EMCON
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ENVIRONMENTAL
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Date June 30, 1995
Project 0805-122.02

To:

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harborbay Parkway, Suite 250
Alameda, California 94502-6577

We are enclosing:

Copies	Description
1	First quarter 1995 groundwater monitoring and SVE remediation system performance evaluation report for ARCO service station 771, Livermore, California

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

Comments:
The enclosed groundwater monitoring report is being sent to you per the request of ARCO Products Company. Plaese call if you have questions or comments.

David Larsen
Project Coordinator

cc: Sum Arigala, RWQCB - SFBR
Danielle Stefani, LFD
Michael Whelan, ARCO Products Company
David Larsen, EMCON
File

ARCO Products Company
Environmental Engineering
2155 South Bascom Avenue, Suite 202
Campbell, California 95008

Date: June 30, 1995

Re: ARCO Station # 771 • 899 Rincon Avenue • Livermore, CA
First Quarter 1995 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
Environmental Engineer

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

June 7, 1995
Project 0805-122.02

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

Re: First quarter 1995 groundwater monitoring program results, ARCO service station 771, Livermore, California

Dear Mr. Whelan:

This letter presents the results of the first quarter 1995 groundwater monitoring program at ARCO Products Company (ARCO) service station 771, 899 Rincon Avenue, Livermore, California (Figure 1). Operation and performance data for the site's interim soil-vapor extraction (SVE) system are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

BACKGROUND

A total of seven on-site monitoring wells (MW-1 through MW-7), four off-site monitoring wells (MW-8 through MW-11), one on-site recovery well (RW-1), and one on-site vapor extraction well (VW-1) were installed as part of a comprehensive site assessment conducted at this site from February 1990 through January 1993 (Figure 2). Please refer to *Fourth Quarter 1994 Groundwater Monitoring Program Results, ARCO Service Station 771, Livermore, California* (EMCON, March 1995), and *Additional On Site and Initial Off Site Subsurface Investigation* (RESNA, February 1993) for more details.

MONITORING PROGRAM FIELD PROCEDURES

A program of quarterly groundwater monitoring was initiated during the first quarter of 1991 to provide information concerning water quality, flow direction, and gradient, and to meet ACHCSA and Regional Water Quality Control Board (RWQCB) requirements regarding underground fuel tank investigations. Water levels are measured quarterly in wells MW-1 through MW-11 and RW-1. Wells MW-8 through MW-11 are sampled

semiannually, during the first and third quarters of the year. Wells MW-1 through MW-7 and RW-1 are sampled quarterly.

The first quarter 1995 groundwater monitoring event was performed by EMCON on March 20, 1995. Field work 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-10 was not sampled because of an oversight. The well will be sampled during the third quarter of 1995. Copies of all field data sheets from the first quarter 1995 groundwater monitoring event are included in Appendix A.

ANALYTICAL PROCEDURES

Groundwater samples collected during first quarter 1995 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* (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 USEPA method 3510 and the Cal-EPA LUFT method, and total recoverable petroleum hydrocarbons (TRPH) by USEPA method 418.1. These methods are recommended for samples from petroleum-hydrocarbon-impacted sites in the *Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites* (August 10, 1990).

MONITORING PROGRAM RESULTS

Results of the first quarter 1995 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 TRPH analyses. Table 4 summarizes historical floating product recovery data for wells MW-1, MW-2, and MW-5. Copies of the first quarter 1995 analytical results and chain-of-custody documentation are included in Appendix B.

Groundwater elevation data collected on March 20, 1995, illustrate that groundwater beneath the site flows northwest at an approximate hydraulic gradient of 0.03 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the first quarter of 1995.

Groundwater samples collected from off-site wells MW-8, MW-9, and MW-11 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples collected from well MW-3 contained 94 micrograms per liter (µg/L) TPHG, but did not contain detectable concentrations of BTEX. Groundwater samples collected from wells MW-1, MW-2, MW-4 through MW-7, and RW-1 contained concentrations of TPHG from 2,600 to 90,000 µg/L, and concentrations of benzene from 210 to 2,600 µg/L. Additional samples collected from well MW-6 contained 2,000 µg/L of TPHD and 1.7 milligrams per liter (mg/L) of TRPH. The laboratory noted that the chromatogram for the TPHD result did not match the typical diesel fingerprint.

REMEDIATION SYSTEM PERFORMANCE EVALUATION

Floating Product Recovery

Floating product has not been observed in any of the monitoring wells since January 1993. Floating product was measured and recovered monthly by RESNA using skimmers installed in MW-1, MW-2, and MW-5. Approximately 2.77 and 0.29 gallons of floating product were recovered in 1991 and 1992, respectively. Cumulative floating product recovery from wells MW-1, MW-2, and MW-5 is summarized in Table 4.

Soil-Vapor Extraction System

System Description. RESNA completed construction of the SVE system in March 1993. Initial startup of the remediation system was postponed because of heavy rain during March and April 1993, which caused water levels at the site to rise approximately 20 feet and flood the screen in the SVE wells. The on-site SVE system extracts hydrocarbon vapor from subsurface soils by applying a vacuum to vapor extraction wells VW-1, MW-1, MW-2, MW-4, MW-5, and MW-7. Hydrocarbon vapor extracted from the wells is directed via subgrade remediation piping to an off-gas abatement unit in

the treatment compound (Figure 2). The trailer-mounted off-gas abatement unit used to treat the influent extracted vapor is a King/Buck Associates, MMC-6A/E model catalytic oxidizer with a nominal operating capacity of 200 standard cubic feet per minute (scfm). Treated off-gas from the unit is discharged to the atmosphere via a 24-inch-diameter stack, 15 feet above grade. For additional information on the SVE system startup, please refer to *Soil-Vapor Extraction System Performance Test Results* (EMCON, January 3, 1995).

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

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

System Operation. The SVE system was initially activated on December 20, 1994, after observing that there was at least 3 to 5 feet of exposed screen above the water table in wells VW-1 and MW-4. The SVE system was operated until January 17, 1995. As stipulated in the Authority to Construct issued by the BAAQMD, results of system startup were submitted to the BAAQMD in a letter report dated January 3, 1995, for a Permit to Operate. Table 5 summarizes SVE system operation and performance data from initial startup on December 20, 1994, to April 20, 1995.

Rising water levels at the site caused by heavy precipitation in December 1994 and January 1995 caused resubmergence of the screen in SVE wells VW-1 and MW-4, and resulted in minimal flow from these wells. Screened intervals in all other SVE wells remained submerged, as they have been since late 1992 and early 1993, when water levels in those wells rose approximately 20 feet. The submergence of the SVE well screens reduced air flow from the well field to minimal levels. Therefore, the system was manually shut down on January 17, 1995, because of insufficient air flow from the well field. EMCON is currently in the process of installing a blower, tubing, and necessary instrumentation to

facilitate the option of in-well air-bubbling in conjunction with SVE, to enhance volatilization of dissolved-phase hydrocarbons in groundwater and possibly promote biodegradation of hydrocarbons in saturated soils and groundwater as well .

