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

Date December 29, 1994
Project 0805-122.01

To:

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

We are enclosing:

Copies	Description
1	Third quarter 1994 groundwater monitoring report for ARCO service station 771, Livermore, 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

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

Date:
December 29, 1994

Re: ARCO Station # 771 • 899 Rincon Avenue • Livermore, CA
Third 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 Associates
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

December 21, 1994
Project 0805-122.01

Mr. Michael Whelan
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Re: Third quarter 1994 groundwater monitoring program results, ARCO service station 771, Livermore, California

Dear Mr. Whelan:

This letter presents the results of the third quarter 1994 groundwater monitoring program at ARCO Products Company (ARCO) service station 771, 899 Rincon Avenue, Livermore, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

BACKGROUND

In August, 1987, a waste oil tank was removed from the site by Crosby and Overton. In February 1990, RESNA/AGS conducted a preliminary subsurface environmental investigation prior to the removal of the gasoline underground storage tanks (USTs). This investigation included drilling three borings in the vicinity of the USTs. In December 1990, an initial phase of investigation was conducted by RESNA which included installation of groundwater monitoring wells MW-1 through MW-3 to characterize the lateral and vertical extent of gasoline hydrocarbons near the USTs.

In June and July, 1991, RESNA performed a second phase of investigation which included the installation of four groundwater monitoring wells, MW-4 through MW-7, to further characterize the lateral and vertical extent of gasoline hydrocarbon-impacted soil and groundwater on site. In December 1991, RESNA performed a soil-vapor extraction (SVE) test at the site and concluded that SVE would be a viable soil remediation alternative at the site.

Between December 1991 and March 1992, ROUX observed the removal of four gasoline USTs and the installation of new USTs at the site. During the tank removal and replacement, eight soil samples were collected from beneath the former USTs and six soil samples were collected from the base of the new UST pit. During the installation of the

new USTs and product piping, ROUX supervised installation of conductor casing, vault boxes of existing wells, and PVC piping between vault boxes to facilitate connecting wells to the future remediation system.

In December 1992, RESNA began construction of a SVE remediation system utilizing existing groundwater monitoring wells and vapor extraction wells at the site. Construction of the system was completed in March 1993. Startup of the remediation system was postponed by heavy rain experienced at the site during March and April, 1993 which caused water levels at the site to rise approximately 20 feet.

Between August 1992 and January 1993, RESNA performed additional on-site and initial off-site investigations which included the installation of four off site monitoring wells (MW-8 through MW-11), one on site-vapor extraction well (VW-1), and one on site recovery well (RW-1).

Groundwater monitoring and sampling at the site was initiated in January 1991. For additional background information, please refer to "Additional On Site and Initial Off Site Subsurface Investigation", RESNA Report 600000.09, dated February 26, 1993.

Wells MW-1 through MW-11 and RW-1 are monitored quarterly.

MONITORING PROGRAM FIELD PROCEDURES AND RESULTS

The third quarter 1994 groundwater monitoring event was performed by Integrated Wastestream Management, Inc. (IWM), on September 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-11, and RW-1 (2) purging and subsequently sampling groundwater monitoring wells MW-1 through MW-11 and RW-1 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. Well MW-5 was inaccessible due to a parked vehicle and was not monitored during third quarter 1994. The results of IWM's field work were transmitted to EMCON in a report dated October 14, 1994. These data are presented in Appendix A.

ANALYTICAL PROCEDURES

Groundwater samples collected during third quarter 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 (EPA) method 5030 (purge and trap). Groundwater was analyzed for

TPHG by the methods accepted by the Department of Toxic Substances Control, California EPA (Cal-EPA), and referenced in the *Leaking Underground Fuel Tank (LUFT) Field Manual* (State Water Resources Control Board, May 1988, revised October 1989). Samples were analyzed for BTEX by EPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (EPA, SW-846, November 1986, Third Edition). Groundwater samples collected from well MW-6 were also analyzed for total petroleum hydrocarbons as diesel (TPHD) by EPA method 3510/California DHS LUFT method, and total oil and grease (TOG) by standard method 5520F. 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 third 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, TPHD, and TOG analyses. Table 4 summarizes historical floating product recovery data for wells MW-1, MW-2, and MW-5. Copies of the third quarter 1994 certified analytical report and chain-of-custody documentation are included in Appendix B.

MONITORING PROGRAM EVALUATION

Groundwater elevation data collected on September 22, 1994, illustrate that groundwater beneath the site flows north-northeast at an approximate hydraulic gradient of 0.056 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the third quarter of 1994.

Well MW-5 was inaccessible due to a parked vehicle and was not sampled during third quarter 1994. Groundwater samples collected from wells MW-3 and MW-8 through MW-11 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples collected from well MW-6 did not contained detectable concentrations of TPHD or TOG. Groundwater samples collected from wells MW-1, MW-2, MW-4, MW-6, MW-7, and RW-1 contained concentrations of TPHG from 73 to 51,000 parts per billion (ppb) and concentrations of benzene from 2.6 to 1,800 ppb. Except for well MW-6, similar analytical results were reported for these wells during previous monitoring events.

TPHG concentrations in well MW-6 have dropped from 43,000 ppb during the second quarter of 1993 to 73 ppb during the third quarter of 1994.

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 third quarter of 1994 and the anticipated site activities for the fourth quarter of 1994.

Third Quarter 1994 Activities

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

Work Anticipated Fourth Quarter 1994

- Prepare and submit quarterly groundwater monitoring report for third quarter 1994.
- Perform quarterly groundwater monitoring for fourth quarter 1994.
- Perform startup of the soil-vapor extraction system.

Project 0805-122.01

Please call if you have questions.

Sincerely,

EMCON Associates

David Larsen
Sampling Coordinator

Mark Smolley, R.G. 4650
Senior Project Geologist

Attachment:
- Table 1 - Groundwater Monitoring Data, Third Quarter 1994
- Table 2 - Historical Groundwater Elevation Data
- Table 3 - Historical Groundwater Analytical Data (TPHG, BTEX, TPHD, and TOG)
- Table 4 - Approximate Cumulative Floating Product Recovered (Wells MW-1, MW-2, and MW-5)
- Figure 1 - Site Location
- Figure 2 - Groundwater Data, Third Quarter 1994
- Appendix A - Field Data Report, Integrated Wastestream Management, October 14, 1994
- Appendix B - Certified Analytical Report and Chain-of-Custody Documentation, Third Quarter 1994

Table 1
Groundwater Monitoring Data
Third Quarter 1994
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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	TPHD	TOG
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		ppb	ppb	ppb	ppb	ppb	ppb	ppm
MW-1	09-22-94	451.73	31.61	420.12	ND	NNE	0.056	09-22-94	51000	1400	280	570	2800	NA	NA
MW-2	09-22-94	449.49	29.54	419.95	ND	NNE	0.056	09-22-94	42000	1200	620	710	2000	NA	NA
MW-3	09-22-94	450.28	32.34	417.94	ND	NNE	0.056	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-4	09-22-94	451.09	30.98	420.11	ND	NNE	0.056	09-22-94	10000	700	61	420	570	NA	NA
MW-5	09-22-94	451.40	Not surveyed: vehicle was parked on well					09-22-94	Not sampled: vehicle was parked on well						
MW-6	09-22-94	451.37	30.37	421.00	ND	NNE	0.056	09-22-94	73	2.6	<0.5	1.7	0.7	<50	<0.5a
MW-7	09-22-94	450.33	30.46	419.87	ND	NNE	0.056	09-22-94	22000	1800	240	430	1900	NA	NA
MW-8	09-22-94	449.43	38.77	410.66	ND	NNE	0.056	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	09-22-94	449.21	31.36	417.85	ND	NNE	0.056	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	09-22-94	449.22	31.79	417.43	ND	NNE	0.056	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	09-22-94	448.02	34.75	413.27	ND	NNE	0.056	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
RW-1	09-22-94	451.67	30.52	421.15	ND	NNE	0.056	09-22-94	4900	390	30	190	210	NA	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
TPHD = Total petroleum hydrocarbons as diesel
TOG = Total oil and grease/petroleum hydrocarbons using method: (a) 5520F-IR, (b) 5520C, (c) 413.2, or (d) 418.1
ppb = Parts per billion or micrograms per liter (µg/l)
ppm = Parts per million or milligrams per liter (mg/l); TOG only
ND = None detected
NNE = North-northeast
NA = Not analyzed

