilution Air from field.

Recvalve 3/8 | 3/8
CO 3/8 | 3/8
Blower rpm 2359

GSI

THERM-TECH SYSTEM MONITORING DATA SHEET

Client: AVCO #2169 — Job#: 9927
Site: 889 W. Grand, Oakland CA — Field Technician: PC
Date: 6-22-94

EXTRACTION WELL #	A-4	AV-2	A-3	AV-1	AV-6	AC	AV-5	AV-2	AV-4	AV-1	AV-7	A-1
Time	1531	—	—	—	—	—	—	—	—	—	—	—
Pipe ID @ Influent (in)	3"	—	—	—	—	—	—	—	—	—	—	—
Differential Pressure (in WC)	.005	.03	.085	.078	.032	.030	.072	.065	.076	.075	.15	1.25
Vacuum (in WC)	2"	82"	12"	80"	26"	6"	82"	83"	83"	85"	82"	81
Temperature (F)	80.8	86.6	73.6	74.6	74.8	76.0	71.2	75.8	73.8	74.4	71.9	59.2
HC Concentration (ppm)	0	20	0	0	70	260	600	2700	9400	2550	1800	18000
Sampled (Y/N) / ID#	N	—	—	—	—	—	—	—	—	—	—	—

INFLUENT	OAC	OAC	OAC	OAC	OAC	O	O	O	O	O	AV-3	O
Time	15:34						16:34				A-1	AV-2
Pipe ID @ Influent (in)	3"						3"				2"	2"
Differential Pressure (in WC)	1.25"						1.30"				.05	.50
Vacuum (in WC)	87"						80"				82"	82"
Temperature (F)	75°F						75°F				67.4	73.6
HC Concentration (ppm)	1720 ppm						1500 ppm				1100	750
Sampled (Y/N) / ID#	Yes Inf						NO				N	—
											O	O
DILUTION AIR												
Pipe ID @ Dilution Intake (in)	3"						3"					
Differential Pressure (in WC)	0"						0"					
Temperature (F)	96"						96°					
TOTAL INTAKE												
DP ~~Flowmeter (acfm)~~	0.30"						0.32"					
Pressure (in WC)	3.0"						3.0"					
EFFLUENT												
Stack Dimensioins (inXin)	12x12						12x12					
Differential Pressure (in WC)	.032						—					
Pressure (in WC)	Within						open					
Temperature (F)	1420						1420					
HC Concentration (ppm)	0ppm						0ppm					
Sampled (Y/N) / ID#	Yes Eff						N/C					
SYSTEM												
Hour Meter	340.67											
Electric Meter	06505											
Gas/Propane Meter	8161											
Set Point (F)	1420 / 1500											
Operating Temperature (F)	1432 - 1407											
High Temperature Shutoff (F)	1421 404											
Filter Pressure (in WC)	10"											

STATUS

Active on Arrival (circle one): (Y) N
Active on Departure (circle one): (Y) N
Monitoring Device (circle one): FID PID IR
Mode (circle one): Therm Cat
Restart Date
Comments: Adjust well which didn't affect ~~Values~~. System

Supplies Used:

GSI

THERM-TECH SYSTEM MONITORING DATA SHEET

Client: ARCO #2169
Site: 889 West Grand Ave.
Oakland, CA

Job#: 7927
Field Technician: FCL-e
Date: 6-30-94

INFLUENT		
Time	16:28	~~17:30~~ 18:00
Pipe ID @ Influent (in)	3	3
Differential Pressure (in WC)	1.0	1.0
Vacuum (in WC)	23	20
Temperature (F)	78.6	78.6
HC Concentration (ppm)	~~1800~~ 1700	1800
Sampled (Y/N) / ID#	Yes Inf	NO
DILUTION AIR		
Pipe ID @ Dilution Intake (in)	3	3
Differential Pressure (in WC)	0"	0"
Temperature (F)	86.5°F	86.5
TOTAL INTAKE		
Differential Pressure (in WC)	0.26 @ 4" pipe	0.26
Total Pressure (in WC)	2.5	2.5
EFFLUENT		
Stack Dimensions (inXin)	12 x 12	12 x 12
Differential Pressure (in WC)	.038	
Temperature (F)	1410	~~44~~
HC Concentration (ppm)	0	0
Sampled (Y/N) / ID#	Yes	N
SYSTEM		
Hour Meter	446.92	
Electric Meter	08544	
Gas/Propane Meter		
Set Point (F)	1420/1500	
Operating Temperature (F)	1413 - 1428	
High Temperature Shutoff (F)	1407 - 1416	
Filter Pressure (in WC)	2psi	

STATUS

Active on Arrival (circle one): (Y) N
Active on Departure (circle one): (Y) N
Restart Date _____

Monitoring Device (circle one): (FID) PID (IR)
Mode (circle one): (Therm) Cat

Comments: Blower 255°F

193 cfm

Supplies Used:

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080 Pike Lane
Suite C
Concord, CA 94520
(510) 685-7852
(800) 544-3422 Inside CA
FAX (510) 825-0720

Client Number: GTR01ARC01
Arco Representative: Mike Whelan
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0037

June 6, 1994

Joel Coffman
Gettler Ryan, Inc.
6747 Sierra Court, Suite G
Dublin, CA 94568

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 06/02/94, under task order number 2169-94-4B.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services, Laboratory certification number E1075, to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Rashmi Shah
Laboratory Director

Client Number: GTR01ARC01
Arco Representative: Mike Whelan
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0037

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		01	02	E060294-1	
Client Identification		INF	EFF	METHOD BLANK	
Date Sampled		06/02/94	06/02/94	--	
Date Analyzed		06/02/94	06/02/94	06/02/94	
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	250	<0.15	<0.15	
Toluene	0.13	150	<0.13	<0.13	
Ethylbenzene	0.11	30	<0.11	<0.11	
Xylene, total	0.11	89	<0.11	<0.11	
TPH as Gasoline	4	18000	<4	<4	
Detection Limit Multiplier		10	1	1	
BFB Surrogate, % recovery		121	125	101	

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: GTR01ARC01
Arco Representative: Mike Whelan
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0037

QC Sample and Sample Duplicate Results

Matrix: Air

Analyte	Sample ID	Date of Analysis	Units	Sample Results	Sample Duplicate Results	RPD, %	Control Limits
Modified EPA 8020:							
Benzene	C4060037-01	06/02/94	ug/L	818	816	0.2	53
Toluene	C4060037-01	06/02/94	ug/L	578	583	0.9	39
Ethylbenzene	C4060037-01	06/02/94	ug/L	127	128	0.8	33
Xylene, total	C4060037-01	06/02/94	ug/L	386	388	0.5	41

ARCO Products Company
Division of AtlanticRichfieldCompany

Chain of Custody

Task Order No. 2169 - 94 - 413

ARCO Facility no. 2169	City (Facility) - Oakland	Project manager (Consultant) Joel Coffman	Laboratory name GTEL
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other Air	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 Gas	TPH Modified 8015 Gas / Diesel	Oil and Grease 413.1 / 413.2	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals / VOA / Semi VOA	CAM Metals EPA 6010/7000 TTLC / STLC	Lead Org./DHS / Lead EPA 7420/7421
Inf	01	1			X			6-2-94	12:33		X				24 hr. Rush					
Eff	02	1			X			↓	12:40		X					C4060037				
A-3	01	1			X			6-2-94			X									
AV-1	02	1																		
AV-6	03	1																		
A-2	04	1																		
AV-5	05	1													2 day Rush.					
AVC-2	06	1												C4060038						
AV-4	07	1																		
AVC 1	08	1																		
AV 7	09	1																BOX 6		
A 1	10	1																		
AV 5	11	1															C4060037-24 HR			
AV-2	12	1															C4060038-48 HR			

