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

Rec'd 10/5/95

Date September 29, 1995
Project 20805-122.002

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	Second 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: Cert. 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: September 29, 1995

Re: ARCO Station # 771 • 899 Rincon Avenue • Livermore, CA
Second Quarter 1995 Groundwater Monitoring and
Remediation System Performance Evaluation Report

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

Submitted by:

Michael R. Whelan
Environmental Engineer

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

September 11, 1995
Project 20805-122.002

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

Re: Second quarter 1995 groundwater monitoring and SVE system performance evaluation report, ARCO service station 771, Livermore, California

Dear Mr. Whelan:

This letter presents the results of the second 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

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.

EMCON performed the second quarter 1995 groundwater monitoring event on June 2 and 3, 1995. Field work 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-7 and RW-1 for laboratory analysis; and (3) directing a state-certified laboratory to analyze the groundwater samples. Copies of all field data sheets from the second quarter 1995 groundwater monitoring event are included in Appendix A.

ANALYTICAL PROCEDURES

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

MONITORING PROGRAM RESULTS

Results of the second 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 second quarter 1995 analytical results and chain-of-custody documentation are included in Appendix B.

Groundwater elevation data collected on June 2, 1995, indicate that groundwater beneath the site flows north-northwest with an approximate hydraulic gradient of 0.014 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the second quarter of 1995.

Groundwater samples collected from well MW-3 contained 72 micrograms per liter (µg/L) of TPHG, but did not contain detectable concentrations of BTEX (<0.5 µg/L). Groundwater samples collected from wells MW-1, MW-2, MW-4 through MW-7, and RW-1 contained concentrations of TPHG from 1,600 to 81,000 µg/L, and concentrations of benzene from 55 to 2,200 µg/L. Additional samples collected from well MW-6 contained 1,200 µg/L of TPHD and 1.0 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

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).

As proposed in the first quarter 1995, EMCON completed modifications to the SVE system. The modifications included installing a 3-horsepower blower, installing tubing into wells VW-1, MW-1, MW-2, MW-4, MW-5, MW-7, and RW-1, and necessary instrumentation to facilitate 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. EMCON began bubbling air at low flows (less than 1 scfm per well) into wells VW-1, MW-1, MW-2, MW-4, MW-5, MW-7, and RW-1 on July 12, 1995.

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 fresh-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 parameters described above, 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 rates 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.

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 manually shut down on January 17, 1995, because of resubmergence of the screen in SVE wells resulting in minimal flow from the vapor extraction wells.

On July 12, 1995, EMCON restarted the SVE system in conjunction with the air-bubbling system to recover dissolved-phase hydrocarbons volatilized by bubbling air into the vapor extraction wells. The SVE system operated for a total of 7.1 days during this 90-day reporting period.

The SVE system was down for a portion of the first and second quarters 1995 because of the resubmergence of screen in the vapor extraction wells. Copies of operation and maintenance field data sheets generated during the second quarter 1995 are provided in Appendix C. Table 5 summarizes SVE system operation and performance data from initial startup on December 20, 1994, to July 19, 1995.

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 to July 11, 1995, because the SVE system remained shut down.

Air Sample Results. Copies of the laboratory analytical reports for all air samples collected during the second quarter of 1995 are provided in Appendix D.

Destruction Efficiency and Emission Rates. The destruction efficiency of the catalytic oxidizer unit during the second quarter 1995 was 70 percent. TVHG and benzene emissions were nondetectable during this reporting period. Although the destruction efficiency is lower than 90 percent, the nondetectable TVHG and benzene emissions demonstrate compliance with the site-specific BAAQMD air permit requirements (90 percent destruction efficiency condition is waived if TVHG and benzene emissions are less than 1 and 0.02 pound per day, respectively).

Hydrocarbon Removal Rates. Approximately 20.2 pounds (3.3 gallons) of hydrocarbons were recovered by the SVE system during this 90-day reporting period. A total of approximately 43.2 pounds (7.0 gallons) of hydrocarbons was recovered by the SVE system from system startup on December 20, 1994, to the end of the second quarter reporting period on July 19, 1995. Table 5 summarizes historical hydrocarbon removal rates, and cumulative total amount of hydrocarbons removed from system startup on December 20, 1994, to July 19, 1995. The calculations and assumptions made in estimating hydrocarbon removal rates for the SVE system are explained in the footnotes for Table 5.

PERFORMANCE IMPROVEMENTS

As proposed in the first quarter 1995, EMCON completed modifications to the SVE system. The modifications included installing a 3-horsepower blower, installing tubing into wells VW-1, MW-1, MW-2, MW-4, MW-5, MW-7, and RW-1, and necessary instrumentation to facilitate 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. EMCON began bubbling air at low flows (less than 1 scfm per well) into wells VW-1, MW-1, MW-2, MW-4, MW-5, MW-7, and RW-1 on July 12, 1995. To evaluate the effectiveness of air-bubbling, EMCON will monitor dissolved oxygen levels in on-site monitoring wells and changes in hydrocarbon concentrations in extracted vapor during the following months of the SVE and air-bubbling systems' operations.