Operational Status of SVE Wells. Table 6 summarizes the operating status of the individual vapor extraction wells since system startup on December 20, 1994. To maximize hydrocarbon removal rates, vapor extraction wells were brought on-line or closed based on TVHG concentrations of extracted vapor, and on the length of unsubmerged screened interval available. The vapor extraction wells were off-line from January 17, 1995, to the end of the first quarter 1995 because the SVE system remained shut down.

SVE System Air Sample Results. The SVE was shut down on January 17, 1995. Therefore, air sampling was not conducted.

SVE System Destruction Efficiency and Emission Rates. The SVE system was shut down during on January 17, 1995, and remained shut down for the remainder of the first quarter 1995. Therefore, hydrocarbons were not emitted from the SVE system since January 17, 1995.

Hydrocarbon Removal Rates. Table 5 summarizes historical hydrocarbon removal rates, and the total amount of hydrocarbons removed since system startup on December 20, 1994. The calculations and assumptions made for estimating hydrocarbon removal rates for the SVE system are explained in the footnotes for Table 5.

The SVE system was shut down on January 17, 1995, and did not operate for the remainder of first quarter 1995.

PERFORMANCE IMPROVEMENTS

EMCON is currently in the process of installing a blower and necessary accessories to facilitate the option of in-well air-bubbling in conjunction with SVE, to enhance volatilization of dissolved-phase hydrocarbons in groundwater. Bubbling of air may also promote biodegradation in saturated-zone soils and groundwater via introduction of oxygen.

LIMITATIONS

No monitoring event is thorough enough to describe all geologic and 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 first quarter of 1995 and the anticipated site activities for the second quarter of 1995.

First Quarter 1995 Activities

- Prepared and submitted quarterly groundwater monitoring report for fourth quarter 1994.
- Performed quarterly groundwater monitoring for first quarter 1995.
- Manually shut down the SVE system on January 17, 1995, because of flooded screen in vapor extraction wells.
- Evaluated in-well air-bubbling as an option to enhance volatilization of dissolved-phase hydrocarbons in groundwater.

Work Anticipated for Second Quarter 1995

- Prepare and submit quarterly groundwater monitoring report for first quarter 1995.
- Perform quarterly groundwater monitoring for second quarter 1995.
- Install a blower and necessary ancillary equipment (tubing, instrumentation, etc.) to facilitate in-well air-bubbling.
- Restart the SVE system if groundwater levels drop and sufficient well screen is available for SVE.

Please call if you have questions.

Sincerely,

EMCON

David Larsen
Project Coordinator

Valli Voruganti
Project Engineer

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

REGISTERED GEOLOGIST
LYNN A. GALLAGHER
RG6090
STATE OF CALIFORNIA

Attachments:

Table 1 -	Groundwater Monitoring Data, First Quarter 1995
Table 2 -	Historical Groundwater Elevation Data
Table 3 -	Historical Groundwater Analytical Data (TPHG, BTEX, TPHD, TRPH, and TOG)
Table 4 -	Approximate Cumulative Floating Product Recovered (Wells MW-1, MW-2, and MW-5)
Table 5 -	Soil-Vapor Extraction System, Operation and Performance Data
Table 6 -	Soil-Vapor Extraction Well Data
Figure 1 -	Site Location
Figure 2 -	Groundwater Data, First Quarter 1995
Appendix A -	Field Data Sheets, First Quarter 1995 Groundwater Monitoring Event
Appendix B -	Analytical Results and Chain-of-Custody Documentation, Groundwater Monitoring, First Quarter 1995

cc: Susan Hugo, ACHCSA
Sum Arigala, RWQCB - SFBR
Danielle Stefani, LFD

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Table 1
Groundwater Monitoring Data
First Quarter 1995
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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 or TRPH
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
MW-1	03-20-95	451.73	24.50	427.23	ND	NW	0.03	03-20-95	90000	1800	1100	1000	5600	NA	NA
MW-2	03-20-95	449.49	20.27	429.22	ND	NW	0.03	03-20-95	54000	2600	1600	1200	7600	NA	NA
MW-3	03-20-95	450.28	22.19	428.09	ND	NW	0.03	03-20-95	94	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-4	03-20-95	451.09	22.68	428.41	ND	NW	0.03	03-20-95	12000	1000	100	450	700	NA	NA
MW-5	03-20-95	451.40	23.20	428.20	ND	NW	0.03	03-20-95	26000	1300	180	890	2900	NA	NA
MW-6	03-20-95	451.37	25.19	426.18	ND	NW	0.03	03-20-95	2600	210	87	82	140	2000*	1.7(d)
MW-7	03-20-95	450.33	22.07	428.26	ND	NW	0.03	03-20-95	31000	2300	400	620	2900	NA	NA
MW-8	03-20-95	449.43	24.75	424.68	ND	NW	0.03	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	03-20-95	449.21	19.11	430.10	ND	NW	0.03	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	03-20-95	449.22	20.96	428.26	ND	NW	0.03	03-20-95	Not analyzed: well was not scheduled for sampling						
MW-11	03-20-95	448.02	25.02	423.00	ND	NW	0.03	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
RW-1	03-20-95	451.67	23.76	427.91	ND	NW	0.03	03-20-95	15000	1000	140	310	950	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, or (c) 413.2
TRPH = Total recoverable petroleum hydrocarbons using method: (d) 418.1
µg/L = Micrograms per liter
mg/L = Milligrams per liter
ND = None detected
NW = Northwest
NA = Not analyzed
* = Chromatogram does not match the typical fingerprint for diesel

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Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-1	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
MW-1	11-25-94	451.73	29.76	421.97	ND	N	0.06
MW-1	03-20-95	451.73	24.50	427.23	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-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
MW-2	11-25-94	449.49	27.85	421.64	ND	N	0.06
MW-2	03-20-95	449.49	20.27	429.22	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-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
MW-3	11-25-94	450.28	30.76	419.52	ND	N	0.06
MW-3	03-20-95	450.28	22.19	428.09	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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
MW-4	11-25-94	451.09	29.08	422.01	ND	N	0.06
MW-4	03-20-95	451.09	22.68	428.41	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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	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				
MW-5	11-25-94	451.40	29.76	421.64	ND	N	0.06
MW-5	03-20-95	451.40	23.20	428.20	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-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
MW-6	11-25-94	451.37	29.88	421.49	ND	N	0.06
MW-6	03-20-95	451.37	25.19	426.18	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-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
MW-7	11-25-94	450.33	28.30	422.03	ND	N	0.06
MW-7	03-20-95	450.33	22.07	428.26	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-8	11-25-94	449.43	36.46	412.97	ND	N	0.06
MW-8	03-20-95	449.43	24.75	424.68	ND	NW	0.03
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
MW-9	11-25-94	449.21	29.84	419.37	ND	N	0.06
MW-9	03-20-95	449.21	19.11	430.10	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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-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-10	11-25-94	449.22	30.30	418.92	ND	N	0.06
MW-10	03-20-95	449.22	20.96	428.26	ND	NW	0.03
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
MW-11	11-25-94	448.02	33.84	414.18	ND	N	0.06
MW-11	03-20-95	448.02	25.02	423.00	ND	NW	0.03