Method of shipment: GT

Special detection Limit/reporting: Report Results in PPM

Special QA/QC: Standard

Remarks: 687 # 9927.19

Lab number

Turnaround time
- Priority Rush 1 Business Day
- Rush 2 Business Days
- Expedited 5 Business Days
- Standard 10 Business Days

Condition of sample

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler	6-2-94	14:07	Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory: Jeorge Madrid	6/2/94	16:10

Kevin Molander 6-2-94 6:10

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169 - 94 - 4B

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name GTEL
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other Air	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 Gas	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	
Inf		1			X			6-2-94	12:33		X				24 hr			Rush			
Eff		1			X			"	12:40		X										
A-3		1			X			6-2-94			X										
AV-1		1																			
AV-6		1																			
A-2		1																			
AV-5		1													2 day	Rush					
ADR-2		1																			
AV-4		1																			
ADR-1		1																			
AV-7		1																			
-1		1																			
AV-5		1																			
AV-2		1																			

Special detection Limit/reporting: Report Results in PPMV

Special QA/QC: Standard

Remarks: GSI # 9927.19

Lab number

Turnaround time

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-2-94 Time 14:07	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory George Vadrys	Date 6/2/94 Time 16:10

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

APPC-3292 (2-91)

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Western Region
4080 Pike Lane, Suite C
Concord, CA 94520
(510) 685-7852
(800) 544-3422 Inside CA
FAX (510) 825-0720

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

June 8, 1994

Joel Coffman
Gettler Ryan, Inc.
6747 Sierra Ct., Ste. G
Dublin, CA 94568

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 06/02/94, under task order number 2169-94-4B.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services, Laboratory certification number E1075, to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Rashmi Shah
Laboratory Director

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		01[b]	02	03	04
Client Identification		A-3	AV-1	AV-6	A-2
Date Sampled		06/02/94	06/02/94	06/02/94	06/02/94
Date Analyzed		06/03/94	06/04/94	06/03/94	06/03/94
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	<0.15	12	590	12
Toluene	0.13	<0.13	12	350	21
Ethylbenzene	0.11	<0.11	1.8	32	4.9
Xylene, total	0.11	<0.11	8.5	200	42
TPH as Gasoline	0.37	20	1400	43000	630
Detection Limit Multiplier		1	5	50	5
BFB surrogate, % recovery		116	115	117	115

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

b. Bag partlally depleted upon receipt.

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		05	06	07	08
Client Identification		AV-5	ADR-2	AV-4	ADR-1
Date Sampled		06/02/94	06/02/94	06/02/94	06/02/94
Date Analyzed		06/04/94	06/04/94	06/04/94	06/03/94
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	330	6.8	370	53
Toluene	0.13	220	12	250	61
Ethylbenzene	0.11	19	2.9	21	12
Xylene, total	0.11	130	22	150	100
TPH as Gasoline	0.37	31000	530	30000	5400
Detection Limit Multiplier		50	2	50	25
BFB surrogate, % recovery		115	118	103	112

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		09	10	11[b]	12
Client Identification		AV-7	A-1	AV-53	AV-2
Date Sampled		06/02/94	06/02/94	06/02/94	06/02/94
Date Analyzed		06/04/94	06/04/94	06/04/94	06/04/94
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	230	130	350	140
Toluene	0.13	170	130	180	120
Ethylbenzene	0.11	16	9.9	27	16
Xylene, total	0.11	140	64	120	69
TPH as Gasoline	0.37	17000	8500	30000	9400
Detection Limit Multiplier		25	25	50	25
BFB surrogate, % recovery		107	115	117	95

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

b. Client sample ID according to label on bag.

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		E06039401			
Client Identification		METHOD BLANK			
Date Sampled		--			
Date Analyzed		06/03/94			
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	<0.15			
Toluene	0.13	<0.13			
Ethylbenzene	0.11	<0.11			
Xylene, total	0.11	<0.11			
TPH as Gasoline	0.37	<4			
Detection Limit Multiplier		1			
BFB surrogate, % recovery		112			

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: GTR01ARC01
Facility Number: 2169
Project ID: Oakland
Work Order Number: C4-06-0038

QC Sample and Sample Duplicate Results

Matrix: Air

Analyte	Sample ID	Date of Analysis	Units	Sample Results	Sample Duplicate Results	RPD, %	Control Limits
Modified EPA 8020:							
Benzene	C4060038-02	06/03/94	ug/L	38.3	37.6	1.8	53
Toluene	C4060038-02	06/03/94	ug/L	44.7	42.6	4.8	39
Ethylbenzene	C4060038-02	06/03/94	ug/L	8.07	7.97	1.2	33
Xylene, total	C4060038-02	06/03/94	ug/L	37.4	39.0	1.1	41

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-4 [illegible]

Chain of Custody

ARCO Facility no.	2169
City (Facility)	Oakland
Project manager (Consultant)	Joel Coffman
ARCO engineer	Mike Whelan
Telephone no. (ARCO)	
Telephone no. (Consultant)	510-551-7555
Fax no. (Consultant)	551-7555
Consultant name	GSI
Address (Consultant)	6742 Sierra Ct Suite G Dublin CA
Laboratory name	GTEL
Contract number	
Method of shipment	Cour
Special detection Limit/reporting	Report Results in PPMV
Special QA/QC	[illegible]
Remarks	GSI # 4927.19
Lab number	

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Air)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH (Gas) EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
Inf	01	1			x			6-2-94	12:33		x											
Eff	02	1			x			↓	12:40		x											
A-3	01	1			x			6-2-94			x											
AV-1	02	1																				
AV-6	03	1																				
A-2	04	1																				
AV-5	05	1																				
ADC-2	06	1																				
AV-4	07	1																				
ADC-1	08	1																				
AV 1	09	1																				
A-1	10	1																				
AV 5	11	1																				
AV-2	12	1																				

Handwritten annotations across table: 24 hr Rush → C4060037; C4060038; 2 day Rush; BOX 6; C4060037-24 HR; C4060038-48 HR

Condition of sample:

Temperature received:

Relinquished by sampler	Date	Time	Received by
[signature]	6-2-94	14:07	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory
			George Madrigal — Date 6/2/94 — Time 16:10
			Kevin Molander — 6-2-94 — 6:10

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

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Western Region
4080 Pike Lane, Suite C
Concord, CA 94520
(510) 685-7852
(800) 544-3422 Inside CA
FAX (510) 825-0720

Client Number: ARC01
Facility Number: 2169
Arco Representative: Mike Whelan
Project ID: Arco Oakland
Work Order Number: C4-06-0116

June 9, 1994

Joel Coffman
Gettler-Ryan, Inc.
6747 Sierra Court, Suite G
Dublin, CA 94568

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 06/08/94, under task order number 2169-94-4.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