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 second quarter of 1995 and the anticipated site activities for the third quarter of 1995.

Second Quarter 1995 Activities

- Prepared and submitted quarterly groundwater monitoring report for first quarter 1995.
- Performed quarterly groundwater monitoring for second quarter 1995.
- Installed a blower and necessary ancillary equipment (tubing, instrumentation, etc.) to facilitate in-well air-bubbling.
- Started bubbling air into vapor extraction wells on July 12, 1995.

- Restarted the SVE system on July 12, 1995.

Work Anticipated for Third Quarter 1995

- Prepare and submit quarterly groundwater monitoring report for second quarter 1995.
- Perform quarterly groundwater monitoring for third quarter 1995.
- Perform operation and maintenance activities for the SVE system during third quarter 1995.
- Evaluate the effectiveness of bubbling air into vapor extraction wells.

Please call if you have questions.

Sincerely,

EMCON

David Larsen
Project Coordinator

FOR
Sailaja Yelamanchili
Staff Engineer

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

REGISTERED GEOLOGIST
LYNN A. GALLAGHER
RG6090
STATE OF CALIFORNIA

Attachments:

Table 1 -	Groundwater Monitoring Data, Second 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, Second Quarter 1995
Appendix A -	Field Data Sheets, Second Quarter 1995 Groundwater Monitoring Event
Appendix B -	Analytical Results and Chain-of-Custody Documentation, Groundwater Monitoring, Second Quarter 1995
Appendix C -	Operation and Maintenance Field Data Sheets, SVE System, Second Quarter 1995
Appendix D -	Analytical Results and Chain-of-Custody Documentation, SVE System Air Samples, Second Quarter 1995

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

Table 1
Groundwater Monitoring Data
Second Quarter 1995

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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	06-02-95	451.73	25.60	426.13	ND	NNW	0.014	06-03-95	81000	2000	1400	990	4600	NA	NA
MW-2	06-02-95	449.49	22.32	427.17	ND	NNW	0.014	06-03-95	37000	2200	800	980	4800	NA	NA
MW-3	06-02-95	450.28	23.28	427.00	ND	NNW	0.014	06-02-95	72	<0.5	<0.5	<0.5	<0.5	NA	NA
MW-4	06-02-95	451.09	24.41	426.68	ND	NNW	0.014	06-02-95	9000	850	56	380	430	NA	NA
MW-5	06-02-95	451.40	24.80	426.60	ND	NNW	0.014	06-02-95	39000	940	160	740	1900	NA	NA
MW-6	06-02-95	451.37	25.75	425.62	ND	NNW	0.014	06-02-95	1600	55	7.9	40	26	1200*	1.0(d)
MW-7	06-02-95	450.33	23.42	426.91	ND	NNW	0.014	06-03-95	40000	1400	280	610	2400	NA	NA
MW-8	06-02-95	449.43	24.95	424.48	ND	NNW	0.014	06-02-95	Not sampled: not scheduled for chemical analysis						
MW-9	06-02-95	449.21	21.23	427.98	ND	NNW	0.014	06-02-95	Not sampled: not scheduled for chemical analysis						
MW-10	06-02-95	449.22	22.15	427.07	ND	NNW	0.014	06-02-95	Not sampled: not scheduled for chemical analysis						
MW-11	06-02-95	448.02	23.82	424.20	ND	NNW	0.014	06-02-95	Not sampled: not scheduled for chemical analysis						
RW-1	06-02-95	451.67	25.12	426.55	ND	NNW	0.014	06-02-95	12000	1300	280	420	1100	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
NNW: north-northwest
NA: not analyzed
*: chromatogram does not match the typical fingerprint for diesel

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Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
		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
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
MW-1	06-02-95	451.73	25.60	426.13	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
		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
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
MW-2	06-02-95	449.49	22.32	427.17	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
MW-3	06-02-95	450.28	23.28	427.00	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
MW-4	06-02-95	451.09	24.41	426.68	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
MW-5	06-02-95	451.40	24.80	426.60	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
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
MW-6	06-02-95	451.37	25.75	425.62	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
MW-7	06-02-95	450.33	23.42	426.91	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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-8	06-02-95	449.43	24.95	424.48	ND	NNW	0.014
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
MW-9	06-02-95	449.21	21.23	427.98	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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-10	06-02-95	449.22	22.15	427.07	ND	NNW	0.014
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
MW-11	06-02-95	448.02	23.82	424.20	ND	NNW	0.014

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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
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
RW-1	06-02-95	451.67	25.12	426.55	ND	NNW	0.014

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
NNW: north-northwest

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG or TRPH
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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-1	06-03-95	81000	2000	1400	990	4600	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
MW-2	06-03-95	37000	2200	800	980	4800	NA	NA

