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ENVIRONMENTAL
PROGRAM

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Date April 21, 1995
Project 0805-129.01

To:

Mr. Roel Meregillano
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harborbay Parkway, Suite 250
Alameda, California 94502-6577

We are enclosing:

Copies	Description
1	Fourth quarter 1994 groundwater monitoring and remediation system performance evaluation report, interim soil-vapor extraction and air-sparge systems, ARCO service station 2169, Oakland, California

For your:	X	Use	Sent by:		Regular Mail
		Approval			Standard Air
		Review			Courier
		Information		X	Other: Certified Mail

Comments:
The enclosed groundwater monitoring and performance evaluation report is being sent to you per the request of ARCO Products Company.

David Larsen
Project Coordinator

cc: Kevin Graves, RWQCB - SFBR
Michael Whelan - ARCO Products Company
David Larsen, EMCON
File

ARCO Products Company
2000 Alameda de las Pulgas
Mailing Address: Box 5811
San Mateo, California 94402
Telephone 415 571 2400

Date: March 28, 1995

Re: ARCO Station # 2169 • 889 West Grand Avenue • Oakland, CA
Fourth Quarter 1994 Groundwater Monitoring and Remediation System Performance Evaluation Report

" I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached proposal or report are true and correct."

Submitted by:

Michael R. Whelan

Michael R. Whelan
Environmental Engineer

EMCON

EMCON
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

March 20, 1995
Project 0805-129.01

Mr. Michael Whelan
ARCO Products Company
2155 South Bascom Avenue, Suite 202
Campbell, California 95008

Re: Fourth quarter 1994 groundwater monitoring results and remediation system performance evaluation report, interim SVE and AS remediation systems, ARCO service station 2169, 889 West Grand Avenue, Oakland, California

Dear Mr. Whelan:

This letter presents the results of the fourth quarter 1994 groundwater monitoring program at ARCO Products Company (ARCO) service station 2169, 889 West Grand Avenue, Oakland, California (Figure 1). Operation and performance data for the interim soil-vapor extraction (SVE) and air-sparge (AS) remediation systems at the site are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations. Pertinent site features, including existing on-site monitoring and vapor extraction wells, are shown in Figure 2.

BACKGROUND

In May 1991, GeoStrategies, Inc. (GSI), conducted a limited site assessment, which included drilling five exploratory soil borings, A-A through A-E, adjacent to the underground storage tank (UST) complex at this site.

Between January and April 1992, four USTs containing gasoline and diesel fuel, and associated product lines were removed and replaced. In March 1992, GSI installed four groundwater monitoring wells, A-1 through A-4 , and one recovery well, AR-1. In June 1992, GSI installed three vapor extraction wells, AV-1, AV-2, and AV-3, and a groundwater extraction well, AR-2, then conducted an SVE pilot test to evaluate the feasibility of SVE as a soil remedial alternative. In July 1992, GSI conducted an aquifer pumping and recovery test to evaluate the feasibility of groundwater extraction as a groundwater remediation alternative.

In February 1993, GSI installed two off-site groundwater monitoring wells, A-5 and A-6. In September 1993, GSI installed three AS wells, AS-1, AS-2 and AS-3, two additional vapor extraction wells, AV-4 and AV-5, and two dual groundwater/vapor extraction wells, ADR-1 and ADR-2. Subsequently, in the same month, GSI conducted SVE and

AS pilot tests. Between December 1993 and January 1994, GSI installed two additional vapor extraction wells, AV-6 and AV-7, and completed construction of an interim remediation system. In June 1994, GSI initiated operation of the interim remediation systems. In October 1994, ARCO transferred the site from GSI to EMCON.

MONITORING PROGRAM FIELD PROCEDURES AND RESULTS

The fourth quarter 1994 groundwater monitoring event was performed by Integrated Wastestream Management (IWM) on November 16, 1994. Field work performed by IWM during this quarter included (1) measuring depths to groundwater and subjectively analyzing groundwater for the presence of floating product in wells A-1 through A-6, AR-1, AR-2, ADR-1, and ADR-2, (2) purging and subsequently sampling groundwater monitoring wells A-1 through A-6, AR-1, AR-2, ADR-1, and ADR-2 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. Floating product was observed in wells ADR-1 (sheen) and ADR-2 (0.09 foot) on November 16, 1994, and were not sampled during fourth quarter 1994. The results of IWM's field work were transmitted to EMCON in a report dated December 9, 1994. These data are presented in Appendix A.

ANALYTICAL PROCEDURES

Groundwater samples collected during fourth quarter 1994 monitoring were analyzed for total petroleum hydrocarbons as gasoline (TPHG) and benzene, toluene, ethylbenzene, and total xylenes (BTEX). The samples were prepared for analysis by U.S. Environmental Protection Agency (USEPA) method 5030 (purge and trap). The samples were analyzed for TPHG by the methods accepted by the Department of Toxic Substances Control, California Environmental Protection Agency (Cal-EPA), and referenced in the *Leaking Underground Fuel Tank* (LUFT) *Field Manual* (State Water Resources Control Board, October 1989). Samples were analyzed for BTEX by USEPA method 8020 as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA, SW-846, November 1986, 3rd Edition). Additional groundwater samples collected from wells A-1, AR-1, AR-2, and ADR-1 were analyzed for total petroleum hydrocarbons as diesel (TPHD) by USEPA method 3510 and the LUFT method. These methods are recommended for samples from petroleum-hydrocarbon-impacted sites in the *Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites* (August 10, 1990).

MONITORING PROGRAM RESULTS

Results of the fourth quarter 1994 groundwater monitoring event are summarized in Table 1 and illustrated in Figure 3. Historical groundwater elevation data, including

top-of-casing elevations, depth-to-water measurements, calculated groundwater elevations, floating-product thickness measurements, and groundwater flow direction and gradient data, are summarized in Table 2. Table 3 summarizes historical laboratory data for TPHG, BTEX, and TPHD analyses. Copies of the analytical results and chain-of-custody documentation for fourth quarter 1994 are included in Appendix B.

MONITORING PROGRAM EVALUATION

Groundwater elevation data collected on November 16, 1994, indicate that groundwater beneath the site flows northwest at an approximate hydraulic gradient of 0.005 foot per foot. Figure 3 illustrates groundwater contours and analytical data for fourth quarter 1994.

Groundwater samples collected from wells A-2, A-3, and A-4 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples from well A-6 contained 250 parts per billion (ppb) TPHG, but did not contain detectable concentrations of BTEX. Groundwater samples collected from well AR-2 contained 0.8 ppb benzene, but did not contain detectable concentrations of TPHG. Groundwater samples collected from wells A-1, A-5, and AR-1 contained concentrations of TPHG ranging from 1,200 to 2,600 ppb, and concentrations of benzene ranging from 66 to 460 ppb. Groundwater samples collected from wells A-1 and AR-1 contained 640 and 560 ppb TPHD, respectively. The laboratory noted that the chromatograms for TPHD analysis on these samples do not match the typical diesel fingerprint. Floating product was observed in wells ADR-1 (sheen) and ADR-2 (0.09 foot). Therefore, these wells were not sampled during fourth quarter 1994.

REMEDIATION SYSTEM PERFORMANCE EVALUATION

Soil-Vapor Extraction System

System Description. GSI completed construction of the SVE system in January 1994 and initiated system operation on June 2, 1994. The system was operated by GSI until September 13, 1994. The on-site SVE system uses a blower to apply vacuum to vapor extraction wells A-1 through A-4, AV-1 through AV-7, AR-2, ADR-1, and ADR-2, and extract hydrocarbon vapor from subsurface soils. Extracted hydrocarbon vapor from the wells is directed via subgrade remediation piping to an off-gas abatement unit in the treatment compound (Figure 2). The trailer-mounted off-gas abatement unit used to treat the influent extracted vapor is a Thermtech, Inc., VAC 25 model thermal/catalytic oxidizer with a nominal operating capacity of 250 standard cubic feet per minute (scfm). Treated off-gas from the unit is discharged to the atmosphere via a 10-inch by 10-inch square stack. The off-gas abatement unit was operated in the thermal mode from system startup

on June 2, 1994, to July 15, 1994. As a result of decreases in total volatile hydrocarbons as gasoline (TVHG) and BTEX concentrations in extracted vapor, the off-gas abatement unit operation was changed to catalytic mode on July 15, 1994. ARCO transferred the site from GSI to EMCON in October 1994. EMCON began operating the SVE system on December 15, 1994.

System Monitoring. Consistent with site-specific air permit requirements, the operating temperature of the oxidation unit is measured and recorded continuously during system operation. Once a month, air samples are collected at three sample ports: (1) effluent from the well field and before air dilution (sample port I-1), (2) influent to the oxidizer, after fresh air dilution (sample port I-2), and (3) effluent from the unit (sample port E-1). Air samples collected from sample ports I-1, I-2, and E-1 are submitted to a state-certified laboratory for chemical analysis. The samples are analyzed for TVHG and BTEX by USEPA methods 8015 and 8020, respectively.

In addition to the above parameters, the SVE system is generally monitored once a month for (1) TVHG concentrations in extracted vapor from each extraction well, using a flame-ionization detector (FID); (2) applied and induced vacuum on vapor extraction wells; (3) depths to water in extraction wells; and (4) measured vapor flow rate from individual wells and the combined well field. Site visits are also conducted once a month for routine operation and maintenance of the treatment system.

Copies of analytical results for all air samples collected during fourth quarter 1994 are shown in Appendix C. Copies of the field data sheets for all operation and maintenance visits conducted during fourth quarter 1994 are shown in Appendix D.

System Operation. Table 4 summarizes SVE system operation and performance data from startup, June 2, 1994, to the end of this reporting period, January 3, 1995. The SVE system operated for a total of 53.3 days during the 112.1-day reporting period from September 13, 1994, to January 3, 1995 (47.6 percent operational). The SVE system was off-line during a portion of the fourth quarter 1994 due to the pending transfer of site from GSI to EMCON. The system was restarted on December 15, 1994, and was 100 percent operational during the remainder of the reporting period for the fourth quarter 1994.

Operational Status of SVE Wells. Table 5 summarizes the operating status of the individual vapor extraction wells during fourth quarter 1994. To maximize hydrocarbon removal rates, each vapor extraction well was brought on-line or closed depending on the TVHG concentrations of the extracted vapor from the well.

Air Sample Results. Copies of the analytical results for all air samples collected during fourth quarter 1994 are provided in Appendix C.

system. Hence, any observed changes in petroleum-hydrocarbon concentrations in vapor extracted from vadose-zone soils (i.e., from vapor extraction wells) may be a result of operating the AS system.

AS also helps introduce dissolved oxygen (DO) into groundwater and saturated-zone soils, which may in turn promote biodegradation of petroleum hydrocarbons.

System Monitoring. The AS system is generally monitored once every two weeks in conjunction with monitoring of the SVE system. Parameters monitored during each visit included (1) applied total air pressure and total air flow to the AS wells; (2) applied AS pressure to each AS well; (3) changes in TVHG concentrations in extracted vapor from the combined well field, influent to the SVE system, as a result of sparging; and (4) changes in DO in AS and monitoring wells.

System Operation. Table 6 summarizes the AS system operation and performance data from startup of the AS system on July 15, 1994. The AS system is currently off-line because the sparge blower has been damaged. EMCON is currently evaluating replacing the existing AS blower with an air compressor to meet the AS pressure demand required for effective sparging into the saturated zone at the site.

Field Monitoring Results

Copies of field data sheets for operation and performance of the SVE system during routine site visits are included in Appendix D.

PERFORMANCE IMPROVEMENTS

To improve system performance (maximize hydrocarbon removal rates), during fourth quarter 1994, different combinations of vapor extraction wells were brought on-line or closed during routine site visits based on observed vacuum at each well and TVHG concentrations in extracted vapor from each well.

LIMITATIONS

Field procedures were performed by, and field data acquired from, IWM and GSI. EMCON does not warrant the accuracy of data supplied by IWM or GSI. EMCON's scope of work was limited to interpreting field data collected by IWM and GSI, which included evaluating trends in the groundwater gradient, groundwater flow direction, and dissolved- and adsorbed-phase petroleum-hydrocarbon concentrations beneath the site.

No monitoring event is thorough enough to describe all geologic/hydrogeologic conditions of interest at a given site. If conditions have not been identified during the monitoring

event, such a finding should not be construed as a guarantee of the absence of such conditions at the site, but rather as the result of the scope, limitations, and cost of the work performed during the monitoring event.

SITE STATUS UPDATE

This update reports site activities performed during fourth quarter 1994 and the anticipated site activities for the first quarter of 1995.

Fourth Quarter 1994 Activities

- Performed quarterly groundwater monitoring (by IWM) for fourth quarter 1994.
- Performed operation and maintenance of the SVE system for fourth quarter 1994.
- Began preparation of the quarterly groundwater monitoring and performance evaluation report for the SVE and AS systems for third quarter 1994.

Work Anticipated for First Quarter 1995

- Submit the quarterly groundwater monitoring and performance evaluation report for the SVE and AS systems for third quarter 1994.
- Prepare the quarterly groundwater monitoring and performance evaluation report for the SVE and AS systems for fourth quarter 1994.
- Perform quarterly groundwater monitoring for first quarter 1995.
- Perform operation and maintenance of the SVE and AS systems for first quarter 1995.

If you have questions, please call.

Sincerely,

EMCON

David Larsen
Project Coordinator

Valli Voruganti
Project Engineer

Lynn A. Galagher, R.G. 6090
Project Geologist

REGISTERED GEOLOGIST
LYNN A. GALLAGHER
RG6090
STATE OF CALIFORNIA

cc: Kevin Graves, RWQCB
Roel Meregillano, ACHCSA

Attachments:

Table 1 -	Groundwater Monitoring Data, Fourth Quarter 1994
Table 2 -	Historical Groundwater Elevation Data
Table 3 -	Historical Groundwater Analytical Data
Table 4 -	Soil-Vapor Extraction System Operation and Performance Data
Table 5 -	Soil-Vapor Extraction Well Data
Table 6 -	Air-Sparge System Operation and Performance Data
Figure 1 -	Site Location
Figure 2 -	Site Plan
Figure 3 -	Groundwater Data, Fourth Quarter 1994
Figure 4 -	Historical SVE System Influent TPHG and Benzene Concentrations
Figure 5 -	Historical SVE System Hydrocarbon Removal Rates
Appendix A -	Field Data Report, Integrated Wastestream Management, December 9, 1994
Appendix B -	Analytical Results and Chain-of-Custody Documentation for Groundwater Monitoring Samples, Fourth Quarter 1994
Appendix C -	Analytical Results and Chain-of-Custody Documentation for Soil-Vapor Extraction System Samples, Fourth Quarter 1994
Appendix D -	Field Data Sheets, Operation and Maintenance Visits, Fourth Quarter 1994

Table 1
Groundwater Monitoring Data
Fourth Quarter 1994
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-20-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPHD
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		ppb	ppb	ppb	ppb	ppb	ppb
A-1	11-16-94	14.16	9.75	4.41	ND	NW	0.005	11-16-94	2100	460	6.4	62	120	^^^^640
A-2	11-16-94	14.55	10.31	4.24	ND	NW	0.005	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	11-16-94	15.75	11.02	4.73	ND	NW	0.005	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	11-16-94	15.25	9.78	5.47	ND	NW	0.005	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-5	11-16-94	13.51	9.09	4.42	ND	NW	0.005	11-16-94	2600	160	220	130	400	Not analyzed
A-6	11-16-94	13.51	9.14	4.37	ND	NW	0.005	11-16-94	250	<0.5	<1.5	<0.6	<1.5	Not analyzed
AR-1	11-16-94	15.61	10.19	5.42	ND	NW	0.005	11-16-94	1200	66	20	34	210	^^^^560
AR-2	11-16-94	15.28	10.95	4.33	ND	NW	0.005	11-16-94	<50	0.8	<0.5	<0.5	<0.5	<50
ADR-1	11-16-94	13.95	9.64	4.31	Sheen	NW	0.005	11-16-94	Not sampled: well contained floating product					
ADR-2	11-16-94	14.64	9.84	** 4.87	0.09	NW	0.005	11-16-94	Not sampled: well contained floating product					