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If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Rashmi Shah
Laboratory Director

Client Number: ARC01
Facility Number: 2169
Arco Representative: Mike Whelan
Project ID: Arco Oakland
Work Order Number: C4-06-0116

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8020/8015[a]

GTEL Sample Number		01	02	E060894-1	
Client Identification		INF	EFF	METHOD BLANK	
Date Sampled		06/07/94	06/07/94	--	
Date Analyzed		06/08/94	06/08/94	06/08/94	
Analyte	Detection Limit, ppm-v	Concentration, ppm-v			
Benzene	0.15	420	0.3	<0.15	
Toluene	0.13	430	1.1	<0.13	
Ethylbenzene	0.11	46	0.4	<0.11	
Xylene, total	0.11	170	3.8	<0.11	
TPH as Gasoline	4	16000	45	<4	
Detection Limit Multiplier		10	1	1	
BFB surrogate, % recovery		117	114	120	

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: ARC01
Facility Number: 2169
Arco Representative: Mike Whelan
Project ID: Arco Oakland
Work Order Number: C4-06-0116

QC Sample and Sample Duplicate Results

Matrix: Air

Analyte	Sample ID	Date of Analysis	Units	Sample Results	Sample Duplicate Results	RPD, %	Control Limits
Modified EPA 8020:							
Benzene	C4060116-1	06/08/94	ug/L	1360	1260	7.6	53
Toluene	C4060116-1	06/08/94	ug/L	1620	1500	7.7	39
Ethylbenzene	C4060116-1	06/08/94	ug/L	201	185	8.3	33
Xylene, total	C4060116-1	06/08/94	ug/L	771	711	8.3	41

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-4

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name CTEL
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510 551-7444	Fax no. (Consultant) 510-551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
2nd	01	1			+			6-7-93	18:48		X									
BH	02	1			+			6-7-93	18:43		X									

Method of shipment: GSI

Special detection Limit/reporting: Reporting in ppmv

Special QA/QC: Standard

Remarks: GSI # 9927.19

Lab number: C4060116

Turnaround time

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-8-94 Time 14:18	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory Ken Molander	Date 6-8-94 Time 2:20

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

APPC-3292 (2-91)

INITIAL BY: RCJ

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. 2164-94-4B

Chain of Custody

ARCO Facility no.	2164
City (Facility)	Oakland
Project manager (Consultant)	Joel Coffman
ARCO engineer	Mike Whelan
Telephone no. (ARCO)	
Telephone no. (Consultant)	510-551-7555
Fax no. (Consultant)	551 7555
Consultant name	GSI
Address (Consultant)	6747 Sierra Ct Suite G Dublin CA

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Air)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH (Gas) EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
Inf	01	1			x			6-2-94	12:33		x				24 hr Rush							
Eff	02	1			x			↓	12:40		x											
															C4060037							
A-3	01	1			x			6-2-94			x											
AV-1	02	1																				
AV-6	03	1																				
A-2	04	1																				
AV-5	05	1												C4060038	2 day Rush							
ADC-2	06	1																				
AV-4	07	1																				
ARC 1	08	1																				
AV 7	09	1																	BOX 6			
1	10	1																				
AV-5	11	1															C 4060037-24 HR						
AV-2	12	1			↓			↓			↓						C4060038-48 HR						

Laboratory name: GTEL

Contract number:

Method of shipment: GTEL

Special detection Limit/reporting: Report results in PPMV

Special QA/QC: Standard

Remarks: GSI # 9977.19

Lab number:

Turnaround time:
- Priority Rush 1 Business Day ☑
- Rush 2 Business Days ☑
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample:

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler: [signature]	6-2-94	14:07	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory: George Madrid	6/2/94	16:10
			Kevin Molander	6-2-94	6:10

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

APPC-3292 (2-91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-4

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name GTEL
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510 551-7444	Fax no. (Consultant) 510-551-7888
Consultant name GSI		Address (Consultant) 6747 Sierra Ct Suite G Dublin CA	Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
2nL		1			+			6-7-93	18:45		X											
BH		1			+			6-7-93	18:43		X											

Method of shipment: GSI

Special detection Limit/reporting: Report in ppmv

Special QA/QC: Standard

Remarks: GSI # 9927.19

Lab number:

Turnaround time

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

Condition of sample:

Temperature received:

	Date	Time	
Relinquished by sampler	6-8-94	14:18	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: Kevin Molander — Date: 6-9-94 — Time: 2:20

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco 2169

Enclosed are the results from 2 air samples received at Sequoia Analytical on June 16,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4FA1301	Air, Inf.	6/16/94	Calderon Inert Gases EPA 5030/8015 Mod./8020
4FA1302	Air, Eff.	6/16/94	EPA 5030/8015 Mod./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

Todd Olive
Project Manager

Sequoia Analytical

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Gettler Ryan/Geostrategies	Client Project ID:	Arco 2169	Sampled:	Jun 16, 1994
6747 Sierra Court, Suite J	Sample Matrix:	Air	Received:	Jun 16, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported:	Jun 20, 1994
Attention: Joel Coffman	First Sample #:	4FA1301		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit ppmv	Sample I.D. 4FA1301 Inf.	Sample I.D. 4FA1302 Eff.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	2.3	830	N.D.				
Benzene	0.019	17	N.D.				
Toluene	0.016	19	N.D.				
Ethyl Benzene	0.014	3.0	N.D.				
Total Xylenes	0.014	11	N.D.				
Chromatogram Pattern:		Gas + Non-Gas Mix, + < C8	--				

Quality Control Data

Report Limit Multiplication Factor:	50	1.0
Date Analyzed:	6/17/94	6/17/94
Instrument Identification:	GCHP-17	GCHP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	117	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

Todd Olive
Project Manager

Please Note:

A molecular weight of 65 was used to calculate ppmv for Purgeable Hydrocarbons.

Sequoia Analytical

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Gettler Ryan/Geostrategies	Client Project ID:	Arco 2169	Sampled: Jun 16, 1994
6747 Sierra Court, Suite J	Sample Descript:	Air,	Received: Jun 16, 1994
Dublin, CA 94568			
Attention: Joel Coffman	First Sample #:	4FA1301	Reported: Jun 20, 1994

CALDERON INERT GASES

Sample Number	Sample Description	Inert Gases, % O2	N2	CO2	CH4
4FA1301	Inf.	16	-	1.0	-
Detection Limits:		**0.10**	**0.0050**	**0.15**	**0.0050**

SEQUOIA ANALYTICAL ELAP #1271

Todd Olive
Project Manager

Sequoia Analytical

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 2169
Matrix: Liquid
QC Sample Group: 4FA1301

Reported: Jun 20, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4F88711	4F88711	4F88711	4F88711
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/17/94	6/17/94	6/17/94	6/17/94
Instrument I.D.#:	GCHP-17	GCHP-17	GCHP-17	GCHP-17
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	98	100	99	100
Matrix Spike Duplicate % Recovery:	95	97	95	97
Relative % Difference:	3.1	3.0	4.1	3.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

Sequoia Analytical

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 2169
Matrix: Liquid
QC Sample Group: 4FA1302

