



**EMCON**

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Date March 17, 1995  
Project 0805-130.01

To:

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



We are enclosing:

Copies	Description
<u>1</u>	<u>Fourth quarter 1994 groundwater monitoring report</u> <u>for ARCO service station 2185, Oakland, California</u>

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

Comments:

The enclosed groundwater monitoring report is being sent to you per the request of ARCO Products Company. Please 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 # 2185 • 9800 East 14th Street • 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:

A handwritten signature in black ink that reads "Michael R. Whelan". The signature is written in a cursive style with a large initial 'M'.

Michael R. Whelan  
Environmental Engineer



**EMCON**

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March 17, 1995  
Project 0805-130.01

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

Re: Fourth quarter 1994 groundwater monitoring program results, ARCO service station 2185, 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 2185, 9800 East 14th Street, Oakland, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

## **BACKGROUND**

Between May and October 1991, ROUX performed a preliminary subsurface environmental assessment to evaluate the presence of gasoline hydrocarbons in soil near the existing underground storage tanks (USTs) before tank removal. This investigation included (1) installing two soil-vapor extraction (SVE) wells (VW-1 and VW-2) and performing a vapor extraction pilot test in June 1991, to evaluate the feasibility of SVE at the site, and (2) drilling four soil borings in the vicinity of the proposed new UST pit to evaluate preexisting hydrocarbon impact to soils in the area. In October 1991, ROUX observed the removal of three gasoline USTs from the site. During the tank removal, soil samples were collected from the base of the tank excavation to assess potential hydrocarbon impact to soil beneath the former USTs.

In July 1992, RESNA conducted an initial phase of subsurface environmental investigation, which included installing four groundwater monitoring wells (MW-1 through MW-4). In January 1993, a second phase of investigation was conducted by RESNA which included (1) installing on-site groundwater monitoring wells MW-5 and MW-6, (2) installing off-site monitoring well MW-7, (3) conducting aquifer pump tests, and (4) conducting a records search to identify potential off-site sources of hydrocarbons in soil and groundwater at the site. In April 1994, RESNA installed one groundwater monitoring compliance well (MW-8) on-site, at the request of the ACHCSA.



Groundwater monitoring was initiated at the site in July 1992. For additional background information, please refer to *Report of Findings, Initial Offsite and Additional Onsite Subsurface Investigation and Aquifer Pumping Test* RESNA October 12, 1993.

Wells MW-1 through MW-8 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 22, 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-8, (2) purging and subsequently sampling groundwater monitoring wells MW-1 through MW-8 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 February 16, 1995. 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). 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 BTEX by USEPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA, SW-846, November 1986, Third Edition). 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 and BTEX analyses. 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 22, 1994, illustrate that groundwater beneath the site flows southwest at an approximate hydraulic gradient of 0.003 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the fourth quarter of 1994.

Groundwater samples collected from wells MW-1, MW-4, and MW-7 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples collected from wells MW-2, MW-3, MW-5, MW-6, and MW-8 contained concentrations of TPHG from 84 to 15,000 parts per billion (ppb) and concentrations of benzene from 1 to 390 ppb. Except for well MW-7, similar analytical results were reported for all wells during previous monitoring events. Groundwater samples collected from well MW-7 have historically contained detectable concentrations of an unspecified compound eluting within the gasoline range (the chromatograms for this compound do not match the typical gasoline fingerprint) at concentrations of 320 to 630 ppb. The results reported for well MW-7 represent the first time nondetectable concentrations of TPHG and BTEX have been reported for this well.

## **LIMITATIONS**

Field procedures were performed by, and field data 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.

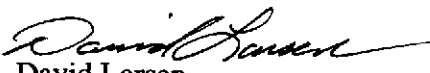
#### Work Anticipated for First Quarter 1995

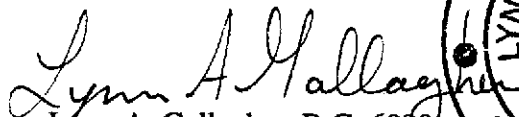
- Prepare and submit quarterly groundwater monitoring report for fourth quarter 1994.
- Perform quarterly groundwater monitoring for first quarter 1995.
- Obtain off-site access to install wells MW-9 and MW-10.

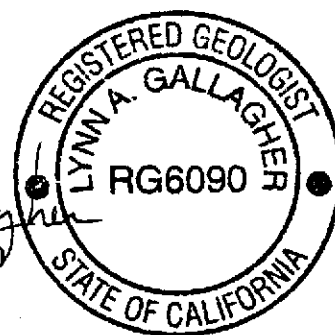
Please call if you have questions.

Sincerely,

EMCON

  
David Larsen  
Project Coordinator

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



Attachments: Table 1 - Groundwater Monitoring Data, Fourth Quarter 1994  
Table 2 - Historical Groundwater Elevation Data  
Table 3 - Historical Groundwater Analytical Data (TPHG and BTEX)  
Figure 1 - Site Location  
Figure 2 - Groundwater Data, Fourth Quarter 1994  
Appendix A - Field Data Report, Integrated Wastestream Management,  
February 16, 1995  
Appendix B - Analytical Results and Chain-of-Custody Documentation,  
Fourth Quarter 1994


cc:   
Kevin Graves, RWQCB-SFBR

Table 1  
Groundwater Monitoring Data  
Fourth Quarter 1994  
Summary Report

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 03-15-95  
Project Number: 0805-130.01

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	Water Sample Field Date	TPHG ppb	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb
MW-1	11-22-94	29.15	11.12	18.03	ND	SW	0.003	11-22-94	<50	<0.5	<0.5	<0.5	<0.5
MW-2	11-22-94	28.47	10.65	17.82	ND	SW	0.003	11-22-94	2300	45	<0.5	190	93
MW-3	11-22-94	28.57	10.76	17.81	ND	SW	0.003	11-22-94	15000	150	<10	1300	2000
MW-4	11-22-94	29.21	11.35	17.86	ND	SW	0.003	11-22-94	<50	<0.5	<0.5	<0.5	<0.5
MW-5	11-22-94	28.12	10.29	17.83	ND	SW	0.003	11-22-94	84	1	<0.5	5	2
MW-6	11-22-94	27.79	10.10	17.69	ND	SW	0.003	11-22-94	7300	390	<5	940	640
MW-7	11-22-94	27.88	10.60	17.28	ND	SW	0.003	11-22-94	<50	<0.5	<0.5	<0.5	<0.5
MW-8	11-22-94	NR	10.42	NR	ND	SW	0.003	11-22-94	2300	16	<0.5	140	4

