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

ENVIRONMENTAL PROTECTION
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Date March 17, 1995
Project 0805-135.01

To:

Ms. Susan Hugo
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 report for ARCO service station 6148, 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 report is being sent to you per the request of ARCO Products Company. Plaese call if you have questions or comments.

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 17, 1995

Re: ARCO Station # 6148 • 5131 Shattuck Avenue • Oakland, CA
Fourth Quarter 1994 Groundwater Monitoring 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
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

March 17, 1995
Project 0805-135.01

Mr. Michael Whelan
ARCO Products Company
2155 South Bascom Avenue, Suite 202
Campbell, California 94008

Re: Fourth quarter 1994 groundwater monitoring program results, ARCO service station 6148, 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 6148, 5131 Shattuck Avenue, Oakland, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

BACKGROUND

On June 1, 1987, a waste-oil tank was removed from the site by Crosby and Overton and Erico Construction. In December 1991, RESNA conducted an initial subsurface environmental investigation, which included installing three groundwater monitoring wells (MW-1, MW-2, and MW-3). In October 1992, a second phase of investigation was conducted by RESNA, which included installing four additional groundwater monitoring wells, MW-4 through MW-7. Between April 1993 and July 1993, RESNA conducted a third phase of investigation, which included installing one air-sparge (AS) well (AS-1), one combination air-sparge/vapor extraction well (AS-2/NW-2), and two vadose wells (VW-1 and VW-3). Combination AS and soil-vapor extraction (SVE) pilot tests were performed at the site in February 1994.

Groundwater monitoring and sampling activities at this site were initiated in December 1991 and March 1992, respectively. There are currently seven groundwater monitoring wells, three vadose wells, and two AS wells on site (Figure 2). For additional background information, please refer to *Report of Findings, Air Sparge Pilot Test at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California* (RESNA June 7, 1994).

EMCON is currently evaluating results of the AS and SVE tests to select an appropriate off-gas abatement system for SVE and AS remediation at this site.

Wells MW-1 through MW-7 are monitored quarterly.

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 MW-1 through MW-7, (2) purging and subsequently sampling groundwater monitoring wells MW-1 through MW-7 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. The results of IWM's field work were transmitted to EMCON in a report dated December 15, 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); benzene, toluene, ethylbenzene, and total xylenes (BTEX); and halogenated volatile organic compounds (VOCs). Groundwater samples were prepared for analysis by U.S. Environmental Protection Agency (USEPA) method 5030 (purge and trap). Groundwater was 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 VOCs by USEPA method 8010, and BTEX by USEPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA, SW-846, November 1986, Third Edition). Groundwater samples collected from well MW-3 were also analyzed for semivolatile organic compounds (SVOCs) by USEPA method 3520/8270, and total recoverable petroleum hydrocarbons (TRPH) by USEPA method 418.1. 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 2. 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 TRPH analyses. Table 4 summarizes historical laboratory data for VOC and SVOC analyses. Historical laboratory data for diesel and metals analyses are

summarized in Table 5. Copies of the fourth quarter 1994 analytical results and chain-of-custody documentation are included in Appendix B.

MONITORING PROGRAM EVALUATION

Groundwater elevation data collected on November 16, 1994, illustrate that groundwater beneath the site flows southwest at an approximate hydraulic gradient of 0.02 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the fourth quarter of 1994.

Groundwater samples collected from well MW-7 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples collected from wells MW-1 through MW-5 contained concentrations of TPHG from 110 to 49,000 parts per billion (ppb) and concentrations of benzene from 31 to 5,900 ppb. Groundwater samples collected from well MW-6 contained 1.1 ppb benzene, but did not contain detectable concentrations of TPHG (<50 ppb). Groundwater samples collected from well MW-3 contained 2.3 parts per million (ppm) TRPH. Similar analytical results were reported for these wells during previous monitoring events.

Groundwater samples collected from wells MW-1 through MW-7 contained detectable levels of VOCs at concentrations similar to those from previous monitoring events (Table 4). Groundwater samples collected from well MW-3 contained detectable levels of SVOCs at concentrations similar to those from previous monitoring events (Table 4). Based on groundwater flow direction and distribution of halogenated VOC and SVOC concentrations in wells at the site, EMCON believes the halogenated VOC and SVOC compounds detected at the site may be coming from an upgradient source.

LIMITATIONS

Field procedures were performed by, and field data were acquired from, IWM. EMCON does not warrant the accuracy of data supplied by IWM. EMCON's scope of work was limited to interpreting field data, which included evaluating trends in the groundwater gradient, groundwater flow direction, and dissolved-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 therefore 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 work performed during the monitoring event.

SITE STATUS UPDATE

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

Fourth Quarter 1994 Activities

- Prepared and submitted quarterly groundwater monitoring report for third quarter 1994.
- Performed quarterly groundwater monitoring for fourth quarter 1994.

Work Anticipated First Quarter 1995

- Prepare and submit quarterly groundwater monitoring report for fourth quarter 1994.
- Perform quarterly groundwater monitoring for first quarter 1995. Based on eight consecutive quarters of nondetectable TPHG and BTEX analytical results for well MW-7, ARCO will begin sampling well MW-7 semiannually (second and fourth quarters). Wells MW-1 through MW-6 will be sampled quarterly. Water levels in all wells will be measured quarterly.
- Initiate design and permitting of the interim soil-vapor extraction and air-sparge remediation systems.

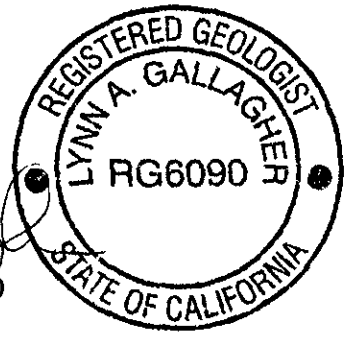
Please call if you have questions.

Sincerely,

EMCON

David Larsen
Project Coordinator

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



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Attachments:

Table 1 -	Groundwater Monitoring Data, Fourth Quarter 1994
Table 2 -	Historical Groundwater Elevation Data
Table 3 -	Historical Groundwater Analytical Data (TPHG, BTEX, and TRPH)
Table 4 -	Historical Groundwater Analytical Data (VOCs and SVOCs)
Table 5 -	Historical Groundwater Analytical Data (Diesel and Metals)
Figure 1 -	Site Location
Figure 2 -	Groundwater Data, Fourth Quarter 1994
Appendix A -	Field Data Report, Integrated Wastestream Management, December 15, 1994
Appendix B -	Analytical Results and Chain-of-Custody Documentation, Fourth Quarter 1994

cc: [redacted]
Kevin Graves, RWQCB - SFBR

Table 1
Groundwater Monitoring Data
Fourth Quarter 1994
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Level Field Date	TOC Elevation	Depth to Water	Ground-Water Elevation	Floating Product Thickness	Ground-Water Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TOG or TRPH
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		ppb	ppb	ppb	ppb	ppb	ppm
MW-1	11-16-94	108.03	17.04	90.99	ND	SW	0.02	11-16-94	650	260	38	6.1	15	NA
MW-2	11-16-94	107.43	16.73	90.70	ND	SW	0.02	11-16-94	49000	3300	8300	1400	7200	NA
MW-3	11-16-94	107.77	16.91	90.86	ND	SW	0.02	11-16-94	18000	1400	560	790	2800	2.3
MW-4	11-16-94	106.58	14.99	91.59	ND	SW	0.02	11-16-94	110	31	<0.5	<0.5	<0.5	NA
MW-5	11-16-94	106.68	16.12	90.56	ND	SW	0.02	11-16-94	17000	5900	700	440	320	NA
MW-6	11-16-94	105.16	13.11	92.05	ND	SW	0.02	11-16-94	<50	1.1	<0.5	<0.5	<0.5	NA
MW-7	11-16-94	107.08	13.37	93.71	ND	SW	0.02	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	NA

TOC = Top of casing
ft-MSL = Elevation in feet, relative to mean sea level
MWN = Ground-water flow direction and gradient apply to the entire monitoring well network
TPHG = Total petroleum hydrocarbons as gasoline
TOG = Total oil and grease measured by EPA Method 5520 C&F
TRPH = Total recoverable petroleum hydrocarbons measured by EPA Method 418.1
ppb = Parts per billion or micrograms per liter (µg/l)
ppm = Parts per million or milligrams per liter (mg/l)
ND = None detected
SW = Southwest
NA = Not analyzed

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Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-1	12-23-91	108.03	18.26	89.77	Sheen	NR	NR
MW-1	01-07-92	108.03	17.44	90.59	Sheen	NR	NR
MW-1	01-19-92	108.03	17.17	90.86	ND	NR	NR
MW-1	02-19-92	108.03	16.52	91.51	ND	NR	NR
MW-1	03-18-92	108.03	16.81	91.22	ND	NR	NR
MW-1	04-20-92	108.03	17.56	90.47	ND	NR	NR
MW-1	05-15-92	108.03	17.96	90.07	ND	NR	NR
MW-1	06-12-92	108.03	18.16	89.87	ND	NR	NR
MW-1	07-15-92	108.03	18.32	89.71	ND	NR	NR
MW-1	08-07-92	108.03	18.34	89.69	ND	NR	NR
MW-1	09-14-92	108.03	18.46	89.57	ND	NR	NR
MW-1	10-07-92	108.03	18.52	89.51	ND	NR	NR
MW-1	11-12-92	108.03	18.11	89.92	ND	NR	NR
MW-1	12-09-92	108.03	17.10	90.93	ND	NR	NR
MW-1	01-21-93	108.03	15.44	92.59	ND	NR	NR
MW-1	02-22-93	108.03	16.54	91.49	ND	NR	NR
MW-1	03-25-93	108.03	17.05	90.98	ND	NR	NR
MW-1	04-14-93	108.03	17.45	90.58	ND	NR	NR
MW-1	05-22-93	108.03	17.78	90.25	ND	NR	NR
MW-1	06-17-93	108.03	17.90	90.13	ND	NR	NR
MW-1	07-27-93	108.03	18.10	89.93	ND	NR	NR
MW-1	08-29-93	108.03	18.31	89.72	ND	NR	NR
MW-1	09-30-93	108.03	18.24	89.79	ND	NR	NR
MW-1	11-16-93	108.03	18.17	89.86	ND	NR	NR
MW-1	02-02-94	108.03	17.31	90.72	ND	NR	NR
MW-1	04-29-94	108.03	17.31	90.72	ND	NR	NR
MW-1	08-02-94	108.03	17.95	90.08	ND	SW	0.017
MW-1	11-16-94	108.03	17.04	90.99	ND	SW	0.02