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Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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	01-15-91	451.80	32.77	419.03	Sheen	NR	NR
MW-1	02-27-91	451.80	32.23	419.57	ND	NR	NR
MW-1	03-20-91	451.80	27.38	424.42	Sheen	NR	NR
MW-1	04-10-91	451.80	26.49	425.31	ND	NR	NR
MW-1	05-20-91	451.80	Not surveyed: interface probe failure				
MW-1	06-20-91	451.80	33.95	417.85	Sheen	NR	NR
MW-1	07-25-91	451.80	^36.59	^415.21	0.10	NR	NR
MW-1	08-13-91	451.80	^37.72	^414.08	0.20	NR	NR
MW-1	09-12-91	451.80	^39.25	^412.55	0.23	NR	NR
MW-1	10-30-91	451.80	^39.14	^412.66	0.20	NR	NR
MW-1	11-13-91	451.80	DRY	DRY	ND	NR	NR
MW-1	12-26-91	451.80	^39.30	^412.50	0.01	NR	NR
MW-1	01-18-92	NR	37.81	NR	Skimmer	NR	NR
MW-1	02-21-92	NR	Not surveyed: well inaccessible due to construction				
MW-1	03-31-92	NR	31.90	NR	Skimmer	NR	NR
MW-1	04-24-92	451.42	Not surveyed: well inaccessible due to construction				
MW-1	05-20-92	451.42	33.00	418.42	Skimmer	NR	NR
MW-1	06-12-92	451.42	33.25	418.17	0.02	NR	NR
MW-1	07-28-92	451.42	32.31	419.11	ND	NR	NR
MW-1	08-24-92	451.42	30.87	420.55	ND	NR	NR
MW-1	09-15-92	451.42	^32.24	^419.18	0.01	NR	NR
MW-1	10-29-92	451.42	32.29	419.13	ND	NR	NR
MW-1	11-25-92	451.73	32.15	419.58	ND*	NR	NR
MW-1	12-14-92	451.73	30.54	421.19	ND	NR	NR
MW-1	01-29-93	451.73	23.49	428.24	ND	NR	NR
MW-1	02-26-93	451.73	25.23	426.50	ND	NR	NR
MW-1	03-29-93	451.73	25.66	426.07	ND	NR	NR
MW-1	04-27-93	451.73	28.02	423.71	ND	NR	NR
MW-1	05-10-93	451.73	30.38	421.35	ND	NR	NR
MW-1	06-17-93	451.73	30.81	420.92	ND	NR	NR
MW-1	07-27-93	451.73	Not surveyed: vehicle parked on well				
MW-1	08-26-93	451.73	31.23	420.50	ND	NR	NR
MW-1	09-14-93	451.73	32.59	419.14	ND	NR	NR
MW-1	11-05-93	451.73	32.13	419.60	ND	NR	NR
MW-1	03-26-94	451.73	28.22	423.51	ND	NR	NR
MW-1	06-13-94	451.73	29.86	421.87	ND	NR	NR
MW-1	09-22-94	451.73	31.61	420.12	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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	01-15-91	449.52	^30.89	^418.63	0.16	NR	NR
MW-2	02-27-91	449.52	^29.11	^420.41	0.02	NR	NR
MW-2	03-20-91	449.52	^24.57	^424.95	0.02	NR	NR
MW-2	04-10-91	449.52	^22.85	^426.67	0.05	NR	NR
MW-2	05-20-91	449.51	Not surveyed:				
MW-2	06-20-91	449.51	^31.42	^418.09	0.15	NR	NR
MW-2	07-25-91	449.51	^33.69	^415.82	0.49	NR	NR
MW-2	08-13-91	449.51	^34.80	^414.71	0.47	NR	NR
MW-2	09-12-91	449.51	^36.39	^413.12	0.45	NR	NR
MW-2	10-30-91	449.51	DRY	DRY	ND	NR	NR
MW-2	11-13-91	449.51	DRY	DRY	ND	NR	NR
MW-2	12-26-91	449.51	36.45	413.06	Sheen	NR	NR
MW-2	01-18-92	449.51	Not surveyed: well inaccessible due to construction				
MW-2	02-21-92	449.51	26.27	NR	Skimmer	NR	NR
MW-2	03-31-92	449.51	28.85	NR	Skimmer	NR	NR
MW-2	04-24-92	449.51	30.95	418.56	Skimmer	NR	NR
MW-2	05-20-92	449.51	30.69	418.82	Skimmer	NR	NR
MW-2	06-12-92	449.51	31.25	418.26	ND	NR	NR
MW-2	07-28-92	449.51	30.31	419.20	ND	NR	NR
MW-2	08-24-92	449.51	29.83	419.68	ND	NR	NR
MW-2	09-15-92	449.51	30.06	419.45	Sheen	NR	NR
MW-2	10-29-92	449.51	30.90	418.61	ND	NR	NR
MW-2	11-25-92	449.49	31.13	418.36	ND*	NR	NR
MW-2	12-14-92	449.49	29.24	420.25	ND	NR	NR
MW-2	01-29-93	449.49	20.12	429.37	ND	NR	NR
MW-2	02-26-93	449.49	22.59	426.90	ND	NR	NR
MW-2	03-29-93	449.49	22.83	426.66	ND	NR	NR
MW-2	04-27-93	449.49	25.10	424.39	ND	NR	NR
MW-2	05-10-93	449.49	27.23	422.26	ND	NR	NR
MW-2	06-17-93	449.49	28.26	421.23	ND	NR	NR
MW-2	07-27-93	449.49	29.50	419.99	ND	NR	NR
MW-2	08-26-93	449.49	29.85	419.64	ND	NR	NR
MW-2	09-14-93	449.49	30.43	419.06	ND	NR	NR
MW-2	11-05-93	449.49	30.20	419.29	ND	NR	NR
MW-2	03-26-94	449.49	25.30	424.19	ND	NR	NR
MW-2	06-13-94	449.49	27.28	422.21	ND	NR	NR
MW-2	09-22-94	449.49	29.54	419.95	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-3	01-15-91	450.29	32.34	417.95	ND	NR	NR
MW-3	02-27-91	450.29	31.78	418.51	ND	NR	NR
MW-3	03-20-91	450.29	27.74	422.55	ND	NR	NR
MW-3	04-10-91	450.29	25.05	425.24	ND	NR	NR
MW-3	05-20-91	450.28	27.06	423.22	ND	NR	NR
MW-3	06-20-91	450.28	32.35	417.93	ND	NR	NR
MW-3	07-25-91	450.28	35.02	415.26	ND	NR	NR
MW-3	08-13-91	450.28	36.50	413.78	ND	NR	NR
MW-3	09-12-91	450.28	38.47	411.81	ND	NR	NR
MW-3	10-30-91	450.28	DRY	DRY	ND	NR	NR
MW-3	11-13-91	450.28	DRY	DRY	ND	NR	NR
MW-3	12-26-91	450.28	38.53	411.75	ND	NR	NR
MW-3	01-18-92	450.28	Not surveyed: well inaccessible due to construction				
MW-3	02-21-92	450.28	Not surveyed: well inaccessible due to construction				
MW-3	03-31-92	450.28	30.61	NR	ND	NR	NR
MW-3	04-24-92	450.28	32.83	417.45	ND	NR	NR
MW-3	05-20-92	450.28	33.85	416.43	ND	NR	NR
MW-3	06-12-92	450.28	34.51	415.77	ND	NR	NR
MW-3	07-28-92	450.28	34.42	415.86	ND	NR	NR
MW-3	08-24-92	450.28	32.46	417.82	ND	NR	NR
MW-3	09-15-92	450.28	34.29	415.99	ND	NR	NR
MW-3	10-29-92	450.28	33.40	416.88	ND	NR	NR
MW-3	11-25-92	450.28	33.67	416.61	ND	NR	NR
MW-3	12-14-92	450.28	34.26	416.02	ND	NR	NR
MW-3	01-29-93	450.28	21.88	428.40	ND	NR	NR
MW-3	02-26-93	450.28	24.71	425.57	ND	NR	NR
MW-3	03-29-93	450.28	24.74	425.54	ND	NR	NR
MW-3	04-27-93	450.28	25.96	424.32	ND	NR	NR
MW-3	05-10-93	450.28	27.61	422.67	ND	NR	NR
MW-3	06-17-93	450.28	28.73	421.55	ND	NR	NR
MW-3	07-27-93	450.28	30.37	419.91	ND	NR	NR
MW-3	08-26-93	450.28	30.94	419.34	ND	NR	NR
MW-3	09-14-93	450.28	31.84	418.44	ND	NR	NR
MW-3	11-05-93	450.28	33.22	417.06	ND	NR	NR
MW-3	03-26-94	450.28	26.97	423.31	ND	NR	NR
MW-3	06-13-94	450.28	28.71	421.57	ND	NR	NR
MW-3	09-22-94	450.28	32.34	417.94	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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	07-25-91	451.56	36.07	415.49	ND	NR	NR
MW-4	08-13-91	451.56	37.54	414.02	ND	NR	NR
MW-4	09-12-91	451.56	38.73	412.83	ND	NR	NR
MW-4	10-30-91	451.56	39.90	411.66	ND	NR	NR
MW-4	11-13-91	451.56	40.56	411.00	ND	NR	NR
MW-4	12-26-91	450.99	38.78	412.21	ND	NR	NR
MW-4	01-18-92	450.99	38.71	NR	ND	NR	NR
MW-4	02-21-92	450.99	31.91	NR	ND	NR	NR
MW-4	03-31-92	450.99	30.36	NR	ND	NR	NR
MW-4	04-24-92	450.99	32.65	418.34	ND	NR	NR
MW-4	05-20-92	450.99	32.62	418.37	ND	NR	NR
MW-4	06-12-92	450.99	32.73	418.26	ND	NR	NR
MW-4	07-28-92	450.99	31.48	419.51	ND	NR	NR
MW-4	08-24-92	450.99	32.84	418.15	ND	NR	NR
MW-4	09-15-92	450.99	31.37	419.62	ND	NR	NR
MW-4	10-29-92	450.99	32.58	418.41	ND	NR	NR
MW-4	11-25-92	451.09	32.37	418.72	ND	NR	NR
MW-4	12-14-92	451.09	30.99	420.10	ND	NR	NR
MW-4	01-29-93	451.09	22.30	428.79	ND	NR	NR
MW-4	02-26-93	451.09	24.47	426.62	ND	NR	NR
MW-4	03-29-93	451.09	24.67	426.42	ND	NR	NR
MW-4	04-27-93	451.09	26.68	424.41	ND	NR	NR
MW-4	05-10-93	451.09	28.64	422.45	ND	NR	NR
MW-4	06-17-93	451.09	29.28	421.81	ND	NR	NR
MW-4	07-27-93	451.09	31.14	419.95	ND	NR	NR
MW-4	08-26-93	451.09	31.38	419.71	ND	NR	NR
MW-4	09-14-93	451.09	32.00	419.09	ND	NR	NR
MW-4	11-05-93	451.09	31.16	419.93	ND	NR	NR
MW-4	03-26-94	451.09	26.94	424.15	ND	NR	NR
MW-4	06-13-94	451.09	28.88	422.21	ND	NR	NR
MW-4	09-22-94	451.09	30.98	420.11	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-5	07-25-91	451.41	36.67	414.74	Sheen	NR	NR
MW-5	08-13-91	451.41	^37.98	^413.43	0.01	NR	NR
MW-5	09-12-91	451.41	^39.01	^412.40	0.05	NR	NR
MW-5	10-30-91	451.41	38.28	413.13	Sheen	NR	NR
MW-5	11-13-91	451.41	39.24	412.17	Sheen	NR	NR
MW-5	12-26-91	451.41	39.11	412.30	Sheen	NR	NR
MW-5	01-18-92	451.41	38.15	NR	Skimmer	NR	NR
MW-5	02-21-92	451.41	30.59	NR	Skimmer	NR	NR
MW-5	03-18-92	451.41	30.84	NR	Skimmer	NR	NR
MW-5	04-24-92	451.40	33.00	418.40	Skimmer	NR	NR
MW-5	05-20-92	451.40	32.86	418.54	Skimmer	NR	NR
MW-5	06-12-92	451.40	33.03	418.37	ND	NR	NR
MW-5	07-28-92	451.40	31.92	419.48	ND	NR	NR
MW-5	08-24-92	451.40	32.17	419.23	ND	NR	NR
MW-5	09-15-92	451.40	31.90	419.50	ND	NR	NR
MW-5	10-29-92	451.40	32.94	418.46	ND	NR	NR
MW-5	11-25-92	451.40	Not surveyed: new wellhead prevented measurement				
MW-5	12-14-92	451.40	30.90	NR	ND	NR	NR
MW-5	01-29-93	451.40	23.25	NR	ND	NR	NR
MW-5	02-26-93	451.40	25.02	NR	ND	NR	NR
MW-5	03-29-93	451.40	24.72	NR	ND	NR	NR
MW-5	04-27-93	451.40	27.11	NR	ND	NR	NR
MW-5	05-10-93	451.40	29.04	NR	ND	NR	NR
MW-5	06-17-93	451.40	29.33	NR	ND	NR	NR
MW-5	07-27-93	451.40	31.12	420.28	ND	NR	NR
MW-5	08-26-93	451.40	31.37	420.03	ND	NR	NR
MW-5	09-14-93	451.40	31.96	419.44	ND	NR	NR
MW-5	11-05-93	451.40	31.03	420.37	ND	NR	NR
MW-5	03-26-94	451.40	27.41	423.99	ND	NR	NR
MW-5	06-13-94	451.40	29.29	422.11	ND	NR	NR
MW-5	09-22-94	451.40	Not surveyed: vehicle was parked on well				