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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-3	06-02-95	72	<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
MW-4	06-02-95	9000	850	56	380	430	NA	NA

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG or TRPH
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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-5	06-02-95	39000	940	160	740	1900	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)
MW-6	06-02-95	1600	55	7.9	40	26	1200*	1.0(d)

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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-7	06-03-95	40000	1400	280	610	2400	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-8	06-02-95	Not sampled: not scheduled for chemical analysis						

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
Project Number: 0805-122.02

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHD	TOG or TRPH
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
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
MW-9	06-02-95	Not sampled: not scheduled for chemical analysis						
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 sampled: not scheduled for chemical analysis						
MW-10	06-02-95	Not sampled: not scheduled for chemical analysis						

Table 3
Historical Groundwater Analytical Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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-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
MW-11	06-02-95	Not sampled: not scheduled for chemical analysis						
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
RW-1	06-02-95	12000	1300	280	420	1100	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

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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: 07-19-95

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	0.0	0.0
Pounds Removed To Date, as gasoline:		23.0	23.0	23.0	23.0
Gallons Removed This Period, as gasoline (11):		3.7	0.0	0.0	0.0
Gallons Removed To Date, as gasoline:		3.7	3.7	3.7	3.7

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: 07-19-95

Date Begin:		04-20-95	05-19-95	06-19-95
Date End:		05-19-95	06-19-95	07-19-95
Mode of Oxidation:		Catalytic	Catalytic	Catalytic
Days of Operation:		0.0	0.0	7.1
Days of Downtime:		29.0	31.0	22.9
Vapor Monitoring Concentrations				
Well Field Influent, as gasoline:	mg/m3 (1)	NA	NA	370
	ppmv (2)	NA	NA	91
System Influent, as gasoline:	mg/m3	NA	NA	200
	ppmv	NA	NA	48
System Effluent, as gasoline:	mg/m3	NA	NA	<60
	ppmv	NA	NA	<15
Well Field Influent, as benzene:	mg/m3	NA	NA	6.7
	ppmv	NA	NA	2.1
System Influent, as benzene:	mg/m3	NA	NA	3.8
	ppmv	NA	NA	1.2
System Effluent, as benzene:	mg/m3	NA	NA	<0.5
	ppmv	NA	NA	<0.1
Well Field Flow Rate, scfm (5):		0.0	0.0	74.8
System Influent Flow Rate, scfm:		0.0	0.0	157.7
Destruction Efficiency, percent (6):		NA	NA	70.0 (13)
Emission Rates (pounds per day) (8)				
Gasoline:		0.00	0.00	<0.85
Benzene:		0.00	0.00	<0.01
Operating Hours This Period:		0.0	0.0	171.2
Operating Hours To Date:		544.7	544.7	715.9
Pounds/ Hour Removal Rate, as gasoline (9):		0.00	0.00	0.12
Pounds Removed This Period, as gasoline (10):		0.0	0.0	20.2
Pounds Removed To Date, as gasoline:		23.0	23.0	43.2
Gallons Removed This Period, as gasoline (11):		0.0	0.0	3.3
Gallons Removed To Date, as gasoline:		3.7	3.7	7.0

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: 07-19-95

CURRENT REPORTING PERIOD:	04-20-95	to	07-19-95
DAYS / HOURS IN PERIOD:	90.0	2160.0	
DAYS / HOURS OF OPERATION:	7.1	171.2	
DAYS / HOURS OF DOWN TIME:	82.9	1988.8	
PERCENT OPERATIONAL:		7.9 %	
PERIOD POUNDS REMOVED:	20.2		
PERIOD GALLONS REMOVED:	3.3		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		157.7	

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 0.1613 gallons/pound of gasoline
12. NA: not analyzed, not available, or not applicable
13. Although the destruction efficiency appeared to be less than 90 percent, laboratory analytical results collected during this period indicate the effluent TVHG and benzene concentrations in off-gas discharged to the atmosphere were below laboratory detection limits, indicating compliance with BAAQMD discharge requirements.

Table 6
Soil-Vapor Extraction Well Data

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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											
07-12-95	System was restarted											
07-12-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA