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

ppb = Parts per billion or micrograms per liter ( $\mu\text{g/l}$ )

ND = None detected

SW = Southwest

NR = Not reported; data is not available or not measurable

Table 2  
Historical Groundwater Elevation Data  
Summary Report

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 03-03-95  
Project Number: 0805-130.01

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-1	07-24-92	29.15	13.38	15.77	ND	NR	NR
MW-1	08-26-92	29.15	13.92	15.23	ND	NR	NR
MW-1	09-22-92	29.15	14.18	14.97	ND	NR	NR
MW-1	10-19-92	29.15	14.52	14.63	ND	NR	NR
MW-1	11-23-92	29.15	14.54	14.61	ND	NR	NR
MW-1	12-16-92	29.15	12.20	16.95	ND	NR	NR
MW-1	01-14-93	29.15	9.32	19.83	ND	NR	NR
MW-1	02-26-93	29.15	9.38	19.77	ND	NR	NR
MW-1	03-26-93	29.15	10.04	19.11	ND	NR	NR
MW-1	04-09-93	29.15	10.50	18.65	ND	NR	NR
MW-1	05-19-93	29.15	11.26	17.89	ND	NR	NR
MW-1	06-17-93	29.15	11.53	17.62	ND	NR	NR
MW-1	07-28-93	29.15	12.00	17.15	ND	NR	NR
MW-1	08-23-93	29.15	12.31	16.84	ND	NR	NR
MW-1	09-28-93	29.15	12.60	16.55	ND	NR	NR
MW-1	10-11-93	29.15	12.74	16.41	ND	NR	NR
MW-1	11-16-93	29.15	12.96	16.19	ND	NR	NR
MW-1	12-16-93	29.15	11.68	17.47	ND	NR	NR
MW-1	02-08-94	29.15	11.29	17.86	ND	NR	NR
MW-1	03-04-94	29.15	10.61	18.54	ND	NR	NR
MW-1	05-10-94	29.15	11.12	18.03	ND	NR	NR
MW-1	08-12-94	29.15	12.55	16.60	ND	SW	0.004
MW-1	09-23-94	29.15	11.27	17.88	ND	NR	NR
MW-1	11-22-94	29.15	11.12	18.03	ND	SW	0.003



Table 2  
 Historical Groundwater Elevation Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 03-03-95  
 Project Number: 0805-130.01

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-2	07-24-92	28.47	12.95	15.52	ND	NR	NR
MW-2	08-26-92	28.47	13.55	14.92	ND	NR	NR
MW-2	09-22-92	28.47	13.78	14.69	ND	NR	NR
MW-2	10-19-92	28.47	14.09	14.38	ND	NR	NR
MW-2	11-23-92	28.47	14.06	14.41	ND	NR	NR
MW-2	12-16-92	28.47	11.70	16.77	ND	NR	NR
MW-2	01-14-93	28.47	8.87	19.60	ND	NR	NR
MW-2	02-26-93	28.47	8.98	19.49	ND	NR	NR
MW-2	03-26-93	28.47	9.57	18.90	ND	NR	NR
MW-2	04-09-93	28.47	10.02	18.45	ND	NR	NR
MW-2	05-19-93	28.47	10.81	17.66	ND	NR	NR
MW-2	06-17-93	28.47	11.08	17.39	ND	NR	NR
MW-2	07-28-93	28.47	11.60	16.87	ND	NR	NR
MW-2	08-23-93	28.47	11.90	16.57	ND	NR	NR
MW-2	09-28-93	28.47	12.17	16.30	ND	NR	NR
MW-2	10-11-93	28.47	12.31	16.16	ND	NR	NR
MW-2	11-16-93	28.47	12.54	15.93	ND	NR	NR
MW-2	12-16-93	28.47	11.29	17.18	ND	NR	NR
MW-2	02-08-94	28.47	10.85	17.62	ND	NR	NR
MW-2	03-04-94	28.47	10.16	18.31	ND	NR	NR
MW-2	05-10-94	28.47	10.70	17.77	ND	NR	NR
MW-2	08-12-94	28.47	12.12	16.35	ND	SW	0.004
MW-2	09-23-94	28.47	10.87	17.60	ND	NR	NR
MW-2	11-22-94	28.47	10.65	17.82	ND	SW	0.003

Table 2  
 Historical Groundwater Elevation Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 03-03-95  
 Project Number: 0805-130.01

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	07-24-92	28.57	12.90	15.67	Sheen	NR	NR
MW-3	08-26-92	28.57	13.51	15.06	ND	NR	NR
MW-3	09-22-92	28.57	13.73	14.84	ND	NR	NR
MW-3	10-19-92	28.57	14.04	14.53	ND	NR	NR
MW-3	11-23-92	28.57	14.02	14.55	ND	NR	NR
MW-3	12-16-92	28.57	11.73	16.84	ND	NR	NR
MW-3	01-14-93	28.57	9.17	19.40	ND	NR	NR
MW-3	02-26-93	28.57	9.30	19.27	ND	NR	NR
MW-3	03-26-93	28.57	9.83	18.74	ND	NR	NR
MW-3	04-09-93	28.57	10.22	18.35	ND	NR	NR
MW-3	05-19-93	28.57	10.91	17.66	ND	NR	NR
MW-3	06-17-93	28.57	10.74	17.83	ND	NR	NR
MW-3	07-28-93	28.57	11.60	16.97	ND	NR	NR
MW-3	08-23-93	28.57	11.93	16.64	ND	NR	NR
MW-3	09-28-93	28.57	12.13	16.44	ND	NR	NR
MW-3	10-11-93	28.57	12.26	16.31	ND	NR	NR
MW-3	11-16-93	28.57	12.48	16.09	ND	NR	NR
MW-3	12-16-93	28.57	11.26	17.31	ND	NR	NR
MW-3	02-08-94	28.57	10.93	17.64	ND	NR	NR
MW-3	03-04-94	28.57	10.33	18.24	ND	NR	NR
MW-3	05-10-94	28.57	10.77	17.80	ND	NR	NR
MW-3	08-12-94	28.57	12.07	16.50	ND	SW	0.004
MW-3	09-23-94	28.57	10.94	17.63	ND	NR	NR
MW-3	11-22-94	28.57	10.76	17.81	ND	SW	0.003