Reported: Jun 20, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4F88710	4F88710	4F88710	4F88710
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/17/94	6/17/94	6/17/94	6/17/94
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	100	110	110	110
Matrix Spike Duplicate % Recovery:	110	110	110	110
Relative % Difference:	9.5	0.0	0.0	0.0

LCS Batch#:

Date Prepared:
Date Analyzed:
Instrument I.D.#:

LCS % Recovery:

% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 2169
Matrix: Liquid
QC Sample Group: 4FA1301

Reported: Jun 20, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	C02	O2
Method:	-	-
Analyst:	K.Lee	K.Lee
Date Analyzed:	6/17/94	6/17/94
Sample #:	4F84101	4F84101
Sample Concentration:	1.0	16
Sample Duplicate Concentration:	1.0	16
% RPD:	0.0	0.0
Control Limits:	0-30	0-30

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

SEQUOIA ANALYTICAL ELAP #1271

Todd Olive
Project Manager

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-5

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number 07-073

Method of shipment: GSI

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other Air	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas. ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	CO_2 & HCO_3
Inf		1			+			6-16-94	15:26		X			01A							X
RFI		1			+			6-16-94	15:20		+			02A							

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: GSI # 9427.70

Lab number: 9406A13

Turnaround time

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-16-94 Time 19:45	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date 6-16-94 (EMS) Time 19:45

6-16-94

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

APPC-3292 (2-91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-5

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Wilson	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number 07-073

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	O_2 & CO_2	
T-1		1			+			6-16-94	15:26		2										X	
FB1		1			2			6-16-94	15:26		2											

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: GSI # 9927.70

Lab number:

Turnaround time:
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☑
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-19-94 Time 19:45	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date 6-19-94 Time 19:45

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

ARCO-3292 (2-91)

Sequoia Analytical

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco, 2169-94-5

Enclosed are the results from 2 air samples received at Sequoia Analytical on June 22,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4FD3001	Air,, Inf.	6/22/94	Calderon Intert Gases EPA 5030/8015 Mod./8020
4FD3002	Air, Eff.	6/22/94	EPA 5030/8015 Mod./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

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 93 (415) 364-9600 FAX (415) 364-9233
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819 Striker Avenue, Suite 8, Sacramento, CA 95834 (916) 921-9600 FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco, 2169-94-5	Sampled:	Jun 22, 1994
6747 Sierra Court, Suite J	Sample Matrix:	Air	Received:	Jun 22, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported:	Jun 24, 1994
Attention: Joel Coffman	First Sample #:	4FD3001		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit ppmv	Sample I.D. 4FD3001 Inf.	Sample I.D. 4FD3002 Eff.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	2.3	1,100	4.9				
Benzene	0.019	24	0.078				
Toluene	0.016	29	0.25				
Ethyl Benzene	0.014	1.9	0.048				
Total Xylenes	0.014	7.2	0.28				
Chromatogram Pattern:		Gas & Non-Gas Mix < C8	Gas				

Quality Control Data

Report Limit Multiplication Factor:	50	1.0
Date Analyzed:	6/22/94	6/22/94
Instrument Identification:	GCHP-2	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	124	97

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:

A molecular weight of 65 was used to calculate ppmv for Purgeable Hydrocarbons.

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco, 2169-94-5	Sampled: Jun 22, 1994
6747 Sierra Court, Suite J	Sample Descript:	Air,	Received: Jun 22, 1994
Dublin, CA 94568			
Attention: Joel Coffman	First Sample #:	4FD3001	Reported: Jun 24, 1994

CALDERON INERT GASES

Sample Number	Sample Description	Inert Gases, % O2	Inert Gases, % CO2
4FD3001	Inf.	18	0.74

Detection Limits:	**0.10**	**0.15**

SEQUOIA ANALYTICAL ELAP #1271

Todd Olive
Project Manager

Sequoia Analytical

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco, 2169-94-5
Matrix: Liquid
QC Sample Group: 4FD3001
Reported: Jun 24, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Vincent	R. Vincent	R. Vincent	R. Vincent
MS/MSD Batch#:	4F38001	4F38001	4F38001	4F38001
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/22/94	6/22/94	6/22/94	6/22/94
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	100	110	100	103
Matrix Spike Duplicate % Recovery:	110	120	100	103
Relative % Difference:	9.5	8.7	0.0	0.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco, 2169-94-5
Matrix: Liquid
QC Sample Group: 4FD3002

Reported: Jun 24, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Vincent	R. Vincent	R. Vincent	R. Vincent
MS/MSD Batch#:	4FB8001	4FB8001	4FB8001	4FB8001
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	6/22/94	6/22/94	6/22/94	6/22/94
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	91	94	93	93
Matrix Spike Duplicate % Recovery:	93	96	94	93
Relative % Difference:	2.2	2.1	1.1	0.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco, 2169-94-5
Matrix: Liquid
QC Sample Group: 4FD3001

Reported: Jun 24, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Oxygen	Carbon Dioxide
Method:	-	-
Analyst:	K.Lee	K.Lee
Date Analyzed:	6/23/94	6/23/94
Sample #:	4F104301	4F104301
Sample Concentration:	18	0.74
Sample Duplicate Concentration:	18	0.73
% RPD:	0.0	1.4
Control Limits:	0-30	0-30

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

SEQUOIA ANALYTICAL ELAP #1271

Todd Olive
Project Manager

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 2169-94-5

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 510-551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Ste 6 Dublin CA		Contract number 07-073

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Air)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	EPA 9040
Inf		1			X			6-22-94	15:10		X					9406	D30		-01		X
Eff		1			X				15:00		X								-02		

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: GSI # 9927.70

Lab number:

Turnaround time

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

Method of shipment: GSI

Condition of sample		Temperature received:	
Relinquished by sampler	Date 6-22-94 Time 18:00	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date 6/22/94 Time 18:00

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

APPC-3292 (2-91)

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA .,3, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco 2169-94-4

Enclosed are the results from 2 air samples received at Sequoia Analytical on July 1,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4F02201	Air, Inf.	6/30/94	EPA 5030/8015 Mod./8020
4F02202	Air, Eff.	6/30/94	EPA 5030/8015 Mod./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

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco 2169-94-4	Sampled: Jun 30, 1994
6747 Sierra Court, Suite J	Sample Matrix:	Air	Received: Jul 1, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Jul 5, 1994
Attention: Joel Coffman	First Sample #:	4F02201	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit ppmv	Sample I.D. 4F02201 Inf.	Sample I.D. 4F02202 Eff.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	2.3	230	75				
Benzene	0.019	3.8	0.78				
Toluene	0.016	6.9	3.7				
Ethyl Benzene	0.014	1.5	0.90				
Total Xylenes	0.014	7.4	4.8				
Chromatogram Pattern:		Gas & Non-Gas Mix, + <C 8	Gas				

Quality Control Data

Report Limit Multiplication Factor:	50	1.0
Date Analyzed:	7/1/94	7/1/94
Instrument Identification:	GCHP-20	GCHP-20
Surrogate Recovery, %: (QC Limits = 70-130%)	104	125

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

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:

A molecular weight of 65 was used to calculate ppmv for Purgeable Hydrocarbons.