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

Table 6
Soil-Vapor Extraction Well Data

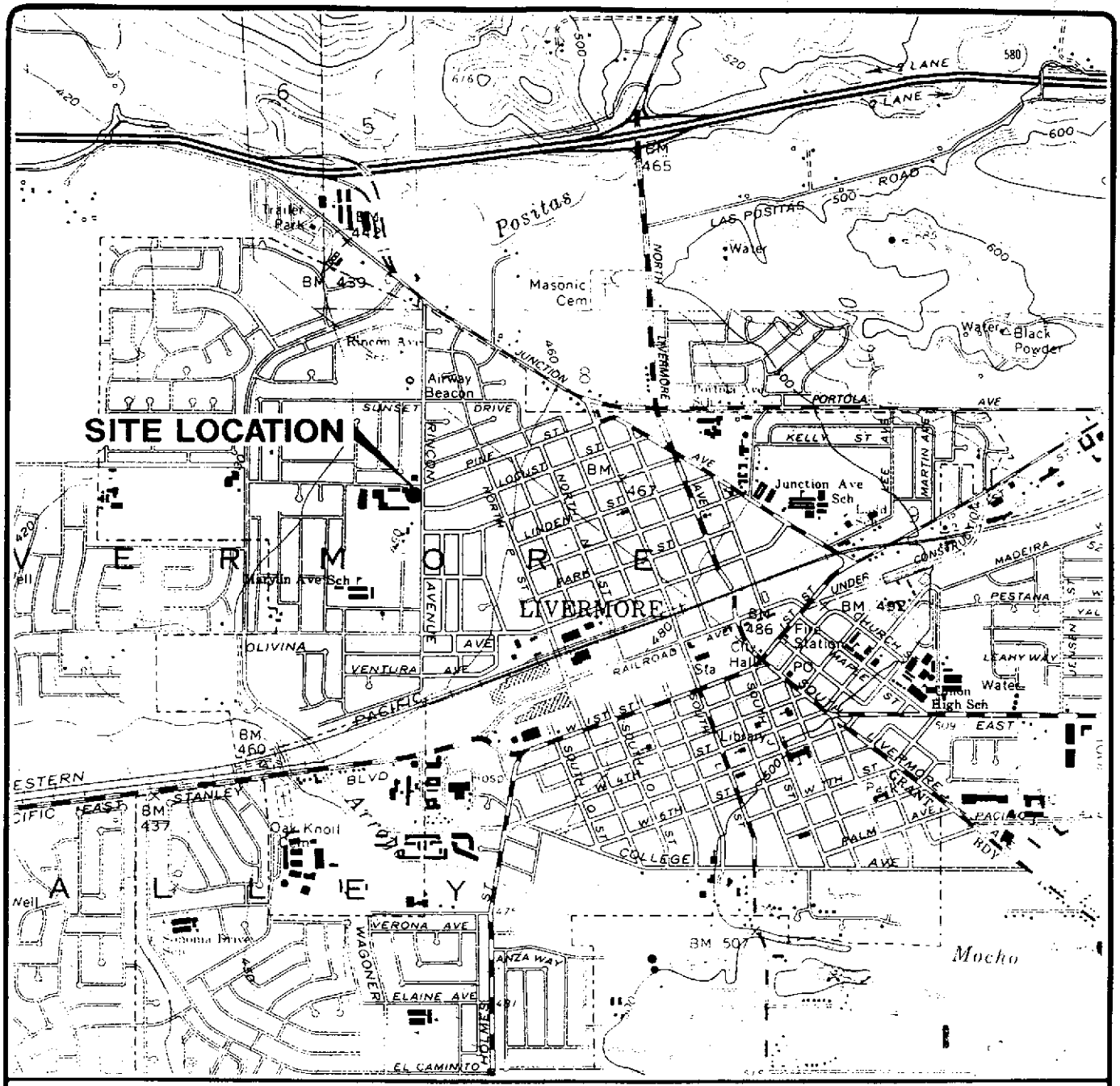
ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 09-07-95
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											
07-12-95	System was restarted											
07-12-95	open	NA	NA	open	NA	NA						