Table 2  
 Historical Groundwater Elevation Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 03-03-95  
 Project Number: 0805-130.01

Well Desig- nation	Water Level Field Date	TOC	Depth	Ground-	Floating	Ground-	Hydraulic
		Elevation	to	Water	Product	Water	
		ft-MSL	Water	Elevation	Thickness	Flow	Gradient
			feet	ft-MSL	feet	Direction	foot/foot
						MWN	
MW-4	07-24-92	29.21	13.68	15.53	ND	NR	NR
MW-4	08-26-92	29.21	14.12	15.09	ND	NR	NR
MW-4	09-22-92	29.21	14.46	14.75	ND	NR	NR
MW-4	10-19-92	29.21	14.74	14.47	ND	NR	NR
MW-4	11-23-92	29.21	14.75	14.46	ND	NR	NR
MW-4	12-16-92	29.21	12.45	16.76	ND	NR	NR
MW-4	01-14-93	29.21	9.46	19.75	ND	NR	NR
MW-4	02-26-93	29.21	9.54	19.67	ND	NR	NR
MW-4	03-26-93	29.21	10.19	19.02	ND	NR	NR
MW-4	04-09-93	29.21	10.67	18.54	ND	NR	NR
MW-4	05-19-93	29.21	11.52	17.69	ND	NR	NR
MW-4	06-17-93	29.21	11.79	17.42	ND	NR	NR
MW-4	07-28-93	29.21	12.30	16.91	ND	NR	NR
MW-4	08-23-93	29.21	12.60	16.61	ND	NR	NR
MW-4	09-28-93	29.21	12.88	16.33	ND	NR	NR
MW-4	10-11-93	29.21	13.03	16.18	ND	NR	NR
MW-4	11-16-93	29.21	13.24	15.97	ND	NR	NR
MW-4	12-16-93	29.21	11.96	17.25	ND	NR	NR
MW-4	02-08-94	29.21	11.54	17.67	ND	NR	NR
MW-4	03-04-94	29.21	10.84	18.37	ND	NR	NR
MW-4	05-10-94	29.21	11.38	17.83	ND	NR	NR
MW-4	08-12-94	29.21	12.82	16.39	ND	SW	0.004
MW-4	09-23-94	29.21	11.54	17.67	ND	NR	NR
MW-4	11-22-94	29.21	11.35	17.86	ND	SW	0.003

Table 2  
Historical Groundwater Elevation Data  
Summary Report

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 03-03-95  
Project Number: 0805-130.01

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-5	02-26-93	28.12	9.00	19.12	ND	NR	NR
MW-5	03-26-93	28.12	9.41	18.71	ND	NR	NR
MW-5	04-09-93	28.12	9.80	18.32	ND	NR	NR
MW-5	05-19-93	28.12	10.50	17.62	ND	NR	NR
MW-5	06-17-93	28.12	10.73	17.39	ND	NR	NR
MW-5	07-28-93	28.12	11.15	16.97	ND	NR	NR
MW-5	08-23-93	28.12	11.43	16.69	ND	NR	NR
MW-5	09-28-93	28.12	11.66	16.46	ND	NR	NR
MW-5	10-11-93	28.12	11.80	16.32	ND	NR	NR
MW-5	11-16-93	28.12	12.00	16.12	ND	NR	NR
MW-5	12-16-93	28.12	10.81	17.31	ND	NR	NR
MW-5	02-08-94	28.12	10.53	17.59	ND	NR	NR
MW-5	03-04-94	28.12	9.89	18.23	ND	NR	NR
MW-5	05-10-94	28.12	10.37	17.75	ND	NR	NR
MW-5	08-12-94	28.12	11.60	16.52	ND	SW	0.004
MW-5	09-23-94	28.12	10.52	17.60	ND	NR	NR
MW-5	11-22-94	28.12	10.29	17.83	ND	SW	0.003
MW-6	02-26-93	27.79	8.47	19.32	ND	NR	NR
MW-6	03-26-93	27.79	9.07	18.72	ND	NR	NR
MW-6	04-09-93	27.79	9.53	18.26	ND	NR	NR
MW-6	05-19-93	27.79	10.23	17.56	ND	NR	NR
MW-6	06-17-93	27.79	10.51	17.28	ND	NR	NR
MW-6	07-28-93	27.79	10.98	16.81	ND	NR	NR
MW-6	08-23-93	27.79	11.28	16.51	ND	NR	NR
MW-6	09-28-93	27.79	11.50	16.29	ND	NR	NR
MW-6	10-11-93	27.79	11.65	16.14	ND	NR	NR
MW-6	11-16-93	27.79	11.87	15.92	ND	NR	NR
MW-6	12-16-93	27.79	10.63	17.16	ND	NR	NR
MW-6	02-08-94	27.79	10.28	17.51	ND	NR	NR
MW-6	03-04-94	27.79	9.67	18.12	ND	NR	NR
MW-6	05-10-94	27.79	10.13	17.66	ND	NR	NR
MW-6	08-12-94	27.79	11.44	16.35	ND	SW	0.004
MW-6	09-23-94	27.79	10.27	17.52	ND	NR	NR
MW-6	11-22-94	27.79	10.10	17.69	ND	SW	0.003