Table 2
Historical Groundwater Elevation Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

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
RW-1	11-25-94	451.67	30.89	420.78	ND	N	0.06
RW-1	03-20-95	451.67	23.76	427.91	ND	NW	0.03

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
N = North
NW = Northwest

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	TPHD µg/L	TOG or TRPH mg/L
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-1	11-25-94	170000	990	1000	1700	9400	NA	NA
MW-1	03-20-95	90000	1800	1100	1000	5600	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
MW-2	11-25-94	60000	3900	4100	1400	7400	NA	NA
MW-2	03-20-95	54000	2600	1600	1200	7600	NA	NA

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	TPHD µg/L	TOG or TRPH mg/L
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-3	11-25-94	54	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-3	03-20-95	94	<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
MW-4	11-25-94	13000	1400	250	490	1200	NA	NA
MW-4	03-20-95	12000	1000	100	450	700	NA	NA

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	TPHD µg/L	TOG or TRPH mg/L
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-5	11-25-94	31000	2400	1100	1100	4400	NA	NA
MW-5	03-20-95	26000	1300	180	890	2900	NA	NA
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*	2.5(a), 4.0(b)
MW-6	06-12-92	2900	480	17	190	170	1100*	1.2(c)
MW-6	09-16-92	2300	220	<5	92	43	810*	1.5(d)
MW-6	11-25-92	2700	240	11	103	32	720*	1.6(a), 1.8(b)
MW-6	01-29-93	20000	1800	1700	490	2600	2300*	3.6(a), 4.0(b)
MW-6	05-10-93	43000	3000	1700	1100	4800	3900*	16(a), 110(b)
MW-6	09-15-93	3500	300	10	100	180	1100*	1.0(a), 1.0(b)
MW-6	11-05-93	1100	140	<5	35	23	290	1.0(a), 1.0(b)
MW-6	03-26-94	3100	350	99	130	340	880	1.5(d)
MW-6	06-13-94	2300	250	12	130	31	350*	0.80(d)
MW-6	09-22-94	73	2.6	<0.5	1.7	0.7	<50	<0.5(a)
MW-6	11-25-94	1100	78	<2.5	46	17	<50	<0.5(d)
MW-6	03-20-95	2600	210	87	82	140	2000*	1.7(d)

Table 3
Historical Groundwater Analytical Data
Summary Report

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	TPHD µg/L	TOG or TRPH mg/L
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-7	11-25-94	29000	2600	380	640	3300	NA	NA
MW-7	03-20-95	31000	2300	400	620	2900	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-8	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-8	03-20-95	<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
MW-9	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-9	03-20-95	<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: 06-01-95
Project Number: 0805-122.02

Well Desig-nation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	TPHD µg/L	TOG or TRPH mg/L
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-10	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-10	03-20-95	Not analyzed; well was not scheduled for sampling						
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
MW-11	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-11	03-20-95	<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
RW-1	11-25-94	4900	550	68	200	230	NA	NA
RW-1	03-20-95	15000	1000	140	310	950	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, or (c) 413.2
TRPH = Total recoverable petroleum hydrocarbons using method: (d) 418.1
µg/L = Micrograms per liter
mg/L = Milligrams per liter
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: 06-01-95
Project Number: 0805-122.02

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
MW-1, MW-2, and MW-5	1994	0.00
MW-1, MW-2, and MW-5	1995	0.00
	1991 to 1995 Total:	3.06

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 771
Location: 899 Rincon Avenue
Livermore, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: King Buck / 200 cfm
Model MMC-6A/E
catalytic oxidizer

Start-Up Date: 12-20-94
Reporting Period From: 12-20-94
To: 04-20-95

Date Begin:		12-20-94	01-17-95	02-22-95	03-21-95
Date End:		01-17-95	02-22-95	03-21-95	04-20-95
Mode of Oxidation:		Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation:		22.7	0.0	0.0	0.0
Days of Downtime:		5.4	36.0	27.0	30.0
Vapor Monitoring Concentrations					
Well Field Influent, as gasoline:	mg/m3(1)	300	NA (12)	NA	NA
	ppmv(2)(3)	83	NA	NA	NA
System Influent, as gasoline:	mg/m3	<60	NA	NA	NA
	ppmv	<17	NA	NA	NA
System Effluent, as gasoline:	mg/m3	<60	NA	NA	NA
	ppmv	<17	NA	NA	NA
Well Field Influent, as benzene:	mg/m3	<0.5	NA	NA	NA
	ppmv(4)	<0.2	NA	NA	NA
System Influent, as benzene:	mg/m3	<0.5	NA	NA	NA
	ppmv	<0.2	NA	NA	NA
System Effluent, as benzene:	mg/m3	<0.5	NA	NA	NA
	ppmv	<0.2	NA	NA	NA
Well Field Flow Rate, scfm(5):		17.6	0.0	0.0	0.0
System Influent Flow Rate, scfm:		187.8	0.0	0.0	0.0
Destruction Efficiency, percent(6):		NR (7)	NA	NA	NA
Emission Rates (pounds per day)(8)					
Gasoline:		<1.01	0.00	0.00	0.00
Benzene:		<0.01	0.00	0.00	0.00
Operating Hours This Period:		544.7	0.0	0.0	0.0
Operating Hours To Date:		544.7	544.7	544.7	544.7
Pounds/ Hour Removal Rate, as gasoline(9):		0.04	0.00	0.00	0.00
Pounds Removed This Period, as gasoline(10):		23	0	0	0
Pounds Removed To Date, as gasoline:		23	23	23	23
Gallons Removed This Period, as gasoline(11):		4	0	0	0
Gallons Removed To Date, as gasoline:		4	4	4	4

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 771	Vapor Treatment Unit: King Buck / 200 cfm
Location: 899 Rincon Avenue	Model MMC-6A/E
Livermore, California	catalytic oxidizer
Consultant: EMCON	Start-Up Date: 12-20-94
1921 Ringwood Avenue	Reporting Period From: 12-20-94
San Jose, California	To: 04-20-95

CURRENT REPORTING PERIOD:	01-17-95	to	04-20-95
DAYS / HOURS IN PERIOD:	93.0		2232
DAYS / HOURS OF OPERATION:	0.0		0
DAYS / HOURS OF DOWN TIME:	93.0		2232
PERCENT OPERATIONAL:			0.0 %
PERIOD POUNDS REMOVED:	0		
PERIOD GALLONS REMOVED:	0		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):			0.0