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

152753



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

N

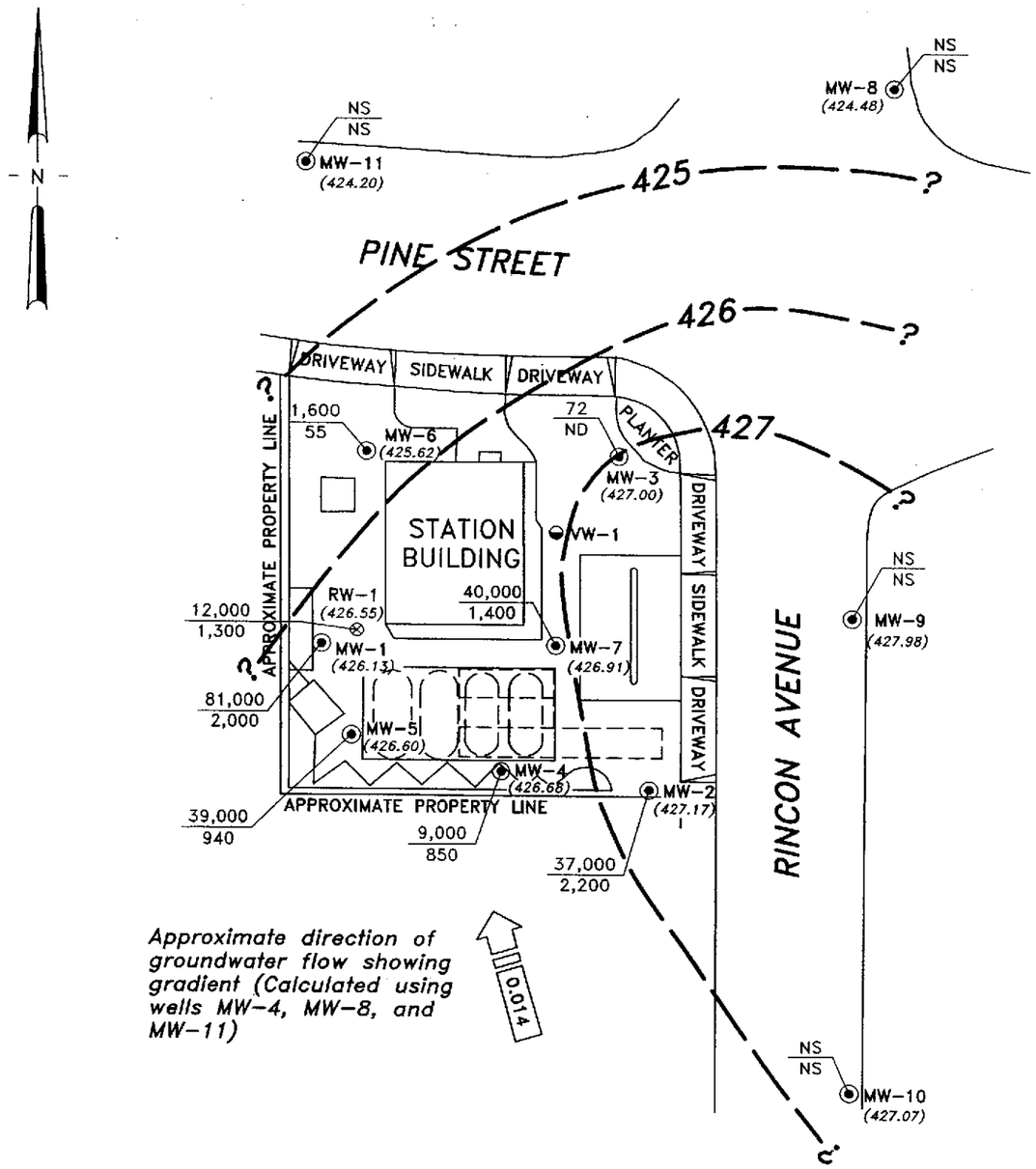
Scale : 0 2000 4000 Feet

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
- (427.00) Groundwater elevation (Ft.–MSL) measured 6/2/95
- Groundwater elevation contour (Ft.–MSL)
- 40,000 / 1400 — TPHG concentration in groundwater (ug/L); sampled 6/2/95 – 6/3/95; Benzene concentration in groundwater (ug/L); sampled 6/2/95 – 6/3/95
- NS — Not sampled; not scheduled for chemical analysis
- ND — Not detected at or above the method reporting limit for TPHG (50 ug/L) and benzene (0.5 ug/L)

EMCON

SCALE: 0 40 80 FEET
(Approximate)

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

GROUNDWATER DATA
SECOND QUARTER 1995

FIGURE NO.
2

PROJECT NO.
805-122.02

APPENDIX A

FIELD DATA SHEETS, SECOND QUARTER 1995 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 1775-213.01 STATION ADDRESS : 899 Rincon Avenue DATE : 6/2/95

ARCO STATION # : 771 FIELD TECHNICIAN : Rob Davis/M. Gallegos DAY : Friday

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-8	yes	yes	OK	OK	OK	24.95	24.95	NR	NR	42.2	water in box above TOC
2	MW-9	"	"	"	"	"	21.23	21.23		NR	39.3	
3	MW-10	"	"	"	"	"	22.15	22.15		NR	36.1	
4	MW-11	"	"	"	"	"	23.82	23.82		NR	38.5	
5	MW-3	"	"	"	"	"	23.28	23.28		NR	39.5	water in box (3" below TOC)
6	MW-6	"	"	"	"	"	25.75	25.75		NR	43.1	
7	MW-4	"	"	"	"	"	24.41	24.41		NR	41.1	
8	RW-1	"	"	"		"	25.12	25.12		NR	39.7	strong product odor
9	MW-5	"	"	"	"	"	24.80	24.80		NR	40.1	
10	MW-7	"	"	"	"	"	23.42	23.42		NR	39.6	
11	MW-2	"	"	"	"	"	22.32	22.32		NR	37.4	
12	MW-1	"	"	"	"	"	25.60	25.60	V	NR	37.2	

SURVEY POINTS ARE TOP OF WELL CASINGS

MW-1 → 1, RW-1

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: MW-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.): 7.57