TOC = Top of casing
TPHG = Total petroleum hydrocarbons as gasoline
TPHD = Total petroleum hydrocarbons as diesel
ft-MSL = Elevation in feet, relative to mean sea level
MWN = Groundwater flow direction and gradient apply to the entire monitoring well network
ppb = Parts per billion or micrograms per liter (µg/l)
ND = None detected
NW = Northwest
^^^^ = Sample contains components eluting in the diesel range, quantified as diesel; chromatogram does not match the typical diesel fingerprint
** [Corrected elevation (Z')] = Z + (h * 0.73) where: Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

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Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-1	04-03-92	14.75	10.35	4.40	ND	NR	NR
A-1	05-20-92	14.75	11.66	3.09	ND	NR	NR
A-1	06-16-92	14.75	11.95	2.80	ND	NR	NR
A-1	07-17-92	14.75	12.23	2.52	ND	NR	NR
A-1	08-07-92	14.75	12.16	2.59	ND	NR	NR
A-1	09-22-92	14.75	12.42	2.33	ND	NR	NR
A-1	10-13-92	14.75	12.47	2.28	ND	NR	NR
A-1	11-23-92	14.75	11.83	2.92	ND	NR	NR
A-1	12-16-92	14.75	11.03	3.72	ND	NR	NR
A-1	01-28-93	14.75	9.08	5.67	ND	NR	NR
A-1	02-22-93	14.75	9.46	5.29	ND	NR	NR
A-1	03-25-93	14.75	10.02	4.73	ND	NR	NR
A-1	04-15-93	14.75	10.50	4.25	ND	NR	NR
A-1	05-22-93	14.75	11.33	3.42	ND	NR	NR
A-1	06-16-93	14.75	11.51	3.24	ND	NR	NR
A-1	07-27-93	14.75	11.91	2.84	ND	NR	NR
A-1	08-26-93	14.75	12.11	2.64	ND	NR	NR
A-1	09-27-93	14.75	12.21	2.54	ND	NR	NR
A-1	10-08-93	14.75	12.21	2.54	ND	NR	NR
A-1	02-09-94	14.16	10.09	4.07	ND	NR	NR
A-1	05-04-94	14.16	10.68	3.48	ND	NW	0.004
A-1	08-10-94	14.16	10.28	3.88	ND	WNW	0.007
A-1	11-16-94	14.16	9.75	4.41	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-2	04-03-92	15.16	10.97	4.19	ND	NR	NR
A-2	05-20-92	15.16	12.17	2.99	ND	NR	NR
A-2	06-16-92	15.16	12.43	2.73	ND	NR	NR
A-2	07-17-92	15.16	12.64	2.52	ND	NR	NR
A-2	08-07-92	15.16	12.75	2.41	ND	NR	NR
A-2	09-22-92	15.16	12.88	2.28	ND	NR	NR
A-2	10-13-92	15.16	12.92	2.24	ND	NR	NR
A-2	11-23-92	15.16	12.18	2.98	ND	NR	NR
A-2	12-16-92	15.16	11.52	3.64	ND	NR	NR
A-2	01-28-93	15.16	9.73	5.43	ND	NR	NR
A-2	02-22-93	15.16	9.28	5.88	ND	NR	NR
A-2	03-25-93	15.16	10.57	4.59	ND	NR	NR
A-2	04-15-93	15.16	11.20	3.96	ND	NR	NR
A-2	05-22-93	15.16	11.91	3.25	ND	NR	NR
A-2	06-16-93	15.16	12.04	3.12	ND	NR	NR
A-2	07-27-93	15.16	12.41	2.75	ND	NR	NR
A-2	08-25-93	15.16	12.54	2.62	ND	NR	NR
A-2	09-27-93	15.16	12.66	2.50	ND	NR	NR
A-2	10-08-93	15.16	12.65	2.51	ND	NR	NR
A-2	02-09-94	14.55	10.67	3.88	ND	NR	NR
A-2	05-04-94	14.55	11.25	3.30	ND	NW	0.004
A-2	08-10-94	14.55	11.56	2.99	ND	WNW	0.007
A-2	11-16-94	14.55	10.31	4.24	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-3	04-03-92	16.38	11.70	4.68	ND	NR	NR
A-3	05-20-92	16.38	13.00	3.38	ND	NR	NR
A-3	06-16-92	16.38	13.46	2.92	ND	NR	NR
A-3	07-17-92	16.38	13.45	2.93	ND	NR	NR
A-3	08-07-92	16.38	12.37	4.01	ND	NR	NR
A-3	09-22-92	16.38	13.71	2.67	ND	NR	NR
A-3	10-13-92	16.38	13.76	2.62	ND	NR	NR
A-3	11-23-92	16.38	13.60	2.78	ND	NR	NR
A-3	12-16-92	16.38	12.31	4.07	ND	NR	NR
A-3	01-28-93	16.38	10.33	6.05	ND	NR	NR
A-3	02-22-93	16.38	10.44	5.94	ND	NR	NR
A-3	03-25-93	16.38	11.27	5.11	ND	NR	NR
A-3	04-15-93	16.38	11.98	4.40	ND	NR	NR
A-3	05-22-93	16.38	12.70	3.68	ND	NR	NR
A-3	06-16-93	16.38	12.84	3.54	ND	NR	NR
A-3	07-27-93	16.38	13.22	3.16	ND	NR	NR
A-3	08-25-93	16.38	13.35	3.03	ND	NR	NR
A-3	09-27-93	16.38	13.50	2.88	ND	NR	NR
A-3	10-08-93	16.38	13.48	2.90	ND	NR	NR
A-3	02-09-94	15.75	11.32	4.43	ND	NR	NR
A-3	05-04-94	15.75	11.99	3.76	ND	NW	0.004
A-3	08-10-94	15.75	11.12	4.63	ND	WNW	0.007
A-3	11-16-94	15.75	11.02	4.73	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-4	04-03-92	15.89	10.84	5.05	ND	NR	NR
A-4	05-20-92	15.89	12.13	3.76	ND	NR	NR
A-4	06-16-92	15.89	12.33	3.56	ND	NR	NR
A-4	07-17-92	15.89	12.60	3.29	ND	NR	NR
A-4	08-07-92	15.89	12.56	3.33	ND	NR	NR
A-4	09-22-92	15.89	12.87	3.02	ND	NR	NR
A-4	10-13-92	15.89	12.87	3.02	ND	NR	NR
A-4	11-23-92	15.89	12.63	3.26	ND	NR	NR
A-4	12-16-92	15.89	11.34	4.55	ND	NR	NR
A-4	01-28-93	15.89	9.40	6.49	ND	NR	NR
A-4	02-22-93	15.89	9.35	6.54	ND	NR	NR
A-4	03-25-93	15.89	10.32	5.57	ND	NR	NR
A-4	04-15-93	15.89	11.15	4.74	ND	NR	NR
A-4	05-22-93	15.89	11.84	4.05	ND	NR	NR
A-4	06-16-93	15.89	12.01	3.88	ND	NR	NR
A-4	07-27-93	15.89	12.33	3.56	ND	NR	NR
A-4	08-25-93	15.89	12.48	3.41	ND	NR	NR
A-4	09-27-93	15.89	12.60	3.29	ND	NR	NR
A-4	10-08-93	15.89	12.57	3.32	ND	NR	NR
A-4	02-09-94	15.25	10.01	5.24	ND	NR	NR
A-4	05-04-94	15.25	11.08	4.17	ND	NW	0.004
A-4	08-10-94	15.25	11.75	3.50	ND	WNW	0.007
A-4	11-16-94	15.25	9.78	5.47	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation	Depth to Water	Ground-water Elevation	Floating Product Thickness	Ground-water Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
A-5	02-11-93	14.14	9.15	4.99	ND	NR	NR
A-5	03-25-93	14.14	9.33	4.81	ND	NR	NR
A-5	04-15-93	14.14	10.11	4.03	ND	NR	NR
A-5	05-22-93	14.14	10.71	3.43	ND	NR	NR
A-5	06-16-93	14.14	10.84	3.30	ND	NR	NR
A-5	07-27-93	14.14	11.22	2.92	ND	NR	NR
A-5	08-26-93	14.14	11.44	2.70	ND	NR	NR
A-5	09-27-93	14.14	11.51	2.63	ND	NR	NR
A-5	10-08-93	14.14	11.68	2.46	ND	NR	NR
A-5	02-09-94	13.51	9.44	4.07	ND	NR	NR
A-5	05-04-94	13.51	10.00	3.51	ND	NW	0.004
A-5	08-10-94	13.51	10.76	2.75	ND	WNW	0.007
A-5	11-16-94	13.51	9.09	4.42	ND	NW	0.005
A-6	02-11-93	14.17	9.35	4.82	ND	NR	NR
A-6	03-25-93	14.17	Not surveyed: well was inaccessible				
A-6	04-16-93	14.17	9.36	4.81	ND	NR	NR
A-6	05-22-93	14.17	10.86	3.31	ND	NR	NR
A-6	06-16-93	14.17	10.98	3.19	ND	NR	NR
A-6	07-27-93	14.17	Not surveyed: well was inaccessible				
A-6	08-25-93	14.17	Not surveyed: well was inaccessible				
A-6	09-27-93	14.17	11.65	2.52	ND	NR	NR
A-6	10-08-93	14.17	11.80	2.37	ND	NR	NR
A-6	02-09-94	13.51	9.48	4.03	ND	NR	NR
A-6	05-04-94	13.51	10.07	3.44	ND	NW	0.004
A-6	08-10-94	13.51	10.77	2.74	ND	WNW	0.007
A-6	11-16-94	13.51	9.14	4.37	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation	Depth to Water	Ground-water Elevation	Floating Product Thickness	Ground-water Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
AR-1	04-03-92	15.71	11.07	4.64	ND	NR	NR
AR-1	05-20-92	15.71	12.37	3.34	ND	NR	NR
AR-1	06-16-92	15.71	12.47	3.24	ND	NR	NR
AR-1	07-17-92	15.71	13.00	2.71	ND	NR	NR
AR-1	08-07-92	15.71	12.87	2.84	ND	NR	NR
AR-1	09-22-92	15.71	12.99	2.72	ND	NR	NR
AR-1	10-13-92	15.71	13.05	2.66	ND	NR	NR
AR-1	11-23-92	15.71	12.80	2.91	ND	NR	NR
AR-1	12-16-92	15.71	11.49	4.22	ND	NR	NR
AR-1	01-28-93	15.71	9.46	6.25	ND	NR	NR
AR-1	02-22-93	15.71	10.05	5.66	ND	NR	NR
AR-1	03-25-93	15.71	10.75	4.96	ND	NR	NR
AR-1	04-15-93	15.71	11.26	4.45	ND	NR	NR
AR-1	05-22-93	15.71	12.07	3.64	ND	NR	NR
AR-1	06-16-93	15.71	12.21	3.50	ND	NR	NR
AR-1	07-27-93	15.71	12.60	3.11	ND	NR	NR
AR-1	08-25-93	15.71	12.78	2.93	ND	NR	NR
AR-1	09-27-93	15.71	12.89	2.82	ND	NR	NR
AR-1	10-08-93	15.71	12.84	2.87	ND	NR	NR
AR-1	02-09-94	15.61	11.08	4.53	ND	NR	NR
AR-1	05-04-94	15.61	11.83	3.78	ND	NW	0.004
AR-1	08-10-94	15.61	11.09	4.52	ND	WNW	0.007
AR-1	11-16-94	15.61	10.19	5.42	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
AR-2	07-17-92	15.79	13.14	2.65	ND	NR	NR
AR-2	08-07-92	15.79	13.25	2.54	ND	NR	NR
AR-2	09-22-92	15.79	13.58	2.21	ND	NR	NR
AR-2	10-13-92	15.79	13.65	2.14	ND	NR	NR
AR-2	11-23-92	15.79	Not surveyed: could not located well				
AR-2	12-16-92	15.79	12.16	3.63	ND	NR	NR
AR-2	01-28-93	15.79	10.26	5.53	ND	NR	NR
AR-2	02-22-93	15.79	10.52	5.27	ND	NR	NR
AR-2	03-25-93	15.79	11.18	4.61	ND	NR	NR
AR-2	04-15-93	15.79	11.81	3.98	ND	NR	NR
AR-2	05-22-93	15.79	12.46	3.33	ND	NR	NR
AR-2	06-16-93	15.79	12.53	3.26	ND	NR	NR
AR-2	07-27-93	15.79	12.77	3.02	ND	NR	NR
AR-2	08-26-93	15.79	13.23	2.56	ND	NR	NR
AR-2	09-27-93	15.79	13.16	2.63	ND	NR	NR
AR-2	10-08-93	15.79	13.32	2.47	ND	NR	NR
AR-2	02-09-94	15.28	11.33	3.95	ND	NR	NR
AR-2	05-04-94	15.28	11.88	3.40	ND	NW	0.004
AR-2	08-10-94	15.28	12.48	2.80	ND	WNW	0.007
AR-2	11-16-94	15.28	10.95	4.33	ND	NW	0.005

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-03-95
Project Number: 0805-129.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
ADR-1	02-09-94	13.95	9.90	4.05	ND	NR	NR
ADR-1	05-04-94	13.95	10.50	3.45	ND	NW	0.004
ADR-1	08-10-94	13.95	10.36	3.59	ND	WNW	0.007
ADR-1	11-16-94	13.95	9.64	4.31	Sheen	NW	0.005
ADR-2	02-09-94	14.64	10.73	3.91	ND	NR	NR
ADR-2	05-04-94	14.64	11.31	3.33	ND	NW	0.004
ADR-2	08-10-94	14.64	9.81	** 4.90	0.10	WNW	0.007
ADR-2	11-16-94	14.64	9.84	** 4.87	0.09	NW	0.005