1. mg/m3 = milligrams per cubic meter
2. ppmv = parts per million by volume
3. Concentration (as gasoline in ppmv) = [concentration (as gasoline in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 87 lb/lb-mole
4. Concentration (as benzene in ppmv) = [concentration (as benzene in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 78 lb/lb-mole
5. scfm = flow in standard cubic feet per minute at one atmosphere and 70 degrees Farenheit
6. Destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - system effluent concentration (as gasoline in mg/m3)] / system influent concentration (as gasoline in mg/m3)) x 100 percent
7. NR = Not reported; minimum destruction efficiency of 90 % is waived when mass emission rates are less than 1.0 lb/day for TPHG and 0.02 lb/day for benzene
8. Emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
9. Pounds/ hour removal rate (as gasoline) = system influent concentration (as gasoline in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
10. Pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
11. Gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1667 gallons/pound of gasoline
12. NA = Not analyzed, not available, or not applicable

Table 6
Soil-Vapor Extraction Well Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Date	Well Identification											
	VW-1			MW-1			MW-2			MW-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-20-94	open	177 LAB	32.5	passive	NA	NA	passive	NA	NA	open	53 LAB	25.0
01-17-95	System shut down											

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

Table 6
Soil-Vapor Extraction Well Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 06-01-95
Project Number: 0805-122.02

Date	Well Identification											
	MW-5			MW-7								
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-20-94	passive	NA	NA	passive	NA	NA						
01-17-95	System shut down											

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

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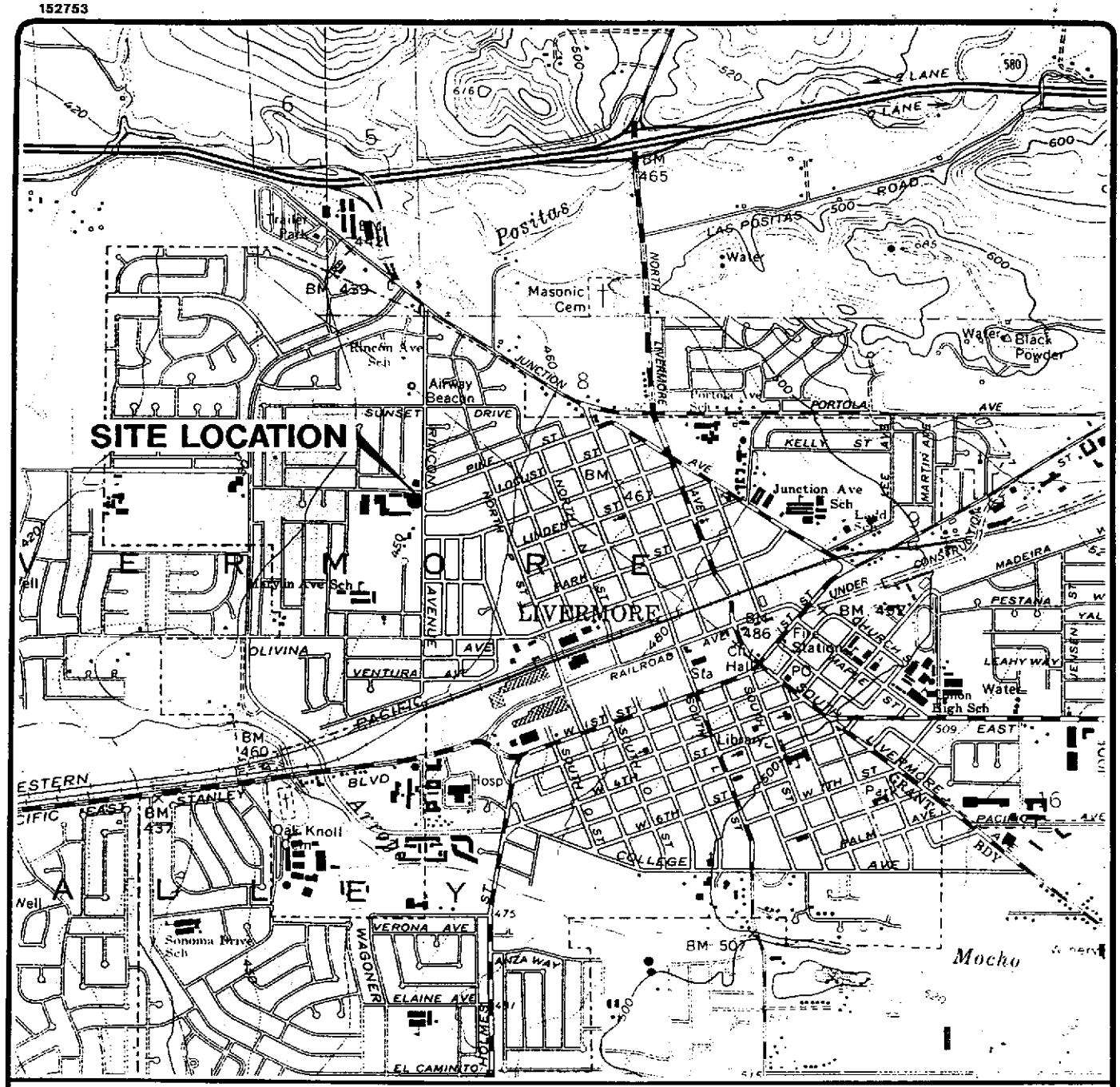