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-6	07-25-91	451.38	37.68	413.70	ND	NR	NR
MW-6	08-13-91	451.38	39.17	412.21	ND	NR	NR
MW-6	09-12-91	451.38	41.14	410.24	ND	NR	NR
MW-6	10-30-91	451.38	42.10	409.28	ND	NR	NR
MW-6	11-13-91	451.38	41.45	409.93	ND	NR	NR
MW-6	12-26-91	451.38	41.23	410.15	ND	NR	NR
MW-6	01-18-92	451.38	38.23	NR	ND	NR	NR
MW-6	02-21-92	451.37	35.21	NR	ND	NR	NR
MW-6	03-31-92	451.37	32.26	NR	ND	NR	NR
MW-6	04-24-92	451.37	33.24	418.13	ND	NR	NR
MW-6	05-20-92	451.37	33.14	418.23	ND	NR	NR
MW-6	06-12-92	451.37	33.43	417.94	ND	NR	NR
MW-6	07-28-92	451.37	32.52	418.85	ND	NR	NR
MW-6	08-24-92	451.37	32.57	418.80	ND	NR	NR
MW-6	09-15-92	451.37	32.58	418.79	ND	NR	NR
MW-6	10-29-92	451.37	32.33	419.04	ND	NR	NR
MW-6	11-25-92	451.37	32.43	418.94	ND	NR	NR
MW-6	12-14-92	451.37	31.52	419.85	ND	NR	NR
MW-6	01-29-93	451.37	23.70	427.67	ND	NR	NR
MW-6	02-26-93	451.37	26.22	425.15	ND	NR	NR
MW-6	03-29-93	451.37	26.13	425.24	ND	NR	NR
MW-6	04-27-93	451.37	27.27	424.10	ND	NR	NR
MW-6	05-10-93	451.37	29.74	421.63	ND	NR	NR
MW-6	06-17-93	451.37	30.92	420.45	ND	NR	NR
MW-6	07-27-93	451.37	30.90	420.47	ND	NR	NR
MW-6	08-26-93	451.37	31.18	420.19	ND	NR	NR
MW-6	09-14-93	451.37	31.70	419.67	ND	NR	NR
MW-6	11-05-93	451.37	31.83	419.54	ND	NR	NR
MW-6	03-26-94	451.37	28.24	423.13	ND	NR	NR
MW-6	06-13-94	451.37	29.20	422.17	ND	NR	NR
MW-6	09-22-94	451.37	30.37	421.00	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-7	07-25-91	450.65	34.88	415.77	Sheen	NR	NR
MW-7	08-13-91	450.65	36.17	414.48	ND	NR	NR
MW-7	09-12-91	450.65	37.81	412.84	ND	NR	NR
MW-7	10-30-91	450.65	38.50	412.15	ND	NR	NR
MW-7	11-13-91	450.65	38.31	412.34	ND	NR	NR
MW-7	12-26-91	450.65	37.90	412.75	ND	NR	NR
MW-7	01-18-92	450.65	Not surveyed: well inaccessible due to construction				
MW-7	02-21-92	450.65	31.50	NR	ND	NR	NR
MW-7	03-31-92	450.65	29.40	NR	ND	NR	NR
MW-7	04-24-92	450.63	32.14	418.49	ND	NR	NR
MW-7	05-20-92	450.63	32.51	418.12	ND	NR	NR
MW-7	06-12-92	450.63	32.45	418.18	ND	NR	NR
MW-7	07-28-92	450.63	32.08	418.55	ND	NR	NR
MW-7	08-24-92	450.63	32.29	418.34	ND	NR	NR
MW-7	09-15-92	450.63	31.93	418.70	ND	NR	NR
MW-7	10-29-92	450.63	32.37	418.26	ND	NR	NR
MW-7	11-25-92	450.33	31.80	418.53	ND	NR	NR
MW-7	12-14-92	450.33	30.44	419.89	ND	NR	NR
MW-7	01-29-93	450.33	21.76	428.57	ND	NR	NR
MW-7	02-26-93	450.33	24.16	426.17	ND	NR	NR
MW-7	03-29-93	450.33	24.32	426.01	ND	NR	NR
MW-7	04-27-93	450.33	25.44	424.89	ND	NR	NR
MW-7	05-10-93	450.33	27.40	422.93	ND	NR	NR
MW-7	06-17-93	450.33	28.80	421.53	ND	NR	NR
MW-7	07-27-93	450.33	29.89	420.44	ND	NR	NR
MW-7	08-26-93	450.33	30.52	419.81	ND	NR	NR
MW-7	09-14-93	450.33	31.09	419.24	ND	NR	NR
MW-7	11-05-93	450.33	31.42	418.91	ND	NR	NR
MW-7	03-26-94	450.33	26.03	424.30	ND	NR	NR
MW-7	06-13-94	450.33	27.94	422.39	ND	NR	NR
MW-7	09-22-94	450.33	30.46	419.87	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-8	01-29-93	449.43	23.23	426.20	ND	NR	NR
MW-8	02-26-93	449.43	29.20	420.23	ND	NR	NR
MW-8	03-29-93	449.43	29.77	419.66	ND	NR	NR
MW-8	04-27-93	449.43	31.52	417.91	ND	NR	NR
MW-8	05-10-93	449.43	33.88	415.55	ND	NR	NR
MW-8	06-17-93	449.43	35.25	414.18	ND	NR	NR
MW-8	07-27-93	449.43	36.61	412.82	ND	NR	NR
MW-8	08-26-93	449.43	37.71	411.72	ND	NR	NR
MW-8	09-14-93	449.43	38.78	410.65	ND	NR	NR
MW-8	11-05-93	449.43	39.01	410.42	ND	NR	NR
MW-8	03-26-94	449.43	31.40	418.03	ND	NR	NR
MW-8	06-13-94	449.43	35.10	414.33	ND	NR	NR
MW-8	09-22-94	449.43	38.77	410.66	ND	NNE	0.056
MW-9	01-29-93	449.21	18.91	430.30	ND	NR	NR
MW-9	02-26-93	449.21	21.35	427.86	ND	NR	NR
MW-9	03-29-93	449.21	21.78	427.43	ND	NR	NR
MW-9	04-27-93	449.21	24.70	424.51	ND	NR	NR
MW-9	05-10-93	449.21	26.19	423.02	ND	NR	NR
MW-9	06-17-93	449.21	27.50	421.71	ND	NR	NR
MW-9	07-27-93	449.21	29.11	420.10	ND	NR	NR
MW-9	08-26-93	449.21	29.55	419.66	ND	NR	NR
MW-9	09-14-93	449.21	30.65	418.56	ND	NR	NR
MW-9	11-05-93	449.21	32.24	416.97	ND	NR	NR
MW-9	03-26-94	449.21	25.68	423.53	ND	NR	NR
MW-9	06-13-94	449.21	27.69	421.52	ND	NR	NR
MW-9	09-22-94	449.21	31.36	417.85	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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-10	01-29-93	449.22	19.27	429.95	ND	NR	NR
MW-10	02-26-93	449.22	21.34	427.88	ND	NR	NR
MW-10	03-29-93	449.22	20.89	428.33	ND	NR	NR
MW-10	04-27-93	449.22	25.40	423.82	ND	NR	NR
MW-10	05-10-93	449.22	26.77	422.45	ND	NR	NR
MW-10	06-17-93	449.22	26.80	422.42	ND	NR	NR
MW-10	07-27-93	449.22	29.87	419.35	ND	NR	NR
MW-10	08-26-93	449.22	29.67	419.55	ND	NR	NR
MW-10	09-14-93	449.22	31.07	418.15	ND	NR	NR
MW-10	11-05-93	449.22	30.42	418.80	ND	NR	NR
MW-10	03-26-94	449.22	26.20	423.02	ND	NR	NR
MW-10	06-13-94	449.22	28.23	420.99	ND	NR	NR
MW-10	09-22-94	449.22	31.79	417.43	ND	NNE	0.056
MW-11	04-24-92	448.02	35.06	412.96	ND	NR	NR
MW-11	05-20-92	448.02	34.10	413.92	ND	NR	NR
MW-11	06-12-92	448.02	34.48	413.54	ND	NR	NR
MW-11	07-28-92	448.02	35.13	412.89	ND	NR	NR
MW-11	08-24-92	448.02	33.32	414.70	ND	NR	NR
MW-11	09-15-92	448.02	35.72	412.30	ND	NR	NR
MW-11	10-29-92	448.02	35.26	412.76	ND	NR	NR
MW-11	11-25-92	448.02	36.44	411.58	ND	NR	NR
MW-11	12-14-92	448.02	33.18	414.84	ND	NR	NR
MW-11	01-29-93	448.02	23.89	424.13	ND	NR	NR
MW-11	02-26-93	448.02	27.31	420.71	ND	NR	NR
MW-11	03-29-93	448.02	27.27	420.75	ND	NR	NR
MW-11	04-27-93	448.02	30.61	417.41	ND	NR	NR
MW-11	05-10-93	448.02	32.78	415.24	ND	NR	NR
MW-11	06-17-93	448.02	33.25	414.77	ND	NR	NR
MW-11	07-27-93	448.02	34.49	413.53	ND	NR	NR
MW-11	08-26-93	448.02	35.44	412.58	ND	NR	NR
MW-11	09-14-93	448.02	36.62	411.40	ND	NR	NR
MW-11	11-05-93	448.02	36.68	411.34	ND	NR	NR
MW-11	03-26-94	448.02	30.20	417.82	ND	NR	NR
MW-11	06-13-94	448.02	33.39	414.63	ND	NR	NR
MW-11	09-22-94	448.02	34.75	413.27	ND	NNE	0.056