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

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
MW-2	12-23-91	107.43	17.98	89.45	Sheen	NR	NR
MW-2	01-07-92	107.43	17.15	90.28	Sheen	NR	NR
MW-2	01-19-92	107.43	17.47	89.96	ND	NR	NR
MW-2	02-19-92	107.43	16.28	91.15	ND	NR	NR
MW-2	03-18-92	107.43	16.52	90.91	ND	NR	NR
MW-2	04-20-92	107.43	17.27	90.16	ND	NR	NR
MW-2	05-15-92	107.43	17.62	89.81	ND	NR	NR
MW-2	06-12-92	107.43	^17.63	^89.80	0.05	NR	NR
MW-2	07-15-92	107.43	17.65	89.78	ND	NR	NR
MW-2	08-07-92	107.43	17.80	89.63	ND	NR	NR
MW-2	09-14-92	107.43	^18.09	^89.34	0.55	NR	NR
MW-2	10-07-92	107.43	^18.55	^88.88	0.31	NR	NR
MW-2	11-12-92	107.43	17.95	89.48	Sheen	NR	NR
MW-2	12-09-92	107.43	^16.85	^90.58	0.02	NR	NR
MW-2	01-21-93	107.43	^15.08	^92.35	0.01	NR	NR
MW-2	02-22-93	107.43	^16.20	^91.23	0.01	NR	NR
MW-2	03-25-93	107.43	^16.72	^90.71	0.01	NR	NR
MW-2	04-14-93	107.43	^17.15	^90.28	ND	NR	NR
MW-2	05-22-93	107.43	^17.44	^89.99	ND	NR	NR
MW-2	06-17-93	107.43	17.57	89.86	ND	NR	NR
MW-2	07-27-93	107.43	^17.71	^89.72	ND	NR	NR
MW-2	08-29-93	107.43	^18.20	^89.23	ND	NR	NR
MW-2	09-30-93	107.43	^18.14	^89.29	ND	NR	NR
MW-2	11-16-93	107.43	^17.85	^89.58	ND	NR	NR
MW-2	02-02-94	107.43	16.96	90.47	ND	NR	NR
MW-2	04-29-94	107.43	16.95	90.48	ND	NR	NR
MW-2	08-02-94	107.43	17.59	89.84	ND	SW	0.017
MW-2	11-16-94	107.43	16.73	90.70	ND	SW	0.02

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Desig-nation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-3	12-23-91	107.77	18.14	89.63	Sheen	NR	NR
MW-3	01-07-92	107.77	17.26	90.51	Sheen	NR	NR
MW-3	01-19-92	107.77	17.63	90.14	ND	NR	NR
MW-3	02-19-92	107.77	16.34	91.43	ND	NR	NR
MW-3	03-18-92	107.77	16.62	91.15	ND	NR	NR
MW-3	04-20-92	107.77	17.38	90.39	ND	NR	NR
MW-3	05-15-92	107.77	17.80	89.97	ND	NR	NR
MW-3	06-12-92	107.77	18.01	89.76	ND	NR	NR
MW-3	07-15-92	107.77	18.17	89.60	ND	NR	NR
MW-3	08-07-92	107.77	18.23	89.54	ND	NR	NR
MW-3	09-14-92	107.77	18.36	89.41	ND	NR	NR
MW-3	10-07-92	107.77	18.90	88.87	Sheen	NR	NR
MW-3	11-12-92	107.77	18.00	89.77	Sheen	NR	NR
MW-3	12-09-92	107.77	16.85	90.92	Droplets	NR	NR
MW-3	01-21-93	107.77	15.24	92.53	ND	NR	NR
MW-3	02-22-93	107.77	16.36	91.41	ND	NR	NR
MW-3	03-25-93	107.77	16.89	90.88	ND	NR	NR
MW-3	04-14-93	107.77	17.29	90.48	ND	NR	NR
MW-3	05-22-93	107.77	17.64	90.13	ND	NR	NR
MW-3	06-17-93	107.77	17.75	90.02	ND	NR	NR
MW-3	07-27-93	107.77	17.98	89.79	ND	NR	NR
MW-3	08-29-93	107.77	18.14	89.63	ND	NR	NR
MW-3	09-30-93	107.77	18.14	89.63	ND	NR	NR
MW-3	11-16-93	107.77	18.30	89.47	ND	NR	NR
MW-3	02-02-94	107.77	17.16	90.61	ND	NR	NR
MW-3	04-29-94	107.77	17.14	90.63	ND	NR	NR
MW-3	08-02-94	107.77	17.81	89.96	ND	SW	0.017
MW-3	11-16-94	107.77	16.91	90.86	ND	SW	0.02

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-4	11-12-92	106.58	16.08	90.50	ND	NR	NR
MW-4	12-09-92	106.58	15.00	91.58	ND	NR	NR
MW-4	01-21-93	106.58	13.35	93.23	ND	NR	NR
MW-4	02-22-93	106.58	14.48	92.10	ND	NR	NR
MW-4	03-25-93	106.58	15.06	91.52	ND	NR	NR
MW-4	04-14-93	106.58	15.50	91.08	ND	NR	NR
MW-4	05-22-93	106.58	15.79	90.79	ND	NR	NR
MW-4	06-17-93	106.58	14.90	91.68	ND	NR	NR
MW-4	07-27-93	106.58	16.11	90.47	ND	NR	NR
MW-4	08-29-93	106.58	16.21	90.37	ND	NR	NR
MW-4	09-30-93	106.58	16.23	90.35	ND	NR	NR
MW-4	11-16-93	106.58	16.30	90.28	ND	NR	NR
MW-4	02-02-94	106.58	15.36	91.22	ND	NR	NR
MW-4	04-29-94	106.58	15.36	91.22	ND	NR	NR
MW-4	08-02-94	106.58	15.94	90.64	ND	SW	0.017
MW-4	11-16-94	106.58	14.99	91.59	ND	SW	0.02
MW-5	11-12-92	106.68	16.81	89.87	ND	NR	NR
MW-5	12-09-92	106.68	16.40	90.28	ND	NR	NR
MW-5	01-21-93	106.68	14.58	92.10	ND	NR	NR
MW-5	02-22-93	106.68	15.65	91.03	ND	NR	NR
MW-5	03-25-93	106.68	16.07	90.61	ND	NR	NR
MW-5	04-14-93	106.68	16.34	90.34	ND	NR	NR
MW-5	05-22-93	106.68	16.56	90.12	ND	NR	NR
MW-5	06-17-93	106.68	Not surveyed:				
MW-5	07-27-93	106.68	16.80	89.88	ND	NR	NR
MW-5	08-29-93	106.68	16.93	89.75	ND	NR	NR
MW-5	09-30-93	106.68	16.97	89.71	ND	NR	NR
MW-5	11-16-93	106.68	17.03	89.65	ND	NR	NR
MW-5	02-02-94	106.68	16.38	90.30	ND	NR	NR
MW-5	04-29-94	106.68	16.41	90.27	ND	NR	NR
MW-5	08-02-94	106.68	16.81	89.87	ND	SW	0.017
MW-5	11-16-94	106.68	16.12	90.56	ND	SW	0.02

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Desig-nation	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
MW-6	11-12-92	105.16	14.05	91.11	ND	NR	NR
MW-6	12-09-92	105.16	13.37	91.79	ND	NR	NR
MW-6	01-21-93	105.16	11.76	93.40	ND	NR	NR
MW-6	02-22-93	105.16	12.62	92.54	ND	NR	NR
MW-6	03-25-93	105.16	13.04	92.12	ND	NR	NR
MW-6	04-14-93	105.16	13.47	91.69	ND	NR	NR
MW-6	05-22-93	105.16	13.80	91.36	ND	NR	NR
MW-6	06-17-93	105.16	13.88	91.28	ND	NR	NR
MW-6	07-27-93	105.16	14.13	91.03	ND	NR	NR
MW-6	08-29-93	105.16	14.19	90.97	ND	NR	NR
MW-6	09-30-93	105.16	14.34	90.82	ND	NR	NR
MW-6	11-16-93	105.16	14.41	90.75	ND	NR	NR
MW-6	02-02-94	105.16	13.60	91.56	ND	NR	NR
MW-6	04-29-94	105.16	13.66	91.50	ND	NR	NR
MW-6	08-02-94	105.16	13.99	91.17	ND	SW	0.017
MW-6	11-16-94	105.16	13.11	92.05	ND	SW	0.02
MW-7	11-12-92	107.08	14.75	92.33	ND	NR	NR
MW-7	12-09-92	107.08	12.55	94.53	ND	NR	NR
MW-7	01-21-93	107.08	11.52	95.56	ND	NR	NR
MW-7	02-22-93	107.08	12.82	94.26	ND	NR	NR
MW-7	03-25-93	107.08	13.43	93.65	ND	NR	NR
MW-7	04-14-93	107.08	13.98	93.10	ND	NR	NR
MW-7	05-22-93	107.08	14.41	92.67	ND	NR	NR
MW-7	06-17-93	107.08	14.50	92.58	ND	NR	NR
MW-7	07-27-93	107.08	14.82	92.26	ND	NR	NR
MW-7	08-29-93	107.08	15.05	92.03	ND	NR	NR
MW-7	09-30-93	107.08	15.04	92.04	ND	NR	NR
MW-7	11-16-93	107.08	15.12	91.96	ND	NR	NR
MW-7	02-02-94	107.08	14.04	93.04	ND	NR	NR
MW-7	04-29-94	107.08	14.10	92.98	ND	NR	NR
MW-7	08-02-94	107.08	14.61	92.47	ND	SW	0.017
MW-7	11-16-94	107.08	13.37	93.71	ND	SW	0.02
AS-2	09-30-93	NR	18.31	NR	ND	NR	NR