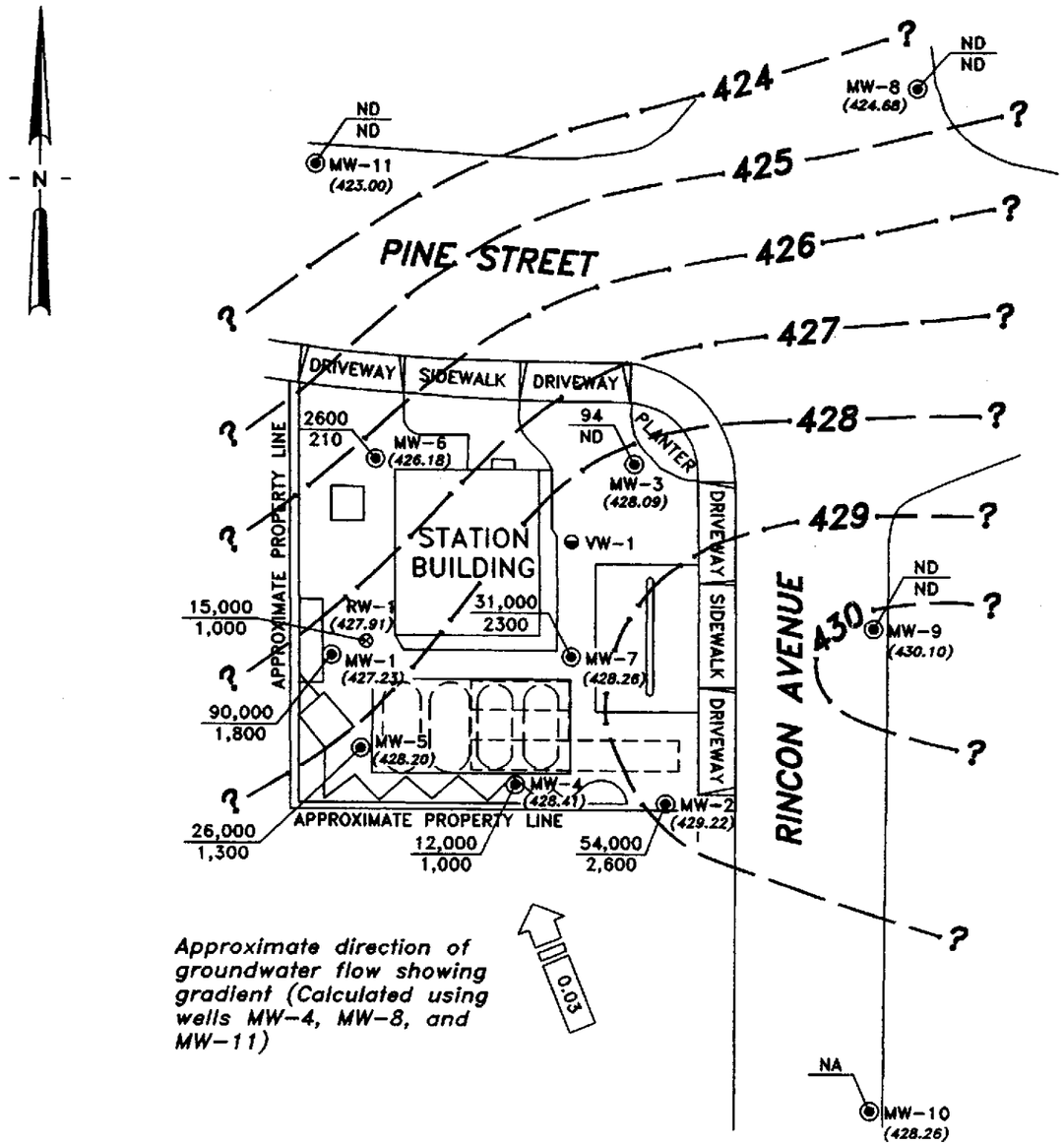
Base map from USGS 7.5' Quad. Map:
Livermore, California. (Photorevised 1980).

EMCON

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-122.02



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Recovery well
- Former underground gasoline storage tank
- Existing underground gasoline storage tank
- (427.23) Groundwater elevation (Ft.–MSL) measured 3/20/95
- Groundwater elevation contour (Ft.–MSL)
- 90,000 / 1,800 — TPHG, concentration in groundwater (µg/L); sampled 3/20/95; Benzene concentration in groundwater (µg/L); sampled 3/20/95
- NA — Not analyzed: well was not scheduled for sampling

EMCON

SCALE: 0 40 80 FEET
(Approximate)

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

GROUNDWATER DATA
FIRST QUARTER 1995

FIGURE NO.
2

PROJECT NO.
805-122.02

APPENDIX A

FIELD DATA SHEETS, FIRST QUARTER 1995 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 1775-213.01 STATION ADDRESS : 899 Rincon Avenue DATE : 3/20/95

ARCO STATION # : 771 FIELD TECHNICIAN : Mike Ross / Joe Williams DAY : MONDAY

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-10	OK	Yes	Yes	Yes	Yes	20.96	20.96	NONE	NONE	35.9	UNDER PRESSURE
2	MW-8						24.75	24.75			41.9	WATER IN BOX
3	MW-9						19.11	19.11			39.0	LOCKING WELL CAP NOT ON WELL.
4	MW-11						25.02	25.02			38.4	—
5	MW-3						22.19	22.19			39.5	WATER IN BOX
6	MW-6				↓	↓	25.19	25.19			43.0	—
7	RW-1				SUB	NO	23.76	23.76			39.7	—
8	MW-7						22.07	22.07			39.4	—
9	MW-4						22.68	22.68			40.9	—
10	MW-5						23.20	23.20			39.4	
11	MW-2						20.27	20.27			34.4	—
12	MW-1	↓	↓	↓	↓	↓	24.50	24.50	↓	↓	40.4	—

SURVEY POINTS ARE TOP OF WELL CASINGS

1.96

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-1

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. ROSS LOCATION: Livermore, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 10.38

DEPTH TO WATER (feet): 24.5 CALCULATED PURGE (gal.): 31.16

DEPTH OF WELL (feet): 40.4 ACTUAL PURGE VOL. (gal.): 31.5

DATE PURGED: 3/20/95 Start (2400 Hr) 1626 End (2400 Hr) 1643

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1650 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1632	10.5	7.51	903	63.4	clr	clr
1637	21.0	7.04	915	64.3	"	"
1643	31.5	7.99	881	64.6	"	"

D. O. (ppm): NA ODOR: Slight

COLOR: NA (COBALT 0 - 500)

TURBIDITY: NA (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

___ 2" Bladder Pump
___ Centrifugal Pump
✓ Submersible Pump
___ Well Wizard™
___ Bailer (Teflon®)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated
Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump
___ DDL Sampler
___ Dipper
___ Well Wizard™
✓ Bailer (Teflon®)
___ Bailer (Stainless Steel)
___ Submersible Pump
___ Dedicated
Other: ___

WELL INTEGRITY: GOOD LOCK #: SLIP CAP

REMARKS: ___

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-8

Signature: Mike Ross Reviewed By: JB Page 1 of 12

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: MW-2

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 771

SAMPLED BY: J WILLIAMS LOCATION: Livermore CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 9.23

DEPTH TO WATER (feet): 20.27 CALCULATED PURGE (gal.): 27.69

DEPTH OF WELL (feet): 34.4 ACTUAL PURGE VOL. (gal.): 28

DATE PURGED: 03-20-95 Start (2400 Hr) 1601 End (2400 Hr) 1613

DATE SAMPLED: 03-20-95 Start (2400 Hr) ___ End (2400 Hr) 1616

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1605	10	7.00	1163	68.1	CLEAR	CLEAR
1607	20	6.99	1163	68.1	CLEAR	TRACE
1613	28	6.92	1094	68.1	CLEAR	TRACE

D. O. (ppm): NR ODOR: STRONG

COLOR (COBALT 0 - 500): NR

TURBIDITY (NTU 0 - 200 or 0 - 1000): NR

Field QC samples collected at this well: FB-1 1620

Parameters field filtered at this well: NR

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ Centrifugal Pump ___ Bailer (PVC)

✓ Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump ✓ Bailer (Teflon®)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: ___