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 12-20-94
Project Number: 0805-122.01

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
RW-1	04-24-92	451.44	32.85	418.59	ND	NR	NR
RW-1	05-20-92	451.44	32.60	418.84	ND	NR	NR
RW-1	06-12-92	451.44	32.72	418.72	ND	NR	NR
RW-1	07-28-92	451.44	31.94	419.50	ND	NR	NR
RW-1	08-24-92	451.44	31.73	419.71	ND	NR	NR
RW-1	09-15-92	451.44	31.94	419.50	ND	NR	NR
RW-1	10-29-92	451.44	32.15	419.29	ND	NR	NR
RW-1	11-25-92	451.67	32.21	419.46	ND	NR	NR
RW-1	12-14-92	451.67	30.58	421.09	ND	NR	NR
RW-1	01-29-93	451.67	22.89	428.78	ND	NR	NR
RW-1	02-26-93	451.67	23.97	427.70	ND	NR	NR
RW-1	03-29-93	451.67	23.98	427.69	ND	NR	NR
RW-1	04-27-93	451.67	27.26	424.41	ND	NR	NR
RW-1	05-10-93	451.67	29.64	422.03	ND	NR	NR
RW-1	06-17-93	451.67	30.18	421.49	ND	NR	NR
RW-1	07-27-93	451.67	31.55	420.12	ND	NR	NR
RW-1	08-26-93	451.67	31.82	419.85	ND	NR	NR
RW-1	09-14-93	451.67	32.32	419.35	ND	NR	NR
RW-1	11-05-93	451.67	31.91	419.76	ND	NR	NR
RW-1	03-26-94	451.67	27.78	423.89	ND	NR	NR
RW-1	06-13-94	451.67	29.48	422.19	ND	NR	NR
RW-1	09-22-94	451.67	30.52	421.15	ND	NNE	0.056

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
^ = 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)]
* = Floating product was not initially detected, but entered the well during purging
NNE = North-northeast

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG
		ppb	ppb	ppb	ppb	ppb	ppb	ppm
MW-1	01-15-91	Not sampled: well contained floating product						
MW-1	04-10-91	98000	11000	18000	2800	20000	NA	NA
MW-1	07-25-91	Not sampled: well contained floating product						
MW-1	10-30-91	Not sampled: well contained floating product						
MW-1	03-31-92	Not sampled: well contained floating product						
MW-1	06-12-92	Not sampled: well contained floating product						
MW-1	09-16-92	Not sampled: well contained floating product						
MW-1	11-25-92	Not sampled: well contained floating product						
MW-1	01-29-93	360000	2500	9300	5100	41000	NA	NA
MW-1	05-10-93	1900000	4100	15000	21000	140000	NA	NA
MW-1	09-16-93	1800000	6400	21000	19000	140000	NA	NA
MW-1	11-05-93	700000	3000	7600	8600	65000	NA	NA
MW-1	03-26-94	29000	1000	290	610	3300	NA	NA
MW-1	06-13-94	25000	600	160	500	2500	NA	NA
MW-1	09-22-94	51000	1400	280	570	2800	NA	NA
MW-2	01-15-91	Not sampled: well contained floating product						
MW-2	04-10-91	Not sampled: well contained floating product						
MW-2	07-25-91	Not sampled: well contained floating product						
MW-2	10-30-91	Not sampled: well contained floating product						
MW-2	03-31-92	270000	7000	12000	4400	40000	NA	NA
MW-2	06-12-92	110000	8900	13000	2800	16000	NA	NA
MW-2	09-16-92	Not sampled: well contained floating product						
MW-2	11-25-92	Not sampled: well contained floating product						
MW-2	01-29-93	89000	4600	5700	1800	15000	NA	NA
MW-2	05-10-93	440000	3900	4300	4400	36000	NA	NA
MW-2	09-16-93	200000	5500	4300	2300	19000	NA	NA
MW-2	11-05-93	250000	7800	8400	3100	24000	NA	NA
MW-2	03-26-94	22000	1100	1400	190	3700	NA	NA
MW-2	06-13-94	71000	4100	4600	1700	9900	NA	NA
MW-2	09-22-94	42000	1200	620	710	2000	NA	NA