DEPTH TO WATER (feet): 25.60 CALCULATED PURGE (gal.): 22.73

DEPTH OF WELL (feet): 37.2 ACTUAL PURGE VOL. (gal.): 24

DATE PURGED: 01-03-95 Start (2400 Hr) 1554 End (2400 Hr) 1606

DATE SAMPLED: 01-03-95 Start (2400 Hr) ~ End (2400 Hr) 16

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
~~1558~~	8	6.85	1084	72.0	CLEAR	CLEAR
1602	16	6.85	1087	71.7	CLEAR	TRACE
1606	24	6.80	1083	71.2	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: NA

Parameters field filtered at this well: NA

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: GOOD LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 6-3-95 Time: ___ Meter Serial #: 9510 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: [signature] Reviewed By: [signature] Page 1 of 4

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.):	9.85
DEPTH TO WATER (feet):	22.32	CALCULATED PURGE (gal.):	29.55
DEPTH OF WELL (feet):	39.4	ACTUAL PURGE VOL. (gal.):	30

DATE PURGED: 06-03-95 Start (2400 Hr) 1500 End (2400 Hr) 1515

DATE SAMPLED: 06-03-95 Start (2400 Hr) — End (2400 Hr) 1521

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1506	10	6.79	978	74.6	CLEAR	CLEAR
1510	20	6.75	1026	72.1	CLEAR	TRACE
1515	30	6.75	1020	71.9	GRAY	MOD

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		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 #: Arco

REMARKS: ___

Meter Calibration: Date: 6-3-95 Time: ___ Meter Serial #: 9016 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Jon Williams Reviewed By: SVT Page 2 of 8

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-3

PURGED BY: M. Gallegos CLIENT NAME: ARCO #771

SAMPLED BY: ✓ LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	10.24
DEPTH TO WATER (feet):	23.82	CALCULATED PURGE (gal.):	30.73
DEPTH OF WELL (feet):	39.5	ACTUAL PURGE VOL. (gal.):	31.0

DATE PURGED: 6-2-95 Start (2400 Hr) 1205 End (2400 Hr) 1224

DATE SAMPLED: ✓ Start (2400 Hr) ~~1225~~ 1229 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1216	10.0	7.20	1081	66.5	grey	clear
1219	20.5	7.23	1088	67.3	"	"
1223	31.0	7.22	1093	67.1	grey	"

D. O. (ppm): NR ODOR: Strong COLOR: NR (COBALT 0 - 500) TURBIDITY: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

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

WELL INTEGRITY: Good LOCK #: Arco Key

REMARKS: all samples collected

Meter Calibration: Date: 6-2-95 Time: 1150 Meter Serial #: 9011 Temperature °F: 66.3

(EC 1000 998 / 1000) (DI ___) (pH 7 707 / 700) (pH 10 1008 / 1000) (pH 4 3971 / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: SH Page 3 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-4

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 771

SAMPLED BY: ↓ LOCATION: Livermore CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 10.9

DEPTH TO WATER (feet): 24.41 CALCULATED PURGE (gal.): 32.7

DEPTH OF WELL (feet): 41.1 ACTUAL PURGE VOL. (gal.): 33.0

DATE PURGED: 6-2-95 Start (2400 Hr) 13:18 End (2400 Hr) 13:29

DATE SAMPLED: ↓ Start (2400 Hr) 13:34 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
13:22	11.0	7.17	1282	69.1	clear	v. clean
13:25	22.0	7.02	1260	68.7	"	"
13:29	33.0	7.01	1239	69.4	"	"

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

WELL INTEGRITY: good LOCK #: Arco Key

REMARKS: all samples collected

Meter Calibration: Date: 6-2-95 Time: ___ Meter Serial #: 9011 Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: SJ Page 4 of 9

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

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

PURGED BY: McCallegos CLIENT NAME: ARCO # 771

SAMPLED BY: V LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 9.99

DEPTH TO WATER (feet): 24.80 CALCULATED PURGE (gal.): 29.98

DEPTH OF WELL (feet): 40.1 ACTUAL PURGE VOL. (gal.): 23.0

DATE PURGED: 6-2-95 Start (2400 Hr) 13:49 End (2400 Hr) 1405

DATE SAMPLED: V 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)
13:55	10.0	7.28	1244	65.2	gray	clear
13:59	20.0	7.04	1240	66.7	"	"
14:[illegible]	[illegible]	well dried at 23.0 gallons				
14:15	recharge	7:08	1192	64.2	"	"

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

COLOR: NR (COBALT 0 - 500) TURBIDITY: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X 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 #: Arco Key

REMARKS: heavy sheen on pump water

Oil Sample taken

WL = 39.43

Meter Calibration: Date: 6-2-95 Time: ___ Meter Serial #: 9011 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: SJC Page 5 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213.01 SAMPLE ID: MW-6

PURGED BY: McGallegos CLIENT NAME: ARCO #771

SAMPLED BY: ✓ LOCATION: Livermore CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	11.33
DEPTH TO WATER (feet):	25.75	CALCULATED PURGE (gal.):	34.0
DEPTH OF WELL (feet):	43.1	ACTUAL PURGE VOL. (gal.):	28.0

DATE PURGED: 6-2-95 Start (2400 Hr) 12:38 End (2400 Hr) 12:49

DATE SAMPLED: ✓ Start (2400 Hr) 12:59 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:42	11.0	7.16	1173	67.0	—	V. clear
12:47	22.5	7.12	1185	67.3	—	"
12:49	well dried at 28.0 gallons					
12:55	WL prior to sampling: 37.15'					
12:59	recharge	7.10	1157	65.3	Clear	Clear

D. O. (ppm): NR ODOR: very 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		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X 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 #: Arco Key.