WELL INTEGRITY: OK LOCK #: ___

REMARKS: ___

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: JB Page 2 of 12

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: MW-3

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 771

SAMPLED BY: J WILLIAMS LOCATION: Livermore CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 16.30

DEPTH TO WATER (feet): 22.19 1.96 CALCULATED PURGE (gal.): 33.52

DEPTH OF WELL (feet): 39.5 ACTUAL PURGE VOL. (gal.): ~~34~~ 34

DATE PURGED: 03-20-95 Start (2400 Hr) 1309 End (2400 Hr) 1321

DATE SAMPLED: 03-20-95 Start (2400 Hr) ✓ End (2400 Hr) 1325

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1314	12	6.59	1151	69.1	CLEAR	CLEAR
1317	23	7.06	1128	68.5	CLEAR	CLEAR
1321	34	7.08	1145	68.1	BROWN	HEAVY

D. O. (ppm): NR ODOR: None NR NR

(COBALT 0 - 500) (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ Centrifugal Pump ___ Bailer (PVC)

✓ Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump ✓ Bailer (Teflon®)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: ___

WELL INTEGRITY: OK LOCK #: ___

REMARKS: ___

Meter Calibration: Date: 3-20-95 Time: 1305 Meter Serial #: ___ Temperature °F: 66.9

(EC 1000 1551 1000) (DI ___) (pH 7 6.98 7) (pH 10 10.17 ___) (pH 4 ___ / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: JB Page 3 of 17

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: MW-4

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 771

SAMPLED BY: J WILLIAMS LOCATION: Livermore, Ca

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 11.90

DEPTH TO WATER (feet): 22.68 CALCULATED PURGE (gal.): 35.71

DEPTH OF WELL (feet): 40.9 ACTUAL PURGE VOL. (gal.): 36

DATE PURGED: 03-20-95 Start (2400 Hr) 1514 End (2400 Hr) 1526

DATE SAMPLED: 03-20-95 Start (2400 Hr) ___ End (2400 Hr) 1530

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1514	12	6.99	~~1155~~	79.8	CLEAR	TRACE
1523	24	6.95	1166	72.4	CLEAR	CLEAR
1526	36	6.95	1106	74.5	CLEAR	CLEAR

D. O. (ppm): NR ODOR: STRONG

COLOR (COBALT 0 - 500): NR

TURBIDITY (NTU 0 - 200 or 0 - 1000): NR

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ Centrifugal Pump ___ Bailer (PVC)

✓ Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump ✓ Bailer (Teflon®)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: ___

WELL INTEGRITY: OK LOCK #: ___

REMARKS: ___

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: JB Page 4 of 17

1.96

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-5

PURGED BY: M. ROSS CLIENT NAME: ARCO 771

SAMPLED BY: M. ROSS LOCATION: LIVERMORE, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 10.58

DEPTH TO WATER (feet): 23.20 CALCULATED PURGE (gal.): 31.75

DEPTH OF WELL (feet): 39.4 ACTUAL PURGE VOL. (gal.): 32.0

DATE PURGED: 3/20/95 Start (2400 Hr) 1535 End (2400 Hr) 1557

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1600 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1543	11.0	7.25	954	66.4	clr	clr
1550	22.0	7.14	972	63.9	"	"
1557	32.0	7.08	928	63.1	"	"

D. O. (ppm): NA ODOR: STRONG

COLOR: NA (COBALT 0 - 500)

TURBIDITY: NA (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: GOOD LOCK #: Slip CAP

REMARKS: ___

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: ___

Signature: Mike Ross Reviewed By: JB Page 5 of 14

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 7775-213-01 SAMPLE ID: MW-6

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 771

SAMPLED BY: J WILLIAMS LOCATION: Livermore CA

TYPE: Ground Water ✓ Surface Water ____ Treatment Effluent ____ Other ____

CASING DIAMETER (inches): 2 ____ 3 ____ 4 ✓ 4.5 ____ 6 ____ Other ____

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 11.63

DEPTH TO WATER (feet): 25.19 1.5 CALCULATED PURGE (gal.): 34.90

DEPTH OF WELL (feet): 43.0 ACTUAL PURGE VOL. (gal.): 35

DATE PURGED: 03-20-95 Start (2400 Hr) 1343 End (2400 Hr) 1406

DATE SAMPLED: 03-20-95 Start (2400 Hr) ____ End (2400 Hr) 1413

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1349	12	7.02	926	68.9	CLEAR	CLEAR
1355	24	7.02	1050	69.8	CLEAR	CLEAR
1406	35	7.05	1076	68.5	CLEAR	CLEAR

D. O. (ppm): NR ODOR: SLIGHT

NR (COBALT 0 - 500) NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: ____

Parameters field filtered at this well: NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
____ 2" Bladder Pump	____ Bailer (Teflon®)	____ 2" Bladder Pump	____ Bailer (Teflon®)
____ Centrifugal Pump	____ Bailer (PVC)	____ DDL Sampler	____ Bailer (Stainless Steel)
____ Submersible Pump	____ Bailer (Stainless Steel)	____ Dipper	____ Submersible Pump
____ Well Wizard™	____ Dedicated	____ Well Wizard™	____ Dedicated
Other: ____		Other: ____	

WELL INTEGRITY: OK LOCK #: ____

REMARKS: NEEDS LOCK CAP

Meter Calibration: Date: ____ Time: ____ Meter Serial #: ____ Temperature °F: ____

(EC 1000 ____ / ____) (DI ____) (pH 7 ____ / ____) (pH 10 ____ / ____) (pH 4 ____ / ____)

Location of previous calibration: MW-3

Signature: ____ Reviewed By: ____ Page 6 of 17

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-7

PURGED BY: M. ROSS CLIENT NAME: ARCO 771

SAMPLED BY: M. ROSS LOCATION: Livermore, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 11.32

DEPTH TO WATER (feet): 22.07 CALCULATED PURGE (gal.): 33.96

DEPTH OF WELL (feet): 39.4 ACTUAL PURGE VOL. (gal.): 28.0

DATE PURGED: 3/20/95 Start (2400 Hr) 1440 End (2400 Hr) 1455

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1500 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1446	11.5	7.71	807	62.5	clr	clr
1452	23.0	7.73	828	64.8	"	"
1455	DRY AT 28.0 GALLONS					
1500	Recharge	7.31	835	65.2	clr	clr

D. O. (ppm): NA ODOR: SLIGHT

COLOR (visual): NA (COBALT 0 - 500)

TURBIDITY (visual): NA (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
✓ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: GOOD LOCK #: SLP CAP

REMARKS: WELL DRY AT 28.0 GALLONS

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-8

Signature: Mike Ross Reviewed By: JB Page 7 of 17

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-8

PURGED BY: M. ROSS CLIENT NAME: ARCO 771

SAMPLED BY: M. ROSS LOCATION: Livermore, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ✓ 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL):	NA	VOLUME IN CASING (gal.):	2.80
DEPTH TO WATER (feet):	24.75	CALCULATED PURGE (gal.):	8.40
DEPTH OF WELL (feet):	41.9	ACTUAL PURGE VOL. (gal.):	8.5