TOC = Top of casing
ft-MSL = Elevation in feet, relative to mean sea level
MWN = Ground-water flow direction and gradient apply to the entire monitoring well network
NR = Not reported; data not available
ND = None detected
SW = Southwest
^ = Groundwater elevation (GWE) and depth to water (DTW) adjusted to include 80 percent of the floating product thickness (FPT):
[GWE = (TOC - DTW) + (FPT x 0.8)]

Table 3
Historical Groundwater Analytical Data
(TPHG, BTEX, and TRPH)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TOG or TRPH
		ppb	ppb	ppb	ppb	ppb	ppm
MW-1	03-18-92	790	310	26	12	44	<0.5 (1.4)
MW-1	06-12-92	1000	290	15	10	30	<0.5
MW-1	09-14-92	1000	370	6.5	6.5	17	0.9
MW-1	10-07-92	590	200	19	6.7	19	<0.5
MW-1	01-22-93	1200	370	57	18	39	NA
MW-1	04-14-93	140	46	<2.5	<2.5	<2.5	NA
MW-1	09-30-93	220	64	0.9	2.2	4	NA
MW-1	11-16-93	180	53	0.7	1.7	4.1	NA
MW-1	02-02-94	250	93	<0.5	1.9	1	NA
MW-1	04-29-94	350	99	1.3	3.9	11	NA
MW-1	08-02-94	210	82	<1	<1	2.5	NA
MW-1	11-16-94	650	260	38	6.1	15	NA
MW-2	03-18-92	8400	1400	1000	220	870	1.2 (3.0)
MW-2	06-12-92	Not sampled: well contained floating product					
MW-2	09-14-92	Not sampled: well contained floating product					
MW-2	10-07-92	Not sampled: well contained floating product					
MW-2	01-22-93	Not sampled: well contained floating product					
MW-2	04-14-93	Not sampled: well contained floating product					
MW-2	09-30-93	Not sampled: well contained floating product					
MW-2	11-16-93	Not sampled: well contained floating product					
MW-2	02-02-94	16000	1300	2500	540	2700	NA
MW-2	04-29-94	11000	1400	1200	360	1400	NA
MW-2	08-02-94	4900	800	290	120	620	NA
MW-2	11-16-94	49000	3300	8300	1400	7200	NA
MW-3	03-18-92	20000	3200	560	380	1000	7.8 (8.1)
MW-3	06-12-92	46000	3400	4200	1300	5400	16
MW-3	09-14-92	53000	4300	5700	1300	7300	5.5
MW-3	10-07-92	Not sampled: well contained floating product					
MW-3	01-22-93	35000	2100	1400	1200	4400	31
MW-3	04-14-93	13000	1800	390	990	3500	26
MW-3	09-30-93	79000	2400	3400	1900	8100	23
MW-3	11-16-93	72000	1400	2100	1900	8300	38
MW-3	02-02-94	26000	1400	1200	1200	4400	7.7 (7.8)
MW-3	04-29-94	22000	1400	620	910	3400	10
MW-3	08-02-94	17000	530	410	720	2600	6.6
MW-3	11-16-94	18000	1400	560	790	2800	2.3

Table 3
Historical Groundwater Analytical Data
(TPHG, BTEX, and TRPH)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TOG or TRPH
		ppb	ppb	ppb	ppb	ppb	ppm
MW-4	11-12-92	77	32	<0.5	<0.5	<0.5	NA
MW-4	01-22-93	170	66	0.8	<0.5	1.5	NA
MW-4	04-14-93	<50	4.6	<0.5	<0.5	<0.5	NA
MW-4	09-30-93	52	13	<0.5	<0.5	<0.5	NA
MW-4	11-16-93	230	34	<0.5	<0.5	<0.5	NA
MW-4	02-02-94	<50	3.9	<0.5	<0.5	<0.5	NA
MW-4	04-29-94	<50	4.2	<0.5	<0.5	<0.5	NA
MW-4	08-02-94	<50	3.8	<0.5	<0.5	<0.5	NA
MW-4	11-16-94	110	31	<0.5	<0.5	<0.5	NA
MW-5	11-12-92	2900	1300	12	67	18	NA
MW-5	01-22-93	17000	5000	780	260	330	NA
MW-5	04-14-93	12000	4600	<50	180	130	NA
MW-5	09-30-93	4500	1100	<10	39	16	NA
MW-5	11-16-93	3300	700	<10	22	<10	NA
MW-5	02-02-94	10000	3000	65	240	78	NA
MW-5	04-29-94	7600	2400	27	130	44	NA
MW-5	08-02-94	1900	680	<10	24	<10	NA
MW-5	11-16-94	17000	5900	700	440	320	NA
MW-6	11-12-92	51	2.6	<0.5	<0.5	<0.5	NA
MW-6	01-22-93	<50	1.2	<0.5	<0.5	<0.5	NA
MW-6	04-14-93	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-6	09-30-93	74	2	<0.5	<0.5	<0.5	NA
MW-6	11-16-93	72	2.6	<0.5	<0.5	<0.5	NA
MW-6	02-02-94	61	2.2	<0.5	<0.5	<0.5	NA
MW-6	04-29-94	<50	0.6	<0.5	<0.5	<0.5	NA
MW-6	08-02-94	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-6	11-16-94	<50	1.1	<0.5	<0.5	<0.5	NA

Table 3
Historical Groundwater Analytical Data
(TPHG, BTEX, and TRPH)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TOG or TRPH
		ppb	ppb	ppb	ppb	ppb	ppm
MW-7	11-12-92	<50	1.8	<0.5	<0.5	<0.5	NA
MW-7	01-22-93	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	04-14-93	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	09-30-93	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	11-16-93	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	02-02-94	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	04-29-94	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	08-02-94	<50	<0.5	<0.5	<0.5	<0.5	NA
MW-7	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	NA
AS-2	09-30-93	<50	1.2	<0.5	<0.5	<0.5	NA

TPHG = Total petroleum hydrocarbons as gasoline
TOG = Total oil and grease measured by EPA Method 5520 C&F
TRPH = Total recoverable petroleum hydrocarbons measured by EPA Method 418.1
ppb = Parts per billion or micrograms per liter (µg/l)
ppm = Parts per million or milligrams per liter (mg/l)
NA = Not analyzed

Table 4
Historical Groundwater Analytical Data
(VOCs and SVOCs)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 03-06-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds (VOCs) by EPA Method 5030/601						Semi-Volatile Organic Compounds (SVOCs) by EPA Method 3510/8270			
		PCE	TCE	Chloroform	cis-1,2-DCE	Vinyl Chloride	1,1-DCA	Naphthalene	2-Methylnaphthalene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
MW-1	03-18-92	13	1.2	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	06-12-92	18	1.4	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	09-14-92	15	1.5	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	10-07-92	23	1.5	0.6	ND	ND	ND	NA	NA	NA	NA
MW-1	01-22-93	11	0.9	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	04-14-93	21	1.8	0.6	ND	ND	ND	ND	ND	ND	ND
MW-1	09-30-93	19	1.1	0.7	ND	ND	ND	NA	NA	NA	NA
MW-1	11-16-93	22	0.9	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	02-02-94	11	1.1	ND	ND	ND	ND	NA	NA	NA	NA
MW-1	04-29-94	13	1.3	0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
MW-1	08-02-94	15	1.4	0.7	0.7	<0.5	<0.5	NA	NA	NA	NA
MW-1	11-16-94	12	1.1	0.5	1.2	<0.5	<0.5	NA	NA	NA	NA
MW-2	03-18-92	19	2.22	ND	0.5	ND	ND	NA	NA	NA	NA
MW-2	06-12-92	Not sampled: well contained floating product									
MW-2	09-14-92	Not sampled: well contained floating product									
MW-2	10-07-92	Not sampled: well contained floating product									
MW-2	01-22-93	Not sampled: well contained floating product									
MW-2	04-14-93	Not sampled: well contained floating product									
MW-2	09-30-93	Not sampled: well contained floating product									
MW-2	11-16-93	Not sampled: well contained floating product									
MW-2	02-02-94	13	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-2	04-29-94	9.4	1.9	<0.5	2.2	<0.5	<0.5	NA	NA	NA	NA
MW-2	08-02-94	15	2	<0.5	2.9	<0.5	<0.5	NA	NA	NA	NA
MW-2	11-16-94	9.6	1.8	<0.5	2.1	<0.5	<0.5	NA	NA	NA	NA

Table 4
Historical Groundwater Analytical Data
(VOCs and SVOCs)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 03-06-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds (VOCs) by EPA Method 5030/601						Semi-Volatile Organic Compounds (SVOCs) by EPA Method 3510/8270			
		PCE	TCE	Chloroform	cis-1,2-DCE	Vinyl Chloride	1,1-DCA	Naphthalene	2-Methylnaphthalene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
MW-3	03-18-92	2.7	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-3	06-12-92	1.9	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-3	09-14-92	2	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-3	10-07-92	Not sampled: well contained floating product									
MW-3	01-22-93	1.9	ND	ND	ND	ND	ND	440	350	280	13
MW-3	04-14-93	1.7	ND	ND	ND	ND	ND	130	100	250	14
MW-3	09-30-93	1.2	ND	ND	ND	ND	ND	480	320	ND	ND
MW-3	11-16-93	1.5	ND	ND	ND	ND	ND	590	640	ND	ND
MW-3	02-02-94	ND*	ND*	ND*	ND*	ND*	ND*	160	91	9	ND
MW-3	04-29-94	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	110	50	<10	<10
MW-3	08-02-94	1	<0.5	<0.5	<0.5	<0.5	<0.5	120	53	10	<10
MW-3	11-16-94	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	100	53	<10	<10
MW-4	11-12-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	01-22-93	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	04-14-93	1.1	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-4	09-30-93	1.6	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-4	11-16-93	1.9	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-4	02-02-94	1.4	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-4	04-29-94	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
MW-4	08-02-94	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
MW-4	11-16-94	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA

Table 4
Historical Groundwater Analytical Data
(VOCs and SVOCs)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 03-06-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds (VOCs) by EPA Method 5030/601						Semi-Volatile Organic Compounds (SVOCs) by EPA Method 3510/8270			
		PCE	TCE	Chloroform	cis-1,2-DCE	Vinyl Chloride	1,1-DCA	Naphthalene	2-Methylnaphthalene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
MW-5	11-12-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	01-22-93	11	4.7	ND	1.8	ND	ND	ND	ND	ND	ND
MW-5	04-14-93	7.9	2	ND	1.5	0.9	ND	NA	NA	NA	NA
MW-5	09-30-93	17	2.8	ND	2.9	0.8	ND	NA	NA	NA	NA
MW-5	11-16-93	19	5.1	ND	4	ND	ND	NA	NA	NA	NA
MW-5	02-02-94	2.7	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-5	04-29-94	10	2.7	<0.5	2.4	<0.5	<0.5	NA	NA	NA	NA
MW-5	08-02-94	13	5.4	<0.5	5.7	<0.5	<0.5	NA	NA	NA	NA
MW-5	11-16-94	1.1	1	<0.5	3.5	1.3	<0.5	NA	NA	NA	NA
MW-6	11-12-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6	01-22-93	120	6.2	6.6	1.8	ND	ND	NA	NA	NA	NA
MW-6	04-14-93	120	5.8	ND	1.1	ND	6.3	NA	NA	NA	NA
MW-6	09-30-93	220	5.2	ND	2.7	ND	ND	NA	NA	NA	NA
MW-6	11-16-93	160	8.5	15	3.2	ND	ND	NA	NA	NA	NA
MW-6	02-02-94	100	ND	6.7	ND	ND	ND	NA	NA	NA	NA
MW-6	04-29-94	95	6.6	7.2	<2.5	<2.5	<2.5	NA	NA	NA	NA
MW-6	08-02-94	87	6.1	4.6	<2.5	<2.5	<2.5	NA	NA	NA	NA
MW-6	11-16-94	86	6.8	8.9	<2.5	<2.5	<2.5	NA	NA	NA	NA

Table 4
Historical Groundwater Analytical Data
(VOCs and SVOCs)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 03-06-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds (VOCs) by EPA Method 5030/601						Semi-Volatile Organic Compounds (SVOCs) by EPA Method 3510/8270			
		PCE	TCE	Chloroform	cis-1,2-DCE	Vinyl Chloride	1,1-DCA	Naphthalene	2-Methylnaphthalene	Bis(2-ethylhexyl) Phthalate	Di-n-octyl Phthalate
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
MW-7	11-12-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	01-22-93	6.8	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-7	04-14-93	4.3	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-7	09-30-93	2.5	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-7	11-16-93	4	ND	ND	ND	ND	ND	NA	NA	NA	NA
MW-7	02-02-94	3.4	ND	0.8	ND	ND	ND	NA	NA	NA	NA
MW-7	04-29-94	3.4	<0.5	1.1	<0.5	<0.5	<0.5	NA	NA	NA	NA
MW-7	08-02-94	3.3	<0.5	0.8	<0.5	<0.5	<0.5	NA	NA	NA	NA
MW-7	11-16-94	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
AS-2	09-30-93	29	1.5	1	ND	ND	ND	NA	NA	NA	NA

PCE = Tetrachloroethene
TCE = Trichloroethene
cis-1,2-DCE = cis-1,2-Dichloroethene
1,1-DCA = 1,1-Dichloroethane
ppb = Parts per billion or micrograms per liter (µg/l)
ND = Not detected
* = Sample was analyzed for volatile organic compounds using EPA Method 624 (only BTEX was detected)

Table 5
Historical Groundwater Analytical Data
(Diesel and Metals)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Desig-nation	Water Sample Field Date	TPHD	Cadmium by EPA 6010	Chromium by EPA 6010	Lead by EPA 7421	Zinc by EPA 6010	Nickel by EPA 6010
		ppb	ppb	ppb	ppb	ppb	ppb
MW-1	03-18-92	<50	<3	5	3	31	<20
MW-1	06-12-92	<50	NA	NA	NA	NA	NA
MW-1	09-14-92	<80	NA	NA	NA	NA	NA
MW-1	10-07-92	<50	NA	NA	NA	NA	NA
MW-1	01-22-93	NA	NA	NA	NA	NA	NA
MW-1	04-14-93	NA	<3	<5	3	25	<20
MW-1	09-30-93	NA	NA	NA	NA	NA	NA
MW-1	11-16-93	NA	NA	NA	NA	NA	NA
MW-1	02-02-94	NA	NA	NA	NA	NA	NA
MW-1	04-29-94	NA	NA	NA	NA	NA	NA
MW-1	08-02-94	NA	NA	NA	NA	NA	NA
MW-1	11-16-94	NA	NA	NA	NA	NA	NA
MW-2	03-18-92	230*	<3	21	9	54	38
MW-2	06-12-92	Not sampled: well contained floating product					
MW-2	09-14-92	Not sampled: well contained floating product					
MW-2	10-07-92	Not sampled: well contained floating product					
MW-2	01-22-93	Not sampled: well contained floating product					
MW-2	04-14-93	Not sampled: well contained floating product					
MW-2	09-30-93	Not sampled: well contained floating product					
MW-2	11-16-93	Not sampled: well contained floating product					
MW-2	02-02-94	NA	NA	NA	NA	NA	NA
MW-2	04-29-94	NA	NA	NA	NA	NA	NA
MW-2	08-02-94	NA	NA	NA	NA	NA	NA
MW-2	11-16-94	NA	NA	NA	NA	NA	NA
MW-3	03-18-92	2800*	<3	67	27	156	113
MW-3	06-12-92	1600*	NA	NA	NA	NA	NA
MW-3	09-14-92	40000*	NA	NA	NA	NA	NA
MW-3	10-07-92	Not sampled: well contained floating product					
MW-3	01-22-93	13000*	<3	10	8	28	23
MW-3	04-14-93	<50	<3	<5	3	25	<20
MW-3	09-30-93	17000*	<5	50	26	100	70
MW-3	11-16-93	NA	NA	NA	NA	NA	NA
MW-3	02-02-94	NA	NA	NA	NA	NA	NA
MW-3	04-29-94	NA	NA	NA	NA	NA	NA
MW-3	08-02-94	NA	NA	NA	NA	NA	NA
MW-3	11-16-94	NA	NA	NA	NA	NA	NA

Table 5
Historical Groundwater Analytical Data
(Diesel and Metals)

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Desig-nation	Water Sample Field Date	TPHD	Cadmium by EPA 6010	Chromium by EPA 6010	Lead by EPA 7421	Zinc by EPA 6010	Nickel by EPA 6010
		ppb	ppb	ppb	ppb	ppb	ppb
MW-4	11-12-92	NA	NA	NA	NA	NA	NA
MW-4	01-22-93	NA	NA	NA	NA	NA	NA
MW-4	04-14-93	NA	NA	NA	NA	NA	NA
MW-4	09-30-93	NA	NA	NA	NA	NA	NA
MW-4	11-16-93	NA	NA	NA	NA	NA	NA
MW-4	02-02-94	NA	NA	NA	NA	NA	NA
MW-4	04-29-94	NA	NA	NA	NA	NA	NA
MW-4	08-02-94	NA	NA	NA	NA	NA	NA
MW-4	11-16-94	NA	NA	NA	NA	NA	NA
MW-5	11-12-92	NA	NA	NA	NA	NA	NA
MW-5	01-22-93	NA	NA	NA	NA	NA	NA
MW-5	04-14-93	NA	NA	NA	NA	NA	NA
MW-5	09-30-93	NA	NA	NA	NA	NA	NA
MW-5	11-16-93	NA	NA	NA	NA	NA	NA
MW-5	02-02-94	NA	NA	NA	NA	NA	NA
MW-5	04-29-94	NA	NA	NA	NA	NA	NA
MW-5	08-02-94	NA	NA	NA	NA	NA	NA
MW-5	11-16-94	NA	NA	NA	NA	NA	NA
MW-6	11-12-92	NA	NA	NA	NA	NA	NA
MW-6	01-22-93	NA	NA	NA	NA	NA	NA
MW-6	04-14-93	NA	NA	NA	NA	NA	NA
MW-6	09-30-93	NA	NA	NA	NA	NA	NA
MW-6	11-16-93	NA	NA	NA	NA	NA	NA
MW-6	02-02-94	NA	NA	NA	NA	NA	NA
MW-6	04-29-94	NA	NA	NA	NA	NA	NA
MW-6	08-02-94	NA	NA	NA	NA	NA	NA
MW-6	11-16-94	NA	NA	NA	NA	NA	NA

Table 5
Historical Groundwater Analytical Data
(Diesel and Metals)