TOC = Top of casing
ft-MSL = Elevation in feet, relative to mean sea level
MWN = Groundwater flow direction and gradient apply to the entire monitoring well network
ND = None detected
NR = Not reported; data not available or not measurable
NW = Northwest
WNW = West-northwest
** [Corrected elevation (Z')] = Z + (h * 0 73) where· Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-08-95
Project Number: 0805-129.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD
		ppb	ppb	ppb	ppb	ppb	ppb
A-1	04-03-92	34000	6200	3900	410	3100	6100
A-1	07-17-92	5600	3000	500	<100	<100	Not analyzed
A-1	10-13-92	5600	980	590	85	910	Not analyzed
A-1	01-28-93	3700	780	360	130	460	^620
A-1	04-15-93	210	34	11	7.1	20	^420
A-1	08-26-93	2000	370	35	50	220	^1500
A-1	10-08-93	2600	430	65	64	99	^1200
A-1	02-09-94	3000	560	150	66	190	^650
A-1	05-04-94	1300	250	61	27	110	^2100
A-1	08-10-94	27000	3700	1100	540	3000	^3000
A-1	11-16-94	2100	460	6.4	62	120	^^^^640
A-2	04-03-92	<30	<0.3	<0.3	<0.3	<0.3	<50
A-2	07-17-92	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	10-13-92	<50	0.57	<0.5	<0.5	<0.5	Not analyzed
A-2	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	04-15-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	08-25-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	02-09-94	^^260	<0.6	<0.5	<0.5	<0.5	Not analyzed
A-2	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-2	08-10-94	690	47	25	3.9	86	Not analyzed
A-2	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	04-03-92	200	0.79	0.65	4.4	<0.3	130
A-3	07-17-92	<50	<0.5	<0.5	1.3	2.3	Not analyzed
A-3	10-13-92	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	04-15-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	08-25-93	<50	<0 5	<0.5	<0.5	<0.5	Not analyzed
A-3	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	02-09-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	08-10-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-3	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-08-95
Project Number: 0805-129.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD
		ppb	ppb	ppb	ppb	ppb	ppb
A-4	04-03-92	35	<0.3	<0.3	<0.3	<0.3	85
A-4	07-17-92	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	10-13-92	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	04-15-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	08-25-93	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	10-08-93	<50	<0.5	<0.5	<0 5	<0.5	Not analyzed
A-4	02-09-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	08-10-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-4	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	Not analyzed
A-5	02-11-93	4900	380	640	140	970	Not analyzed
A-5	04-15-93	27000	3100	4000	1100	4600	Not analyzed
A-5	08-26-93	13000	1100	1400	480	1800	Not analyzed
A-5	10-08-93	6800	490	620	280	980	Not analyzed
A-5	02-09-94	2200	190	130	130	310	Not analyzed
A-5	05-09-94	13000	1000	1500	490	2000	Not analyzed
A-5	08-10-94	11000	730	930	310	1300	Not analyzed
A-5	11-16-94	2600	160	220	130	400	Not analyzed
A-6	02-11-93	990	1.8	5.1	17	7.2	Not analyzed
A-6	04-16-93	390	1.3	1.6	1.7	7.7	Not analyzed
A-6	08-25-93	Not sampled: well was inaccessible					
A-6	10-08-93	220	0.73	<0.5	0.82	0.65	Not analyzed
A-6	02-09-94	640	<2.9	<3.7	<2.4	<8.2	Not analyzed
A-6	05-04-94	260	<0.5	<1.5	<1.5	<0.5	Not analyzed
A-6	08-10-94	300	<0.6	<2.5	<0.8	<1	Not analyzed
A-6	11-16-94	250	<0.5	<1.5	<0.6	<1.5	Not analyzed

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-08-95
Project Number: 0805-129.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD
		ppb	ppb	ppb	ppb	ppb	ppb
AR-1	04-03-92	17000	310	1400	320	3000	12000
AR-1	07-17-92	44000	4300	1800	1800	10000	Not analyzed
AR-1	10-13-92	32000	310	730	570	3100	^22000
AR-1	01-28-93	15000	1200	510	510	2600	^5300
AR-1	04-15-93	17000	1800	360	520	1600	^5400
AR-1	08-25-93	2900	260	54	80	160	^2800
AR-1	10-08-93	3500	200	85	120	290	^4100
AR-1	02-09-94	26000	2900	450	920	3000	^4200
AR-1	05-04-94	36000	3400	360	1400	3700	^7200
AR-1	08-10-94	6100	120	66	65	530	^2900
AR-1	11-16-94	1200	66	20	34	210	^^^^560
AR-2	07-17-92	150	6.6	24	6.6	39	Not analyzed
AR-2	10-13-92	<50	2	0.86	0.51	3.8	^58
AR-2	01-28-93	2000	570	13	<10	380	^290
AR-2	04-15-93	85	15	<0.5	<0.5	2.4	<50
AR-2	08-26-93	<50	<0.5	<0.5	<0.5	<0.5	<50
AR-2	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	<50
AR-2	02-09-94	^^82	<0.5	<0.5	<0.5	<0.5	<50
AR-2	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	<50
AR-2	08-10-94	200	5	1.7	2.7	38	^55
AR-2	11-16-94	<50	0.8	<0.5	<0.5	<0.5	<50
ADR-1	02-09-94	3000	380	140	59	240	^110
ADR-1	05-04-94	2100	490	93	68	140	^60
ADR-1	08-10-94	150000	5400	15000	3600	24000	^^^4800
ADR-1	11-16-94	Not sampled: well contained floating product					
ADR-2	02-09-94	83000	6300	6100	2000	11000	12000
ADR-2	05-04-94	36000	4600	2600	930	4500	^4200
ADR-2	08-10-94	Not sampled: well contained floating product					
ADR-2	11-16-94	Not sampled: well contained floating product					

TPHG = Total petroleum hydrocarbons as gasoline
TPHD = Total petroleum hydrocarbons as diesel
ppb = Parts per billion or micrograms per liter (µg/l)
^ = Sample contains a lower boiling point hydrocarbon quantitated as diesel; chromatogram does not match the typical diesel fingerprint
^^ = Sample contains a single non-fuel component eluting in the gasoline range, and quantified as gasoline
^^^ = Sample contains a mixture of diesel and a lower boiling point hydrocarbon quantitated as diesel; chromatogram does not match the typical diesel fingerprint
^^^^ = Sample contains components eluting in the diesel range, quantified as diesel; chromatogram does not match the typical diesel fingerprint

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer

Start-Up Date: 06-02-94
Reporting Period From: 06-02-94
To: 01-03-95

Beginning Date:	06-02-94	06-02-94	06-07-94	06-16-94	06-22-94
Ending Date:	06-02-94	06-07-94	06-16-94	06-22-94	06-30-94
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
Operation 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	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	2579.35	236.08	313.27	43.64
Product Recovered to Date (lbs):	18.68	2598.02	2834.10	3147.37	3191.01
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

Page 1 Footnotes
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
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.
3. All data and calculations on this page were prepared by GeoStrategies, Inc. (GSI), as presented in *Letter Report, Vapor Extraction Start Up and Quarterly Groundwater Monitoring, Second Quarter 1994,* (GSI, September 1994).

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer

Start-Up Date: 06-02-94
Reporting Period From: 06-02-94
To: 01-03-95

Date Begin:		06-30-94	07-15-94	07-20-94	08-01-94	08-15-94
Date End:		07-15-94	07-20-94	08-01-94	08-15-94	09-13-94
Mode of Oxidation:		Thermal	Thermal	Thermal	Catalytic	Catalytic
Days of Operation:		6.9	3.8	0.3	7.2	10.0
Days of Downtime:		7.8	1.5	11.7	6.8	18.7
Vapor Monitoring Concentrations						
Well Field Influent, as gasoline:	mg/m3(1)(2)	NA(11)	NA	NA	NA	NA
	ppmv(3)	NA	NA	NA	NA	NA
System Influent, as gasoline:	mg/m3	5405	2027	1838	1838	1216
	ppmv	2000	750	680	680	450
System Effluent, as gasoline:	mg/m3	30	ND	141	95	11
	ppmv	11.0	ND	52	35	4.1
Well Field Influent, as benzene:	mg/m3(4)	NA	NA	NA	NA	NA
	ppmv	NA	NA	NA	NA	NA
System Influent, as benzene:	mg/m3	101	32	19	30	9.4
	ppmv	31	10	6.0	9.1	2.9
System Effluent, as benzene:	mg/m3	ND(12)	ND	3.6	1.0	0.14
	ppmv	ND	ND	1.1	0.31	0.044
Well Field Flow Rate, scfm(5):		164.4	197.7	183.9	206.4	211.7
System Influent Flow Rate, scfm:		169.5	195.2	186.7	195.6	212.8
Destruction Efficiency, percent(6):		99.5	98.5	92.4	94.9	99.1
Emission Rates (pounds per day)(7)						
Gasoline:		0.45	<1.05	2.36	1.66	0.21
Benzene:		<0.01	<0.01	0.06	0.02	0.00
Operating Hours This Period:		165.1	90.1	8.3	173.3	241.0
Operating Hours To Date:		733.3	823.4	831.7	1005.0	1246.0
Pounds/ Hour Removal Rate, as gasoline(8):		3.4	1.5	1.3	1.3	1.0
Pounds Removed This Period, as gasoline(9):		566	133	11	233	233
Pounds Removed To Date, as gasoline:		3757	3891	3901	4134	4368
Gallons Removed This Period, as gasoline(10):		94	22	2	39	39
Gallons Removed To Date, as gasoline:		626	649	650	689	728

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer

Start-Up Date: 06-02-94
Reporting Period From: 06-02-94
To: 01-03-95

Date Begin:		09-13-94	10-27-94	11-29-94
Date End:		10-27-94	11-29-94	01-03-95
Mode of Oxidation:		Catalytic	Catalytic	Catalytic
Days of Operation:		34.5	0.3	18.5
Days of Downtime:		9.6	32.7	16.5
Vapor Monitoring Concentrations				
Well Field Influent, as gasoline:	mg/m3(1)(2)	NA	NA(13)	5600
	ppmv(3)	NA	NA	1548
System Influent, as gasoline:	mg/m3	1216	NA	1600
	ppmv	450	NA	442
System Effluent, as gasoline:	mg/m3	11	NA	<60
	ppmv	4.1	NA	<17
Well Field Influent, as benzene:	mg/m3(4)	NA	NA	22
	ppmv	NA	NA	7
System Influent, as benzene:	mg/m3	9.4	NA	6.0
	ppmv	2.9	NA	1.9
System Effluent, as benzene:	mg/m3	0 14	NA	<0.5
	ppmv	0.044	NA	<0.1
Well Field Flow Rate, scfm(5):		213.6	36.6	24.3
System Influent Flow Rate, scfm:		213.6	126.9	139.3
Destruction Efficiency, percent(6):		99.1	NA	96.3
Emission Rates (pounds per day)(7)				
Gasoline:		0.21	NA	<0.75
Benzene:		0.00	NA	<0.01
Operating Hours This Period:		828.7	7.1	443.7
Operating Hours To Date:		2074.7	2081.8	2525.5
Pounds/ Hour Removal Rate, as gasoline(8):		1.0	0.0	0.8
Pounds Removed This Period, as gasoline(9):		806	0	370
Pounds Removed To Date, as gasoline:		5174	5174	5544
Gallons Removed This Period, as gasoline(10):		134	0	62
Gallons Removed To Date, as gasoline:		862	862	924

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169	Vapor Treatment Unit: ThermTech Model
Location: 889 West Grand Avenue	VAC-25, 250cfm Thermal/
Oakland, California	Catalytic Oxidizer
Consultant: EMCON	Start-Up Date: 06-02-94
1921 Ringwood Avenue	Reporting Period From: 06-02-94
San Jose, California	To: 01-03-95

CURRENT REPORTING PERIOD:	09-13-94	to	01-03-95
DAYS / HOURS IN PERIOD:	112.1		2690
DAYS / HOURS OF OPERATION:	53.3		1280
DAYS / HOURS OF DOWN TIME:	58.8		1411
PERCENT OPERATIONAL:			47.6 %
PERIOD POUNDS REMOVED:	1176		
PERIOD GALLONS REMOVED:	196		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):			187.4

1. mg/m3 = milligrams per cubic meter
2. Concentration (as gasoline in mg/m3) = [concentration (as gasoline in ppmv) x 65 lb/lb-mole / 24.05 (lb/m3/lb-mole of air)/mg]
3. ppmv = parts per million by volume
4. Concentration (as benzene in mg/m3) = [concentration (as benzene in ppmv) x 78 lb/lb-mole / 24.05 (lb/m3/lb-mole of air)/mg]
5. scfm = flow in standard cubic feet per minute at one atmosphere and 70 degrees Farenheit
6. Destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - system effluent concentration (as gasoline in mg/m3)] / system influent concentration (as gasoline in mg/m3)) x 100 percent
7. Emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
8. Pounds/ hour removal rate (as gasoline) = system influent concentration (as gasoline in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
9. Pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
10. Gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1667 gallons/pound of gasoline
11. NA = not analyzed
12. ND = Not detected at or above the method reporting limit
13. System was down for this entire period. The system was operated for 7.1 hour on fresh air for check system operation. No samples were collected.

Table 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-09-95
Project Number: 0805-129.01

Date	Well Identification											
	A-1			A-2			A-3			A-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
06-02-94	open	12,300 FID	12	open	560 FID	10	open	90 FID	14	open	0 FID	9
06-07-94	open	8,200 FID	68	closed	600 FID	NA	closed	10 FID	NA	closed	0 FID	NA
06-16-94	open	3,600 FID	54	closed	70 FID	0	closed	0 FID	0	closed	0 FID	0
06-22-94	open	1,800 FID	81	open	260 FID	6	open	0 FID	12	open	0 FID	2
06-30-94	open	2,800 FID	67	open	450 FID	14	open	10 FID	NA	closed	0 FID	0
07-15-94	open	1,350 FID	64	open	160 FID	62	closed	50 FID	NA	closed	20 FID	NA
07-15-94	open	2,860 FID	72	open	510 FID	71	closed	80 FID	NA	closed	30 FID	NA
07-20-94	open	2,300 FID	76	open	1,200 FID	78	closed	0 FID	NA	closed	20 FID	NA
08-01-94	open	3,000 FID	68 - 73	open	700 FID	68 - 73	closed	20 FID	68 - 73	closed	4,300 FID	68 - 73
08-15-94	open	1,200 FID	73	open	400 FID	71	open	20 FID	4	open	0 FID	2
09-13-94	open	410 FID	57	open	400 FID	62	closed	400 FID	NA	closed	0 FID	NA
11-02-94	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-15-94	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-30-94	passive	NA	NA	passive	NA	NA	passive	NA	NA	passive	NA	NA

TVHG = concentration of total volatile hydrocarbons as gasoline
ppmv = parts per million by volume
in-H2O = inches of water
open = open to the system
passive = open to the atmosphere
closed = closed to the system and atmosphere
NA = not analyzed or not measured
FID = TVHG concentration was measured with a portable flame ionization detector
LAB = TVHG concentration was analyzed in the laboratory
PID = TVHG concentration was measured with a portable photoionization detector

Table 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-09-95
Project Number: 0805-129.01

Date	Well Identification											
	AV-1			AV-2			AV-3			AV-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
06-02-94	open	3,000 FID	8	open	13,470 FID	12	open	13,670 FID	12	open	13,680 FID	9
06-07-94	closed	2,800 FID	NA	open	4,100 FID	38	open	12,600 FID	74	open	14,110 FID	74
06-16-94	closed	0 FID	40	open	1,250 FID	55	open	2,400 FID	57	open	9,000 FID	55
06-22-94	open	0 FID	80	open	750 FID	80	open	1,100 FID	82	open	4,400 FID	83
06-30-94	open	0 FID	56	open	1,000 FID	55	open	900 FID	69	open	6,300 FID	68
07-15-94	closed	100 FID	NA	open	750 FID	64	open	570 FID	64	open	7,160 FID	64
07-15-94	closed	130 FID	NA	open	4,500 FID	74	open	1,470 FID	74	open	12,780 FID	73
07-20-94	closed	30 FID	NA	open	1,200 FID	78	open	2,300 FID	79	open	3,200 FID	75
08-01-94	closed	80 FID	68 - 73	open	1,000 FID	68 - 73	open	800 FID	68 - 73	open	4,300 FID	68 - 73
08-15-94	open	80 FID	80	open	1,900 FID	74	open	500 FID	73	open	2,100 FID	73
09-13-94	closed	10 FID	NA	open	300 FID	65	open	230 FID	65	open	440 FID	64
11-02-94	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-15-95	open	NA	32	open	2.1 FID	35	closed	NA	NA	open	>1000 FID	34
12-30-94	passive	NA	NA	passive	NA	NA	passive	NA	NA	open	679 PID	16

TVHG = concentration of total volatile hydrocarbons as gasoline
ppmv = parts per million by volume
in-H2O = inches of water
open = open to the system
passive = open to the atmosphere
closed = closed to the system and atmosphere
NA = not analyzed or not measured
FID = TVHG concentration was measured with a portable flame ionization detector
LAB = TVHG concentration was analyzed in the laboratory
PID = TVHG concentration was measured with a portable photoionization detector

Table 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-09-95
Project Number: 0805-129.01