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 2169-94-4
Matrix: Liquid
QC Sample Group: 4G02201 - 02
Reported: Jul 5, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4FF3001	4FF3001	4FF3001	4FF3001
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	7/1/94	7/1/94	7/1/94	7/1/94
Instrument I.D.#:	GCHP-20	GCHP-20	GCHP-20	GCHP-20
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	97	97	98	97
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	3.0	3.0	2.0	3.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

4F02201.GET <2>

ARCO Products Company — Division of Atlantic Richfield Company

Chain of Custody

Task Order No. 2169-94-4

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 551-7555	Fax no. (Consultant) 551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number 07-073

Method of shipment: GSI

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Water	Other	Preservation: Ice	Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
TW1	01A	1		X				6-30-94	16:30		X									
TW2	02A	1		X					16:25		X		1							

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: GSI # 9927.7C

Lab number: 9407022

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-1-94 Time 12:30	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory Dan	Date 7/1/94 Time 12:50

Turnaround time

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

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

APPC-3292 (2-91)

ARCO Products Company

Division of AtlanticRichfieldCompany

Chain of Custody

Task Order No. 2169-94-5

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 510-551-7888
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number 07-C73

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	EPA 8021
Inf		1			X			6-22-94	15:10		X										X
Eff		1			X				15:00		X										

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: GSI # 927.70

Lab number:

Turnaround time

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 6-22-94 Time 18:00	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date 6/22/94 Time 18:00

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

APPC-3292 (2-91)

APPENDIX D

IWM GROUNDWATER SAMPLING REPORT

I NTEGRATED
W ASTESTREAM
M ANAGEMENT, INC.

June 3, 1994

Ms. Barbara Sieminski
Geostrategies
6747 Sierra Court, Suite G
Dublin, CA 94568

Dear Ms. Sieminski:

Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. A-2169 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on May 4, 1994.

Sampling was carried out in accordance with the protocols described in the "Request for Bid for Quarterly Sampling at ARCO Facilities in Northern California".

Please call us if you have any questions.

Sincerely,
Integrated Wastestream Management

Tom DeLon
Project Manager

Walter H. Howe
Registered Geologist

REGISTERED GEOLOGIST
WALTER H. HOWE
No. 730
Exp. 6/94
STATE OF CALIFORNIA

950 AMES AVENUE MILPITAS, CA. 95035 (408) 942-8955

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

Summary of Ground Water Sample Analyses for ARCO Facility A-2169, Oakland, California

WELL NUMBER	A-1	A-2	A-3	A-4	A-5	A-6	AR-1	AR-2	ADR-1	ADR-2
DATE SAMPLED	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94
DEPTH TO WATER	10.68	11.25	11.99	11.08	10.00	10.07	11.83	11.88	10.50	11.31
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHg	1,300	ND	ND	ND	13,000	260	36,000	ND	2,100	36,000
BTEX										
BENZENE	250	ND	ND	ND	1,000	ND	3,400	ND	490	4,600
TOLUENE	61	ND	ND	ND	1,500	<1.5	360	ND	93	2,600
ETHLYBENZENE	27	ND	ND	ND	490	<1.5	1,400	ND	68	930
XYLENES	110	ND	ND	ND	2,000	ND	3,700	ND	140	4,500
TPHd										
DATE SAMPLED	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/4/94	5/13/94	5/4/94	5/13/94
DIESEL	2,100	NA	NA	NA	NA	NA	7,200	ND	60	4,200

FOOTNOTES:

Concentrations reported in ug/L (ppb).

TPHg = Total Purgeable Petroleum Hydrocarbons (USEPA Method 8015 Modified)

BTEX Distinction (USEPA Method 8020)

PCE = *Tetrachloroethene (USEPA Method 8010)*

* = Well inaccessible

** = Not sampled per consultant request.

DCE = cis-1, 2-Dichloroethene (USEPA Method 8010)

TCE = Trichloroethene (USEAP Method 8010)

ND = Not Detected.

NA = Not applicable.

FP = Floating product.

FIELD REPORT

Depth To Water / Floating Product Survey

NEW TD's Taken 5-4-94

Site Arrival Time: 630

Site Departure Time: 1235

Weather Conditions: Cloudy cold

DTW: Well Box or Well Casing (circle one)

Project No.:

Location: 889 West Grand av. OAK

Date: May 4, 1994

Client / Station#: Arco 2169

Field Technician: Vince / Cisco

Day of Week: Wednesday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y=YES, N=NO)	COMMENTS	MATERIALS
7	A-1	OK	yes	OK	ⓝK	ⓝK	24.48	10.68	10.68	N/A	N/A	N	3"	2x2 grading
4	A-2	OK	yes	OK	ⓝK	ⓝK	25.26	11.25-	11.25-	N/A	N/A	N	3"	2x2 grading
1	A-3	OK	yes	OK	ⓝK	ⓔK	28.88	11.99	11.99	N/A	N/A	N	3"	2x2 grading
2	A-4	OK	yes	OK	ⓝK	ⓝK	28.41	11.08+	11.08+	N/A	N/A	N	3" H2O in MAN hole	2x2 grading
6	A-5	OK	yes	OK	OK	OK	30.30	10.00-	10.00-	N/A	N/A	N	2" Street well / H2O in well box	Christy
5	A-6	OK	yes	OK	OK	OK	27.70	10.07	10.07	N/A	N/A	N	2" street well	Christy
9	AR-1	OK	yes	OK	ⓝK	ⓝK	28.0	11.83	11.83	N/A	N/A	N	6" H2O in MAnhole	2x2 grading
3	AR-2	OK	yes	OK	ⓝK	ⓝK	29.08	11.88	11.88	N/A	N/A	N	4" No bolts	2x2 circular grading
8	ADR-1	OK	yes	OK	ⓝK	ⓝK	21.90	10.50+	10.50+	N/A	N/A	N	4"	circular grading
10	ADR-2	OK	yes	OK	ⓝK	ⓝK	~~26.0~~	11.31-	11.31-	N/A	N/A	N	4" no bolts	circular grading
					ADR	-2 =	26.3							

ⓝK LOCK NOT NEEDED
ⓔK EX CAP " "

PAGE 2 OF 5 DATE: 5-4-94 CLIENT/STATION #: Arco 2169 ADDRESS: 889 West Grand, OAK

WELL ID: A-3 TD 28.88 - DTW 11.99 x 0.38 (Gal./Linear Ft.) x 3 (Casing Volume) = 19.25 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 926 END (2400 HR) 931
DATE SAMPLED: 5-4-94 TIME (2400 HR): 925 DTW: 12.1

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
927	4	7.62	0.75	68.0	CLEAR
928	10	7.48	0.75	69.2	CLEAR
930	15	7.42	0.75	68.6	CLEAR
931	20	7.39	0.75	68.5	CLEAR

Total purge: 20
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: AR-2 (AR-2) TD 29.08 - DTW 11.88 x 0.66 (Gal./Linear Ft.) x 3 (Casing Volume) = 34.05 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 952 END (2400 HR) 1003
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1013 DTW: 12

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
954	5	7.62	0.72	70.9	CLEAR
958	20	7.57	0.81	69.4	CLEAR
1000	27	7.40	0.80	69.0	CLEAR
1003	35	7.30	0.81	69.0	CLEAR

Total purge: 35
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: 2 AMBERS

WELL ID: A-2 TD 25.26 DTW 11.25 x 0.38 (Gal./Linear Ft.) x 3 (Casing Volume) = 15.97 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1022 END (2400 HR) 1027
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1030 DTW: 11.3

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1024	4	7.19	0.83	72.3	CLEAR
1025	9	7.14	0.83	72.2	CLEAR
1026	12	7.13	0.81	72.1	CLEAR
1027	16	7.10	0.81	72.0	CLEAR

Total purge: 16
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-6 TD 27.70 - DTW 10.07 x 0.17 (Gal./Linear Ft.) x 3 (Casing Volume) = 8.99 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1048 END (2400 HR) 1055
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1102 DTW: 11.7

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1049	1.5	7.06	0.89	75.4	CLEAR
1050	5	7.03	0.88	73.6	CLEAR
1055	9	7.08	0.90	73.3	CLEAR

Total purge: 9
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: FRANCISCO ABUNGAL SIGNATURE: Francisco Abungal

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

 DATE: 5-4-94 CLIENT/STATION #: Δ 2169 ADDRESS: 889 West Grand av., Oak.