REMARKS: All samples taken, well dried at 28.0 gallons

Meter Calibration: Date: 6-2-95 Time: ___ Meter Serial #: 9011 Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: SK Page 6 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-213-01 SAMPLE ID: MW-7

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): NA VOLUME IN CASING (gal.): 10.7

DEPTH TO WATER (feet): 23.42 1.56 CALCULATED PURGE (gal.): ~~10.7~~ 31.7

DEPTH OF WELL (feet): 39.6 ACTUAL PURGE VOL. (gal.): 32

DATE PURGED: 06-03-95 Start (2400 Hr) 1400 End (2400 Hr) 1425

DATE SAMPLED: 06-03-95 Start (2400 Hr) — End (2400 Hr) 1429

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1413	11	6.85	998	82.2	GRAY	MEDIUM
1419	22	6.87	999	75.6	"	"
1425	32	6.82	989	75.0	"	"

D. O. (ppm): NR ODOR: Slight 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		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 #: ARCO

REMARKS: ___

Meter Calibration: Date: 6-3-95 Time: 1355 Meter Serial #: 9016 Temperature °F: 70.1

(EC 1000 1032 / 1000) (DI ___) (pH 7 7.21 / 7.00) (pH 10 10.21 / 10.00) (pH 4 3.95 / —)

Location of previous calibration: ___

Signature: Joe Williams Reviewed By: SAT Page 7 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

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

PURGED BY: M. Gallegos CLIENT NAME: ARCO #771

SAMPLED BY: ↓ LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	21.43
DEPTH TO WATER (feet):	25.12	CALCULATED PURGE (gal.):	64.29
DEPTH OF WELL (feet):	39.7	ACTUAL PURGE VOL. (gal.):	52.0

DATE PURGED: 6-2-95 Start (2400 Hr) 13:49 End (2400 Hr) 14:08

DATE SAMPLED: ↓ Start (2400 Hr) 14:19 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
13:57	21.5	6.88	1137	67.2	sdg	clear
14:04	43.0	6.91	1116	66.0	"	"
14:08	~~5~~	well dried at 52.0 gallons			"	"
	wl prior to	~~sampling~~ sampling : 37.60				
14:19	recharge:	6.98	1094	63.8	dk. gray	mod.

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

WELL INTEGRITY: good LOCK #: Arco Key

REMARKS: all samples taken

Meter Calibration: Date: 6-2-95 Time: ___ Meter Serial #: 9011 Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: SLT Page 8 of 8

APPENDIX B

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

Columbia Analytical Services, Inc.

June 16, 1995

Service Request No. S950700

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 0771 / EMCON Project No. 0805-112.02**

Dear Mr. Young:

Attached are the results of the water sample(s) submitted to our lab on June 5, 1995. For your reference, these analyses have been assigned our service request number S950700.

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950700
Project:	ARCO Facility No. 0771 / EMCON Project No. 0805-112.02	**Date Collected:**	6/2,3/95
Sample Matrix:	Water	**Date Received:**	6/5/95
		Date Extracted:	NA
		Date Analyzed:	6/13/95

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-3 (39)	S950700-001	72	ND	ND	ND	ND
MW-6 (43)	S950700-002	1,600	55	7.9	40	26
MW-4 (41)	S950700-003	9,000	850	56	380	430
RW-1 (40)	S950700-004	12,000	1,300	280	420	1,100
MW-5 (40)	S950700-005	39,000	940	160	740	1,900
MW-7 (39)	S950700-006	40,000	1,400	280	610	2,400
MW-2 (37)	S950700-007	37,000	2,200	800	980	4,800
MW-1 (37)	S950700-008	81,000	2,000	1,400	990	4,600
Method Blank	S950613-WB	ND	ND	ND	ND	ND

Approved By: _____ Date: 6/16/95

5ABTXGAS/061694

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 0771 / EMCON Project No. 0805-112.02
Sample Matrix: Water

Service Request: S950700
Date Collected: 6/2,3/95
Date Received: 6/5/95
Date Extracted: NA
Date Analyzed: 6/13/95