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG
		ppb	ppb	ppb	ppb	ppb	ppb	ppm
MW-3	01-15-91	230	<0.5	<0.5	2.2	2.1	NA	NA
MW-3	04-10-91	530	12	8.4	4	7	NA	NA
MW-3	07-25-91	110	0.32	0.75	1.2	1	NA	NA
MW-3	10-30-91	Not sampled: dry well						
MW-3	03-31-92	670	12	1.1	7.4	27	NA	NA
MW-3	06-12-92	280	<0.5	<0.5	2.1	2	NA	NA
MW-3	09-15-92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	11-25-92	220	1	<0.5	4.9	1.2	NA	NA
MW-3	01-29-93	380*	0.8	0.6	2.1	2	NA	NA
MW-3	05-10-93	170	<0.5	<0.5	2	0.6	NA	NA
MW-3	09-15-93	120	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	11-05-93	110	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	03-26-94	54	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-4	07-25-91	23000	590	730	360	3500	NA	NA
MW-4	10-30-91	19000	320	340	230	180	NA	NA
MW-4	03-31-92	30000	1300	740	770	4800	NA	NA
MW-4	06-12-92	28000	990	440	550	3200	NA	NA
MW-4	09-16-92	21000	740	240	350	1300	NA	NA
MW-4	11-25-92	26000	1200	300	350	730	NA	NA
MW-4	01-29-93	23000	2000	580	770	2500	NA	NA
MW-4	05-10-93	74000	2200	890	1400	4000	NA	NA
MW-4	09-16-93	43000	640	90	360	690	NA	NA
MW-4	11-05-93	30000	1000	240	390	1300	NA	NA
MW-4	03-26-94	27000	1800	830	1300	2900	NA	NA
MW-4	06-13-94	17000	1300	620	670	1600	NA	NA
MW-4	09-22-94	10000	700	61	420	570	NA	NA

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG
		ppb	ppb	ppb	ppb	ppb	ppb	ppm
MW-5	07-25-91	57000	2300	4200	77	14000	NA	NA
MW-5	10-30-91	Not sampled: well contained floating product						
MW-5	03-31-92	80000	7100	9100	2000	16000	NA	NA
MW-5	06-12-92	69000	4000	5300	2200	12000	NA	NA
MW-5	09-16-92	65000	2300	2600	1700	9900	NA	NA
MW-5	11-25-92	Not sampled: new wellhead made casing inaccessible for sampling						
MW-5	01-29-93	Not sampled: new wellhead made casing inaccessible for sampling						
MW-5	05-10-93	220000	3900	3700	3400	15000	NA	NA
MW-5	09-16-93	180000	3500	3300	2700	10000	NA	NA
MW-5	11-05-93	66000	3000	2300	1700	6200	NA	NA
MW-5	03-26-94	39000	4000	2300	1600	6200	NA	NA
MW-5	06-13-94	28000	2500	1700	1100	3900	NA	NA
MW-5	09-22-94	Not sampled: vehicle was parked on well						
MW-6	07-25-91	10000	3000	200	340	1000	NA	NA
MW-6	10-30-91	970	150	4.4	4.9	6.6	NA	NA
MW-6	03-31-92	16000	3600	1500	660	1700	2400*	2.5a, 4.0b
MW-6	06-12-92	2900	480	17	190	170	1100*	1.2c
MW-6	09-16-92	2300	220	<5	92	43	810*	1.5d
MW-6	11-25-92	2700	240	11	103	32	720*	1.6a, 1.8b
MW-6	01-29-93	20000	1800	1700	490	2600	2300*	3.6a, 4.0b
MW-6	05-10-93	43000	3000	1700	1100	4800	3900*	16a, 110b
MW-6	09-15-93	3500	300	10	100	180	1100*	1.0a, 1.0b
MW-6	11-05-93	1100	140	<5	35	23	290	1.0a, 1.0b
MW-6	03-26-94	3100	350	99	130	340	880	1.5d
MW-6	06-13-94	2300	250	12	130	31	350*	0.80d
MW-6	09-22-94	73	2.6	<0.5	1.7	0.7	<50	<0.5a

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Water Sample Field Date	TPHG ppb	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHD ppb	TOG ppm
MW-7	07-25-91	45000	1500	2700	1200	9200	NA	NA
MW-7	10-30-91	93000	1800	770	780	6700	NA	NA
MW-7	03-31-92	35000	960	350	300	5900	NA	NA
MW-7	06-12-92	27000	900	270	340	4800	NA	NA
MW-7	09-16-92	39000	1900	410	470	5000	NA	NA
MW-7	11-25-92	49000	2900	810	750	5300	NA	NA
MW-7	01-29-93	38000	3200	1100	740	4300	NA	NA
MW-7	05-10-93	54000	1600	160	560	3100	NA	NA
MW-7	09-16-93	37000	1400	170	560	2700	NA	NA
MW-7	11-05-93	40000	1900	210	570	2900	NA	NA
MW-7	03-26-94	22000	2700	280	500	2600	NA	NA
MW-7	06-13-94	21000	1500	180	360	1900	NA	NA
MW-7	09-22-94	22000	1800	240	430	1900	NA	NA
MW-8	01-29-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	05-10-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	09-15-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	11-05-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	01-29-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	05-10-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	09-15-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	11-05-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Water Sample Field Date	TPHG ppb	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHD ppb	TOG ppm
MW-10	01-29-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	05-10-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	09-15-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	11-05-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	06-12-92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	09-15-92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	11-25-92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	01-29-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	05-10-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	09-15-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	11-05-93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
RW-1	06-12-92	54000	2300	4400	1200	12000	NA	NA
RW-1	09-15-92	49000	1500	2200	870	6900	NA	NA
RW-1	11-25-92	32000	1500	2500	1000	5500	NA	NA
RW-1	01-29-93	43000	3100	2500	990	7400	NA	NA
RW-1	05-10-93	30000	2900	1100	690	4300	NA	NA
RW-1	09-16-93	20000	1800	580	620	2300	NA	NA
RW-1	11-05-93	25000	1800	250	740	1300	NA	NA
RW-1	03-26-94	8100	780	100	360	340	NA	NA
RW-1	06-13-94	4900	510	32	150	170	NA	NA
RW-1	09-22-94	4900	390	30	190	210	NA	NA

TPHG = Total petroleum hydrocarbons as gasoline
TPHD = Total petroleum hydrocarbons as diesel
TOG = Total oil and grease/petroleum hydrocarbons using method: (a) 5520F-IR, (b) 5520C, (c) 413.2, or (d) 418.1
ppb = Parts per billion or micrograms per liter (µg/l)
ppm = Parts per million or milligrams per liter (mg/l); TOG only
NA = Not analyzed
* = Chromatogram does not match the typical fingerprint for gasoline or diesel