Date	Well Identification											
	AV-5			AV-6			AV-7			AR-2		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
06-02-94	open	13,680 FID	11	open	13,650 FID	12	open	13,690 FID	10	open	10 FID	11
06-07-94	open	13,400 FID	74	closed	40 FID	NA	open	13,800 FID	74	closed	30 FID	NA
06-16-94	open	1,250 FID	56	closed	240 FID	0	open	3,200 FID	56	closed	0 FID	0
06-22-94	open	600 FID	82	open	70 FID	26	open	1,800 FID	82	open	20 FID	22
06-30-94	open	1,180 FID	33	open	10 FID	20	open	2,200 FID	69	open	0 FID	13
07-15-94	open	2,120 FID	64	closed	200 FID	NA	open	2,000 FID	64	closed	15 FID	NA
07-15-94	open	9,150 FID	72	closed	760 FID	NA	open	8,200 FID	74	closed	20 FID	NA
07-20-94	open	1,200 FID	78	closed	20 FID	NA	open	2,100 FID	78	closed	200 FID	NA
08-01-94	open	2,560 FID	68 - 73	closed	160 FID	68 - 73	open	800 FID	68 - 73	closed	30 FID	68 - 73
08-15-94	open	1,100 FID	72	open	160 FID	26	open	80 FID	73	open	130 FID	30
09-13-94	open	40 FID	59	open	10 FID	20	open	20 FID	50	closed	500 FID	66
11-02-94	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-15-94	closed	NA	NA	open	310 FID	11	closed	NA	NA	closed	NA	NA
12-30-94	passive	NA	NA	open	42 PID	16	passive	NA	NA	passive	NA	NA

TVHG = concentration of total volatile hydrocarbons as gasoline
ppmv = parts per million by volume
in-H2O = inches of water
open = open to the system
passive = open to the atmosphere
closed = closed to the system and atmosphere
NA = not analyzed or not measured
FID = TVHG concentration was measured with a portable flame ionization detector
LAB = TVHG concentration was analyzed in the laboratory
PID = TVHG concentration was measured with a portable photoionization detector

Table 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-09-95
Project Number: 0805-129.01

Date	Well Identification											
	ADR-1			ADR-2								
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
06-02-94	open	7,000 FID	11	open	460 FID	13						
06-07-94	open	14,160 FID	73	open	11,910 FID	75						
06-16-94	open	5,400 FID	54	open	5,400 FID	57						
06-22-94	open	2,550 FID	80	open	2,700 FID	83						
06-30-94	open	4,000 FID	67	open	4,300 FID	69						
07-15-94	open	4,010 FID	64	open	2,150 FID	64						
07-15-94	open	7,850 FID	72	open	9,530 FID	93						
07-20-94	open	2,800 FID	78	open	3,500 FID	75						
08-01-94	open	5,100 FID	68 - 73	open	4,250 FID	68 - 73						
08-15-94	open	1,500 FID	72	open	1,800 FID	75						
09-13-94	open	250 FID	58	open	440 FID	66						
11-02-94	closed	NA	NA	closed	NA	NA						
12-15-94	open	>1000 FID	35	open	>1000 FID	36						
12-30-94	open	39 PID	16	open	273 PID	16						

TVHG = concentration of total volatile hydrocarbons as gasoline
ppmv = parts per million by volume
in-H2O = inches of water
open = open to the system
passive = open to the atmosphere
closed = closed to the system and atmosphere
NA = not analyzed or not measured
FID = TVHG concentration was measured with a portable flame ionization detector
LAB = TVHG concentration was analyzed in the laboratory
PID = TVHG concentration was measured with a portable photoionization detector

Table 6
Air-Sparge System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Air-Sparge Unit: 3-horse power
Conde blower

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 07-15-94
Reporting Period From: 07-15-94
To: 01-03-95

Date Begin:	07-15-94	08-01-94	08-01-94	08-01-94	08-15-94
Date End:	08-01-94	08-01-94	08-01-94	08-15-94	09-13-94
Days of Operation:	5.5	0.0	0.1	7.2	10.0
Days of Downtime:	10.5	0.0	0.0	6.8	18.7
Air-Sparge Well Status:					
AS-1	open	open	open	open	open
AS-2	open	open	open	open	open
AS-3	open	open	open	open	open
AS-4	open	open	open	open	open
AS-5	open	open	open	open	open
Air-Sparge Well Pressure (psig) (1):					
AS-1	2.8	2.8	3.0	2.0	2.4
AS-2	3.0	3.0	2.8	2.2	2.4
AS-3	3.6	3.6	3.8	3.1	2.2
AS-4	3.1	3.1	3.4	3.0	2.8
AS-5	2.8	2.8	3.2	2.8	3.2
Total Air-Sparge Flow Rate (scfm) (2):	25.0	29.0	29.0	27.0	29.0
Total Air-Sparge Pressure (psig):	5.0	2.8	2.8	2.6	3.0
Dissolved Oxygen (ppm) (3):					
Air-Sparge Wells:					
AS-1	NA (4)	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA
Depth to Water (ft-BGS) (5):					
Air-Sparge Wells:					
AS-1	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA

Table 6
Air-Sparge System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Sparge Unit: 3-horse power
Conde blower

Start-Up Date: 07-15-94
Reporting Period From: 07-15-94
To: 01-03-95

Date Begin:	09-13-94	11-28-94
Date End:	11-28-94	01-03-95
Days of Operation:	0.0	0.0
Days of Downtime:	76.0	36.0
Air-Sparge Well Status:		
AS-1	closed	closed
AS-2	closed	closed
AS-3	closed	closed
AS-4	closed	closed
AS-5	closed	closed
Air-Sparge Well Pressure (psig) (1):		
AS-1	0.0	0.0
AS-2	0.0	0.0
AS-3	0.0	0.0
AS-4	0.0	0.0
AS-5	0.0	0.0
Total Air-Sparge Flow Rate (scfm) (2):	0.0	0.0
Total Air-Sparge Pressure (psig):	0.0	0.0
Dissolved Oxygen (ppm) (3):		
Air-Sparge Wells:		
AS-1	1.4	NA
AS-2	1.2	NA
AS-3	1.2	NA
AS-4	0.8	NA
AS-5	1.4	NA
Depth to Water (ft-BGS) (5):		
Air-Sparge Wells:		
AS-1	10.55	NA
AS-2	11.29	NA
AS-3	10.78	NA
AS-4	10.27	NA
AS-5	10.65	NA

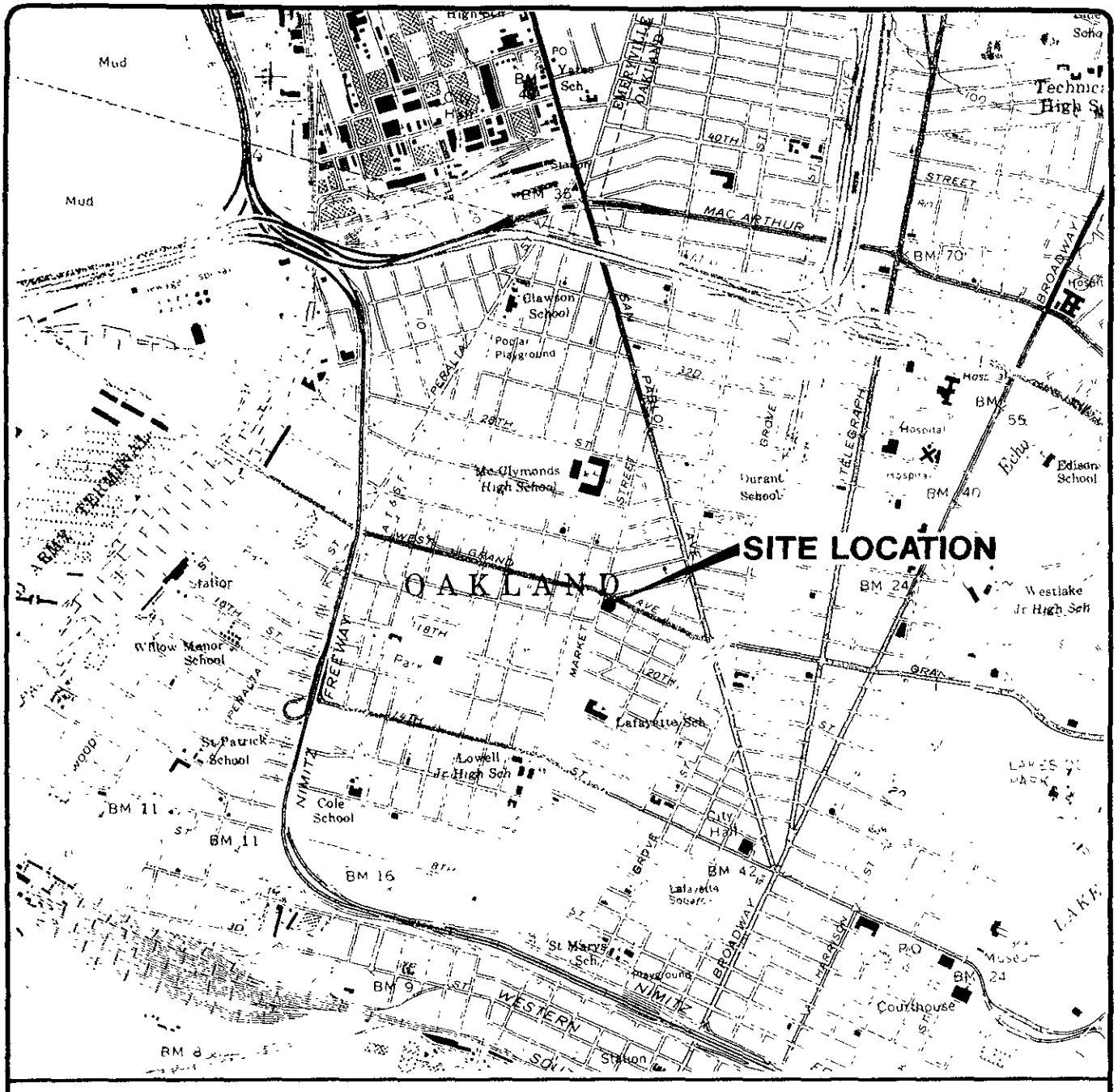
Table 6
Air-Sparge System
Operation and Performance Data

Facility Number:	2169	Air-Sparge Unit:	3-horse power Conde blower
Location:	889 West Grand Avenue Oakland, California		
Consultant:	EMCON *1921 Ringwood Avenue* San Jose, California	Start-Up Date:	07-15-94
		Reporting Period From:	07-15-94
		To:	01-03-95

CURRENT REPORTING PERIOD:	09-13-94	to	01-03-95
DAYS / HOURS IN PERIOD:	112.0		2688
DAYS / HOURS OF OPERATION:	0.0		0
DAYS / HOURS OF DOWN TIME:	112.0		2688
PERCENT OPERATIONAL:			0.0%

1. psig = pounds per square inch gauge
2. scfm = standard cubic feet per minute at 14.7 psi and 70° F
3. ppm = parts per million
4. NA = Not available or not analyzed
5. ft-BGS = feet below grade surface

152753

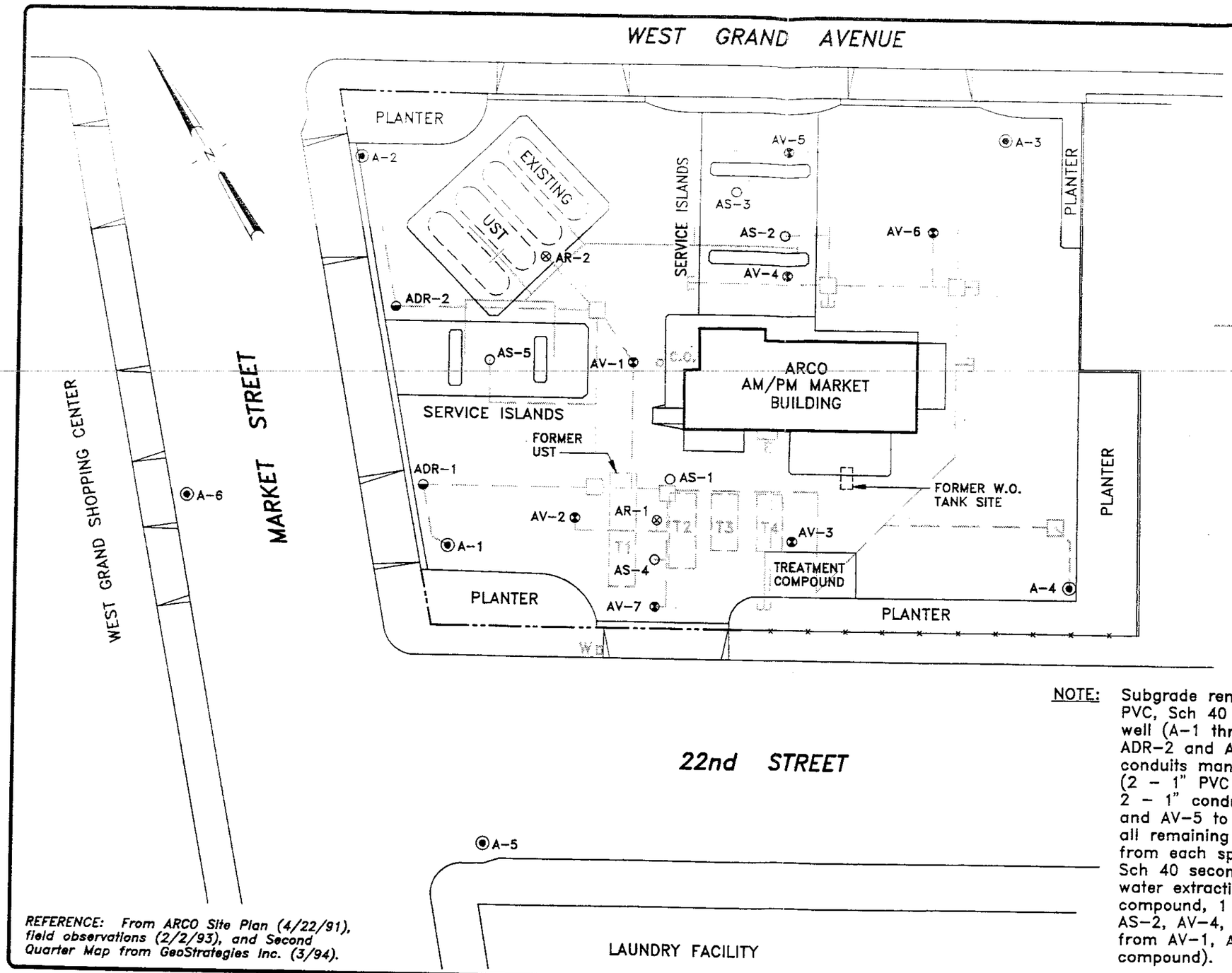


EMCON Associates

ARCO PRODUCTS COMPANY
SERVICE STATION 2169, 889 WEST GRAND AVE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

SITE LOCATION

FIGURE
1
PROJECT NO.
805-129.01



EXPLANATION

- Groundwater monitoring well
- Groundwater recovery well
- Vapor extraction well
- Groundwater recovery/vapor extraction well
- Air sparging well
- Junction box
- Centerline of trench carrying subgrade remediation piping (See note below)
- Stub-out (pipes capped below grade). A brass monument marker exists above the stub-out location
- Sewer clean out
- Existing electrical panel
- Water meter

Wells A-1, A-2, A-3, A-4, and AR-2 also serve as vapor extraction wells.

NOTE: Subgrade remediation piping consists of individual 2" PVC, Sch 40 vapor lines from each vapor extraction well (A-1 through A-4, AV-1 through AV-7, ADR-1, ADR-2 and AR-2), two 1" PVC Sch 40 electrical conduits manifolded to each well and stubout location (2 - 1" PVC elec. conduits from A-4 to compound, 2 - 1" conduits from A-3, AV-6, AV-4, AS-2, AS-3 and AV-5 to compound, and 2 - 1" conduits connecting all remaining wells), a 2" Sch 80 PVC air sparge pipe from each sparge well to the compound and a 4" PVC Sch 40 secondary containment pipe for future groundwater extraction (1 - 4" pipe from A-4 to manifold compound, 1 - 4" manifold pipe from AV-5, AS-3, AS-2, AV-4, AV-6 and A-3 to compound, 1 - 4" pipe from AV-1, AS-1, AV-3 and one from other wells to compound).