Table 2  
 Historical Groundwater Elevation Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 03-03-95  
 Project Number: 0805-130.01

Well Design- ation	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-7	07-28-93	27.88	11.67	16.21	ND	NR	NR
MW-7	08-23-93	27.88	12.00	15.88	ND	NR	NR
MW-7	09-28-93	27.88	12.17	15.71	ND	NR	NR
MW-7	10-11-93	27.88	12.33	15.55	ND	NR	NR
MW-7	11-16-93	27.88	12.46	15.42	ND	NR	NR
MW-7	12-16-93	27.88	11.23	16.65	ND	NR	NR
MW-7	02-08-94	27.88	10.83	17.05	ND	NR	NR
MW-7	03-04-94	27.88	10.13	17.75	ND	NR	NR
MW-7	05-10-94	27.88	10.68	17.20	ND	NR	NR
MW-7	08-12-94	27.88	12.05	15.83	ND	SW	0.004
MW-7	09-23-94	27.88	10.85	17.03	ND	NR	NR
MW-7	11-22-94	27.88	10.60	17.28	ND	SW	0.003
MW-8	08-12-94	NR	11.43	NR	ND	NR	NR
MW-8	09-23-94	NR	10.99	NR	ND	NR	NR
MW-8	11-22-94	NR	10.42	NR	ND	SW	0.003

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  
 ND = None detected  
 NR = Not reported; data not available or not measurable  
 SW = Southwest

Table 3  
 Historical Groundwater Analytical Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 02-08-95  
 Project Number: 0805-130.01

Well Designation	Water Sample Field Date	TPHG  ppb	Benzene  ppb	Toluene  ppb	Ethyl- benzene  ppb	Total Xylenes  ppb	
MW-1	07-24-92	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	10-19-92	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	01-14-93	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	04-09-93	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	08-23-93	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	10-11-93	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	03-04-94	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	05-10-94	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	08-12-94	<50	<0.5	<0.5	<0.5	<0.5	
MW-1	11-22-94	<50	<0.5	<0.5	<0.5	<0.5	
MW-2	07-24-92	5900	510	<10	370	430	
MW-2	10-19-92	4100	110	<10	100	62	
MW-2	01-14-93	12000	700	10	720	680	
MW-2	04-09-93	8400	220	<10	480	320	
MW-2	08-23-93	3700	89	<5	230	150	
MW-2	10-11-93	2700	50	<2.5	<140	68	
MW-2	03-04-94	3100	49	<2.5	180	98	
MW-2	05-10-94	3100	39	<2.5	220	99	
MW-2	08-12-94	1800	13	<2.5	120	35	
MW-2	11-22-94	2300	45	<0.5	190	93	
MW-3	07-24-92	Not sampled: well contained floating product					
MW-3	10-19-92	42000	740	1100	1500	5700	
MW-3	01-14-93	44000	1100	840	2200	9600	
MW-3	04-09-93	21000	33	69	350	1600	
MW-3	08-23-93	13000	63	21	530	1300	
MW-3	10-11-93	11000	56	13	530	1200	
MW-3	03-04-94	17000	50	<10	790	1600	
MW-3	05-10-94	14000	32	<10	710	1200	
MW-3	08-12-94	13000	37	<10	640	970	
MW-3	11-22-94	15000	150	<10	1300	2000	

Table 3  
Historical Groundwater Analytical Data  
Summary Report

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 02-08-95  
Project Number: 0805-130.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl- benzene	Total Xylenes
		ppb	ppb	ppb	ppb	ppb
MW-4	07-24-92	<50	<0.5	<0.5	<0.5	<0.5
MW-4	10-19-92	<50	<0.5	<0.5	<0.5	<0.5
MW-4	01-14-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	04-09-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	08-23-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	10-11-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	03-04-94	<50	<0.5	<0.5	<0.5	<0.5
MW-4	05-10-94	<50	<0.5	<0.5	<0.5	<0.5
MW-4	08-12-94	<50	<0.5	<0.5	<0.5	<0.5
MW-4	11-22-94	<50	<0.5	<0.5	<0.5	<0.5
MW-5	02-11-93	9300	620	<50	890	2200
MW-5	04-09-93	960	29	<1	100	96
MW-5	08-23-93	2700	50	<2.5	260	250
MW-5	10-11-93	840	9	<1	87	41
MW-5	03-04-94	540	0.9	0.6	16	6.3
MW-5	05-10-94	1300	11	<2.5	110	68
MW-5	08-12-94	1500	10	<2.5	110	30
MW-5	11-22-94	84	1	<0.5	5	2
MW-6	02-11-93	4800	630	<10	490	460
MW-6	04-09-93	13000	880	<10	1000	1000
MW-6	08-23-93	6300	390	<20	450	390
MW-6	10-11-93	2900	150	3.4	190	140
MW-6	03-04-94	5800	320	<5	510	360
MW-6	05-10-94	11000	470	<10	880	650
MW-6	08-12-94	4400	170	<10	390	210
MW-6	11-22-94	7300	390	<5	940	640

Table 3  
 Historical Groundwater Analytical Data  
 Summary Report

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 02-08-95  
 Project Number: 0805-130.01

Well Desig- nation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl- benzene	Total Xylenes
		ppb	ppb	ppb	ppb	ppb
MW-7	05-14-93	350	0.83	<0.5	<0.5	<0.5
MW-7	08-23-93	630*	7.3	<1	<1	<1
MW-7	10-11-93	620*	3.5	<0.5	<0.5	<0.5
MW-7	03-04-94	320*	<0.5	<0.5	<0.5	<0.5
MW-7	05-10-94	330*	0.6	<0.5	<0.5	<0.5
MW-7	08-12-94	360*	<0.5	<0.5	<0.5	<0.5
MW-7	11-22-94	<50	<0.5	<0.5	<0.5	<0.5
MW-8	08-12-94	5100	12	<5	470	53
MW-8	11-22-94	2300	16	<0.5	140	4

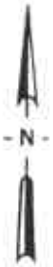
TPHG = Total petroleum hydrocarbons as gasoline  
 ppb = Parts per billion or micrograms per liter (µg/l)  
 \* = Chromatogram does not match the typical gasoline fingerprint.