WELL ID: ADR-2 TD 31.31 (DTW) - DTW 26.3 (TD) X 0.66 Gal. Linear Ft. X 3 Casing Volume = 29.68 Calculated Purge

DATE PURGED: 5-4-94 START (2400 HR): 1116 END (2400 HR) 1124

DATE SAMPLED: 5-4-94 TIME (2400 HR): 11.36 DTW: 20.9

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1117	5	7.34	0.98	72.6	CLEAR
1120	10	7.05	0.98	72.2	CLEAR
1124	12	7.03	0.97	72.2	CLEAR

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS: 2 AMBERS WELL PUMPED DRY AT 12 GALLONS.

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

PRINT NAME: FRANCISCO Albarnyar SIGNATURE: Francisco Albarnyar

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

PAGE 4 OF 5 DATE: 5-4-94 CLIENT/STATION #: Arco 2169 ADDRESS: 889 W. Grand Ave OAK

WELL ID: A-4 TD 28.41 - DTW 11.08 x 0.38 (Gal. / Linear Ft.) x 3 (Casing Volume) = 19.74 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1005 END (2400 HR): 1012
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1015 DTW: 14

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1006	3	7.50	0.67	68.0	clear
1008	7	7.31	0.65	67.3	clear
1010	14	7.28	0.65	67.2	clear
1012	20	7.26	0.65	67.2	clear

Total purge: 20
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-5 TD 30.30 - DTW 10.00 x 0.17 (Gal. / Linear Ft.) x 3 (Casing Volume) = 10.35 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1034 END (2400 HR): 1038
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1041 DTW: 11

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1035	2	7.46	0.81	72.0	clear
1036	5	7.39	0.78	69.2	clear
1037	8	7.37	0.79	68.6	clear
1038	12	7.35	0.78	68.3	

Total purge: 12
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-1 TD 24.18 DTW 10.68 x 0.38 (Gal. / Linear Ft.) x 3 (Casing Volume) = 15.73 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1050 END (2400 HR): 1056
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1059 DTW: 11

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1051	2	7.20	0.86	71.9	clear
1053	8	7.10	0.92	69.8	clear
1055	12	6.95	0.89	69.4	clear
1056	16	6.94	0.91	69.0	clear

Total purge: 16
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: 2 AMBERS

WELL ID: ADR-1 TD 21.90 - DTW 10.50 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) = 22.57 (Calculated Purge)

DATE PURGED: 5-4-94 START (2400 HR): 1128 END (2400 HR): 1136
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1139 DTW: 11

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1129	2	6.95	0.96	70.5	clear
1132	10	6.89	0.97	69.7	clear
1134	17	6.85	0.94	69.8	clear
1136	23	6.89	0.93	69.6	clear

Total purge: 23
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: 2 AMBERS

PRINT NAME: Vince Valdes SIGNATURE: Vince Valdes

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

 DATE: 5-4-94 CLIENT/STATION #: Arco 2169 ADDRESS: 889 W. Grand Av. OAK

WELL ID: AR-1 TD 28.0 - DTW 11.83 X 1.5 Gal. Linear Ft. X 2 Casing Volume = 48.51 Calculated Purge

DATE PURGED: 5-4-94 START (2400 HR): 1156 END (2400 HR) 1209
DATE SAMPLED: 5-4-94 TIME (2400 HR): 1212 DTW: 13

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1158	5	6.65	1.88	68.8	Clear
1200	21	6.84	1.82	68.7	Clear
1205	39	7.16	1.70	68.6	Clear
1209	54	7.21	1.73	68.3	Clear

Total purge: 54
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: 2 AMBERS

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)
DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)
DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: TD - DTW X Gal. Linear Ft. X Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)
DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: Vince Valdes SIGNATURE: Vince Valdes

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

FIELD REPORT

Depth To Water / Floating Product Survey

Site Arrival Time: 649

Site Departure Time: 810

Weather Conditions: Sunny / Clear

DTW: Well Box or Well Casing (circle one)

Project No.: _____ **Location:** 889 W. Grand OAK. **Date:** 5-31-94

Client / Station#: Arco 2169 **Field Technician:** Jince / Cisco **Day of Week:**

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y=YES, N=NO) FP=FLOATING PRODUCT	COMMENTS	MATERIALS
	AR-2	OK	Yes	OK	None	None	29.08	11.85+	11.85+	N/A	N/A	N	4"	
	ADR-2	OK	Yes	OK	None	None	26.3	11.28	11.28	N/A	N/A	N	4"	

 DATE: 5-31-94 (1300) CLIENT/STATION #: Arco 2169 ADDRESS: 889 West Grand ave. OAK

WELL ID: ADR-2 TD 26.3 - DTW 11.28 X Gal. Linear Ft. 0.66 X Casing Volume 3 = Calculated Purge 29.73

DATE PURGED: 5-31-94 START (2400 HR): 705 END (2400 HR) 714
DATE SAMPLED: 5-31-94 TIME (2400 HR): 730 DTW: 20.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
706	4	7.11	0.99	70.4	clear
709	11	7.09	0.99	70.1	clear
714	13	7.08	0.98	69.9	clear

Total purge: 13
PURGING EQUIP.: Centrifugal Pump (circled) Bailer Disp. SAMPLING EQUIP: Bailer Disp. (circled)
REMARKS: Well pumped dry at 12 and again at 13 gallons.