REFERENCE: From ARCO Site Plan (4/22/91), field observations (2/2/93), and Second Quarter Map from GeoStrategies Inc. (3/94).

EMCON Associates

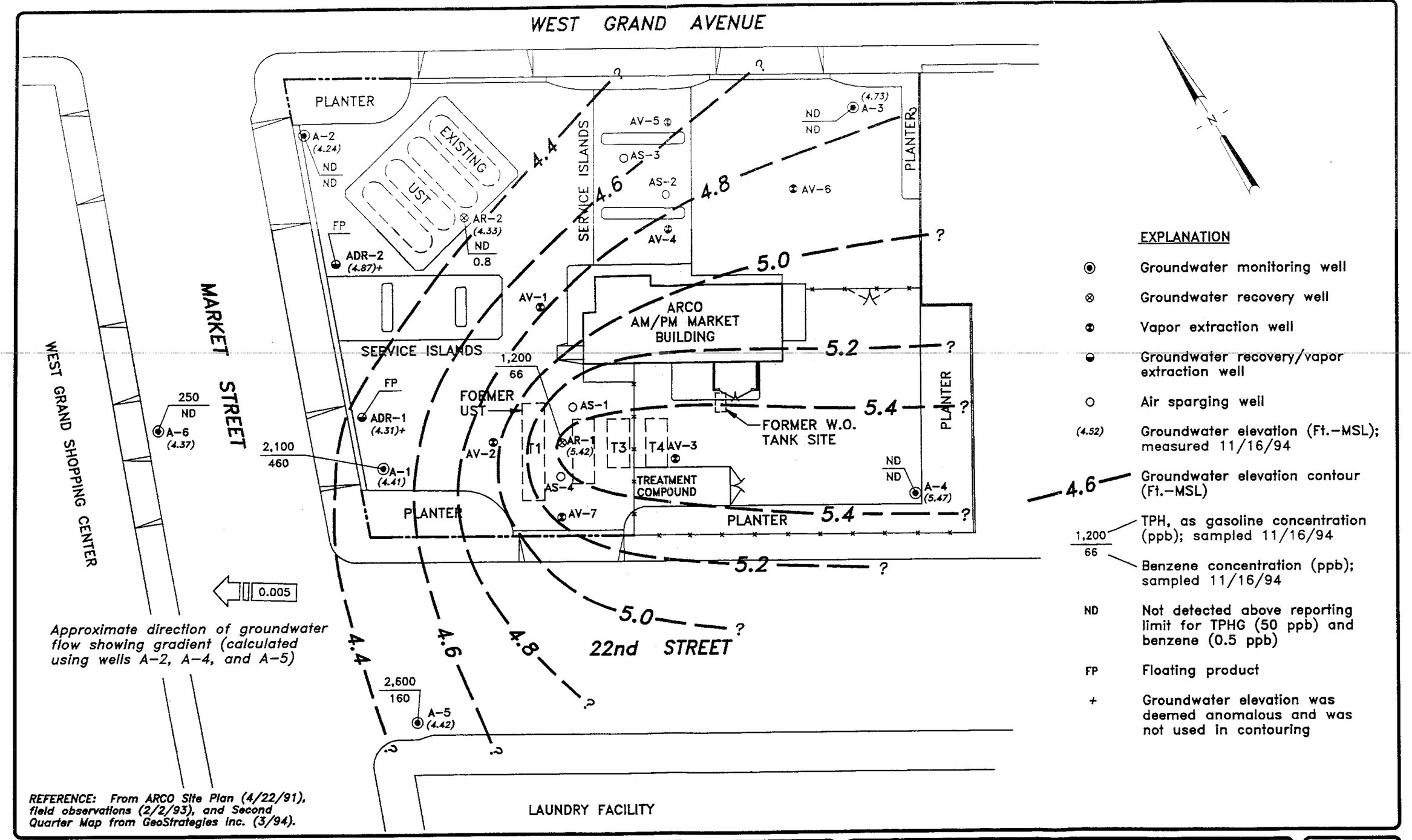
SCALE: 0 40 80 FEET

ARCO PRODUCTS COMPANY
SERVICE STATION #2169, 889 WEST GRAND AVENUE
OAKLAND, CALIFORNIA

SITE PLAN

FIGURE NO. 2

PROJECT NO. 805-129.01



EMCON Associates

SCALE: 0 40 80 FEET

ARCO PRODUCTS COMPANY
SERVICE STATION #2169, 889 WEST GRAND AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

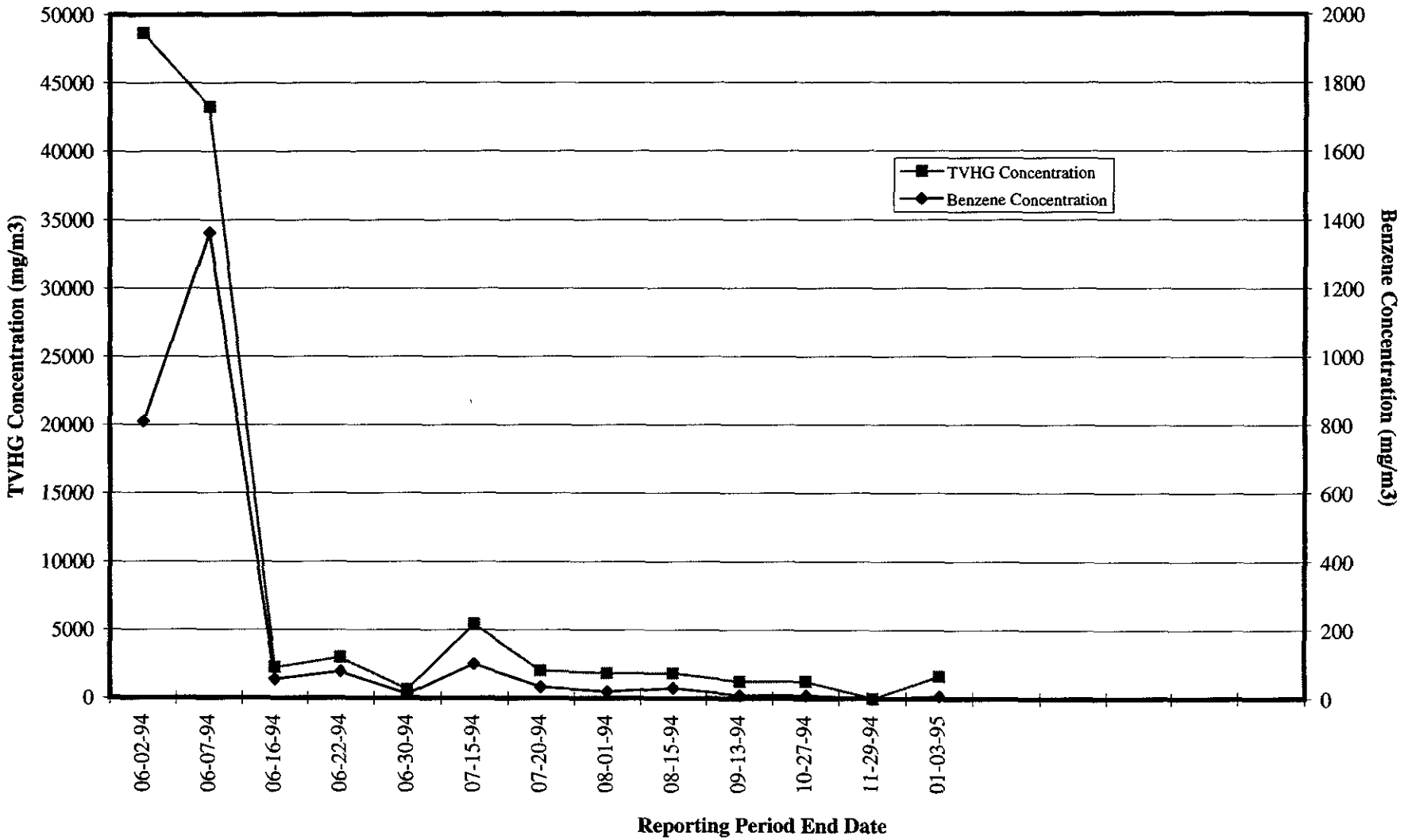
GROUNDWATER DATA
FOURTH QUARTER 1994

FIGURE NO. 3

PROJECT NO. 805-129.01

Figure 4

ARCO Service Station 2169
Soil-Vapor Extraction and Treatment System
Historical System Influent TVHG and Benzene Concentrations



mg/m3 = Milligrams per cubic meter
TVHG = Total volatile hydrocarbons as gasoline

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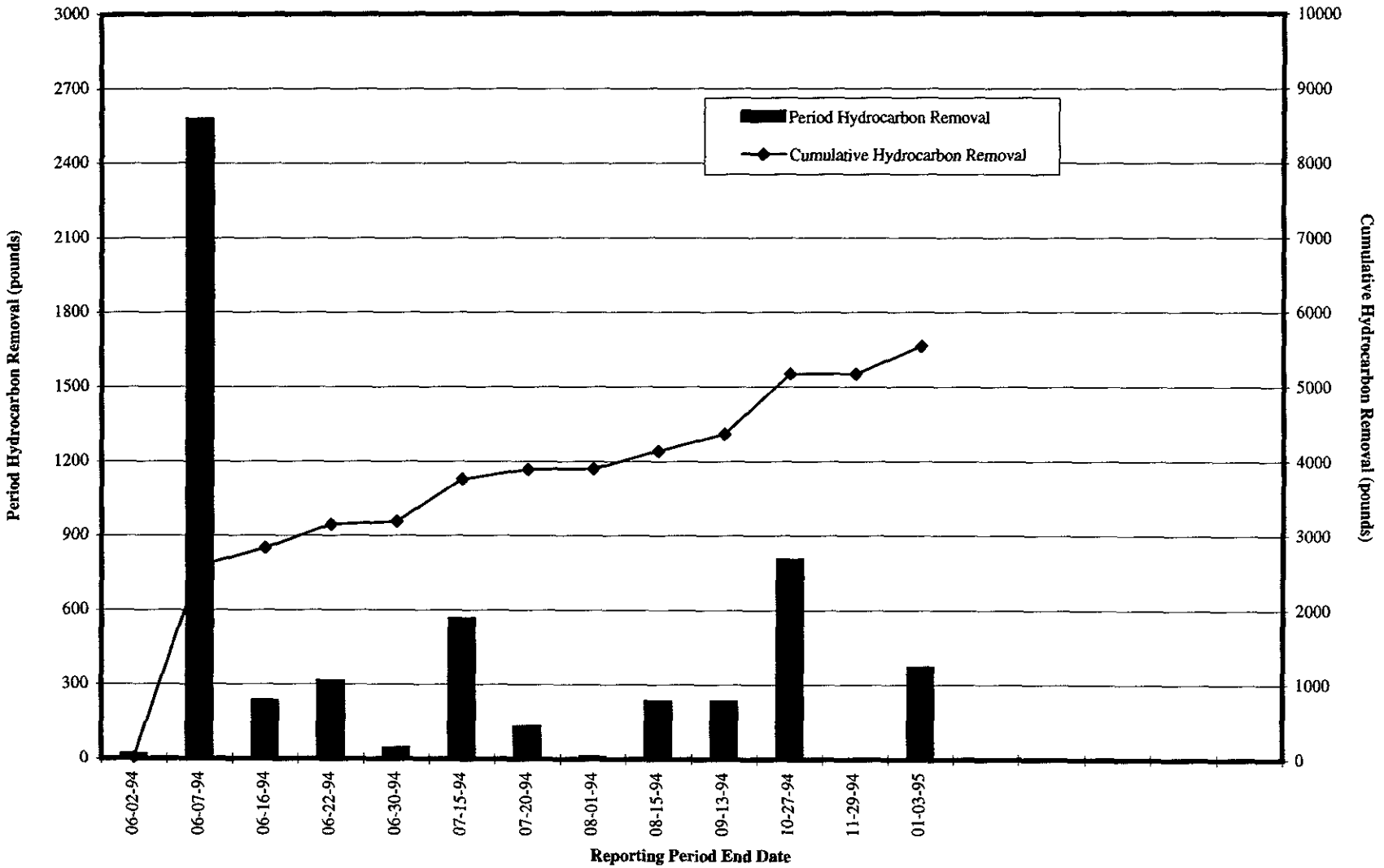
0805-129.01

Figure 5

ARCO Service Station 2169
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



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0805-129.01

APPENDIX A

FIELD DATA REPORT, INTEGRATED WASTESTREAM MANAGEMENT, DECEMBER 9, 1994

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

December 9, 1994

John Young
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

Dear Mr. Young:

Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. 2169 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on November 16, 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. 4/'96
STATE OF CALIFORNIA

EMCON ASSOCIATES
DEC 2 8 1994
RECEIVED

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	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94
DEPTH TO WATER	9.75	10.31	11.02	9.78	9.09	9.14	10.19	10.95	9.64	9.84
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	HEAVY	FP
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.09
TPHg	2,100	ND	ND	ND	2,600	250	1,200	ND	NA	NA
BTEX										
BENZENE	460	ND	ND	ND	160	ND	66	0.8	NA	NA
TOLUENE	6.4	ND	ND	ND	220	<1.5#	20	ND	NA	NA
ETHLYBENZENE	62	ND	ND	ND	130	<0.6#	34	ND	NA	NA
XYLENES	120	ND	ND	ND	400	<1.5#	210	ND	NA	NA
TPHd										
DIESEL	640#	NA	NA	NA	NA	NA	560#	ND	NA	NA

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
# = See laboratory analytical report

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

FIELD REPORT

Depth To Water / Floating Product Survey

Site Arrival Time: 1100
Site Departure Time: 1745
Weather Conditions: CLOUDY / SUNNY

DTW: Well Box or Well Casing (circle one)

Project No.: _____ **Location:** 889 W. GRAND AVE, OAK **Date:** 11-16-94

Client / Station#: ARCO 2169 **Field Technician:** THOMMY / 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) FP=FLOATING PRODUCT	COMMENTS	MATERIALS
8	A-1 *	OK	YES	OK	NONE	NONE	24.48	9.75	9.75	N/A	N/A	N	3" H2O ON WELL BOX	9/16
5	A-2	OK	YES	OK	NONE	NONE	25.26	10.31	10.31	N/A	N/A	N	3" H2O ON WELLBOX	9/16
1	A-3	OK	YES	OK	NONE	NONE	28.88	11.02	11.02	N/A	N/A	N	3" H2O ON WELL BOX	9/16
2	A-4	OK	YES	OK	NONE	NONE	28.41	9.78	9.78	N/A	N/A	N	3"	9/16
7	A-5	OK	YES	NONE	OK	OK	30.30	9.09	9.09	N/A	N/A	N	2" H2O ON WELLBOX	CHRISTY
4	A-6	OK	YES	NONE	OK	OK	27.70	9.14+	9.14+	N/A	N/A	N	2" H2O ON WELL BOX	CHRISTY
6	AR-1 *	OK	YES	OK	NONE	NONE	28.0	10.19	10.19	N/A	N/A	N	6" H2O ON WELL BOX	9/16
3	AR-2 *	OK	YES	OK	NONE	NONE	29.08	10.95	10.95	N/A	N/A	N	4"	1/2
9	ADR-1 *	OK	YES	OK	NONE	NONE	21.90	9.64	9.64	N/A	N/A	N	4" HEAVY SHEEN OBSERVED PRIOR TO PURGING NO SAMPLE	1/2
10	ADR-2 *	OK	YES	OK	NONE	NONE	26.3	9.84	9.84	9.75	0.09	Y	4" FLOATING PRODUCT - NO SAMPLE	1/2