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

Scale : 0 2000 4000 Feet



**EMCON**  
Associates

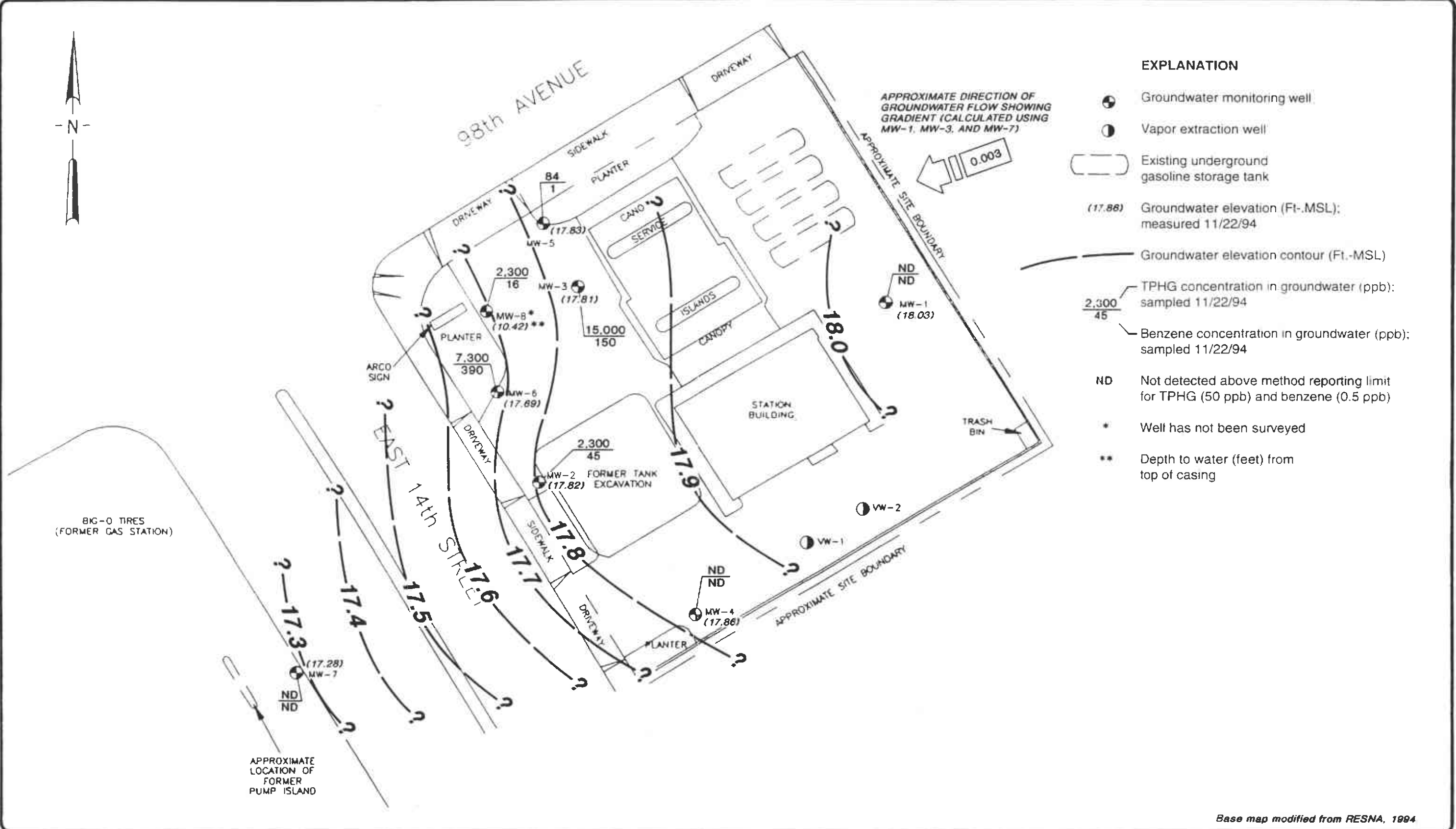
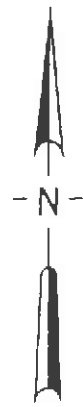
**ARCO PRODUCTS COMPANY**  
**SERVICE STATION 2185, 9800 E. 14TH STREET**  
**QUARTERLY GROUNDWATER MONITORING**  
**OAKLAND, CALIFORNIA**

**SITE LOCATION**

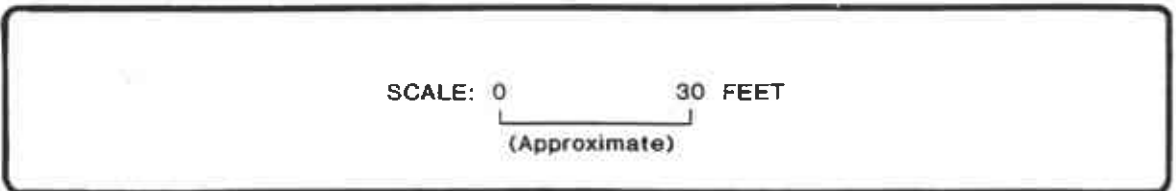
**FIGURE**

**1**

**PROJECT NO.**  
**805-130.01**



Base map modified from RESNA, 1994



ARCO PRODUCTS COMPANY  
SERVICE STATION 2185, 9800 E. 14TH STREET  
QUARTERLY GROUNDWATER MONITORING  
OAKLAND, CALIFORNIA

**GROUNDWATER DATA  
FOURTH QUARTER 1994**

FIGURE  
**2**  
PROJECT NO.  
805-130.01

**APPENDIX A**

**FIELD DATA REPORT, INTEGRATED WASTESTREAM  
MANAGEMENT, FEBRUARY 16, 1995**

**I** NTEGRATED  
**W** ASTESTREAM  
**M** ANAGEMENT

February 16, 1995

David Larsen  
EMCON Associates  
1921 Ringwood Avenue  
San Jose, CA 95131

Dear Mr. Larsen:

Attached is the corrected summary sheet for quarterly ground water sampling at ARCO Facility No. 2185 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on November 22, 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.