WELL ID: ______ TD ______ - DTW ______ X Gal. Linear Ft. ______ X Casing Volume ______ = Calculated Purge ______

DATE PURGED: ______ START (2400 HR): ______ END (2400 HR) ______
DATE SAMPLED: ______ TIME (2400 HR): ______ DTW: ______

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: ______
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: ______

WELL ID: ______ TD ______ - DTW ______ X Gal. Linear Ft. ______ X Casing Volume ______ = Calculated Purge ______

DATE PURGED: ______ START (2400 HR): ______ END (2400 HR) ______
DATE SAMPLED: ______ TIME (2400 HR): ______ DTW: ______

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: ______
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: ______

WELL ID: ______ TD ______ - DTW ______ X Gal. Linear Ft. ______ X Casing Volume ______ = Calculated Purge ______

DATE PURGED: ______ START (2400 HR): ______ END (2400 HR) ______
DATE SAMPLED: ______ TIME (2400 HR): ______ DTW: ______

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: ______
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: ______

PRINT NAME: Vince Valdes SIGNATURE: [signature]

CASING DIAMETER (inches):	2	3	4	6	8	12	Other: ______
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other: ______

 DATE: 5-31-94 CLIENT/STATION #: ARCO 2169 ADDRESS: 889 WEST GRAND AV. OAK

WELL ID: AR-2 — TD 29.08 - DTW 11.85 x Gal./Linear Ft. 0.66 x Casing Volume 3 = Calculated Purge 34.11

DATE PURGED: 5-31-94 START (2400 HR): 712 END (2400 HR) 722

DATE SAMPLED: 5-31-94 TIME (2400 HR): 741 DTW: 12

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
714	6	7.55	0.77	70.9	CLEAR
717	19	7.48	0.72	70.3	CLEAR
719	26	7.45	0.79	69.9	CLEAR
722	34	7.44	0.80	69.8	CLEAR

Total purge: 34

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

WELL ID: ____ TD - DTW x Gal./Linear Ft. x Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

WELL ID: ____ TD - DTW x Gal./Linear Ft. x Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

WELL ID: ____ TD - DTW x Gal./Linear Ft. x Casing Volume = Calculated Purge

DATE PURGED: START (2400 HR): END (2400 HR)

DATE SAMPLED: TIME (2400 HR): DTW:

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge:

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.

REMARKS:

PRINT NAME: Francisco Abungeir SIGNATURE: Francisco Abungeir

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

Columbia Analytical Services inc.

May 25, 1994

Service Request No. SJ940539

Gina Austin
Tom DeLon
IWM
950 Ames Avenue
Milpitas, CA 95035

Re: **ARCO Facility No. 2169**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on May 06, 1994. For your reference, these analyses have been assigned our service request number SJ940539.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven Green for

Keoni A. Murphy
Laboratory Manager

Annelise Gade Krayer

Annelise J. Bazar
Regional QA Coordinator

KAM/drf

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Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NR	Not Requested
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	5/13/94
		Date Analyzed:	5/17, 18/94
		Service Request:	SJ940539

TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
AR-1 (13)	SJ940539-8	50	7200 *
ADR-1 (11)	SJ940539-10	50	60 *
Method Blank	SJ940513-WMB	50	ND

* The sample contains a lower boiling point fuel hydrocarbon mixture quantitated as diesel. The chromatogram does not match the typical diesel fingerprint.

Approved By: Steven Green Date: 5/25/94.

1AMRL_DE/0415094

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility #2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	5/23/94*
		Date Analyzed:	5/23/94
		Service Request:	SJ940539

TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
A-1 (11)	SJ940539-2	50	2,100 **
Method Blank	SJ940523-WMB	50	ND

* This sample was extracted 5 days after the expiration of the maximum recommended holding time. The sample was properly stored and refrigerated. We believe that the quality of the data was not significantly affected.

** The sample contains a mixture of lower and higher boiling point fuel hydrocarbons quantitated as diesel. The chromatogram does not match the typical diesel fingerprint.

Approved By: _____ Date: 5/26/94

1AMRL_DE/0415094

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Service Request:	SJ940539

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

Sample Name:	**A-1 (11)**	**A-2 (11.3)**	**A-3 (12.1)**
Lab Code:	SJ940539-2	SJ940539-3	SJ940539-4
Date Analyzed:	5/13/94	5/12/94	5/12/94

Analyte	**MRL**			
Benzene	0.5	250	ND	ND
Toluene	0.5	61	ND	ND
Ethylbenzene	0.5	27	ND	ND
Total Xylenes	0.5	110	ND	ND
TPH as Gasoline	50	1,300	ND	ND

Approved By: _____ Date: 5/25/94

3S22/041594

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Service Request:	SJ940539

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

	Sample Name:	**A-4 (14)**	**A-5 (11)**	**A-6 (11.7)**
	Lab Code:	SJ940539-5	SJ940539-6	SJ940539-7
	Date Analyzed:	5/12/94	5/13/94	5/13/94
Analyte	**MRL**			
Benzene	0.5	ND	1,000	ND
Toluene	0.5	ND	1,500	<1.5 *
Ethylbenzene	0.5	ND	490	<1.5 *
Total Xylenes	0.5	ND	2,000	ND
TPH as Gasoline	50	ND	13,000	260

* Raised MRL due to matrix interference.

Approved By: _____ Date: 5/16/94

3S22/041594

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Service Request:	SJ940539

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

	Sample Name:	**AR-1 (13)**	**AR-2 (12)**	**ADR-1 (11)**
	Lab Code:	SJ940539-8	SJ940539-9	SJ940539-10
	Date Analyzed:	5/13/94	5/13/94	5/13/94
Analyte	**MRL**			
Benzene	0.5	3,400	ND	490
Toluene	0.5	360	ND	93
Ethylbenzene	0.5	1,400	ND	68
Total Xylenes	0.5	3,700	ND	140
TPH as Gasoline	50	36,000	ND	2,100

Approved By: Steven Green Date: 5/25/94.

3S22/041594

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Service Request:	SJ940539

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

		Sample Name:	**ADR-2 (20.9)**	**Method Blank**	**Method Blank**
		Lab Code:	SJ940539-11	SJ940512-WMB	SJ940513-WMB
		Date Analyzed:	5/13/94	5/12/94	5/13/94
Analyte	**MRL**				
Benzene	0.5		4,600	ND	ND
Toluene	0.5		2,600	ND	ND
Ethylbenzene	0.5		930	ND	ND
Total Xylenes	0.5		4,500	ND	ND
TPH as Gasoline	50		36,000	ND	ND

Approved By: Steven Green Date: 5/25/94

3S22/041594

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APPENDIX A

LABORATORY QC RESULTS

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	5/13,23/1994
		Date Analyzed:	5/17-23/94
		Service Request:	SJ940539

Surrogate Recovery Summary
TPH as Diesel
EPA Method 3510/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery p-Terphenyl
AR-1 (13)	SJ940539-8	87
ADR-1 (11)	SJ940539-10	87
MS	SJ940538-2MS	94
DMS	SJ940538-2DMS	92
Method Blank	SJ940513-WMB	89
A-1 (11)	SJ940539-2	89
Method Blank	SJ940523-WMB	103

CAS Acceptance Limits: 66-123

Approved By: S. Steven Green Date: 5/25/94

SUR1/041594

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QA/QC Report

Client:	IWM	**Date Analyzed:**	5/17/94
Project:	ARCO Facility No. 2169	**Service Request:**	SJ940539

Initial Calibration Verification (ICV) Summary
TPH as Diesel
California DHS LUFT Method
Units: ppm

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
TPH as Diesel	500	459	92	90-110

Approved By: Steven J. Green Date: 5/25/94

ICV24/041594

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	5/13/94
		Date Analyzed:	5/17/94
		Service Request:	SJ940539

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name: BATCH QC
Lab Code: SJ940538-2

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Diesel	4,000	4,000	ND	3,880	4,050	97	101	61-141	4

Approved By: _____ Date: 5/25/94

DMSIS/041594

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Date Analyzed:	5/12,13/94
		Service Request:	SJ940539