* 2 AMBER SAMPLES EACH

PAGE 2 OF 4 DATE: 11-16-94 CLIENT/STATION #: ARCO 2169 ADDRESS: 8399 W GRAND AVE, OAKLAND

WELL ID: A-3 TD 28.88 - DTW 11.02 x Gal./Linear Ft. .38 x Casing Volume 3 = Calculated Purge 20.36

DATE PURGED: 11-16-94 START (2400 HR): 1412 END (2400 HR) 1418
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1422 DTW: 11.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1414	5	7.18	.59	68.7	CLEAR
1415	10	7.20	.57	68.2	CLEAR
1416	15	7.24	.55	67.9	CLEAR
1417	20.5	7.26	.55	67.1	CLEAR

Total purge: 20.5
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-4 TD 28.41 - DTW 9.78 x Gal./Linear Ft. .38 x Casing Volume 3 = Calculated Purge 21.24

DATE PURGED: 11-16-94 START (2400 HR): 1443 END (2400 HR) 1447
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1450 DTW: 10.7

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1444	5	7.20	0.58	69.9	CLEAR
1445	10	7.19	0.59	69.0	CLEAR
1446	15	7.06	0.56	68.8	CLEAR
1447	21	7.04	0.55	68.5	CLEAR

Total purge: 21
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: AR-2 TD 29.08 - DTW 10.95 x Gal./Linear Ft. .66 x Casing Volume 3 = Calculated Purge 35.89

DATE PURGED: 11-16-94 START (2400 HR): 1505 END (2400 HR) 1515
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1520 DTW: (11)

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1506	5	6.97	.52	68.8	CLOUDY
1509	15	6.98	.49	68.0	CLEAR
1512	25	6.96	.50	67.6	CLEAR
1515	36	6.93	.50	66.8	CLEAR

Total purge: 36
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-6 TD 27.70 - DTW 9.14 x Gal./Linear Ft. .17 x Casing Volume 3 = Calculated Purge 9.47

DATE PURGED: 11-16-94 START (2400 HR): 1542 END (2400 HR) 1545
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1536 DTW: 11.40

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1542	2	6.77	0.52	70.6	CLOUDY
1544	6	6.74	0.61	69.7	CLEAR
1545	9.5	6.72	0.65	69.5	CLEAR

Total purge: 9.5
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: TOMMY REYES / CISCO DIZON 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:

PAGE 3 OF 4 DATE: 11-16-94 CLIENT/STATION #: ARCO 2169 ADDRESS: 884 W GRAND AVE OAKLAND

WELL ID: A-2 TD 25.26 - DTW 10.31 X Gal./Linear Ft. .30 X Casing Volume 3 = Calculated Purge 17.04

DATE PURGED: 11-16-94 START (2400 HR): 1559 END (2400 HR) 1604
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1608 DTW: 10.4

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1601	5.0	6.85	.57	65.3	CLEAR
1602	10.0	6.83	.59	64.8	CLEAR
16	17.0	6.77	.57	63.6	CLEAR

Total purge: 17.0
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: ~~Bailer Disp.~~
REMARKS:

WELL ID: AR-1 TD 28.0 - DTW 10.19 X Gal./Linear Ft. 1.5 X Casing Volume 2 = Calculated Purge 53.43

DATE PURGED: 11-16-94 START (2400 HR): 1618 END (2400 HR) 1630
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1635 DTW: 10.6

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1619	5	6.61	0.89	69.8	BLACK
1622	20	6.61	0.94	69.0	GRAY
1624	30	6.61	0.85	68.4	GRAY
1630	53.5	6.62	0.91		GRAY

Total purge: 53.5
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
REMARKS:

WELL ID: A-5 TD 30.30 - DTW 9.09 X Gal./Linear Ft. .17 X Casing Volume 3 = Calculated Purge 10.82

DATE PURGED: 11-16-94 START (2400 HR): 1700 END (2400 HR) 1704
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1708 DTW: 9.7

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1701	2	6.72	.62	68.1	GRAY
1702	5	6.72	.57	67.8	GRAY
1704	11	6.72	.58	67.1	LT GRAY

Total purge: 11
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: A-1 TD 24.48 - DTW 9.75 X Gal./Linear Ft. .30 X Casing Volume 3 = Calculated Purge 16.80

DATE PURGED: 11-16-94 START (2400 HR): 1717 END (2400 HR) 1720
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1725 DTW: 10

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1717	1.0	6.74	.61	65.6	LT GRAY
1718	6.0	6.75	.65	64.8	CLEAR
1719	12.0	6.74	.67	63.4	CLEAR
1720	17.0	6.75	.67	63.1	CLEAR

Total purge: 17.0
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: THOMMY REYES / CISCO ABUNGUN 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:

APPENDIX B

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR GROUNDWATER MONITORING SAMPLES, FOURTH QUARTER 1994

Columbia Analytical Services, Inc.

December 5, 1994

Service Request No. S941481

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 November 18, 1994. For your reference, these analyses have been assigned our service request number S941481.

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
Program Director

Annelise J. Bazar
Regional QA Coordinator

KAM/ajb

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

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
Project: ARCO Facility No. 2169
Sample Matrix: Water

Service Request: S941481
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: 11/28/94
Date Analyzed: 12/1,2/94

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

Sample Name	Lab Code	MRL	Result
A-1 (10)	S941481-001	50	640 *
AR-1 (10.6)	S941481-007	50	560 *
AR-2 (11)	S941481-008	50	ND
Method Blank	S941128-WB	50	ND

* This sample contains components eluting in the diesel range, quantified as diesel. The chromatogram does not match the typical diesel fingerprint.

Approved By: Leon A Murphy Date: December 5, 1994

IAMRL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Service Request:**	S941481
Project:	ARCO Facility No. 2169	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/18/94
		Date Extracted:	NA
		Date Analyzed:	11/28,29/94

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

Analyte.	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name / **Lab Code**					
A-1 (10) S941481-001	2,100	460	6.4	62	120
A-2 (10.4) S941481-002	ND	ND	ND	ND	ND
A-3 (11.2) S941481-003	ND	ND	ND	ND	ND
A-4 (10.7) S941481-004	ND	ND	ND	ND	ND
A-5 (9.7) S941481-005	2,600	160	220	130	400
A-6 (11.4) S941481-006	250	ND	<1.5 *	<0.6 *	<1.5 *
AR-1 (10.6) S941481-007	1,200	66	20	34	210
AR-2 (11) S941481-008	ND	0.8	ND	ND	ND
Method Blank S941128-WB	ND	ND	ND	ND	ND
Method Blank S941129-WB	ND	ND	ND	ND	ND

* Raised MRL due to matrix interference.

Approved By: Joan A Murphy Date: December 5, 1994

5ABTXGAS/061694

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APPENDIX A

LABORATORY QC RESULTS

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

QA/QC Report

Client: IWM
Project: ARCO Facility No. 2169
Sample Matrix: Water

Service Request: S941481
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: 11/28/94
Date Analyzed: 12/1,2/94

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

Sample Name	Lab Code	Percent Recovery p-Terphenyl
A-1 (10)	S941481-001	96
AR-1 (10.6)	S941481-007	62 *
AR-2 (11)	S941481-008	86
MS	S941465-002MS	81
DMS	S941465-002DMS	73
Method Blank	S941128-WB	80

CAS Acceptance Limits: 66-123

* Surrogate recovery outside of acceptance limits. This sample formed an emulsion during the preparation steps.

Approved By: _____ Date: December 5, 1994

SUR1/062994

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QA/QC Report

Client: IWM
Project: ARCO Facility No. 2169

Service Request: S941481
Date Analyzed: 12/1/94

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	1,000	956	96	90-110

Approved By: Leonard Murphy Date: December 5, 1994

ICV25AL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 2169
Sample Matrix: Water

Service Request: S941481
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: 11/28/94
Date Analyzed: 12/1/94

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

Sample Name: Batch QC
Lab Code: S941465-002

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
TPH as Diesel	4,000	4,000	ND	3,630	3,390	91	85	61-141	7

Approved By: _____ Date: December 5, 1994

DMS1S/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 2169
Sample Matrix: Water

Service Request: S941481
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/28,29/94

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-Trifluorotoluene
A-1 (10)	S941481-001	113
A-2 (10.4)	S941481-002	100
A-3 (11.2)	S941481-003	96
A-4 (10.7)	S941481-004	98
A-5 (9.7)	S941481-005	106
A-6 (11.4)	S941481-006	101
AR-1 (10.6)	S941481-007	105
AR-2 (11)	S941481-008	95
MS	S941463-002MS	109
DMS	S941463-002DMS	109
Method Blank	S941128-WB	102
Method Blank	S941129-WB	99

CAS Acceptance Limits: 69-116

Approved By: Tom Murphy Date: December 5, 1994

SUR1/062994

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

Client: IWM
Project: ARCO Facility No 2169

Service Request: S941481
Date Analyzed: 11/28/94

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	25.9	104	85-115
Toluene	25	27.0	108	85-115
Ethylbenzene	25	27.5	110	85-115
Xylenes, Total	75	76.8	102	85-115
Gasoline	500	499	100	90-110

Approved By: Kevin Murphy Date: December 5, 1994

ICV25AL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 2169
Sample Matrix: Water

Service Request: S941481
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/28/94

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
Units: ug/L (ppb)

Sample Name: Batch QC
Lab Code: S941463-002

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
Benzene	25	25	ND	24.3	24.2	97	97	75-135	<1
Toluene	25	25	ND	26.6	26.1	106	104	73-136	2
Ethylbenzene	25	25	ND	27.4	27.3	110	109	69-142	<1

Approved By: _____ Date: December 5, 1994

DMS1S/060194

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APPENDIX B

CHAIN OF CUSTODY

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. TWM-94-5CC

Chain of Custody

ARCO Facility no. A2169	City (Facility) OAKland	Project manager (Consultant) TOM DeSon	Laboratory name Columbia
ARCO engineer MW.	Telephone no. (ARCO) 415 571 2434	Telephone no. (Consultant) 408/942 8955	Fax no. (Consultant) 408/942 1499	Contract number 07077
Consultant name TWM	Address (Consultant) 950 Amer ave. Mtp. CA 95035			Method of shipment Sampler deliver

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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TPH Diesel
FB-1	9	2		✓		✓	✓	11-16-94	1110		✓	✓									
10 A-1	1	4		✓		✓	✓		1725		✓	✓									✓
10.4 A-2	2	2		✓		✓	✓		1608		✓	✓									
11.2 A-3	3	2		✓		✓	✓		1422		✓	✓									
10.7 A-4	4	2		✓		✓	✓		1450		✓	✓									
9.7 A-5	5	2		✓		✓	✓		1708		✓	✓									
11.4 A-6	6	2		✓		✓	✓		1550		✓	✓									
10.6 AR-1	7	4		✓		✓	✓		1635		✓	✓									✓
11 AR-2	8	4		✓		✓	✓		1520		✓	✓									✓

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on FB-1

Lab number 5941481

Turnaround time

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

Condition of sample: Okay		Temperature received: Cool	
Relinquished by sampler [signature]	Date 11/18/94	Time 1235	Received by [signature] 11/18/94 1235
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)

APPENDIX C

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR SOIL-VAPOR EXTRACTION SYSTEM SAMPLES, FOURTH QUARTER 1994

GOLDEN STATE/CAS
LABORATORIES, INC

December 23, 1994

RECEIVED DEC 2 9 1994

Valli Voraganti
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131-1721

Re: **ARCO Faciltiy #2169-Oakland/Project #0805-129.01**

Dear Valli:

Enclosed are the results of the samples submitted to our lab on December 17, 1994. For your reference, these analyses have been assigned our service request number L943856.

All analyses were performed in accordance with our laboratory's quality assurance program. Golden State / CAS is certified for environmental analyses by the California Department of Health Services (Certificate # 1296/Expiration - August 1996).

Please call if you have any questions.

Respectfully submitted,

Golden State / CAS Laboratories, Inc.

Cydie Schwartz for

Dr. B. Gene Bennett
Laboratory Director

Stuart Sigman
Quality Assurance Coordinator

GB/kr

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: ARCO Products Company/#0805-129.01
Sample Matrix: Vapor

Service Request: L943856
Date Collected: 12/15/94
Date Received: 12/17/94
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons*
Units: mg/m^3

	Sample Name:	E-1	I-2	I-1
	Lab Code:	L943856-001	L943856-002	L943856-003
	Date Analyzed:	12/17/94	12/17/94	12/17/94
Analyte	**MRL**			
Benzene[1]	0.5	ND	6.0	22
Toluene[1]	0.5	ND	32	100
Ethylbenzene[2]	0.5	ND	11	24
Total Xylenes[2]	1.0	ND	78	150
Total Volatile Hydrocarbons**	60	89	1800	6800
C_1-C_4 Hydrocarbons*	20	89	140	1200
C_5-C_8 Hydrocarbons*	20	ND	1000	3800
C_9-C_{12} Hydrocarbons*	20	ND	650	1800
Total Volatile Hydrocarbons**[a]	60	ND	1600	5600

NA Not Applicable
1 Benzene and Toluene are included in the C_5-C_8 hydrocarbon fraction.
2 Ethylbenzene and Total Xylenes are included in the C_9-C_{12} hydrocarbon fraction due to the use of C_1-C_8 n-paraffins as the standard for Total Volatile Hydrocarbons.
* Total Volatile Hydrocarbons quantified using n-paraffins with a range of C_1-C_8.
** Result is rounded to two significant figures.
a Gasoline Fraction (C_5-C_{12})
MRL Method Reporting Limit
ND None detected at or above the method reporting limit.

Approved By: Eydie Schwartz Date: 12/23/94

0001

3SOTW/060194
PERMGAS2 XLT - 8020arc 12/23/94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: ARCO Products Company/#0805-129.01
Sample Matrix: Vapor

Service Request: L943856
Date Collected: 12/15/94
Date Received: 12/17/94
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons*
Units: mg/m^3

	Sample Name:	**ADR-1**	**ADR-2**	**AV-2**
	Lab Code:	L943856-004	L943856-005	L943856-006
	Date Analyzed.	12/17/94	12/17/94	12/17/94
Analyte	**MRL**			
Benzene[1]	0.5	22	25	ND
Toluene[1]	0.5	99	96	ND
Ethylbenzene[2]	0.5	30	33	ND
Total Xylenes[2]	1.0	220	270	ND
Total Volatile Hydrocarbons**	60	16000	10000	ND
C_1-C_4 Hydrocarbons*	20	2400	820	ND
C_5-C_8 Hydrocarbons*	20	10000	6100	ND
C_9-C_{12} Hydrocarbons*	20	3300	3200	ND
Total Volatile Hydrocarbons**[a]	60	13000	9300	ND

NA	Not Applicable
1	Benzene and Toluene are included in the C_5-C_8 hydrocarbon fraction.
2	Ethylbenzene and Total Xylenes are included in the C_9-C_{12} hydrocarbon fraction due to the use of C_1-C_8 n-paraffins as the standard for Total Volatile Hydrocarbons.
*	Total Volatile Hydrocarbons quantified using n-paraffins with a range of C_1-C_8.
**	Result is rounded to two significant figures.
a	Gasoline Fraction (C_5-C_{12})
MRL	Method Reporting Limit
ND	None detected at or above the method reporting limit.