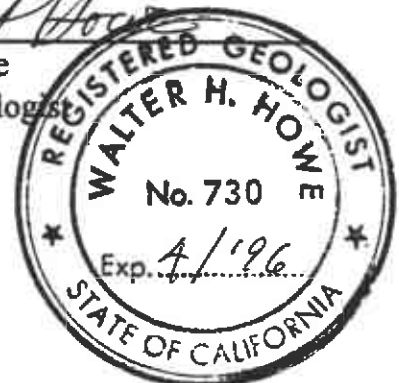
Sincerely,  
Integrated Wastestream Management



Tom DeLon  
Project Manager



Walter H. Howe  
Registered Geologist



**Summary of Ground Water Sample Analyses for ARCO Facility A-2185, Oakland, California**

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	
DATE SAMPLED	11/22/94	11/22/94	11/22/94	11/22/94	11/22/94	11/22/94	11/22/94	11/22/94	
DEPTH TO WATER	11.12	10.65	10.76	11.35	10.29	10.10	10.60	10.42	
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA	NA	
TPHg	ND	2,300	15,000	ND	84	7,300	ND	2,300	
<b>BTEX</b>									
BENZENE	ND	45	150	ND	1	390	ND	16	
TOLUENE	ND	ND	<10#	ND	ND	<5#	ND	ND	
ETHLYBENZENE	ND	190	1,300	ND	5	940	ND	140	
XYLENES	ND	93	2,000	ND	2	640	ND	4	

**FOOTNOTES:**

Concentrations reported in ug/L (ppb)

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

BTEX Distinction (USEPA Method 8020)

PCE = Tetrachloroethane (USEPA Method 8010)

\* = Well inaccessible

\*\* = Not sampled per consultant request

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

TCE = Trichloroethene (USEPA Method 8010)

ND = Not Detected

NA = Not applicable

FP = Floating product

# = See laboratory analytical report

# FIELD REPORT

## Depth To Water / Floating Product Survey

Site Arrival Time: 1738.

Site Departure Time: \_\_\_\_\_

Weather Conditions: cloudy  
cool

DTW: Well Box or Well Casing (circle one)

Project No.: \_\_\_\_\_

Location: 9300 E. 14th St. OAK

Date: November 22, 1994

Client / Station#: Arco 2185

Field Technician: Vince/Cisco

Day of Week: Tuesday

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
2	MW-1	OK	Yes	OK	22	OK	23.79	11.12	11.12	N/A	N/A	N	4" H <sub>2</sub> O filled well box	15/16
5	MW-2	OK	Yes	OK	22	OK	23.80	10.65+	10.65+	N/A	N/A	N	4"	15/16
8	MW-3	OK	Yes	OK	22	OK	23.30	10.76	10.76	N/A	N/A	N	4" H <sub>2</sub> O in well box	15/16
1	MW-4	OK	Yes	OK	22	R	23.85	11.35-	11.35-	N/A	N/A	N	4"	15/16
4	MW-5	OK	Yes	OK	22	OK	26.95	10.29	10.29	N/A	N/A	N	4"	15/16
6	MW-6	OK	Yes	OK	22	OK	29.75	10.10+	10.10+	N/A	N/A	N	4"	15/16
3	MW-7	OK	Yes	OK	22	OK	25.55	10.60	10.60	N/A	N/A	N	2"	
7	MW-8	OK	Yes	OK	22	OK	22.38	10.42+	10.42+	N/A	N/A	N	4"	15/16

WELL ID: MW-4 TD 23.85 DTW 11.35 X 0.66 X 3 - 24  
Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1836 END (2400 HR): 1842  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1845 DTW: 11.4

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1837	5	6.76	0.56	64.8	CLOUDY
1839	12	6.62	0.57	67.1	CLEAR
1840	18	6.48	0.57	67.5	CLEAR
1842	24	6.46	0.58	66.9	CLEAR

Total purge: 24

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

REMARKS:

WELL ID: MW-1 TD 23.79 DTW 11.12 X 0.66 X 3 - 25  
Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1819 END (2400 HR): 1855  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1900 DTW: 11.13

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1851	5	6.21	0.48	64.7	CLEAR
1852	10	6.25	0.49	64.5	CLEAR
1853	15	6.28	0.50	64.7	CLEAR
1855	25	6.31	0.49	64.5	CLEAR

Total purge: \_\_\_\_\_

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

REMARKS:

WELL ID: MW-5 TD 26.95 DTW 10.29 X 0.66 X 3 - 32  
Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1906 END (2400 HR): 1917  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1920 DTW: 17.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1907	5	7.15	0.44	64.5	CLOUDY
1909	15	7.10	0.40	64.3	CLEAR
1915	25	7.07	0.45	63.8	CLEAR
1917	32	7.09	0.46	63.2	CLEAR

Total purge: 32

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

REMARKS:

WELL ID: MW-8 TD 22.38 DTW 10.42 X 0.66 X 3 - 23  
Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1725 END (2400 HR): 1731  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1735 DTW: 11.8

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1727	5	7.05	0.54	67.3	CLOUDY
1728	10	7.00	0.56	67.0	CLEAR
1729	15	6.97	0.57	66.8	CLEAR
1731	23	6.94	0.54	66.3	CLEAR

Total purge: 23

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

REMARKS:

PRINT NAME: Fernando Abungen SIGNATURE: Fernando Abungen

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: \_\_\_\_\_

WELL ID: MW-7 TD 25.55 DTW 10.60 x 0.17 Gal. x 3 Casing - 7.62 Calculated  
 Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1947 END (2400 HR) 1956  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1958 DTW: 16

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1949	3	7.24	0.76	68.9	clear
1950	5	7.19	0.79	68.7	clear
1951	8	7.26	0.68	68.8	clear
1953	9.5	7.25	0.68	68.9	clear