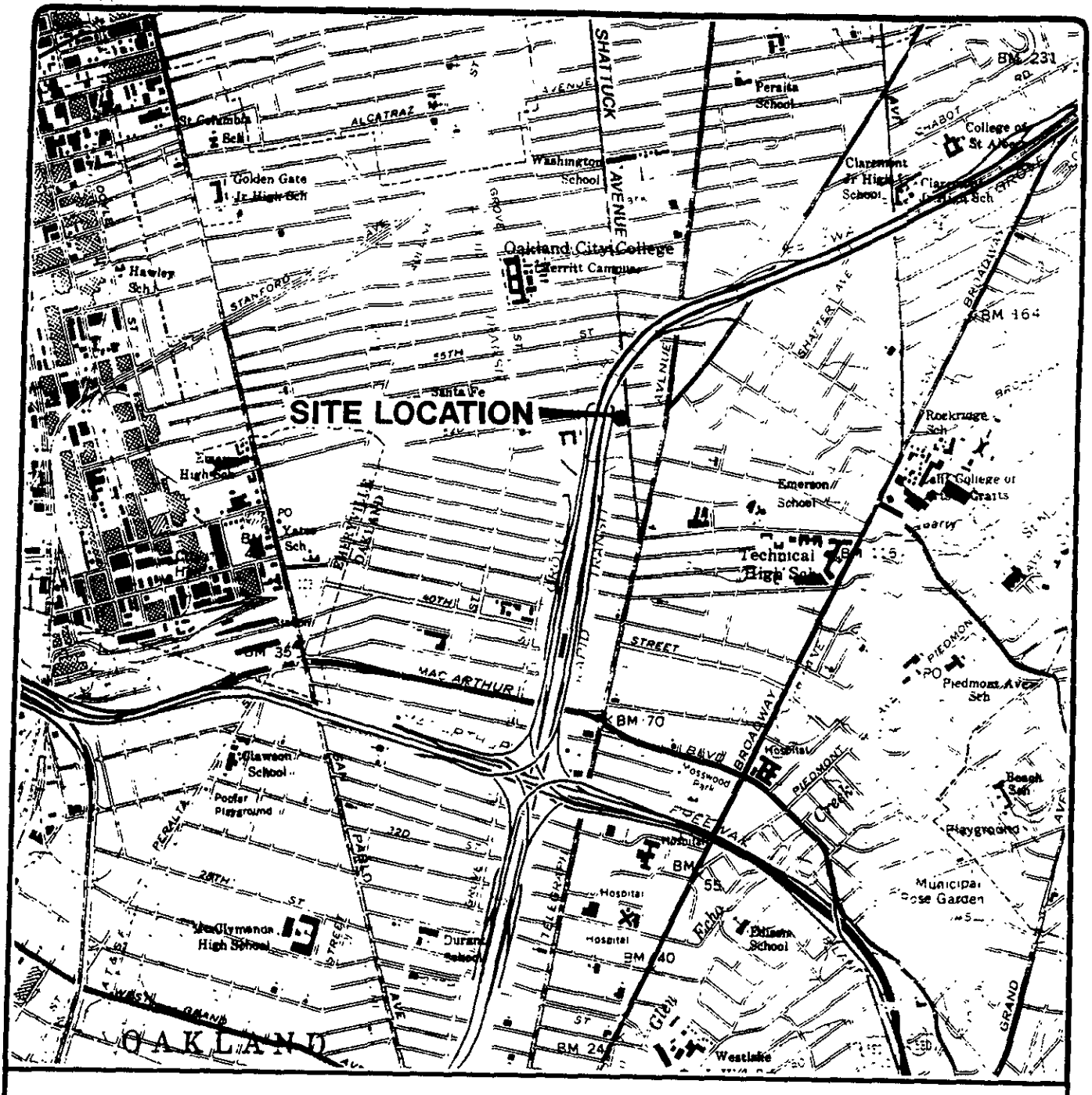
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 01-26-95
Project Number: 0805-135.01

Well Designation	Water Sample Field Date	TPHD	Cadmium by EPA 6010	Chromium by EPA 6010	Lead by EPA 7421	Zinc by EPA 6010	Nickel by EPA 6010
		ppb	ppb	ppb	ppb	ppb	ppb
MW-7	11-12-92	NA	NA	NA	NA	NA	NA
MW-7	01-22-93	NA	NA	NA	NA	NA	NA
MW-7	04-14-93	NA	NA	NA	NA	NA	NA
MW-7	09-30-93	NA	NA	NA	NA	NA	NA
MW-7	11-16-93	NA	NA	NA	NA	NA	NA
MW-7	02-02-94	NA	NA	NA	NA	NA	NA
MW-7	04-29-94	NA	NA	NA	NA	NA	NA
MW-7	08-02-94	NA	NA	NA	NA	NA	NA
MW-7	11-16-94	NA	NA	NA	NA	NA	NA
AS-2	09-30-93	NA	NA	NA	NA	NA	NA

TPHD = Total petroleum hydrocarbons as diesel by EPA Method 3510/California DHS LUFT Method
ppb = Parts per billion or micrograms per liter (µg/l)
NA = Not analyzed
* = Chromatogram does not match the typical diesel fingerprint, but appears to be weathered gasoline

152783



Base map from USGS 7.5' Quad. Maps:
Oakland East and Oakland West, California.
Photorevised 1980.

- N -

Scale : 0 2000 4000 Feet

EMCON Associates

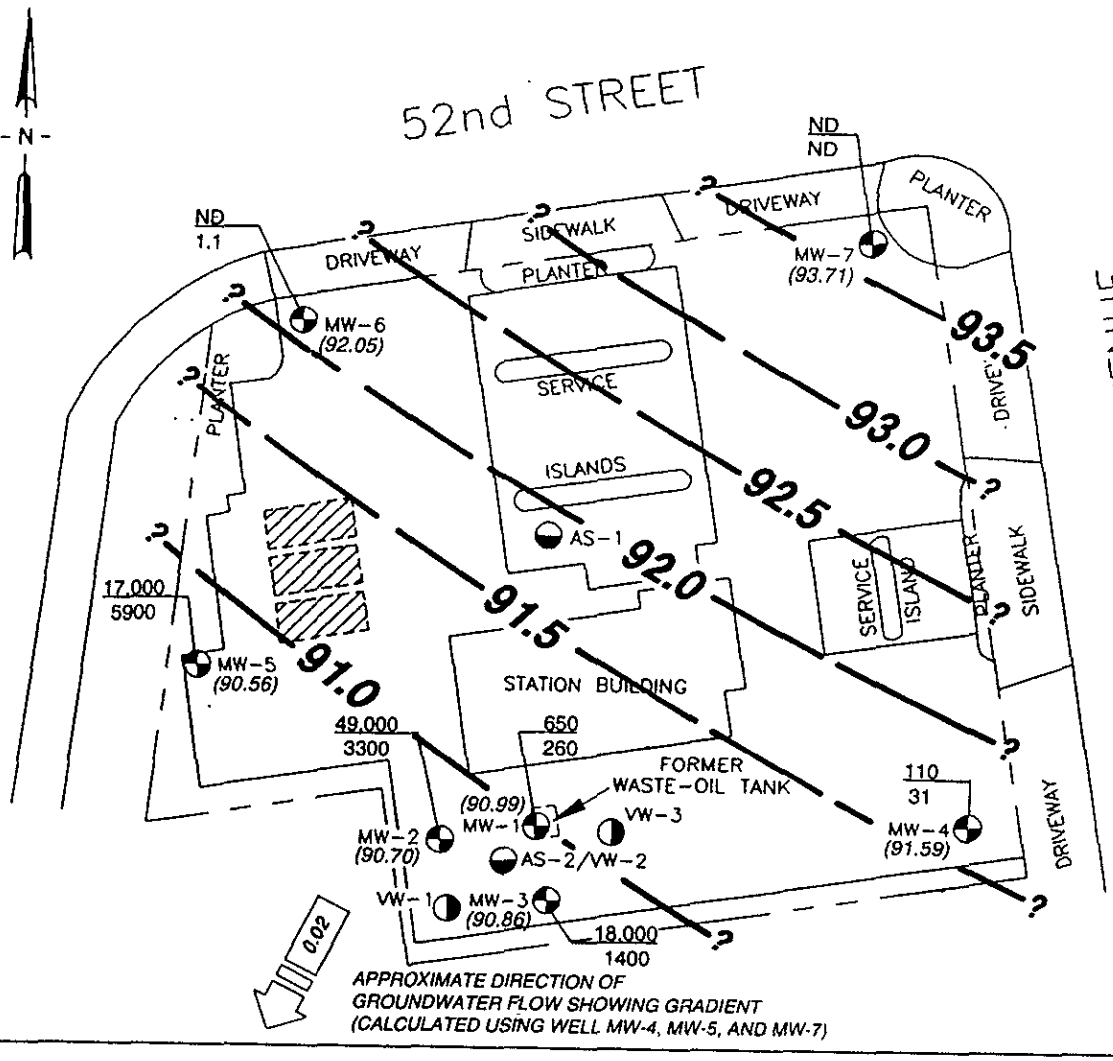
ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

SITE LOCATION

FIGURE 1

PROJECT NO. 805-135.01

155812



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Air sparge/vapor extraction well
- Existing underground gasoline storage tank
- (90.99) Groundwater elevation (Ft.-MSL); measured 11/16/94
- 49,000 / 3300 — TPHG concentration in groundwater (ppb) / Benzene concentration in groundwater (ppb) } sampled 11/16/94
- ND = Not detected
- ? — Groundwater elevation contour (Ft. -MSL)

SCALE: 0 40 FEET
(Approximate)

Base map modified from RESNA, 1994.

1/95

EMCON Associates

ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

GROUNDWATER DATA
FOURTH QUARTER 1994

FIGURE
2

PROJECT NO.
805-135.01

APPENDIX A

FIELD DATA REPORT, INTEGRATED WASTESTREAM MANAGEMENT, DECEMBER 15, 1994

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

December 15, 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. 6148 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

A6148Q4.XLS

Summary of Ground Water Sample Analyses for ARCO Facility A-6148, Oakland, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
DATE SAMPLED	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94
DEPTH TO WATER	17.04	16.73	16.91	14.99	16.12	13.11	13.37
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA
TPHg	650	49,000	18,000	110	17,000	ND	ND
BTEX							
BENZENE	260	3,300	1,400	31	5,900	1.1	ND
TOLUENE	38	8,300	560	ND	700	ND	ND
ETHLYBENZENE	6.1	1,400	790	ND	440	ND	ND
XYLENES	15	7,200	2,800	ND	320	ND	ND
EPA 5030							
VINYL CHLORIDE	ND	ND	ND	ND	1.3	<2.5	ND
CIS-1,2-DICHLOROETHENE	1.2	2.1	ND	ND	3.5	<2.5	ND
CHLOROFORM	0.5	ND	ND	ND	ND	8.9	ND
TCE	1.1	1.8	ND	ND	1.0	6.8	ND
PCE	12	9.6	1.3	1.8	1.1	86	3.3
EPA 418.1	NA	NA	2.3	NA	NA	NA	NA
EPA 3520/8270							
NAPHTHALENE	NA	NA	100	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	53	NA	NA	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: 1145
Site Departure Time: 1610
Weather Conditions: Cloudy Cool

DTW: Well Box or Well Casing (circle one)

Project No.: _____ **Location:** 5131 Shattuck Ave. OAK **Date:** 11-16-94

Client / Station#: Arco 6148 **Field Technician:** Vince Valdes **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
4	mw-1	OK	OK	OK	OK	OK	26.12	17.04	17.04	N/A	N/A	N	4"	15/16
6	mw-2	OK	OK	OK	OK	OK	26.13	16.73	16.73	N/A	N/A	N	4"	15/16
7	mw-3	OK	OK	OK	OK	OK	26.14	16.91	16.91	N/A	N/A	N	4"	15/16
1	mw-4	OK	OK	OK	OK	OK	26.70	14.99-	14.99-	N/A	N/A	N	4" #20 in Wood Box	15/16
5	mw-5	OK	OK	OK	OK	OK	25.38	16.12	16.12	N/A	N/A	N	4"	15/16
2	mw-6	OK	OK	OK	OK	OK	27.30	13.11+	13.11+	N/A	N/A	N	4" #20 in Box	15/16
3	mw-7	OK	OK	OK	OK	OK	27.60	13.37-	13.37-	N/A	N/A	N	4" #20 in Box	15/16

PAGE 2 OF 3 DATE: 11-16-94 CLIENT/STATION #: ARCO 6148 ADDRESS: 5131 Shattuck Ave. OAK.