DATE PURGED: 3/20/95 Start (2400 Hr) 1300 End (2400 Hr) 1307

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1315 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1303	3.0	6.38	711	61.3	BRN	HEAVY
1305	6.0	6.53	745	63.7	"	"
1307	8.5	6.61	795	64.3	"	"

D. O. (ppm): NA ODOR: NONE COLOR: NA (COBALT 0 - 500) TURBIDITY: NA (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
✓ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: GOOD LOCK #: —

REMARKS: ___

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: 9210 Temperature °F: 57.5

(EC 1000 1005 / 1000) (DI —) (pH 7 723 / 700) (pH 10 992 / 1000) (pH 4 403 / —)

Location of previous calibration: —

Signature: Mike Ross Reviewed By: JB Page 8 of 12

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-9

PURGED BY: M. ROSS CLIENT NAME: ARCO 771

SAMPLED BY: M. ROSS LOCATION: LIVERMORE, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ✓ 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 3.24

DEPTH TO WATER (feet): 19.11 CALCULATED PURGE (gal.): 9.74

DEPTH OF WELL (feet): 39.0 ACTUAL PURGE VOL. (gal.): 10.0

DATE PURGED: 3/20/95 Start (2400 Hr) 1400 End (2400 Hr) 1413

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1415 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1404	3.5	7.73	838	62.1	clr/yLw	moderate
1409	7.0	7.30	674	62.2	"	TRACE
1413	10.0	7.33	682	62.7	"	"

D. O. (ppm): NA ODOR: NONE

COLOR: NA (COBALT 0 - 500)

TURBIDITY: NA (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
✓ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: GOOD LOCK #: —

REMARKS: ___

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-8

Signature: Mike Ross Reviewed By: JB Page 9 of 11

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-11

PURGED BY: M. ROSS CLIENT NAME: ARCO. 771

SAMPLED BY: M. ROSS LOCATION: LIVERMORE, CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ✓ 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 2.18

DEPTH TO WATER (feet): 25.02 CALCULATED PURGE (gal.): 6.55

DEPTH OF WELL (feet): 38.4 ACTUAL PURGE VOL. (gal.): 7.0

DATE PURGED: 3/20/95 Start (2400 Hr) 1330 End (2400 Hr) 1336

DATE SAMPLED: 3/20/95 Start (2400 Hr) 1340 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1332	2.5	7.22	776	62.3	Light Brn	Moderate
1334	5.0	7.17	818	64.7	"	Trace
1336	7.0	7.14	831	65.0	"	"

D. O. (ppm): NA ODOR: NONE

COLOR (COBALT 0 - 500): NA

TURBIDITY (NTU 0 - 200 or 0 - 1000): NA

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- ___ Centrifugal Pump
- ✓ Submersible Pump
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated
- Other: ___

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- ___ DDL Sampler
- ___ Dipper
- ___ Well Wizard™
- ✓ Bailer (Teflon®)
- ___ Bailer (Stainless Steel)
- ___ Submersible Pump
- ___ Dedicated
- Other: ___

WELL INTEGRITY: GOOD LOCK #: —

REMARKS: ___

Meter Calibration: Date: 3/20/95 Time: 1255 Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-8

Signature: Mike Ross Reviewed By: JB Page 10 of 12

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: RW-1

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 771

SAMPLED BY: J WILLIAMS LOCATION: Livermore CA

TYPE: Ground Water ✓ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ___ 4.5 ___ 6 ✓ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 17.55

DEPTH TO WATER (feet): 27.76 4.41 CALCULATED PURGE (gal.): 52.65

DEPTH OF WELL (feet): 39.7 ACTUAL PURGE VOL. (gal.): 53

DATE PURGED: 03-20-95 Start (2400 Hr) 1429 End (2400 Hr) 1450

DATE SAMPLED: 03-20-95 Start (2400 Hr) ___ End (2400 Hr) 1453

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1435	18	6.97	1103	73.8	CLEAR	TRACE
1444	36	6.95	1113	70.6	CLEAR	TRACE
1450	53	6.94	1141	73.6	CLEAR	TRACE

D. O. (ppm): NR ODOR: STRONG

NR (COBALT 0 - 500) NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- ___ Centrifugal Pump
- ✓ Submersible Pump
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- ___ DDL Sampler
- ___ Dipper
- ___ Well Wizard™
- ✓ Bailer (Teflon®)
- ___ Bailer (Stainless Steel)
- ___ Submersible Pump
- ___ Dedicated

Other: ___

WELL INTEGRITY: OK LOCK #: ___

REMARKS: ___

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-3

Signature: ___ Reviewed By: ___ Page 11 of 12

APPENDIX B

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, GROUNDWATER MONITORING, FIRST QUARTER 1995

File Under 20805-122.002
ARCO 771

Columbia Analytical Services inc.

April 3, 1995

Service Request No. S950346

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 771 / EMCON Project No.** ~~1776-213-01~~ 20805-122.002

Dear Mr. Young:

Attached are the results of the water sample(s) submitted to our lab on March 21, 1995. For your reference, these analyses have been assigned our service request number S950346.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

001

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL, but greater than or equal to the MDL

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950346
Project:	ARCO Facility No. 771 / EMCON Project No. 1775-213.01	**Date Collected:**	3/20/95
Sample Matrix:	Water	**Date Received:**	3/21/95
		Date Extracted:	NA
		Date Analyzed:	3/29,30/95

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 (40)	S950346-001	90,000	1,800	1,100	1,000	5,600
MW-2 (33)	S950346-002	54,000	2,600	1,600	1,200	7,600
MW-3 (30)	S950346-003	94	ND	ND	ND	ND
MW-4 (40)	S950346-004	12,000	1,000	100	450	700
MW-5 (39)	S950346-005	26,000	1,300	180	890	2,900
MW-6 (42)	S950346-006	2,600	210	87	82	140
MW-7 (39)	S950346-007	31,000	2,300	400	620	2,900
MW-8 (41)	S950346-008	ND	ND	ND	ND	ND
MW-9 (38)	S950346-009	ND	ND	ND	ND	ND
MW-11 (38)	S950346-010	ND	ND	ND	ND	ND
RW-1 (39)	S950346-011	15,000	1,000	140	310	950
FB-1	S950346-012	ND	ND	ND	ND	ND
Method Blank	S950329-WB	ND	ND	ND	ND	ND

Approved By: _____ Date: 4/3/95

SABTXGAS/061694

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Service Request:**	L951762
Project:	ARCO Products Company / # 1775-213.01	**Date Collected:**	3/20/95
Sample Matrix:	Water	**Date Received:**	3/22/95
		Date Extracted:	3/28/95
		Date Analyzed:	3/28/95

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

Sample Name	Lab Code	MRL	Result
MW-6 (42)	L951762-001	0.5	1.7
Method Blank	L951762-MB	0.5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit.