Total purge: 9.5

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

REMARKS:

WELL ID: MW-2 TD 23.80 DTW 10.65 x 0.66 Gal. x 3 Casing - 26.08 Calculated  
 Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1850 END (2400 HR) 1858  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1819 DTW: 12

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1853	2	6.87	0.58	67.9	cloudy
1855	10	6.80	0.60	67.8	clear
1857	20	6.94	0.62	67.4	clear
1858	26	6.93	0.63	67.1	clear

Total purge: 26

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

REMARKS:

WELL ID: MW-6 TD 21.75 DTW 10.10 x 0.66 Gal. x 3 Casing - 38.88 Calculated  
 Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1904 END (2400 HR) 1915  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1918 DTW: 11.8

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1905	1	7.13	0.54	67.9	cloudy
1908	10	7.21	0.58	67.4	clear
1912	30	7.17	0.57	67.0	clear
	40	7.15	0.58	66.8	

Total purge: 40

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

REMARKS:

WELL ID: MW-3 TD 23.30 DTW 10.76 x 0.66 Gal. x 3 Casing - 24.81 Calculated  
 Linear Ft. Volume Purge

DATE PURGED: 11-22-94 START (2400 HR): 1928 END (2400 HR) 1936  
 DATE SAMPLED: 11-22-94 TIME (2400 HR): 1938 DTW: 10.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1931	2	6.97	0.43	67.6	dark
1933	13	6.92	0.43	67.1	cloudy
1935	20	6.90	0.47	66.9	cloudy
1936	25	6.89	0.46	66.8	clear

Total purge: 25

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**



**GOLDEN STATE/CAS**  
LABORATORIES, INC.

December 8, 1994

RECEIVED DEC 09 1994

Tom Delon  
IWM  
950 Ames Avenue  
Milpitas, CA 95035

RECEIVED  
DEC 12 1994

Re: **ARCO Facility #2185-Oakland**

Dear Tom:

Enclosed are the results of the samples submitted to our lab on November 30, 1994. For your reference, these analyses have been assigned our service request number L943685.

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.**

Dr. B. Gene Bennett  
Laboratory Director

Thomas X. Robinson  
Quality Assurance Coordinator

ET/sjt

**COLUMBIA ANALYTICAL SERVICES, INC.**

**Analytical Report**

**Client:** IWM  
**Project:** ARCO Products Company #2185  
**Sample Matrix:** Water

**Service Request:** L943685  
**Date Collected:** 11/22/94  
**Date Received:** 11/30/94  
**Date Extracted:** NA  
**Date Analyzed:** NA

**BTEX and TPH as Gasoline**  
**EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method**

<b>Analyte:</b>	<b>Benzene</b>	<b>Toluene</b>	<b>Ethylbenzene</b>	<b>Total Xylenes</b>	<b>TPH as Gasoline</b>
<b>Units:</b>	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
<b>Method Reporting Limit:</b>	0.5	0.5	0.5	0.5	50

Sample Name	Lab Code	Date		Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH as Gasoline
		Analyzed	Batch No					
MW-1	L943685-001	12/1/94	J113094	ND	ND	ND	ND	ND
MW-2	L943685-002	12/1/94	J113094	45	ND	190	93	2300
MW-3	L943685-003	12/1/94	J113094	150	<10*	1300	2000	15000
MW-4	L943685-004	12/1/94	J113094	ND	ND	ND	ND	ND
MW-5	L943685-005	12/1/94	J113094	1	ND	5	2	84
MW-6	L943685-006	12/1/94	J113094	390	<5*	940	640	7300
MW-7	L943685-007	12/2/94	J120194	ND	ND	ND	ND	ND
MW-8	L943685-008	12/1/94	J120194	16	ND	140	4	2300
Method Blank	L943685-MB	12/1/94	J113094	ND	ND	ND	ND	ND
Method Blank	L943685-MB	12/1/94	J120194	ND	ND	ND	ND	ND

NA Not Applicable  
 TPH Total Petroleum Hydrocarbons  
 ND None Detected at or above the method reporting limit.  
 \* MRL is elevated because of matrix interferences and because the sample required diluting.

Approved By:  Date: 12-1-95

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

Client: IWM  
 Project: ARCO Products Company #2185  
 Sample Matrix: Water

Service Request: L943685  
 Date Collected: NA  
 Date Received: NA  
 Date Extracted: NA  
 Date Analyzed: NA

Surrogate Recovery Summary  
 BTEX and TPH as Gasoline  
 EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene	Percent Recovery <i>a,a,a</i> -Trifluorotoluene
MW-1	L943685-001	93	87
MW-2	L943685-002	105	*
MW-3	L943685-003	101	119
MW-4	L943685-004	96	96
MW-5	L943685-005	106	105
MW-6	L943685-006	103	*
MW-7	L943685-007	84	85
MW-8	L943685-008	100	*
Method Blank	L943685-MB (J113094)	97	88
Method Blank	L943685-MB (J120194)	94	86
Matrix Spike	L943685-5MS	99	97
Duplicate Matrix Spike	L943685-5DMS	102	100
Matrix Spike	L943694-1MS	102	105
Duplicate Matrix Spike	L943694-1DMS	92	92

CAS Acceptance Limits: 50-130 60-120

NA Not Applicable  
 \* Not Applicable because of the sample matrix. The gas chromatogram showed target components that interfered with determination of the surrogate.