WELL ID: MW-4 TD 26.70 DTW 14.97 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 23.18 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1347 END (2400 HR) 1357
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1400 DTW: 15.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1352	3	7.49	0.41	72.0	clear
1354	9	7.56	0.40	71.5	clear
1356	15	7.39	0.41	70.9	clear
1357	24	7.37	0.41	70.4	clear

Total purge: 24
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-7 TD 27.60 DTW 13.37 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 28.17 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1410 END (2400 HR) 1419
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1424 DTW: 14.8

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1412	2	6.96	0.37	72.8	clear
1414	10	7.35	0.36	72.0	clear
1418	26	7.30	0.36	71.3	clear
1419	30	7.28	0.36	70.6	clear

Total purge: 30
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp
REMARKS:

WELL ID: MW-6 TD 27.30 DTW 13.11 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 28.09 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1435 END (2400 HR) 1444
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1447 DTW: 14.7

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1437	2	7.45	0.33	70.5	clear
1440	13	7.36	0.33	70.0	clear
1443	25	7.31	0.34	69.8	clear
1444	29	7.29	0.33	69.6	clear

Total purge: 29
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-1 TD 26.12 DTW 17.04 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 17.97 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1454 END (2400 HR) 1502
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1500 DTW: 23.1

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1456	1	7.71	0.33	69.3	clear
1458	10	7.51	0.33	69.0	clear
1500	14	7.42	0.37	68.9	clear
1502	16	7.40	0.37	68.8	clear

Total purge: 16
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: well pumped dry at 16 gallons.

PRINT NAME: Vince Valdez SIGNATURE: Vince Valdez

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 5 OF 5 DATE: 11-16-94 CLIENT/STATION #: Unocal 6148 ADDRESS: 5131 Shattuck Ave. OAK

WELL ID: MW-5 TD 25.38 DTW 16.12 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 18.33 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1515 END (2400 HR) 1522
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1526 DTW: 23.8

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1518	4	7.29	0.40	69.8	clear
1520	8	7.36	0.42	68.3	Clear
1522	9	7.34	0.42	68.3	Clear

Total purge: 9
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: Well pumped dry at 9 gallons

WELL ID: MW-2 TD → 26.13 - DTW 16.73 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) = 18.61 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1532 END (2400 HR) 1543
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1547 DTW: 22

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1534	1	7.53	0.41	69.8	clear
1536	5	7.45	0.36	69.6	~~Clear~~ Black
1539	12	7.34	0.37	69.4	Black
1543	18	7.32	0.36	69.3	clear

Total purge: 18
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-3 TD 26.14 DTW 16.91 x 0.66 (Gal. / Linear Ft.) x 3 (Casing Volume) - 18.27 (Calculated Purge)

DATE PURGED: 11-16-94 START (2400 HR): 1602 END (2400 HR) 1615
DATE SAMPLED: 11-16-94 TIME (2400 HR): 1622 DTW: 24.1

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1604	2	7.43	0.35	69.3	black
1608	6	7.40	0.45	68.8	black
1612	15	7.37	0.47	68.6	clear
1615	19	7.36	0.48	68.3	clear

Total purge: 19
PURGING EQUIP.: ~~Centrifugal Pump~~ Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

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

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

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

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

PRINT NAME: Vince Valdes SIGNATURE: [signature]

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

APPENDIX B

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, FOURTH QUARTER 1994

Columbia Analytical Services, Inc.

December 5, 1994

Service Request No. S941483

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

Re: **ARCO Facility No. 6148**

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 S941483.

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

COLUMBIA ANALYTICAL SERVICES, Inc.

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	**Service Request:**	S941483
Project:	ARCO Facility 6148	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/18/94
		Date Extracted:	NA
		Date Analyzed:	11/28-30/94

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**					
MW-1 (23.1) S941483-001	650	260	38	6.1	15
MW-2 (22) S941483-002	49,000	3,300	8,300	1,400	7,200
MW-3 (24.1) S941483-003	18,000	1,400	560	790	2,800
MW-4 (15.2) S941483-004	110	31	ND	ND	ND
MW5 (23.8) S941483-005	17,000	5,900	700	440	320
MW-6 (14.7) S941483-006	ND	1.1	ND	ND	ND
MW-7 (14.8) S941483-007	ND	ND	ND	ND	ND
Method Blank S941128-WB	ND	ND	ND	ND	ND
Method Blank S941129-WB	ND	ND	ND	ND	ND
Method Blank S941130-WB	ND	ND	ND	ND	ND

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

5ABTXGAS/061694

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility 6148
Sample Matrix: Water

Service Request: S941483
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
Units: ug/L (ppb)

		Sample Name:	MW-1 (23.1)	MW-2 (22)	MW-3 (24.1)
		Lab Code:	S941483-001	S941483-002	S941483-003
		Date Analyzed:	11/22/94	11/22/94	11/22/94
Analyte	**MRL**				
Dichlorodifluoromethane (CFC 12)	1		ND	ND	ND
Chloromethane	1		ND	ND	ND
Vinyl Chloride	0.5		ND	ND	ND
Bromomethane	0.5		ND	ND	ND
Chloroethane	0.5		ND	ND	ND
Trichlorofluoromethane (CFC 11)	0.5		ND	ND	ND
1,1-Dichloroethene	0.5		ND	ND	ND
Trichlorotrifluoroethane (CFC 113)	0.5		ND	ND	ND
Methylene Chloride	0.5		ND	ND	ND
trans-1,2-Dichloroethene	0.5		ND	ND	ND
cis-1,2-Dichloroethene	0.5		1.2	2.1	ND
1,1-Dichloroethane	0.5		ND	ND	ND
Chloroform	0.5		0.5	ND	ND
1,1,1-Trichloroethane (TCA)	0.5		ND	ND	ND
Carbon Tetrachloride	0.5		ND	ND	ND
1,2-Dichloroethane	0.5		ND	ND	ND
Trichloroethene (TCE)	0.5		1.1	1.8	ND
1,2-Dichloropropane	0.5		ND	ND	ND
Bromodichloromethane	0.5		ND	ND	ND
2-Chloroethyl Vinyl Ether	5		ND	ND	ND
trans-1,3-Dichloropropene	0.5		ND	ND	ND
cis-1,3-Dichloropropene	0.5		ND	ND	ND
1,1,2-Trichloroethane	0.5		ND	ND	ND
Tetrachloroethene (PCE)	0.5		12	9.6	1.3
Dibromochloromethane	0.5		ND	ND	ND
Chlorobenzene	0.5		ND	ND	ND
Bromoform	0.5		ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5		ND	ND	ND
1,3-Dichlorobenzene	1		ND	ND	ND
1,4-Dichlorobenzene	1		ND	ND	ND
1,2-Dichlorobenzene	1		ND	ND	ND

Approved By: _____ Date: December 5, 1994

3S44/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility 6148
Sample Matrix: Water

Service Request: S941483
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
Units: ug/L (ppb)

	Sample Name:	MW-4 (15.2)	MW-5 (23.8)	MW-6 (14.7) *
	Lab Code:	S941483-004	S941483-005	S941483-006
	Date Analyzed:	11/23/94	11/23/94	11/23/94
Analyte	**MRL**			
Dichlorodifluoromethane (CFC 12)	1	ND	ND	<5
Chloromethane	1	ND	ND	<5
Vinyl Chloride	0.5	ND	1.3	<2.5
Bromomethane	0.5	ND	ND	<2.5
Chloroethane	0.5	ND	ND	<2.5
Trichlorofluoromethane (CFC 11)	0.5	ND	ND	<2.5
1,1-Dichloroethene	0.5	ND	ND	<2.5
Trichlorotrifluoroethane (CFC 113)	0.5	ND	ND	<2.5
Methylene Chloride	0.5	ND	ND	<2.5
trans-1,2-Dichloroethene	0.5	ND	ND	<2.5
cis-1,2-Dichloroethene	0.5	ND	3.5	<2.5
1,1-Dichloroethane	0.5	ND	ND	<2.5
Chloroform	0.5	ND	ND	8.9
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	<2.5
Carbon Tetrachloride	0.5	ND	ND	<2.5
1,2-Dichloroethane	0.5	ND	ND	<2.5
Trichloroethene (TCE)	0.5	ND	1.0	6.8
1,2-Dichloropropane	0.5	ND	ND	<2.5
Bromodichloromethane	0.5	ND	ND	<2.5
2-Chloroethyl Vinyl Ether	5	ND	ND	<25
trans-1,3-Dichloropropene	0.5	ND	ND	<2.5
cis-1,3-Dichloropropene	0.5	ND	ND	<2.5
1,1,2-Trichloroethane	0.5	ND	ND	<2.5
Tetrachloroethene (PCE)	0.5	1.8	1.1	86
Dibromochloromethane	0.5	ND	ND	<2.5
Chlorobenzene	0.5	ND	ND	<2.5
Bromoform	0.5	ND	ND	<2.5
1,1,2,2-Tetrachloroethane	0.5	ND	ND	<2.5
1,3-Dichlorobenzene	1	ND	ND	<5
1,4-Dichlorobenzene	1	ND	ND	<5
1,2-Dichlorobenzene	1	ND	ND	<5