Approved By: Eydie Schwartz Date: 12/23/94

0002

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Service Request:**	L943856
Project:	ARCO Products Company/#0805-129.01	**Date Collected:**	12/15/94
Sample Matrix:	Vapor	**Date Received:**	12/17/94
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons*
Units: mg/m^3

Sample Name:	**AV-4**	**AV-6**	**Method Blank**
Lab Code:	L943856-007	L943856-008	L943856-MB
Date Analyzed:	12/17/94	12/17/94	12/17/94

Analyte	**MRL**			
Benzene[1]	0.5	130	10	ND
Toluene[1]	0.5	310	31	ND
Ethylbenzene[2]	0.5	84	15	ND
Total Xylenes[2]	1.0	450	120	ND
Total Volatile Hydrocarbons**	60	31000	980	ND
C_1-C_4 Hydrocarbons*	20	4400	22	ND
C_5-C_8 Hydrocarbons*	20	21000	250	ND
C_9-C_{12} Hydrocarbons*	20	6400	710	ND
Total Volatile Hydrocarbons**[a]	60	27000	960	ND

NA	Not Applicable
1	Benzene and Toluene are included in the C_5-C_8 hydrocarbon fraction.
2	Ethylbenzene and Total Xylenes are included in the C_9-C_{12} hydrocarbon fraction due to the use of C_1-C_8 n-paraffins as the standard for Total Volatile Hydrocarbons.
*	Total Volatile Hydrocarbons quantified using n-paraffins with a range of C_1-C_8.
**	Result is rounded to two significant figures.
a	Gasoline Fraction (C_5-C_{12})
MRL	Method Reporting Limit
ND	None detected at or above the method reporting limit.

Approved By: Eydie Schwartz Date: 12/23/94

3SOTW/060194

PERMGAS2 XLT - 8020arc (3) 12/23/94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Service Request:**	L943856
Project:	ARCO Products Company/#0805-129.01	**Date Collected:**	12/15/94
Sample Matrix:	Vapor	**Date Received:**	12/17/94
		Date Extracted:	NA

Permanent Gases*
Units: % (v/v)

	Sample Name:	**I-1**	**Method Blank**
	Lab Code:	L943856-003	L943856-MB
	Date Analyzed:	12/17/94	12/17/94
Analyte	**MRL**		
Carbon Dioxide	1	4	ND
Oxygen	1	16	ND

NA	Not Applicable
*	Analysis performed using gas chromatography with a thermal conductivity detector.
MRL	Method Reporting Limit
ND	None detected at or above the method reporting limit

Approved By: Eydie Schwartz Date: 12/23/94

3S22/060194
L943856 XLS - permgas2 12/27/94

00.14
Page No

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO Products Company/#0805-129.01
Sample Matrix: Vapor

Service Request: L943856
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 12/17/94

Duplicate Summary
BTEX and Total Volatile Hydrocarbons*

Units: mg/m^3

Sample Name: ADR-2
Lab Code: L943856-005

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	25.1	20.2	22.6	22
Toluene	0.5	95.8	101	98.4	5
Ethylbenzene	0.5	33.2	37.1	35.2	11
Total Xylenes	1.0	272	292	282	7
Total Volatile Hydrocarbon**	60	10000	10000	10000	<1
C_1-C_4 Hydrocarbons*	20	823	851	837	3
C_5-C_8 Hydrocarbons*	20	6100	6270	6180	3
C_9-C_{12} Hydrocarbons*	20	3250	3230	3240	1

NA Not Applicable
* Total Volatile Hydrocarbons quantified using n-paraffins with a range of C_1-C_8.
** Result is rounded to two significant figures.
MRL Method Reporting Limit
ND None detected at or above the method reporting limit.

Approved By: Eydie Schwartz Date: 12/23/94

PERMGAS2 XLT - 8020DA 12/23/94

0005
Page No

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO Products Company/#0805-129.01
Sample Matrix: Vapor

Service Request: L943856
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 12/17/94

Duplicate Summary
Permanent Gases
Units: % (v/v)

Sample Name: I-1
Lab Code: L943856-003

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Carbon Dioxide	1	4	3	3.5	29
Oxygen	1	16	16	16	<1

NA Not Applicable

Approved By: Eydie Schwartz Date: 12/23/94

DUP1SEPA/060194
PERMGAS2 XLT - dupepa 12/23/94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

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) V. Voraganti / D. Lawson	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 415 5712449	Telephone no. (Consultant) 408 453 7300	Fax no. (Consultant) 408 453 0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave San Jose, CA.		Contract number 07077

Sample I.D.	Lab no. 3856	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Vapor)	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 ☐	CO_2 O_2
E-1	1				X			12-15-94	1705		X										
I-2	2				X				1659		X										
I-1	3				X				1654		X										X
ADR-1	4				X				1609		X										
ADR-2	5				X				1615		X										
AV-2	6				X				1555		X										
AV-4	7				X				1618		X										
AV-6	8				X				1623		X										

Special detection Limit/reporting: please report in mg/m³

Special QA/QC

Remarks: 0805-129.01

L943856

Lab number: 5941640

Condition of sample: INFLATED

Temperature received: Amb

Relinquished by sampler	Date 12-16-94 Time 0810	Received by Carol Klein	12-16-94 8:15 a.m
Relinquished by	Date 12-16-94 Time 1740	Received by	
Relinquished by	Date Time	Received by laboratory	Date 12-17-94 Time 11:35A

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)

APPENDIX D

FIELD DATA SHEETS, OPERATION AND MAINTENANCE VISITS, FOURTH QUARTER 1994

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: OC75-005.28 DATE: 11/2/94

CLIENT NAME: ARCO 2169 NAME: MAdler

LOCATION: Oakland, CA.

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER:

REMARKS:

ARCO 2169 @ 1354

System off upon arrival process blower failure

HR meter = 1953.36

Shutoff Power / Closed well gas valve

disconnected battery and telephone.

SIGNATURE: M Adler

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 0805-129.01 DATE: 11/28/94

CLIENT NAME: Arco 2169 NAME: MAdler

LOCATION: Oakland

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: _____

REMARKS: Removed sound cover to Therm Tech blower & motor & found belts chewed up & broken - called Valli to inform.

There are 2 seperate phone lines - 1 to Telemetry & 1 to the Silent Knight

SIGNATURE: MAdler

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 0805-129.01 DATE: 11/28/94

CLIENT NAME: ARCO 2169 NAME: M Adler

LOCATION: Oakland

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER:

REMARKS:

	D.T.W.	D.O.
AS-1	10.55'	1.4
AS-2	11.29'	1.2
AS-3	10.78'	1.2
AS-4	10.27'	0.8
AS-5	10.65'	1.4

SIGNATURE: M Adler

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 0805-129.01 DATE: 11/28/94

CLIENT NAME: ARCO 2169 NAME: MAdler

LOCATION: Oakland

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER:

REMARKS: Sparge Auto dialer – Vac. line to pressure switch then to dialer x 1 Vac. line from sparge line to dialer

Therm Tech. Manual Air Dilution – pitot Tube
Total Air Flow to oxidizer – pitot Tube before CAT ox
ΔP Across Filter – across K.O.

Total Vac. from well – before manual dilution Total pressure – High side in same spot as Total Flow

Therm tech blower motor # AA362996
Spec. 09E283W3076
CAT NO – 814074
HP – 20
V – 230/460
Amps – 18/23
RPM 3525
Phase – 3

Unit Teflon – control Panel
High temp. shutdown

Elect. meter – 40622 KWH

SIGNATURE: MAdler

Page ___ of ___

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 0805-129.01 DATE: 11/28/94

CLIENT NAME: ARCO 2169 NAME: ~~ARCO 2169~~ MAdler

LOCATION: Oakland

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER:

REMARKS: Photographed components of compound

Sparge blower → Conde 14 30494 1" NPT inlet & outlet

motor → Baldor cat. No. M3611T

spec. 35L100Y334

Conde 1-800-367-0972 frame 182T

Dri Air & Vapor Pump MFRS, ser. F693

HP 3

Volts 208 - 230/460

Amps 8.5 - 8.2/4.1

RPM 1725

HZ 60

PH 3

Each sparge line has 0-15 PSI Gauge brass tags

KING FLOW METER (KING Instrument Co. Huntington Beach, CA.)

0-40 SCFM float K72-05-0161A

Silent Knight Model 1410 4 Channel Digital Communicator

Acc# 8369-150 SS# 2169

Telephone 510-465-5542

SIGNATURE: MAdler

Page ____ of ____

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 0805-129.01 DATE: 12-6-94

CLIENT NAME: ARCO 2169 NAME: MAdler

LOCATION: Oakland, CA.

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☒ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: Sparge System

REMARKS:

Sparge elect. motor sheave BK50
blower sheave BK57
belt optibelt - VB 5=C plus B38

Unstuck blower & started system after several minutes it locked up & I couldn't get it to move I removed entire blower and brought back to shop

After taking blower apart - Valli wants blower sent to manufacturer for repairs

(SVE)
Ran blower motor while unit was on - the pressure switch inhibit interlocks the SVE & Sparge system was sticking seems to be working now ok. tapping on it. Rotor shut off when CATOX was shut off & Vacuum was lost.

SIGNATURE: MAdler

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: _____ DATE: _____

CLIENT NAME: Acco 7169 NAME: _____

LOCATION: _____

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: Phone – long distance lockout discontinued & Therm Tech will get called also

REMARKS: Met Derrick Hodges of Therm Tech. on site.

motor sheave MAX RPM 3497 3-5V7 1 SF

blower sheave MAX RPM 5172 35-V490 SDS

motor L AA362996

Spec. 09E283 W3070

CAT. 814074-CX0

HP 20

Volts 230/460

Amps 46/23

RPM 3525

Cycle 60

Blower – Turbotron

Ser 436501

HP 20

SO# 61041-27

RPM 5200

Model TBS5L-A20XPB50

Derrick said it was possible to put High Temp Dilution alarm on ATI

Blower Failure alarm sometimes happens when starting the unit – glitch – just reset and start over

Cooling Fan will be replaced – but it is working now

SIGNATURE: _____

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: _____ DATE: _____

CLIENT NAME: _____ NAME: _____

LOCATION: _____

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: _____

REMARKS:

The Thermo Tech cooling fans had some debris in it which blocked the flow from rotating which blew the fuses, which allowed belt to over heat and break.

The control panel heats had blown fuses - new ones installed.

SIGNATURE: _____

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: _____ DATE: _____

CLIENT NAME: _____ NAME: _____

LOCATION: _____

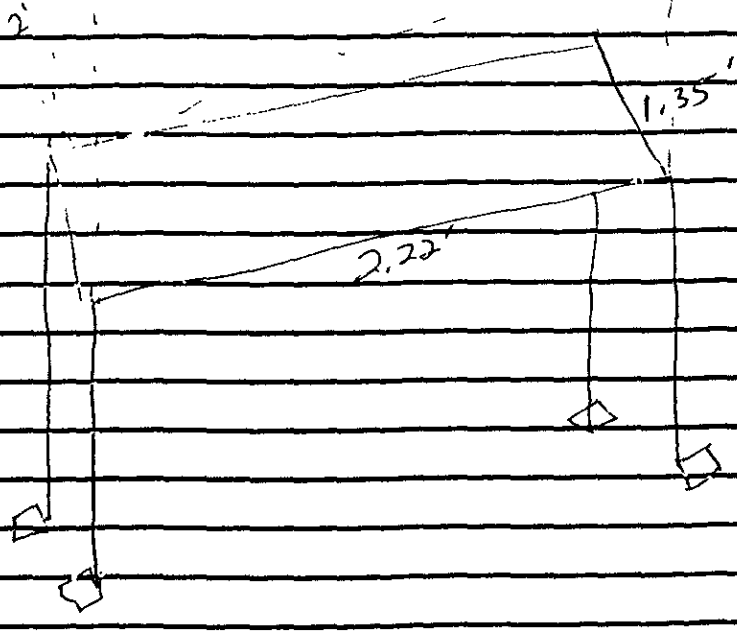
SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: _____

REMARKS: _____



SIGNATURE: _____

EM

ARCO 2169 . San Jose . O&M Log Sheet for 1995 . Project: 0805-129.01

REMARKS: Ran system only long enough to take readings then ran system for 1½ hrs on fresh air dilution to work out [illegible]

Unscheduled site visit ☐ or Scheduled site visit no. ______ of 14

THERMAL/CATALYTIC OXIDIZER	
Arrival Time (24:00 hour)	
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	
Alarm Lights on ?	
Restart Time (24:00 hour)	
Reading Time (24:00 hour)	1441
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	~~[illegible]~~ 45.0
Flow ~~(in. of H2O)~~ (3") FPM	
~~Temperature (°F)~~	
Dilution Air (pipe dia. 3")	
Dilution Air Flow (In. of H2O)	.95
~~Temperature (°F)~~	

THERMAL/CATALYTIC OXDIZER	
After Blower (I2) [system] {Pipe Dia. 4"}	~~[illegible]~~
Pressure (In. of H2O)	~~5~~ 4.7
System Influent Flow (in. of H2O)	.41
Temperature (°F)	166
Effluent (E-1) [Stack dimensions:10"x10"]	
~~Effluent flow (In. of H2O)~~	
Stack Temperature (°F)	~~638~~ 645
System	
Fire Box Temperature (°F)	603
Set Point (°F)	610
Total Hours	1954.50
Electric Meter (kwh)	40693
Natural Gas (%)	

Do once every 2 weeks for the first 3 months; monthly thereafter

FID READINGS (ppm)	I-1	I-2	E-1
Date:			
Date:			

Do Monthly:

Total Air Sparge Press. (psi)=	***Total Air Sparge Flow Rate (cfm)=***	**Total Air Sparge Temp. (°F)=**

Do Monthly:

WELL FIELD

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum/Pressure (psi or in. of H2O)	Air Flow (~~in. of H2O~~ or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"	NA	0	CLOSED	N/A	N/A		N/A
AV-2	2"	5-14	2"	39.9	1200	Full open	N/A	N/A		N/A
AV-3	2"	5-14	2"	40.1	300-400	Full open	N/A	N/A		N/A
AV-4	4"	5-14	2"	40.7	150-250	Full open	N/A	N/A		N/A
AV-5	4"	5-14	2"	NA	0	CLOSED	N/A	N/A		N/A
AV-6	4"	5-14	2"	N/A	0	CLOSED	N/A	N/A		N/A
AV-7	4"	5-14	2"	39.7	NA intermittent	60% open	N/A	N/A		N/A
A-1	3"	9-25	2"	40.5	25	Full open				
A-2	3"	10-25	2"	NA	0	CLOSED				
A-3	3"	9-29.5	2"	39.8	150	Full open				
A-4	3"	8-28	2"	NA	0	CLOSED				
AR-2	4"	8.5-28.5	2"	40.2	400	Full open				
ADR-1	4"	5-22	2"	40.3	200-300	Full open				
ADR-2	4"	5-22	2"	40.2	50-350	Full open				
AS-3	2"	26-29	2"	PSI ↓					N/A	
AS-2	2"	21-23	2"						N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

Special Instructions:
Remember to use ARCO chain-of-custody forms. *Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms.* Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: MAdler Date: 12-6-94 Project: 0805-129 01

ARCO 2169 . San Jose . Operation Maintenance Log Sheet for 1995 . Project: 0805-129.01

REMARKS: Started System on fresh air dilution at 1141 - called Kelli for ATI confirmation
START WELL FIELD @ 1458 & HR meter = 1958.25 HRS. Installed with K.O. line to drums. (Order 3 Ashcroft Temp. gauges)
AV-1 - We couldnt draw air for FID or LAB Sample - No Flow

Unscheduled site visit ☐ or Scheduled site visit no. _____ of 14

THERMAL/CATALYTIC OXIDIZER	
Arrival Time (24:00 hour)	—
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	—
Alarm Lights on ?	—
Restart Time (24:00 hour)	1458
Reading Time (24:00 hour)	1526
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	35
Flow (velocity: ft/min) **(pipe dia. 3")**	800 -900
Temperature (°F)	NOT INSTALLED
Dilution Air (pipe dia. 3")	45% OPEN
Dilution Air Flow (In. of H2O)	.25
Temperature (°F)	NOT INSTALLED