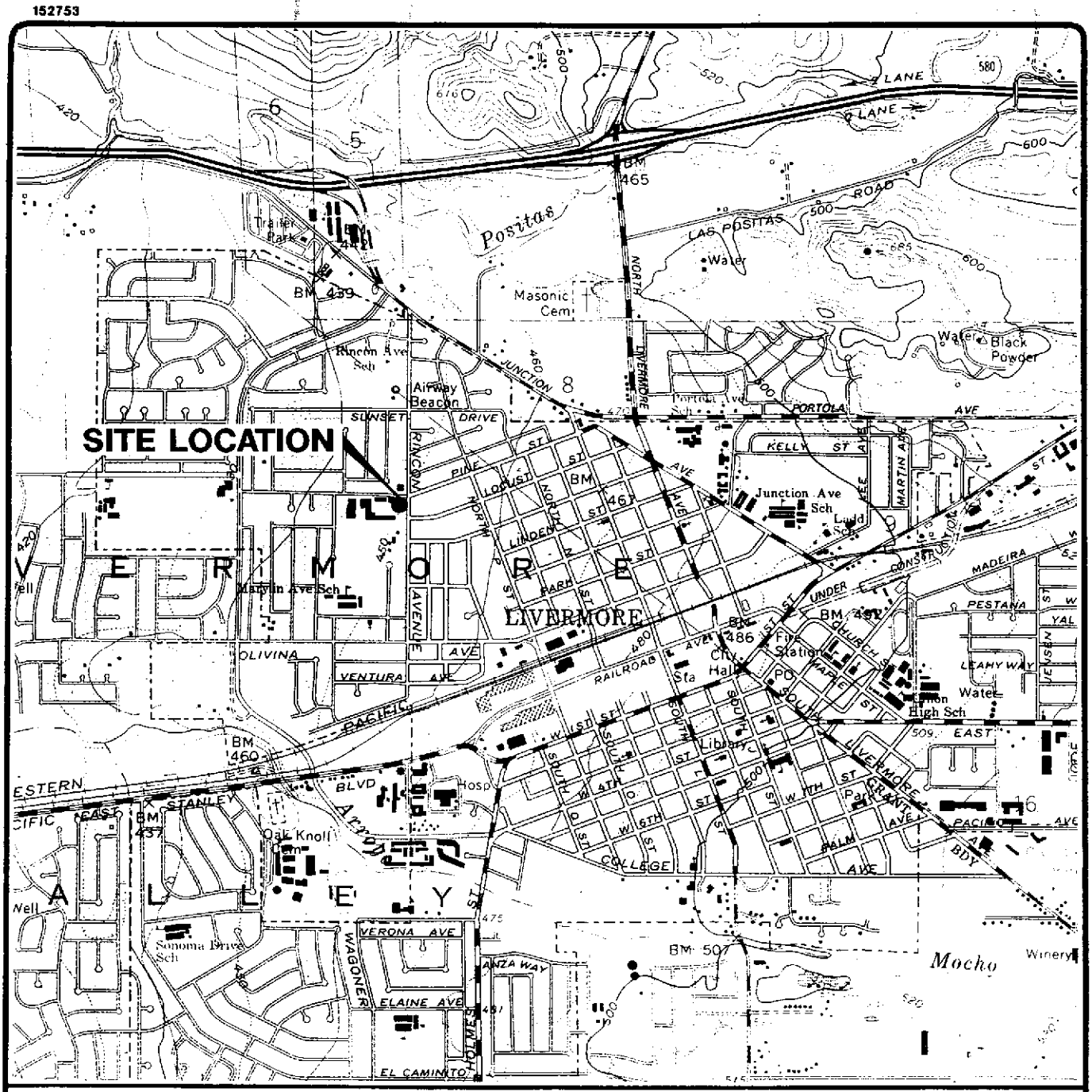
Table 4
Approximate Cumulative Floating Product Recovered
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 11-16-94
Project Number: 0805-122.01

Well Designation	Date	Floating Product Recovered gallons
MW-1, MW-2, and MW-5	1991	2.77
MW-1, MW-2, and MW-5	1992	0.29
MW-1, MW-2, and MW-5	1993	0.00
	1994 to Date:	
MW-1	09-22-94	0.00
MW-2	09-22-94	0.00
MW-5	09-22-94	0.00
	1994 Total:	0.00
	1991 to 1994 Total:	3.06

152753



Base map from USGS 7.5' Quad. Map:
Livermore, California. (Photorevised 1980).

- N -

Scale : 0 2000 4000 Feet

EMCON Associates

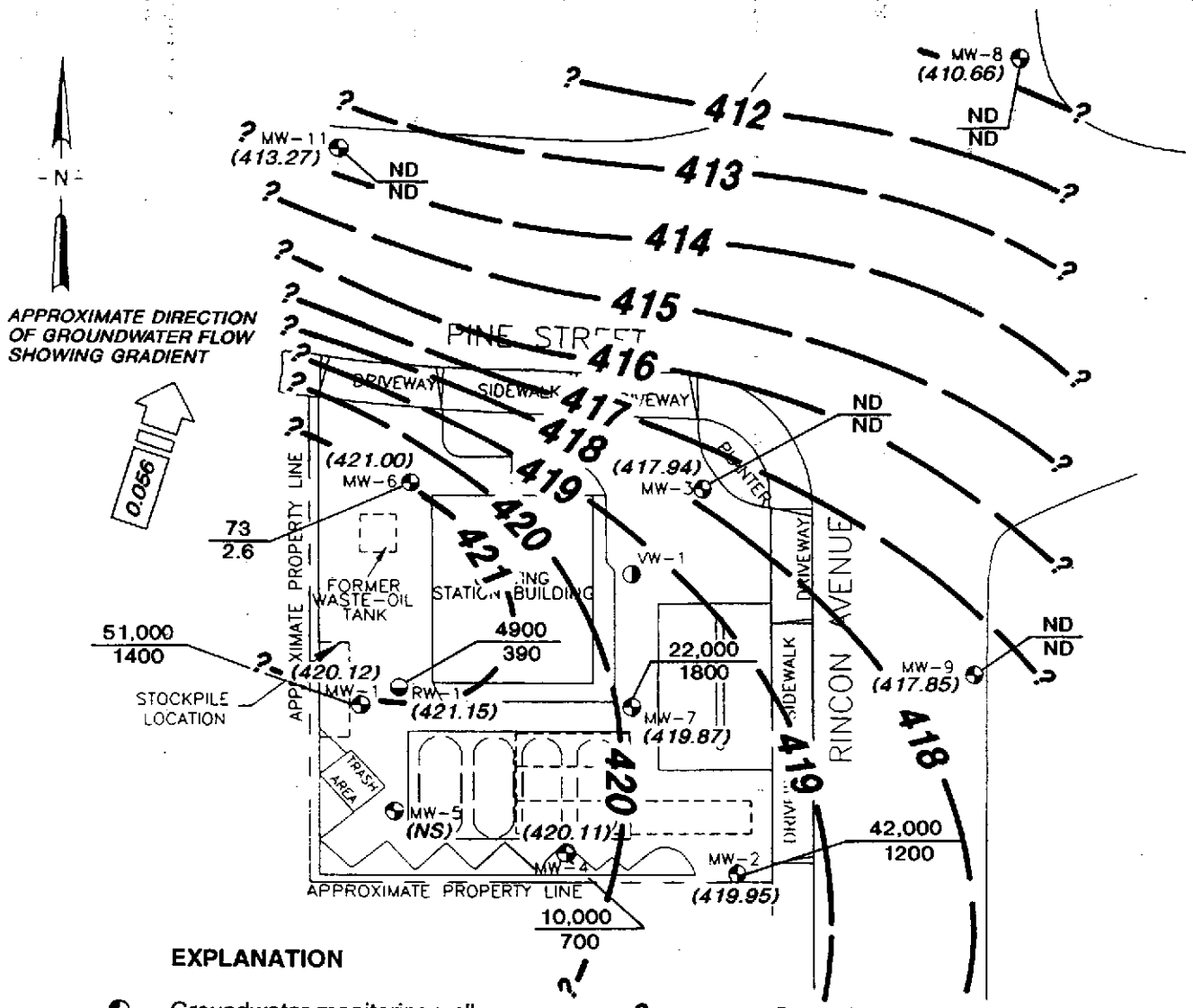
ARCO PRODUCTS COMPANY
SERVICE STATION 771, 899 RINCON AVENUE
QUARTERLY GROUNDWATER MONITORING
LIVERMORE, CALIFORNIA

SITE LOCATION

FIGURE
1

PROJECT NO.
805-122.01

155812



EXPLANATION

- Groundwater monitoring well
- Recovery well
- Vapor extraction well
- Former underground gasoline storage tank
- Existing underground gasoline storage tank
- (417.43) Groundwater elevation (Ft.-MSL); measured 9/22/94
- 51,000 / 1400 — TPHG concentration in groundwater (ppb) / Benzene concentration in groundwater (ppb)
- ND = Not detected
- Groundwater elevation contour (Ft.-MSL)
- NS Not sampled (vehicle parked on well)

SCALE: 0 40 FEET (Approximate)

12/94

Base map modified from RESNA, 1994.

EMCON Associates

ARCO PRODUCTS COMPANY
SERVICE STATION 771, 899 RINCON AVENUE
QUARTERLY GROUNDWATER MONITORING
LIVERMORE, CALIFORNIA

GROUNDWATER DATA
THIRD QUARTER 1994

FIGURE 2

PROJECT NO. 805-122.01

APPENDIX A

FIELD DATA REPORT, INTEGRATED WASTESTREAM MANAGEMENT, OCTOBER 14, 1994

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

October 14, 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. 771 in Livermore, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on September 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

REGISTERED GEOLOGIST
WALTER H. HOWE
No. 730
Exp. 4/'96
STATE OF CALIFORNIA

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

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

A0771Q3.XLS

Summary of Ground Water Sample Analyses for ARCO Facility A-771, Livermore, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	RW-1
DATE SAMPLED	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94	9/22/94
DEPTH TO WATER	31.61	29.54	32.34	30.98	*	30.37	30.46	38.77	31.36	31.79	34.75	30.52
SHEEN	NONE	NONE	NONE	NONE	*	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	*	NA	NA	NA	NA	NA	NA	NA
TPHg	51,000	42,000	ND	10,000	*	73	22,000	ND	ND	ND	ND	4,900
BTEX												
BENZENE	1,400	1,200	ND	700	*	2.6	1,800	ND	ND	ND	ND	390
TOLUENE	280	620	ND	61	*	ND	240	ND	ND	ND	ND	30
ETHLYBENZENE	570	710	ND	420	*	1.7	430	ND	ND	ND	ND	190
XYLENES	2,800	2,000	ND	570	*	0.7	1,900	ND	ND	ND	ND	210
5520 F												
PETROLEUM HYDROCARBONS	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
EPA 3510												
DIESEL	NA	NA	NA	NA	NA	ND	NA	NA	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: 1230
Site Departure Time: 1700
Weather Conditions: Sunny 60°F