Approved By: Eydie Schwartz Date: 3/29/95

004

1AMRL/060194
L951762.XLS - 418w 3/29/95

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Service Request:**	L951762
Project:	ARCO Products Company / # 1775-213.01	**Date Collected:**	3/20/95
Sample Matrix:	Water	**Date Received:**	3/22/95
		Date Extracted:	3/24/95

Total Petroleum Hydrocarbons as Diesel
EPA Method Modified 8015/California DHS LUFT Method
Units: µg/L (ppm)

Sample Name	Lab Code	Date Analyzed	MRL	Result
MW-6 (42)	L951762-001	3/27/95	50	2000 *
Method Blank	L951762-MB	3/27/95	50	ND

NA	Not Applicable
MRL	Method Reporting Limit
ND	None Detected at or above the method reporting limit.
*	Chromatogram fingerprint is not characteristic of diesel; however, hydrocarbons in the gasoline time range were detected at the reported concentration.

Approved By: Eydie Schwartz Date: 3/29/95

005

1AMRLB/071594
L951762.XLS - 8015a 3/29/95

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 771 / EMCON Project No. 1775-213.01
Sample Matrix: Water

Service Request: S950346
Date Collected: 3/20/95
Date Received: 3/21/95
Date Extracted: NA
Date Analyzed: 3/29,30/95

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 (40)	S950346-001	98
MW-2 (33)	S950346-002	97
MW-3 (30)	S950346-003	95
MW-4 (40)	S950346-004	95
MW-5 (39)	S950346-005	92
MW-6 (42)	S950346-006	107
MW-7 (39)	S950346-007	95
MW-8 (41)	S950346-008	88
MW-9 (38)	S950346-009	87
MW-11 (38)	S950346-010	88
RW-1 (39)	S950346-011	104
FB-1	S950346-012	89
MW-2 (33) MS	S950346-002MS	102
MW-2 (33) DMS	S950346-002DMS	95
Method Blank	S950329-WB	98

CAS Acceptance Limits: 69-116

Approved By: Steven Sheer Date: 4/3/95

007

SUR1/062994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 771 / EMCON Project No. 1775-213.01

Service Request: S950346
Date Analyzed: 3/29/95

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	24.0	96	85-115
Toluene	25	23.7	95	85-115
Ethylbenzene	25	24.0	96	85-115
Xylenes, Total	75	70.0	93	85-115
Gasoline	250	238	95	90-110

Approved By: _____ Date: 4/3/95

ICV25AL/060194

008

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	S950346
Project:	ARCO Facility No. 771 / EMCON Project No. 1775-213.01	**Date Collected:**	3/20/95
Sample Matrix:	Water	**Date Received:**	3/21/95
		Date Extracted:	NA
		Date Analyzed:	3/29/95

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

Sample Name: MW-2 (33)
Lab Code: S950346-002

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Benzene	5,000	5,000	2,600	7,060	6,850	89	85	75-135	3
Toluene	5,000	5,000	1,590	6,070	5,890	90	86	73-136	3
Ethylbenzene	5,000	5,000	1,210	5,760	5,580	91	87	69-142	3

Approved By: Steven Sheer Date: 4/3/95

009

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Service Request:**	L951762
Project:	ARCO Products Company / # 1775-213.01	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	3/28/95
		Date Analyzed:	3/28/95

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary *
Total Recoverable Petroleum Hydrocarbons (TRPH) / Oil & Grease
EPA Methods 418.1/413.2
Units: mg/L (ppm)

	True Value		Result		Percent Recovery			
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	CAS Acceptance Limits	**Relative Percent Difference**
TRPH / O&G	2.09	2.09	1.89	2.00	90	96	75-125	6

NA Not Applicable

* Sample quantity was insufficient to perform matrix spike and matrix spike duplicate. Three separate, replicate one liter samples are required to analyze sample and spikes.

Approved By: Lydia Schwartz Date: 3/29/95

010

DLCS/060194
L951762.XLS - genlcs3 3/29/95

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Service Request:**	L951762
Project:	ARCO Products Company / # 1775-213.01	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	NA

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel
EPA Method Modified 8015/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
MW-6 (42)	L951762-001	77
Method Blank	L951762-MB	89

CAS Acceptance Limits: 50-140

NA Not Applicable

Approved By: Cydie Schwartz Date: 3/29/95

011

SUR1/062994
L951762.XLS - 8015srbds 3/29/95

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Service Request:**	L951762
Project:	ARCO Products Company / # 1775-213.01	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	3/24/95
		Date Analyzed:	3/28/95

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary *
Total Petroleum Hydrocarbons as Diesel
EPA Method Modified 8015/California DHS LUFT Method
Units: µg/L (ppb)

Lab Code: L951762-LCS

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
Diesel	2000	2000	ND	1690	1710	85	86	50-136	1

NA	Not Applicable
ND	None Detected at or above the method reporting limit.
LCS	Laboratory Control Sample
*	Sample quantity was insufficient to perform matrix spike and matrix spike duplicate. Three separate, replicate one liter samples are required to analyze sample and spikes.

Approved By: Cydie Schwartz Date: 3/29/95

012

DMS1S/060194
L951762.XLS - 8015dmsa 3/29/95

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 17075.00

Chain of Custody

ARCO Facility no. 771	City (Facility) Livermore	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Michael Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 453-7300	Fax no. (Consultant) 453-0455
Consultant name EMCON	Address (Consultant) 1921 Ringwood Avenue		Contract number 014

L951762-

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM5030E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
MW-1(40)	1	2		X		X	HCl	3-20-95	1650		X									
MW-2(33)	2	↓		↓		↓	↓	↓	1616		X									
MW-3(30)	3								1325		X									
MW-4(40)	4								1530		X									
MW-5(39)	5	↓							1600		X									
MW-6(42)	6	4							1413		X			X						
MW-7(39)	7	2							1500		X									
MW-8(41)	8								1315		X									
MW-9(38)	9								1415		X									
MW-11(38)	10								1340		X									
MW-1(39)	11								1453		X									
FB-1	12	↓		↓		↓	↓		1620		X									
MW-6(42)		2		X		X	NP	✓	1413			X								

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: AS Normal

Remarks: GS/CAS# L951762

775-213.01

Lab number: 9950346

Turnaround time

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

Condition of sample: ok

Temperature received: Cool

Relinquished by sampler	Date 3-21-95	Time 10:30	Received by Jamie Brown CAS-SJ
Relinquished by w/Custody Seal Jamie Brown	Date 3/21/95	Time 1600	Received by
Relinquished by	Date	Time	Received by laboratory Date 3/22/95 Time 1100

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

APC-3292 (2-91)

CAS-SJ: GBTEX CAS-L: 418.1, TPH-D