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

Sample Name	**Lab Code**	**Percent Recovery** α,α,α-Trifluorotolulene
A-1 (11)	SJ940539-2	112
A-2 (11.3)	SJ940539-3	109
A-3 (12.1)	SJ940539-4	111
A-4 (14)	SJ940539-5	113
A-5 (11)	SJ940539-6	110
A-6 (11.7)	SJ940539-7	112
AR-1 (13)	SJ940539-8	109
AR-2 (12)	SJ940539-9	111
ADR-1 (11)	SJ940539-10	110
ADR-2 (20.9)	SJ940539-11	111
A-4 (14) MS	SJ940539-5MS	114
A-4 (14) DMS	SJ940539-5DMS	116
Method Blank	SJ940512-WMB	109
Method Blank	SJ940513-WMB	107

CAS Acceptance Limits: 69-116

Approved By: Steven Green Date: 5/26/94

SUR1/041594

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Client:	IWM	**Date Analyzed:**	5/12/94
Project:	ARCO Facility No. 2169	**Service Request:**	SJ940539

Initial Calibration Verification (ICV) Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	25.2	101	85-115
Toluene	25	25.2	101	85-115
Ethylbenzene	25	25.0	100	85-115
Total Xylenes	75	76.5	102	85-115
TPH as Gasoline	250	251	100	90-110

Approved By: _____ Date: 5/25/94

ICV24/041594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/4/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/6/94
Sample Matrix:	Water	**Date Extracted:**	NA
		Date Analyzed:	5/12/94
		Service Request:	SJ940539

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

Sample Name: A-4 (14)
Lab Code: SJ940539-5

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
TPH as Gasoline	250	250	ND	256	248	102	99	67-121	3

Approved By: Steven Green Date: 5/26/94

DMSIS/041594

APPENDIX B

CHAIN OF CUSTODY

1994 Pinewood Avenue • San Jose, California 95124 • Telephone 408/427-2400 • Fax 408/427-9356

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5CC

Chain of Custody

ARCO Facility no. Arco 2169	City (Facility) Oakland	Project manager (Consultant) Tom DeLon / B. Sevmuski	Laboratory name Columbia
ARCO engineer Mike Whelan	Telephone no. (ARCO) 415 5712434	Telephone no. (Consultant) 408/9428955	Fax no. (Consultant) 408/9421499
Consultant name IWM / GSI		Address (Consultant) 950 Ames av. Milp Ca 95035	Contract number 07077

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid (HCL)	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TPHd/MOD 8015	
	FB-1	1	2		✓		✓	✓	5-4-94	641		✓	✓										
1	A-1	2	4		✓		✓	✓		1059		✓	✓									✓	
3	A-2	3	2		✓		✓	✓		1030		✓	✓										
2.1	A-3	4	2		✓		✓	✓		925		✓	✓										
1	A-4	5	2		✓		✓	✓		1015		✓	✓										
1	A-5	6	2		✓		✓	✓		1041		✓	✓										
7	A-6	7	2		✓		✓	✓		1102		✓	✓										
5	*A-R1	8	4		✓		✓	✓		1212		✓	✓									✓	
12	AR-2	9	4		✓		✓	✓		1013		✓	✓									✓	
1	ADR-1	10	4		✓		✓	✓		1139		✓	✓									✓	
9	ADR-2	11	4		✓		✓	✓		1130		✓	✓									✓	

Method of shipment: CAS courier

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on FB-1. Do not analyze TPHD for AR-2 and ADR-2 per Tom DeLon 5-6-94

Lab number: SJ94-0539

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: Vince Valdes	Date 5/6/94 Time 9:00am	Received by: Gina Austin		
Relinquished by: Gina Austin	Date 5-6-94 Time 10:20	Received by: [signature]	Date 5-6-94	Time 10:20
Relinquished by	Date Time	Received by laboratory	Date	Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

* AR-1

Columbia Analytical Services inc.

RECEIVED MAY 27 1994

May 26, 1994

Service Request No. SJ940580

Gina Austin
Tom DeLon
IWM
950 Ames Avenue
Milpitas, CA 95035

Re: **ARCO Facility No. 2169**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on May 13, 1994. For your reference, these analyses have been assigned our service request number SJ940580.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/drf

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NR	Not Requested
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	5/13/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/13/94
Sample Matrix:	Water	**Date Extracted:**	5/23/94
		Date Analyzed:	5/23/94
		Service Request:	SJ940580

TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
AR-2 (12.6)	SJ940580-1	50	ND
ADR-2 (20.2)	SJ940580-2	50	4200*
Method Blank	SJ940523-WMB	50	ND

* The sample contains a lower boiling point hydrocarbon mixture quantitated as diesel. The chromatogram does not match the typical diesel fingerprint.

Approved By: _____ Date: 5/27/94

IAMRL_DE/0415094

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/13/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/13/94
Sample Matrix:	Water	**Date Extracted:**	5/23/94
		Date Analyzed:	5/23/94
		Service Request:	SJ940580

Surrogate Recovery Summary
TPH as Diesel
EPA Method 3510/California DHS LUFT Method

Sample Name	**Lab Code**	**Percent Recovery** p-Terphenyl
AR-2 (12.6)	SJ940580-1	84
ADR-2 (20.2)	SJ940580-2	75
AR-2 (12.6) MS	SJ940580-1MS	101
AR-2 (12.6) DMS	SJ940580-1DMS	83
Method Blank	SJ940523-WMB	103

CAS Acceptance Limits: 66-123

Approved By: _____ Date: 5/27/94

SUR1/041594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Analyzed:**	5/23/94
Project:	ARCO Facility No. 2169	**Service Request:**	SJ940580

Initial Calibration Verification (ICV) Summary
TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: ppm

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
TPH as Diesel	500	449	90	90-110

Approved By: _____ Date: 5/27/94

ICV24/041594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Date Collected:**	5/13/94
Project:	ARCO Facility No. 2169	**Date Received:**	5/13/94
Sample Matrix:	Water	**Date Extracted:**	5/23/94
		Date Analyzed:	5/23/94
		Service Request:	SJ940580

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Diesel
EPA Method 3510/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name: AR-2 (12.6)
Lab Code: SJ940580-1

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Diesel	4,000	4,000	ND	4,390	4,190	110	105	61-141	5

Approved By: _____ Date: 5/27/94

DMS1S/041594

APPENDIX B

CHAIN OF CUSTODY

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5CC

Chain of Custody

ARCO Facility no. A 2169 | City (Facility) Oakland | Project manager (Consultant) Tom De Lon | Laboratory name Columbia

ARCO engineer Mike Wheland | Telephone no. (ARCO) 415/571 2434 | Telephone no. (Consultant) 408/942 8955 | Fax no. (Consultant) 408 942 1499 | Contract number 07077

Consultant name IWM / GSI | Address (Consultant) 950 Ames ave Milp Ca 95035

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TPH/Diesel 8015
6 AR-2	1	2		✓		✓		5-13-94	741												✓
2 ADR-2	2	2		✓		✓		" "	730												✓

Method of shipment: CASI Courier

Special detection Limit/reporting

Special QA/QC

Remarks: Resample

Lab number: SJ94-0580

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: Vince Valdes	Date 5-13	Time 1502	Received by [signature] 5-13-94 1502		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)