Approved By:  Date: 12-8-97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM  
Project: ARCO Products Company #2185  
LCS Matrix: Water  
Batch Number: J120194

Service Request: L943685  
Date Collected: NA  
Date Received: NA  
Date Extracted: NA  
Date Analyzed: 12/2/94

Laboratory Control Sample Summary  
BTEX and TPH as Gasoline  
EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method  
Units: µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	5.00	5.27	105	39-150
Toluene	5.00	5.84	117	46-148
Ethylbenzene	5.00	4.72	94	32-160
TPH as Gasoline	1000	970	97	70-140

NA Not Applicable  
TPH Total Petroleum Hydrocarbons

Approved By: *[Signature]* Date: 12-7-94

LCS/060194  
L943685.XLS - 8020lcs (2) 12/8/94

Page No.:

**COLUMBIA ANALYTICAL SERVICES, INC.**

**QA/QC Report**

**Client:** IWM  
**Project:** ARCO Products Company #2185  
**Sample Matrix:** Water  
**Batch Number:** J120194

**Service Request:** L943685  
**Date Collected:** NA  
**Date Received:** NA  
**Date Extracted:** NA  
**Date Analyzed:** 12/2/94

**Matrix Spike/Duplicate Matrix Spike Summary**  
**BTEX and TPH as Gasoline**  
**EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method**  
**Units: µg/L (ppb)**

**Sample Name:** Batch QC  
**Lab Code:** L943694-001

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery			
	MS	DMS		MS	DMS	CAS		Relative Percent Difference	
						MS	DMS		Acceptance Limits
Benzene	5.00	5.00	ND	5.77	5.18	115	104	39-150	11
Toluene	5.00	5.00	ND	6.37	5.38	127	108	46-148	17
Ethylbenzene	5.00	5.00	ND	6.65	5.98	133	120	32-160	11
TPH as Gasoline	1000	1000	ND	800	850	80	85	70-140	6

**NA** Not Applicable  
**TPH** Total Petroleum Hydrocarbons  
**ND** None Detected at or above the reporting limit

Approved By: *[Signature]* Date: 12-7-97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM  
Project: ARCO Products Company #2185  
LCS Matrix: Water  
Batch Number: J113094

Service Request: L943685  
Date Collected: NA  
Date Received: NA  
Date Extracted: NA  
Date Analyzed: 12/1/94

Laboratory Control Sample Summary  
BTEX and TPH as Gasoline  
EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method  
Units: µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	80.0	76.5	96	39-150
Toluene	80.0	78.5	98	46-148
Ethylbenzene	80.0	85.0	106	32-160
TPH as Gasoline	2000	1650	83	70-140

NA Not Applicable  
TPH Total Petroleum Hydrocarbons

Approved By: *[Signature]* Date: 12-8-97

LCS/060194  
L943685.XLS - 8020les 12/8/94

Page No.:

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

**Client:** IWM  
**Project:** ARCO Products Company #2185  
**Sample Matrix:** Water  
**Batch Number:** J113094

**Service Request:** L943685  
**Date Collected:** NA  
**Date Received:** NA  
**Date Extracted:** NA  
**Date Analyzed:** 12/1/94

**Matrix Spike/Duplicate Matrix Spike Summary**  
**BTEX and TPH as Gasoline**  
 EPA Methods 5030/8020/Modified 8015/California DHS LUFT Method  
 Units: µg/L (ppb)

**Sample Name:** Batch QC  
**Lab Code:** L943684-005

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference
	MS	DMS		MS	DMS	MS	DMS		
	Benzene	80.0		80.0	ND	76.0	76.8		
Toluene	80.0	80.0	ND	77.8	78.6	97	98	46-148	1
Ethylbenzene	80.0	80.0	ND	83.6	84.7	105	106	32-160	1
TPH as Gasoline	2000	2000	ND	1680	1900	84	95	70-140	12

**NA** Not Applicable  
**TPH** Total Petroleum Hydrocarbons  
**ND** None Detected at or above the reporting limit

Approved By: *[Signature]* Date: 12-7-97

DMS1SRPD061394  
 L943685.XLS - 8020dmsw 12/8/94



**ARCO Products Company**  
Division of AtlanticRichfieldCompany

Task Order No. IWM 94-500

Chain of Custody

ARCO Facility no. <u>A 2185</u>	City (Facility) <u>Oakland</u>	Project manager (Consultant) <u>Tom De Jon</u>	Laboratory name <u>CS</u>
ARCO engineer <u>M.W.</u>	Telephone no. (ARCO) <u>415 5712431</u>	Telephone no. (Consultant) <u>408/942 8955</u>	Contract number <u>07077</u>
Consultant name <u>IWM</u>	Address (Consultant) <u>950 Ames Av. Menlo Park CA 94025</u>		Method of shipment <u>CAS LOURIER</u>
Fax no. (Consultant) <u>408/942 1499</u>			Special detection Limit/reporting

Sample I.D.	Lab no. <u>5943685</u>	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX EPA 8020	BTEX/TPH EPA 8020/8015	TPH Modified 8015 Gas <input checked="" type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/6010	EPA 624/6240	EPA 625/6270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals EPA 6010/7000 <input type="checkbox"/> STL <input type="checkbox"/>	Lead Org./OHS <input type="checkbox"/> Lead EPA 7420/7421 <input type="checkbox"/>
			Soil	Water	Other	Ice	Acid													
<u>FB-1</u>	<u>9</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>11/22/94</u>	<u>600</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-1</u>	<u>2</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	}	<u>1900</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-2</u>	<u>2</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1901</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-3</u>	<u>3</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1938</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-4</u>	<u>4</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1845</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-5</u>	<u>5</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1920</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-6</u>	<u>6</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1918</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-7</u>	<u>7</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>1958</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								
<u>MW-8</u>	<u>8</u>	<u>2</u>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>66 1735</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								

Special detection Limit/reporting

Special QA/QC

Remarks

Hold  
→  
FB-1

943685

Lab number 5941520

Turnaround time

Priority Rush 1 Business Day

Rush 2 Business Days

Expedited 5 Business Days

Standard 10 Business Days

Condition of sample: <u>dry</u>	Temperature received: <u>cool</u>
Relinquished by sampler <u>San Jader</u>	Date <u>11/28/94</u> Time <u>1630P</u>
Relinquished by <u>John Jurey CAS/JS</u>	Date <u>11/29/94</u> Time <u>1600P</u>
Relinquished by	Date
Received by <u>John Jurey CAS/JS</u>	Date <u>11-30-94</u> Time <u>0900</u>

65; all analysis