DTW: Well Box or Well Casing (circle one)

Project No.: _____ **Location:** 899 Rincon ave. SJ. **Date:** Sept 22, 1994

Client / Station#: Arco 7771 **Field Technician:** Vince / Cisco **Day of Week:** Thursday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet) TD	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y=YES, N=NO) FP=FLOATING PRODUCT	COMMENTS	MATERIALS
	mw-1	OK	Yes	none	none	none	40.60	40.60	31.61	N/A	N/A	N	4" SKIMMER IN WELL	3/4 Black Lid
	mw-2	OK	Yes	none	none	none	37.90	29.54	29.54	N/A	N/A	N	4"	3/4 Black Lid
5	mw-3	OK	Yes	OK	OK	OK	39.60	32.34	32.34	N/A	N/A	N	4"	15/16
	mw-4	OK	Yes	none	none	none	41.10	30.98	30.98	N/A	N/A	N	4"	3/4 Black Lid
	mw-5	—	—	N/A	—	—	N/A	N/A	N/A	N/A	N/A	N/A	ABANDONED CAR OVER WELL NO ACCESS / NO Sample.	N/A
	mw-6	OK	Yes	OK	OK	OK	43.30	30.37	30.37	N/A	N/A	N	4"	15/16
	mw-7	OK	Yes	OK	OK	OK	39.70	30.46	30.46	N/A	N/A	N	4"	3/4 Black Lid
3	mw-8	OK	Yes	OK	OK	OK	41.70	38.77	38.77	N/A	N/A	N	2"	15/16
2	mw-9	OK	Yes	OK	OK	OK	40.20	31.36	31.36	N/A	N/A	N	2"	15/16
1	mw-10	OK	Yes	OK	OK	OK	36.10	31.79	31.79	N/A	N/A	N	2"	15/16
4	mw-11	OK	Yes	OK	OK	OK	38.60	34.75	34.75	N/A	N/A	N	2"	15/16
	Rw-1	OK	Yes	OK	none	none	39.70	30.52	30.52	N/A	N/A	N	6"	3/8 Hex
													NOTE: Bring compressor + Blow gun for this site	

 DATE: 9-22-94 CLIENT/STATION #: Arco 771 ADDRESS: 899 Rincon av. Livermore

WELL ID: MW-2 TD 37.90 - DTW 29.54 X Gal./Linear Ft. 0.66 X Casing Volume 3 = Calculated Purge 16.55

DATE PURGED: 9-22-94 START (2400 HR): 1559 END (2400 HR) 1613

DATE SAMPLED: 9-22-94 TIME (2400 HR): 1616 DTW: 35.9

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1605	5	6.79	0.58	70.1	Black
1609	10	6.69	0.56	69.6	Black
1613	14	6.68	0.56	69.7	cloudy

Total purge: 14

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

REMARKS: well pumped dry at 14 gallons.

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

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

DATE SAMPLED: TIME (2400 HR): DTW:

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

Total purge:

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

REMARKS:

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

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

DATE SAMPLED: TIME (2400 HR): DTW:

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

Total purge:

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

REMARKS:

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

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

DATE SAMPLED: TIME (2400 HR): DTW:

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

Total purge:

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

REMARKS:

PRINT NAME: Vince Valdes SIGNATURE: [illegible]

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

PAGE 3 OF 5 DATE: 9-22-94 CLIENT/STATION #: Arco 771 ADDRESS: 899 Rincon Rd. Livermore

WELL ID: MW-9 TD 41.10 - DTW 30.98 X 0.66 Gal./Linear Ft. X 3 Casing Volume = 20.03 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1443 END (2400 HR) 1458
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1503 DTW: 37.3

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1447	5	7.65	0.85	72.4	CLEAR
1450	10	7.08	0.80	71.2	CLEAR
1454	15	7.07	0.80	70.3	CLEAR
1458	20	7.08	0.81	69.7	CLEAR

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

WELL ID: MW-7 TD 39.7 - DTW 30.40 X 0.66 Gal./Linear Ft. X 3 Casing Volume = 18.29 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1534 END (2400 HR) 1550
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1555 DTW: 36

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1538	5	7.30	0.82	72.5	CLEAR
1542	10	7.13	6.75	70.2	CLEAR
1548	~~15~~ 12	7.12	0.70	69.8	CLEAR
	~~20~~				

Total purge: 12
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: Well pumped dry at 12 gallons

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

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

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

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

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

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

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

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

PRINT NAME: Francisco Abunyan SIGNATURE: Francisco Abunyan

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

PAGE 4 OF 5 DATE: 9-22-94 CLIENT/STATION #: arco 771 ADDRESS: 899 Rincon ave. Livermore

WELL ID: MW-10 TD 36.10 DTW 31.79 X 0.17 (Gal./Linear Ft.) X 3 (Casing Volume) = 2.19 (Calculated Purge)

DATE PURGED: 9-22-94 START (2400 HR): 1315 END (2400 HR) 1321
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1325 DTW: 33.3

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1317	.50	7.04	0.91	71.1	cloudy
1319	1.5	6.94	0.82	69.2	cloudy
1321	2	6.95	0.79	67.7	cloudy

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

WELL ID: MW-9 TD 40.20 DTW 31.36 X 0.17 (Gal./Linear Ft.) X 3 (Casing Volume) = 4.50 (Calculated Purge)

DATE PURGED: 9-22-94 START (2400 HR): 1330 END (2400 HR) 1334
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1337 DTW: 34.6

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1332	1	6.40	2.40	74.9	cloudy
1333	2.5	6.05	1.75	74.2	cloudy
1334	4.5	7.07	1.31	73.6	cloudy

Total purge: 4.5
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-8 TD 41.70 DTW 38.77 X 0.17 (Gal./Linear Ft.) X 3 (Casing Volume) = 1.49 (Calculated Purge)

DATE PURGED: 9-22-94 START (2400 HR): 1350 END (2400 HR) 1355
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1358 DTW: 39

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1351	.50	7.40	0.63	72.3	cloudy
1353	1	7.26	0.54	69.8	cloudy
1355	1.5	7.25	0.50	69.1	cloudy

Total purge: 1.5
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-11 TD 38.60 DTW 34.75 X 0.17 (Gal./Linear Ft.) X 3 (Casing Volume) = 1.96 (Calculated Purge)

DATE PURGED: 9-22-94 START (2400 HR): 1402 END (2400 HR) 1407
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1410 DTW: 37

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1404	.50	7.08	0.77	70.4	cloudy
1405	1	7.05	0.77	69.4	cloudy
1407	2	7.04	0.77	69.2	cloudy

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

PRINT NAME: FRANCISCO DURAN SIGNATURE: Francisco Duran

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: 9-22-94 CLIENT/STATION #: Arco 771 ADDRESS: 899 Rincon ave. Livermore

WELL ID: MW-3 TD 39.60 DTW 32.34 X 0.66 Gal. Linear Ft. X 3 Casing Volume - 14.37 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1401 END (2400 HR) 1408
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1411 DTW: 36.3

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1404	3	7.21	0.68	71.6	cloudy
1406	8	7.24	0.59	70.6	clear
1408	9	7.26	0.57	70.2	clear

Total purge: 9
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: well pumped dry at 8 and again at 9 gallons

WELL ID: RW-1 TD 39.70 DTW 30.52 X 1.5 Gal. Linear Ft. X 2 Casing Volume - 27.54 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1425 END (2400 HR) 1443
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1446 DTW: 37

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1430	5	7.16	061	72.0	cloudy
1436	15	7.13	0.65	71.1	cloudy (DARK SILT)
1441	23	7.11	0.59	70.6	cloudy (DARK SILT)
1443	25	7.12	0.59	70.0	cloudy

Total purge: 25
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: well pumped dry at 25 gallons.

WELL ID: MW-6 TD 43.30 DTW 30.35 X 0.66 Gal. Linear Ft. X 3 Casing Volume - 25.60 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1505 END (2400 HR) 1515
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1518 DTW: 38.1

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1508	5	7.05	0.53	71.8	clear
1512	13	7.03	0.53	70.8	clear
1515	15	7.02	0.54	70.1	clear

Total purge: 15
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: Well pumped dry at 15 gallons.