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: Kevin Murphy Date: December 5, 1994

3S44/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility 6148
Sample Matrix: Water

Service Request: S941483
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
Units: ug/L (ppb)

	Sample Name:	MW-7 (14.8)	Method Blank
	Lab Code:	S941483-007	S941122-WB
	Date Analyzed:	11/23/94	11/22/94
Analyte	**MRL**		
Dichlorodifluoromethane (CFC 12)	1	ND	ND
Chloromethane	1	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Trichlorofluoromethane (CFC 11)	0.5	ND	ND
1,1-Dichloroethene	0.5	ND	ND
Trichlorotrifluoroethane (CFC 113)	0.5	ND	ND
Methylene Chloride	0.5	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND
1,1-Dichloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
Trichloroethene (TCE)	0.5	ND	ND
1,2-Dichloropropane	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Tetrachloroethene (PCE)	0.5	3.3	ND
Dibromochloromethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Bromoform	0.5	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND
1,3-Dichlorobenzene	1	ND	ND
1,4-Dichlorobenzene	1	ND	ND
1,2-Dichlorobenzene	1	ND	ND

Approved By: _____ Date: December 5, 1994

3S44/060194

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APPENDIX A

LABORATORY QC RESULTS

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility 6148
Sample Matrix: Water

Service Request: S941483
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/28-30/94

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
MW-1 (23.1)	S941483-001	92
MW-2 (22)	S941483-002	93
MW-3 (24.1)	S941483-003	100
MW-4 (15.2)	S941483-004	94
MW5 (23.8)	S941483-005	94
MW-6 (14.7)	S941483-006	94
MW-7 (14.8)	S941483-007	92
MW-6 (14.7) MS	S941483-006MS	102
MW-6 (14.7) DMS	S941483-006DMS	100
Method Blank	S941128-WB	88
Method Blank	S941129-WB	91
Method Blank	S941130-WB	92

CAS Acceptance Limits: 69-116

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

SUR1/062994

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility 6148

Service Request: S941483
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	26.6	106	85-115
Toluene	25	26.8	107	85-115
Ethylbenzene	25	27.0	108	85-115
Xylenes, Total	75	81.8	109	85-115
Gasoline	250	257	103	90-110

Approved By: Leonard Murphy Date: December 5, 1994

ICV25AL/060194

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	S941483
Project:	ARCO Facility 6148	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/18/94
		Date Extracted:	NA
		Date Analyzed:	11/28/94

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

Sample Name: MW-6 (14.7)
Lab Code: S941483-006

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Gasoline	250	250	ND	265	266	106	106	67-121	<1

Approved By: Donna Murphy Date: December 5, 1994

DMS1S/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility 6148
Sample Matrix: Water

Service Request: S941483
Date Collected: 11/16/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/22,23/94

Surrogate Recovery Summary
Halogenated Volatile Organic Compounds
EPA Methods 5030/601

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
MW-1 (23.1)	S941483-001	99
MW-2 (22)	S941483-002	91
MW-3 (24.1)	S941483-003	94
MW-4 (15.2)	S941483-004	96
MW5 (23.8)	S941483-005	96
MW-6 (14.7)	S941483-006	104
MW-7 (14.8)	S941483-007	98
MW-3 (24.1) MS	S941483-003MS	104
MW-3 (24.1) DMS	S941483-003DMS	108
Method Blank	S941122-WB	112

CAS Acceptance Limits: 76-138

Approved By: Kenneth 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 6148

Service Request: S941483
Date Analyzed: 9/29/94

Initial Calibration Verification (ICV) Summary
Halogenated Organic Compounds
EPA Methods 5030/601
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Chloromethane	100	88.6	89	D-193
Vinyl Chloride	100	89.0	89	28-163
Bromomethane	100	84.5	84	D-144
Chloroethane	100	107	107	46-137
Trichlorofluoromethane (CFC 11)	100	119	119	21-156
1,1-Dichloroethene	100	109	109	28-167
Methylene Chloride	100	114	114	25-162
trans-1,2-Dichloroethene	100	90.0	90	38-155
1,1-Dichloroethane	100	98.7	99	47-132
Chloroform	100	112	112	49-133
1,1,1-Trichloroethane (TCA)	100	110	110	41-138
Carbon Tetrachloride	100	108	108	43-143
1,2-Dichloroethane	100	107	107	51-147
Trichloroethene (TCE)	100	98.9	99	35-146
1,2-Dichloropropane	100	101	101	44-156
Bromodichloromethane	100	104	104	42-172
trans-1,3-Dichloropropene	100	127	127	22-178
cis-1,3-Dichloropropene	100	106	106	22-178
1,1,2-Trichloroethane	100	105	105	39-136
Tetrachloroethene (PCE)	100	102	102	26-162
Dibromochloromethane	100	112	112	24-191
Chlorobenzene	100	99.4	99	38-150
Bromoform	100	114	114	13-159
1,1,2,2-Tetrachloroethane	100	108	108	8-184
1,3-Dichlorobenzene	100	94.8	95	7-187
1,4-Dichlorobenzene	100	94.9	95	42-143
1,2-Dichlorobenzene	100	93.3	93	D-208

Approved By: _____ Date: December 5, 1994

ICV41/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	S941483
Project:	ARCO Facility 6148	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/18/94
		Date Extracted:	NA
		Date Analyzed:	11/22/94

Matrix Spike/Duplicate Matrix Spike Summary
Halogenated Volatile Organics
EPA Methods 5030/601
Units: ug/L (ppb)

Sample Name: MW-3 (24.1)
Lab Code: S941483-003

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
1,1-Dichloroethene	10	10	ND	10.2	9.93	102	99	69-142	3
Trichloroethene	10	10	ND	10.4	10.2	104	102	42-148	2
Tetrachloroethene	10	10	1.3	11.1	10.8	111	108	80-136	3

Approved By: Leah A Murphy 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. IWM-94-SCC

Chain of Custody

ARCO Facility no. A 6148	City (Facility) OAKland	Project manager (Consultant) TOM Deaton	Laboratory name Columbia
ARCO engineer M.W.	Telephone no. (ARCO) 1155712434	Telephone no. (Consultant) 408/942 8955.	Fax no. (Consultant) 408/94 21499
Consultant name IWM	Address (Consultant) 950 Ames ave. Mtn.		Contract number 07077

Method of shipment: Stugler deliver

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
FB-1	8	2		✓		✓	✓	11-16-94	1200		✓	✓			✓							
13.1 MW-1	1	4		✓		✓	✓		1506		✓	✓			✓							
22 MW-2	2	4		✓		✓	✓		1547		✓	✓			✓							
24.1 MW-3	3	8		✓		✓	✓		1622		✓	✓		✓	✓		✓					
5.2 MW-4	4	4		✓		✓	✓		1400		✓	✓			✓							
23.8 MW-5	5	4		✓		✓	✓		1526		✓	✓			✓							
4.7 MW-6	6	4		✓		✓	✓		1447		✓	✓			✓							
4.8 MW-7	7	4		✓		✓	✓		1424		✓	✓			✓							

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on FB-1

Lab number: 9411483

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	Date 11/18/94	Time 1235	Received by
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)

Kelso; 418-1, 8270

RECEIVED
DEC 0 8 1994

Columbia Analytical Services inc.

December 5, 1994

Service Request No.: K947289S

Tom Delon
IWM
950 Ames Avenue
Milpitas, CA 95035

Re: **Arco 6148/Oakland/Project #SJ941483**

Dear Tom:

Enclosed are the results of the sample(s) submitted to our laboratory on November 19, 1994. For your reference, these analyses have been assigned our service request number K947289S.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (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. My extension is 239.

Respectfully submitted,
Columbia Analytical Services, Inc.

Howard Boorse
Project Chemist

HB/rr

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
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
MPN	Most Probable Number
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
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Service Request:**	K947289S
Project:	Arco 6148/Oakland/T.O.# IWM-94-5CC	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/19/94
		Date Extracted:	11/22/94
		Date Analyzed:	11/22/94

Total Recoverable Petroleum Hydrocarbons
EPA Methods 418.1
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Result
MW-3	K947289-001	0.5	2.3
Method Blank	K941122-WB	0.5	ND

Approved By: _____ Date: 12/7/94

IAMRL/102594
7289SPHC IW1 - 418w 11/30/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: Arco 6148/Oakland/T.O.# IWM-94-5CC
Sample Matrix: Water

Service Request: K947289S
Date Collected: 11/16/94
Date Received: 11/19/94
Date Extracted: 11/22/94

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270
Units: µg/L (ppb)

	Sample Name:	MW-3	Method Blank
	Lab Code:	K947289-001	K941122-WB1
	Date Analyzed:	11/28/94	11/28/94
Base Neutral Analyte	**MRL**		
N-Nitrosodimethylamine	25	ND	ND
Aniline	25	ND	ND
Bis(2-chloroethyl) Ether	10	ND	ND
1,2-Dichlorobenzene	10	ND	ND
1,3-Dichlorobenzene	10	ND	ND
1,4-Dichlorobenzene	10	ND	ND
Bis(2-chloroisopropyl) Ether	10	ND	ND
N-Nitrosodi-*n*-propylamine	10	ND	ND
Hexachloroethane	10	ND	ND
Nitrobenzene	10	ND	ND
Isophorone	10	ND	ND
Bis(2-chloroethoxy)methane	10	ND	ND
1,2,4-Trichlorobenzene	10	ND	ND
Naphthalene	10	100	ND
4-Chloroaniline	10	ND	ND
Hexachlorobutadiene	10	ND	ND
2-Methylnaphthalene	10	53	ND
Hexachlorocyclopentadiene	10	ND	ND
2-Chloronaphthalene	10	ND	ND
2-Nitroaniline	25	ND	ND
Dimethyl Phthalate	10	ND	ND
Acenaphthylene	10	ND	ND
3-Nitroaniline	25	ND	ND
Acenaphthene	10	ND	ND
Dibenzofuran	10	ND	ND
2,4-Dinitrotoluene	10	ND	ND