THERMAL/CATALYTIC OXDIZER	
After Blower (system) (I2) (pipe dia. 4")	
Pressure (In. of H2O)	2.0
System Influent Flow (in. of H2O) Total Air Flow	.14
Temperature (°F)	205
Effluent (E-1) [Stack dimensions:10"x10"]	
~~Effluent flow (In. of H2O)~~	
Stack Temperature (°F)	654
System	
Fire Box Temperature (°F)	610
Set Point (°F)	610
Total Hours	1958.72
Electric Meter (kwh)	40768
Natural Gas Meter 2197	2197

Do once every 2 weeks for the first 3 months; monthly thereafter

FID READINGS (ppm)	I-1	I-2	E-1
Date: 12-15-95	>1000	240	5.72
Date: AMB = 2.0			

Calibrated w/ 50 Methane

AV-3 = DTW - 3.27 TD = 13.70

AR-1 DTW = 10.17' TD = 27.30'

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum (in. of H2O)	Air Flow (~~in. of H2O~~ or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet) ↓	TD ↓	FID/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"	32	0	Full open	N/A	11.41	N/A 13.10	NA	N/A
AV-2	2"	5-14	2"	35	120	Full open	N/A	9.95	N/A 12.20	2.1	N/A
AV-3	2"	5-14	2"				N/A	~~10.55~~	N/A ~~26.10~~		N/A
AV-4	4"	5-14	2"	34	200	Full open	N/A	—	N/A 7.50	>1000 (i)	N/A
AV-5	4"	5-14	2"				N/A	N/A	N/A N/A		N/A
AV-6	4"	5-14	2"	11	150	10%	N/A	7.77	N/A 12.70	310	N/A
AV-7	4"	5-14	2"				N/A	3.52	N/A 6.5		N/A
A-1	3"	9-25	2"					9.37	23.10		
A-2	3"	10-25	2"					9.93	24.50		
A-3	3"	9-29.5	2"					10.55	26.10		
A-4	3"	8-28	2"					9.04	27.50		
AR-2	4"	8.5-28.5	2"					16.59	27.90		
ADR-1	4"	5-22	2"	35	100-250	Full open		*9.17	20.80	~~>1000~~ (i)	
ADR-2	4"	5-22	2"	36	100-300	Full open		*10.17	23.60	>1000	

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Pressure (psig)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AS-3	2"	26-29	2"						N/A	
AS-2	2"	21-23	2"	NA					N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

(i) Flame blows out of FID

Total Air Sparge Press. (psi)= NA **Total Air Sparge Flow Rate (cfm)=** NA **Total Air Sparge Temp. (°F)=** NA

Special Instructions:
Remember to use ARCO chain-of-custody forms. Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms. Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: V. Whitten / M. Adler Date: 12-15-94 **Project: 0805-129.01**

* ADR-2 = Dark product in well. * ADR-1 = Product in well - Dark

ARCO 2169 . San Jose . Operation Maintenance Log Sheet for 1995 . Project: 0805-129.01

REMARKS:
There are drums of soil knocked over + spill in fenced in area - No labels on drums (4 drums total 2 knocked over)

Unscheduled site visit ☐ or Scheduled site visit no. _____ of 14

THERMAL/CATALYTIC OXIDIZER	
Arrival Time (24:00 hour)	
System Status (on or off)	
Shutdown Time (24:00 hour)	
Alarm Lights on ?	
Restart Time (24:00 hour)	1458
Reading Time (24:00 hour)	1710
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	35
Flow (velocity: ft/min) (pipe dia. 3")	700-800
Temperature (°F)	NA
Dilution Air (pipe dia. 3")	45% open
Dilution Air Flow (In. of H2O)	.25
Temperature (°F)	NA

THERMAL/CATALYTIC OXDIZER	
After Blower (system) (I2) (pipe dia. 4")	
Pressure (In. of H2O)	2.0
System Influent Flow (in. of H2O)	.14
Temperature (°F)	200
Effluent (E-1) [Stack dimensions:10"x10"]	
~~Effluent flow (In. of H2O)~~	
Stack Temperature (°F)	635
System	
Fire Box Temperature (°F)	614
Set Point (°F)	610
Total Hours	1960.45
Electric Meter (kwh)	
Natural Gas (%)	

Do once every 2 weeks for the first 3 months; monthly thereafter

FID READINGS (ppm)	I-1	I-2	E-1
Date:			
Date:			

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum (in. of H2O)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"	32			N/A	N/A		N/A
AV-2	2"	5-14	2"	35			N/A	N/A		N/A
AV-3	2"	5-14	2"				N/A	N/A		N/A
AV-4	4"	5-14	2"	33			N/A	N/A		N/A
AV-5	4"	5-14	2"				N/A	N/A		N/A
AV-6	4"	5-14	2"	10			N/A	N/A		N/A
AV-7	4"	5-14	2"				N/A	N/A		N/A
A-1	3"	9-25	2"							
A-2	3"	10-25	2"							
A-3	3"	9-29.5	2"							
A-4	3"	8-28	2"							
AR-2	4"	8.5-28.5	2"							
ADR-1	4"	5-22	2"	35						
ADR-2	4"	5-22	2"	35						

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Pressure (psig)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AS-3	2"	26-29	2"						N/A	
AS-2	2"	21-23	2"						N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

Total Air Sparge Press. (psi)=	Total Air Sparge Flow Rate (cfm)=	Total Air Sparge Temp. (°F)=

Special Instructions:
Remember to use ARCO chain-of-custody forms. Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms. Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: MAdler Date: 12-15-94 **Project: 0805-129.01**

ARCO 2169 . San Jose Operation Maintenance Log Sheet No. 95 . Project: 0805-129.01

REMARKS: System on & running upon arrival - Took well field & vent readings
Took w/ell PIDs and I-1, I-2, & E-1 PID readings
Install Thermometer at Dilution Air & I-1
Air streams very moist - velocity readings may be inaccurate
Cleaned up - trash off pad - blew out

Unscheduled site visit ☐ or Scheduled site visit no. 2 of 14

THERMAL/CATALYTIC OXIDIZER	
Arrival Time (24:00 hour)	0811
System Status (on or off)	ON
Shutdown Time (24:00 hour)	—
Alarm Lights on ?	NONE
Restart Time (24:00 hour)	—
Reading Time (24:00 hour)	0922
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	36.0 - 36.3
Flow (velocity: ft/min) **(pipe dia. 3")**	300-400
Temperature (°F)	51
Dilution Air (pipe dia. 3")	
Dilution Air Flow (In. of H2O)	.25
Temperature (°F)	50

THERMAL/CATALYTIC OXDIZER	
After Blower (system) (12) (pipe dia. 4")	
Pressure (In. of H2O)	1.5
System Influent Flow (in. of H2O)	.12
Temperature (°F)	210
Effluent (E-1) [Stack dimensions:10"x10"]	
Effluent flow (In. of H2O)	NA
Stack Temperature (°F)	614
System	
Fire Box Temperature (°F)	618
Set Point (°F)	610
Total Hours	2305.54
Electric Meter (kwh)	44560
Natural Gas (~~%~~) Meter Cubic Feet	2428

Do once every 2 weeks for the first 3 months; monthly thereafter

(~~BB~~) READINGS (ppm)	I-1	I-2	E-1
Date: (FID) 12/30/94	1.2	0.0	6.5
Date:			

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum (in. of H2O)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"	33.5 - 34.9	25	Full open	N/A	N/A	0.0	N/A
AV-2	2"	5-14	2"	33.9 - 34.9	500 - 600	Full open	N/A	N/A	2.5	N/A
AV-3	2"	5-14	2"			CLOSED	N/A	N/A		N/A
AV-4	4"	5-14	2"	32.9 - 35.1	400 - 600	Full open	N/A	N/A	0.0	N/A
AV-5	4"	5-14	2"			CLOSED	N/A	N/A		N/A
AV-6	4"	5-14	2"	0.9 - 1.0	25	10% open	N/A	N/A	0.0	N/A
AV-7	4"	5-14	2"			CLOSED	N/A	N/A		N/A
A-1	3"	9-25	2"							
A-2	3"	10-25	2"							
A-3	3"	9-29.5	2"							
A-4	3"	8-28	2"							
AR-2	4"	8.5-28.5	2"							
ADR-1	4"	5-22	2"	33.6 - 34.7	25	Full open			8.4	NA
ADR-2	4"	5-22	2"	33.6 - 34.9	300 - 400	Full open			8.1	NA

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Pressure (psig)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AS-3	2"	26-29	2"						N/A	
AS-2	2"	21-23	2"						N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

Total Air Sparge Press. (psi)= NA | **Total Air Sparge Flow Rate (cfm)=** NA | **Total Air Sparge Temp. (°F)=** NA

Special Instructions:
Remember to use ARCO chain-of-custody forms. Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms. Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: Mahler Date: 12/30/94 **Project: 0805-129.01**

ARCO 2169 . San Jose Operation Maintenance Log Sheet for 95 . Project: 0805-129.01

REMARKS: Turned off all wells but ADR-1 > ADR-2 & AV-1 I-1 = 29.6 ppm But rapid reading to verify I-1 = 0.0 Tried different valve setting but continued to get NO readings on PID. So I Heated all wells except ADR-1 & ADR-2 and opened manual Dilution Valve I-1 readings came up instantly
I-1 = 240 ppm I-1 = 302 PPM I-1 (ADR-1 & ADR-2 only) = 32 ppm

SEE NEXT SHEET Unscheduled site visit ☐ or Scheduled site visit no. _____ of 14

THERMAL/CATALYTIC OXIDIZER	
Arrival Time (24:00 hour)	0811
System Status (on or off)	ON
Shutdown Time (24:00 hour)	—
Alarm Lights on ?	—
Restart Time (24:00 hour)	—
Reading Time (24:00 hour)	1115
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	36.2 - 37.1
Flow (velocity: ft/min) **(pipe dia. 3")**	100 - 300
Temperature (°F)	
Dilution Air (pipe dia. 3")	
Dilution Air Flow (In. of H2O)	
Temperature (°F)	

THERMAL/CATALYTIC OXDIZER	
After Blower (system) (I2) (pipe dia. 4")	
Pressure (In. of H2O)	
System Influent Flow (in. of H2O)	
Temperature (°F)	
Effluent (E-1) [Stack dimensions:10"x10"]	
Effluent flow (In. of H2O)	
Stack Temperature (°F)	
System	
Fire Box Temperature (°F)	
Set Point (°F)	
Total Hours	
Electric Meter (kwh)	
Natural Gas (%)	

Do once every 2 weeks for the first 3 months; monthly thereafter

FID READINGS (ppm)	I-1	I-2	E-1
Date: 12/30/94	27.6	3.5	
Date:			

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum (in. of H2O)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"	~~36.2-36.7~~	~~700-800~~	Full open	N/A	N/A	0.0	N/A
AV-2	2"	5-14	2"			Closed/Not	N/A	N/A		N/A
AV-3	2"	5-14	2"				N/A	N/A		N/A
AV-4	4"	5-14	2"				N/A	N/A		N/A
AV-5	4"	5-14	2"				N/A	N/A		N/A
AV-6	4"	5-14	2"				N/A	N/A		N/A
AV-7	4"	5-14	2"	Anomalies getting wet from			N/A	N/A		N/A
A-1	3"	9-25	2"	air stream at wells - I don't think						
A-2	3"	10-25	2"	these flows are correct.						
A-3	3"	9-29.5	2"							
A-4	3"	8-28	2"							
AR-2	4"	8.5-28.5	2"							
ADR-1	4"	5-22	2"	36.3 - 36.6	150-200	Full open			0.0	
ADR-2	4"	5-22	2"	36.1-36.5	600-600	Full open			0.2	

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Pressure (psig)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AS-3	2"	26-29	2"						N/A	
AS-2	2"	21-23	2"						N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

Total Air Sparge Press. (psi)= | **Total Air Sparge Flow Rate (cfm)=** | **Total Air Sparge Temp. (°F)=**

Special Instructions:
Remember to use ARCO chain-of-custody forms. Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms. Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: MAdler Date: 12/30/94 **Project: 0805-129.01**

ARCO 2169 . San Jose Operation Maintenance Log Sheet for 95 . Project: 0805-129.01

REMARKS: By lowering overall vacuum - flow increased with higher concentration - Could just lower vacuum at each well - valves had to be almost full closed which interfered with flow - Re-took all readings No water in KO drum.
Changed set point to 625° due to increased dilution air cooling system.

Unscheduled site visit ☐ or Scheduled site visit no. _____ of 14

THERMAL/CATALYTIC OXIDIZER		
Arrival Time (24:00 hour)		0811
System Status (on or off)		ON
Shutdown Time (24:00 hour)		—
Alarm Lights on ?		NONE
Restart Time (24:00 hour)		—
Reading Time (24:00 hour)		1158
Well Field	(I1) (before dilution)	
Vacuum (In. of H2O)		16.5
Flow (velocity: ft/min)	(pipe dia. 3")	200 - 300
Temperature (°F)		~~54~~ 54
Dilution Air	(pipe dia. 3")	
Dilution Air Flow (In. of H2O)		1.35
Temperature (°F)		51

THERMAL/CATALYTIC OXDIZER	
After Blower (system) (I2) (pipe dia. 4")	
Pressure (In. of H2O)	4.0
System Influent Flow (in. of H2O)	.35
Temperature (°F)	165
Effluent (E-1) [Stack dimensions:10"x10"]	
Effluent flow (In. of H2O)	NA
Stack Temperature (°F)	592 → 613
System	
Fire Box Temperature (°F)	612 → 628
Set Point (°F)	610 → 625
Total Hours	2308.08
Electric Meter (kwh)	NA
Natural Gas (%)	

Do once every 2 weeks for the first 3 months; monthly thereafter

PID READINGS (ppm)	I-1	I-2	E-1
Date: 12/30/94	~~[illegible]~~	~~[illegible]~~	
Date:	236	51.4	18.4

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Vacuum (in. of H2O)	Air Flow ~~(in. of H2O)~~ or (fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	~~FID~~/PID Reading(ppm)	DO (ppm)
AV-1	2"	5-14	2"			Vent	N/A	N/A		N/A
AV-2	2"	5-14	2"			Vent	N/A	N/A		N/A
AV-3	2"	5-14	2"			Vent	N/A	N/A		N/A
AV-4	4"	5-14	2"	16.2	50-75	Full open	N/A	N/A	679	N/A
AV-5	4"	5-14	2"			Vent	N/A	N/A		N/A
AV-6	4"	5-14	2"	16.1	100-150	Full open	N/A	N/A	42.3	N/A
AV-7	4"	5-14	2"			Vent	N/A	N/A		N/A
A-1	3"	9-25	2"							
A-2	3"	10-25	2"							
A-3	3"	9-29.5	2"							
A-4	3"	8-28	2"							
AR-2	4"	8.5-28.5	2"							
ADR-1	4"	5-22	2"	16.2	25-50	Full open			39.6	
ADR-2	4"	5-22	2"	16.2	50-100	Full open			273	

Well ID	Well Dia.	Screen interval	Pipe Dia (in compound)	Pressure (psig)	Air Flow (in. of H2O or fpm)	Valve Position (% open)	DTFP (feet)	DTW (feet)	FID/PID Reading(ppm)	DO (ppm)
AS-3	2"	26-29	2"						N/A	
AS-2	2"	21-23	2"						N/A	
AS-1	2"	27-29	2"						N/A	
AS-5	2"	20.5-22.5	2"						N/A	
AS-4	2"	20-22	2"						N/A	

Total Air Sparge Press. (psi)= NA **Total Air Sparge Flow Rate (cfm)=** NA **Total Air Sparge Temp. (°F)=** NA

Special Instructions:
Remember to use ARCO chain-of-custody forms. Please include all analytical method numbers, as indicated on the O&M request forms and on the chain-of-custody forms. Request TPHG, BTEX, and benzene results in mg/m3 on the chain-of-custody forms.

Operator: MAdler Date: 12-30-94 **Project: 0805-129.01**