WELL ID: MW-1 TD 40.60 DTW 31.61 X 0.66 Gal. Linear Ft. X 3 Casing Volume - 17.80 Calculated Purge

DATE PURGED: 9-22-94 START (2400 HR): 1535 END (2400 HR) 1548
DATE SAMPLED: 9-22-94 TIME (2400 HR): 1550 DTW: 36.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1540	5	7.01	0.60	71.2	cloudy
1544	10	6.90	0.61	70.5	Black
1548	15	6.89	0.63	70.0	clear

Total purge: 15
PURGING EQUIP.: Centrifugal Pump / Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: well pumped dry at 15 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:

APPENDIX B

CERTIFIED ANALYTICAL REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION, THIRD QUARTER 1994

Columbia Analytical Services, Inc.

October 7, 1994

Service Request No. S941109

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

RECEIVED
OCT 12 1994

Re: **ARCO Facility No. 771**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on September 23, 1994. For your reference, these analyses have been assigned our service request number S941109.

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.

Carol J Klein for
Keoni A. Murphy
Laboratory Manager

Annelise Jade Bazar
Annelise J. Bazar
Regional QA Coordinator

KAM/ajb

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Acronyms

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

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Service Request:**	S941109
Project:	ARCO Facility No. 771	**Date Collected:**	9/22/94
Sample Matrix:	Water	**Date Received:**	9/23/94
		Date Extracted:	9/30/94
		Date Analyzed:	10/3/94

Petroleum Hydrocarbons, IR
Standard Methods 5520F
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Result
MW-6 (38.1)	S941109-005	0.5	ND
Method Blank	S940930-WB	0.5	ND

Approved By: CJK Date: 10-7-94

1AMRL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 771
Sample Matrix: Water

Service Request: S941109
Date Collected: 9/22/94
Date Received: 9/23/94
Date Extracted: 9/28/94
Date Analyzed: 9/29,30/94

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

Sample Name	Lab Code	MRL	Result
MW-6 (38.1)	S941109-005	50	ND
Method Blank	S940928-WB	50	ND

Approved By: CJK Date: 10-7-94

1AMRL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Service Request:**	S941109
Project:	ARCO Facility No. 771	**Date Collected:**	9/22/94
Sample Matrix:	Water	**Date Received:**	9/23/94
		Date Extracted:	NA
		Date Analyzed:	9/29-10/3/94

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 (36.2)	S941109-001	51,000	1,400	280	570	2,800
MW-2 (35.9)	S941109-002	42,000	1,200	620	710	2,000
MW-3 (36.3)	S941109-003	ND	ND	ND	ND	ND
MW-4 (37.3)	S941109-004	10,000	700	61	420	570
MW-6 (38.1)	S941109-005	73	2.6	ND	1.7	0.7
MW-7 (36)	S941109-006	22,000	1,800	240	430	1,900
MW-8 (39)	S941109-007	ND	ND	ND	ND	ND
MW-9 (34.6)	S941109-008	ND	ND	ND	ND	ND
MW-10 (33.3)	S941109-009	ND	ND	ND	ND	ND
MW-11 (37)	S941109-010	ND	ND	ND	ND	ND
RW-1 (37)	S941109-011	4,900	390	30	190	210
Method Blank	S940929-WB	ND	ND	ND	ND	ND
Method Blank	S941003-WB	ND	ND	ND	ND	ND

Approved By: CJK Date: 10-7-94

5ABTXGAS/061694

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 771

Service Request: S941109
Date Analyzed: 10/3/94

Initial Calibration Verification (ICV) Summary
Petroleum Hydrocarbons, IR
Standard Methods 5520F
Units: ppm

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Hydorcarbon Mixture	40	36	90	90-110

Approved By: CJK Date: 10-7-94

ICV25AL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	S941109
Project:	ARCO Facility No. 771	**Date Collected:**	9/22/94
Sample Matrix:	Water	**Date Received:**	9/23/94
		Date Extracted:	9/30/94
		Date Analyzed:	10/3/94

Matrix Spike/Duplicate Matrix Spike Summary
Petroleum Hydrocarbons, IR
Standard Methods 5520F
Units: mg/L (ppm)

Sample Name: MW-6 (38.1)
Lab Code: S941109-005

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Hydrocarbon Mixture	8.0	8.0	ND	7.96	7.76	100	97	57-127	2

Approved By: CJK Date: 10-7-94

DMS1S/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 771
Sample Matrix: Water

Service Request: S941109
Date Collected: 9/22/94
Date Received: 9/23/94
Date Extracted: 9/28/94
Date Analyzed: 9/29,30/94

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

Sample Name	Lab Code	Percent Recovery p-Terphenyl
MW-6 (38.1)	S941109-005	79
MS	S941107-001MS	109
DMS	S941107-001DMS	91
Method Blank	S940928-WB	97

CAS Acceptance Limits: 66-123

Approved By: GK Date: 10-7-94

SUR1/062994

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 771

Service Request: S941109
Date Analyzed: 9/29/94

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
TPH as Diesel	1,000	1,081	108	90-110

Approved By: GK Date: 10-7-94

ICV25AL/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Service Request:**	S941109
Project:	ARCO Facility No. 771	**Date Collected:**	9/22/94
Sample Matrix:	Water	**Date Received:**	9/23/94
		Date Extracted:	9/28/94
		Date Analyzed:	9/29/94

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

Sample Name: Batch QC
Lab Code: S941107-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
TPH as Diesel	4,000	4,000	ND	4,600	4,180	115	104	61-141	10

Approved By: GK Date: 10-7-94

DMS1S/060194

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 771
Sample Matrix: Water

Service Request: S941109
Date Collected: 9/22/94
Date Received: 9/23/94
Date Extracted: NA
Date Analyzed: 9/29-10/3/94

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 (36.2)	S941109-001	103
MW-2 (35.9)	S941109-002	104
MW-3 (36.3)	S941109-003	92
MW-4 (37.3)	S941109-004	93
MW-6 (38.1)	S941109-005	91
MW-7 (36)	S941109-006	99
MW-8 (39)	S941109-007	90
MW-9 (34.6)	S941109-008	91
MW-10 (33.3)	S941109-009	88
MW-11 (37)	S941109-010	92
RW-1 (37)	S941109-011	96
MW-8 (39) MS	S941109-007MS	101
MW-8 (39) DMS	S941109-007DMS	103
Method Blank	S940929-WB	91
Method Blank	S941003-WB	85

CAS Acceptance Limits: 69-116

Approved By: CJK Date: 10-7-94

SUR1/062994

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 771

Service Request: S941109
Date Analyzed: 9/29/94

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	27.8	111	85-115
Toluene	25	25.5	102	85-115
Ethylbenzene	25	26.1	104	85-115
Xylenes, Total	75	74.9	100	85-115
Gasoline	250	247	99	90-110

Approved By: CJK Date: 10-7-94

ICV25AL/060194

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QA/QC Report

Client: IWM
Project: ARCO Facility No. 771
Sample Matrix: Water

Service Request: S941109
Date Collected: 9/22/94
Date Received: 9/23/94
Date Extracted: NA
Date Analyzed: 9/29/94

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

Sample Name: MW-8 (39)
Lab Code: S941109-007

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
Gasoline	250	250	ND	264	274	106	110	67-121	4

Approved By: CJK Date: 10-7-94

DMS1S/060194

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ARCO Products Company

Division of AtlanticRichfieldCompany

Task Order No. IWM-94-95CC

Chain of Custody

ARCO Facility no. A 771 | City (Facility) Livermore | Project manager (Consultant) Tom Delon / R. Davis | Laboratory name Columbia

ARCO engineer M.W | Telephone no. (ARCO) 415/571 2434 | Telephone no. (Consultant) 408/9428955 | Fax no. (Consultant) 408/94214

Consultant name IWM / Emcon | Address (Consultant) 950 Ames av. Milp CA. 95035 | Contract number 07077

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid HCL	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☑ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TPH/d H2O 3015	
	FB-1	12	2		✓		✓	✓	9-22-94	1240		✓	✓										
36.2	MW-1	1	2		✓		✓	✓		1550		✓	✓										
35.9	MW-2	2	2		✓		✓	✓		1616		✓	✓										
36.3	MW-3	3	2		✓		✓	✓		1411		✓	✓										
37.3	MW-4	4	2		✓		✓	✓		1503		✓	✓										
38.1	MW-6	5	6		✓		✓	✓		1518		✓	✓		✓							✓	
36	MW-7	6	2		✓		✓	✓		1555		✓	✓										
39	MW-8	7	2		✓		✓	✓		1358		✓	✓										
34.6	MW-9	8	2		✓		✓	✓		1337		✓	✓										
33.3	MW-10	9	2		✓		✓	✓		1325		✓	✓										
37	MW-11	10	2		✓		✓	✓		1410		✓	✓										
37	RW-1	11	2		✓		✓	✓		1446		✓	✓										

Method of shipment: CAS Courier

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on FB-1

Lab number: S941109

Turnaround time

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

Condition of sample: good | Temperature received: cool

Relinquished by sampler	Date	Time	Received by	Date	Time
Vince Valdez	9-23-94	15:35	[signature]	9-23-94	15:35

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)