Approved By: _____ Date: 12/6/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: Arco 6148/Oakland/T.O.# IWM-94-5CC
Sample Matrix: Water

Service Request: K947289S
Date Collected: 11/16/94
Date Received: 11/19/94
Date Extracted: 11/22/94

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270
Units: µg/L (ppb)

	Sample Name:	MW-3	Method Blank
	Lab Code:	K947289-001	K941122-WB1
	Date Analyzed:	11/28/94	11/28/94
Base Neutral Analyte	**MRL**		
2,6-Dinitrotoluene	10	ND	ND
Diethyl Phthalate	10	ND	ND
4-Chlorophenyl Phenyl Ether	10	ND	ND
Fluorene	10	ND	ND
4-Nitroaniline	25	ND	ND
N-Nitrosodiphenylamine	10	ND	ND
4-Bromophenyl Phenyl Ether	10	ND	ND
Hexachlorobenzene	10	ND	ND
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Di-*n*-butyl Phthalate	10	ND	ND
Fluoranthene	10	ND	ND
Pyrene	10	ND	ND
Butylbenzyl Phthalate	10	ND	ND
3,3'-Dichlorobenzidine	25	ND	ND
Benz(a)anthracene	10	ND	ND
Bis(2-ethylhexyl) Phthalate	10	ND	ND
Chrysene	10	ND	ND
Di-*n*-octyl Phthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenz(a,h)anthracene	10	ND	ND
Benzo(g,h,i)perylene	10	ND	ND

Approved By: _____ Date: 12/7/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: Arco 6148/Oakland/T.O.# IWM-94-5CC
Sample Matrix: Water

Service Request: K947289S
Date Collected: 11/16/94
Date Received: 11/19/94
Date Extracted: 11/22/94

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270
Units: µg/L (ppb)

		Sample Name:	MW-3	Method Blank
		Lab Code:	K947289-001	K941122-WB1
		Date Analyzed:	11/28/94	11/28/94
Acid Analyte	**MRL**			
Phenol	10		ND	ND
2-Chlorophenol	10		ND	ND
Benzyl Alcohol	10		ND	ND
2-Methylphenol	10		ND	ND
3- and 4-Methylphenol*	10		ND	ND
2-Nitrophenol	10		ND	ND
2,4-Dimethylphenol	10		ND	ND
Benzoic Acid	25		ND	ND
2,4-Dichlorophenol	10		ND	ND
4-Chloro-3-methylphenol	10		ND	ND
2,4,6-Trichlorophenol	10		ND	ND
2,4,5-Trichlorophenol	10		ND	ND
2,4-Dinitrophenol	25		ND	ND
4-Nitrophenol	25		ND	ND
2-Methyl-4,6-dinitrophenol	25		ND	ND
Pentachlorophenol	25		ND	ND

* Quantified as 4-methylphenol.

Approved By: _____ Date: 12/7/94

3S3PBNA/102094

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	K947289S
Project:	Arco 6148/Oakland/T.O.# IWM-94-5CC	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	11/22/94
		Date Analyzed:	11/22/94

Duplicate Summary
Total Recoverable Petroleum Hydrocarbons
EPA Methods 418.1
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	CAS RPD Acceptance Limit
Batch QC	K947153-002	0.5	ND	ND	ND	-	30

Approved By: Howard Foust Date: 12/7/94

DUP1ARPD/102194
7289SPHC JW1 - 418wDUP 11/30/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	K947289S
Project:	Arco 6148/Oakland/T.O.# IWM-94-5CC	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	11/22/94
		Date Analyzed:	11/22/94

Matrix Spike Summary
Total Petroleum Hydrocarbons
Total Recoverable Petroleum Hydrocarbons
EPA Methods 418.1
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Batch QC	K947153-002	0.5	21	ND	17	81	58-126

Approved By: Howard Bowe Date: 12/7/94

MS1A/102194
7289SPHC.JW1 - 418wMS 11/30/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	K947289S
Project:	Arco 6148/Oakland/T.O.# IWM-94-5CC	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	11/22/94
		Date Analyzed:	11/22/94

Laboratory Control Sample Summary
Total Recoverable Petroleum Hydrocarbons
EPA Methods 418.1
Units: mg/L (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Oil	20.0	16.9	84	81-110

Approved By: _____ Date: 12/7/94

LCS/102194

7289SPHC JW1 - 418wLCS 11/30/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: Arco 6148/Oakland/T.O.# IWM-94-5CC
Sample Matrix: Water

Service Request: K947289S
Date Collected: 11/16/94
Date Received: 11/19/94
Date Extracted: 11/22/94
Date Analyzed: 11/28/94

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270

Sample Name	Lab Code	Percent Recovery 2FP	PHL	TBP	NBZ	FBP	TPH
MW-3	K947289-001	ND(a)	ND(a)	<5(a)	51	72	60
Batch QC	K947324-002	40	49	50	52	59	51
Batch QC	K947324-002MS	45	59	59	61	62	58
Batch QC	K947324-002DMS	47	60	58	63	63	55
Lab Control Sample	K941122-WL2	51	64	62	68	65	59
Method Blank	K941122-WB1	43	52	54	52	62	55
CAS Acceptance Limits:		21-100	10-94	10-123	35-114	43-116	33-141

2FP	2-Fluorophenol
PHL	Phenol-d_6
TBP	2,4,6-Tribromophenol
NBZ	Nitrobenzene-d_5
FBP	2-Fluorobiphenyl
TPH	Terphenyl-d_{14}

a Outside of acceptance limits because of matrix effects. This sample was analyzed a second time, and again produced unacceptable recovery values. The results from the initial analysis are reported.

Approved By: Howard Fowler Date: 12/7/94

SUR6/060894
K947289.XLS - 8270wSur 12/7/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	K947289S
Project:	Arco 6148/OaklandT.O.# IWM-94-5CC	**Date Collected:**	11/16/94
Sample Matrix:	Water	**Date Received:**	11/19/94
		Date Extracted:	11/22/94
		Date Analyzed:	11/28/94

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270
Units: µg/L (ppb)

Sample Name: Batch QC
Lab Code: K947324-002

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
Phenol	400	400	ND	214	218	54	54	12-89	2
2-Chlorophenol	400	400	ND	252	264	63	66	27-123	5
1,4-Dichlorobenzene	200	200	ND	108	126	54	63	36-97	15
N-Nitrosodi-n-propylamine	200	200	ND	105	110	52	55	41-116	5
1,2,4-Trichlorobenzene	200	200	ND	133	151	66	76	39-98	13
4-Chloro-3-methylphenol	400	400	ND	281	288	70	72	23-97	2
Acenaphthene	200	200	ND	129	129	64	64	46-118	<1
4-Nitrophenol	400	400	ND	351(a)	381(a)	88	95	10-80	8
2,4-Dinitrotoluene	200	200	ND	159	153	80	76	24-96	4
Pentachlorophenol	400	400	ND	298	286	74	72	9-103	4
Pyrene	200	200	ND	138	127	69	64	26-127	8

a Result is from the analysis of a diluted sample, performed on 11/29/94. Dilution factor: 2.

Approved By: Howard Fowler Date: 12/7/94

DMS1SRPD/061394
K947289.XLS - 8270wDMS 12/7/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	K947289S
Project:	*Arco 6148/Oakland/T.O.# IWM-94-5CC*	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	11/22/94
		Date Analyzed:	11/28/94

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3520/8270
Units: µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Phenol	100	61	61	5-112
2-Chlorophenol	100	82	82	23-134
1,4-Dichlorobenzene	100	64	64	20-124
N-Nitrosodi-n-propylamine	100	57	57	D-230
1,2,4-Trichlorobenzene	100	76	76	44-142
4-Chloro-3-methylphenol	100	90	90	22-147
Acenaphthene	100	67	67	47-145
4-Nitrophenol	100	105	105	D-132
2,4-Dinitrotoluene	100	84	84	39-139
Pentachlorophenol	100	73	73	14-176
Pyrene	100	69	69	52-115

D Detected; result must be greater than zero.

Approved By: Howard Bowe Date: 12/2/94

APPENDIX B

CHAIN OF CUSTODY INFORMATION

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5CC

Chain of Custody

ARCO Facility no. A 6148	City (Facility) OAKland	Project manager (Consultant) TOM Deaton	Laboratory name Columbia
ARCO engineer M.W.	Telephone no. (ARCO) 1155712434	Telephone no. (Consultant) 408/942 8955.	Fax no. (Consultant) 408/94 21499
Consultant name IWM	Address (Consultant) 950 Ames av. Milp.		Contract number 07077

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
FB-1	8	2		✓		✓	✓	11-16-94	1200		✓	✓			✓							
3.1 MW-1	1	4		✓		✓	✓		1506		✓	✓			✓							
2.2 MW-2	2	4		✓		✓	✓		1547		✓	✓			✓							
4.1 MW-3	3	8		✓		✓	✓		1622		✓	✓		✓	✓		✓					
5.2 MW-4	4	4		✓		✓	✓		1400		✓	✓			✓							
3.8 MW-5	5	4		✓		✓	✓		1526		✓	✓			✓							
4.7 MW-6	6	4		✓		✓	✓		1447		✓	✓			✓							
4.8 MW-7	7	4		✓		✓	✓		1424		✓	✓			✓							

Special detection Limit/reporting

Special QA/QC

Method of shipment: Stugler deliver

Remarks: Hold on FB-1

Lab number: 5941483

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)	Date 11/18/94	Time 1235	Received by CAS/BS
Relinquished by CAS/BS	Date 11/18/94	Time 16007	Received by
Relinquished by	Date	Time	Received by laboratory Ruth Higley

Received by CAS/BS 11/18/94 1235

Date 11-19-94 Time 0930

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

Kelso; 418.1, 8270