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-3 (39)	S950700-001	99
MW-6 (43)	S950700-002	98
MW-4 (41)	S950700-003	101
RW-1 (40)	S950700-004	99
MW-5 (40)	S950700-005	102
MW-7 (39)	S950700-006	103
MW-2 (37)	S950700-007	96
MW-1 (37)	S950700-008	101
MW-3 (39) MS	S950700-001MS	101
MW-3 (39) DMS	S950700-001DMS	97
Method Blank	S950613-WB	93

CAS Acceptance Limits: 69-116

Approved By: _____ Date: 6/16/95

SUR1/062994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 0771 / EMCON Project No. 0805-112.02
Sample Matrix: Water

Service Request: S950700
Date Collected: 6/2,3/95
Date Received: 6/5/95
Date Extracted: NA
Date Analyzed: 6/13/95

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

Sample Name: MW-3 (39)
Lab Code: S950700-001

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	25	25	ND	25.4	26.0	102	104	75-135	2
Toluene	25	25	ND	24.0	24.9	96	100	73-136	4
Ethylbenzene	25	25	ND	24.5	25.1	98	100	69-142	2

Approved By: Steve Green Date: 6/16/95

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 0771 / EMCON Project No. 0805-112.02

Service Request: S950700
Date Analyzed: 6/13/95

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	25.8	103	85-115
Toluene	25	25.1	100	85-115
Ethylbenzene	25	25.8	103	85-115
Xylenes, Total	75	75.4	101	85-115
Gasoline	250	249	100	90-110

Approved By: _____ Date: 6/16/95

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	L952521
Project:	ARCO Products Company #0771/#0805-122.02	**Date Collected:**	6/2/95
Sample Matrix:	Water	**Date Received:**	6/7/95
		Date Extracted:	6/8/95

Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/8015M/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name	Lab Code	Date Analyzed	MRL	Result
MW-6 (43)	L952521-001	6/8/95	50	1200*
Method Blank	L952521-MB	6/8/95	50	ND

* Chromatogram fingerprint is not characteristic of diesel; however, hydrocarbons in the gasoline range were detected at the reported concentration.

Approved By: Eydie Schwartz Date: 6/12/95

1AMRLB/071594
L952521.XLS - 8015a 6/12/95

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #0771/#0805-122.02
Sample Matrix: Water

Service Request: L952521
Date Collected: 6/2/95
Date Received: 6/7/95
Date Extracted: 6/8/95
Date Analyzed: 6/8/95

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

Sample Name	Lab Code	MRL	Result
MW-6 (43)	L952521-001	0.5	1.0
Method Blank	L952521-MB	0.5	ND

Approved By: Eydie Schwartz Date: 6/12/95

1AMRL/060194
L952520.XLS - 418w 6/9/95

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #0771/#0805-122.02
Sample Matrix: Water

Service Request: L952521
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/8015M/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
MW-6 (43)	L952521-001	75
Method Blank	L952521-MB	70

CAS Acceptance Limits: 50-140

Approved By: Eydie Schwartz Date: 6/12/95

SUR1/062994
L952521.XLS - 8015srbds 6/12/95

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L952521
Project:	ARCO Products Company #0771/#0805-122.02	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	6/8/95
		Date Analyzed:	6/9/95

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary*
Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/8015M/California DHS LUFT Method
Units: µg/L (ppb)

	True Value		Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	Limits	**Difference**
Diesel	2000	2000	1960	1950	98	98	70-140	<1

* 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: Eydie Schwartz Date: 6/12/95

DLCS/060194
L952521.XLS - genlcs3 6/12/95

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #0771/#0805-122.02
LCS Matrix: Water

Service Request: L952521
Date Collected: NA
Date Received: NA
Date Extracted: 6/8/95
Date Analyzed: 6/8/95

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary*
Total Recoverable Petroleum Hydrocarbons (TRPH)
EPA Method 418.1
Units: mg/L (ppm)

	True Value		Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	Limits	**Difference**
TRPH	2.03	2.03	1.89	1.79	93	88	75-125	5

* 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: Eydie Schwartz Date: 6/12/95

DLCS/060194
L952520.XLS - genlcs3 (2) 6/9/95

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. 0771	City (Facility) Livermore	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave, San Jose, CA 95131		Contract number

	Sample I.D.	Lab no. L952521	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☒	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
1	MW-3(39)		2		X		X	HCL	6-2-95	1229		X											
2	MW-6(43)	1	6		X		X	HCL	6-2-95	1259		X	X		X								
3	MW-4(41)		2		X		X	HCL	6-2-95	1334		X											
4	RW-1(40)		2		X		X	HCL	6-2-95	1417		X											
5	MW-5(40)		2		X		X	HCL	6-2-95	1415		X											
6	MW-7(39)		2		X		X	HCL	6-3-95	1429		X											
7	MW-2(37)		2		X		X	HCL	6-3-95	1521		X											
8	MW-1(37)		2		X		X	HCL	6-3-95	1610		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible
TPH-D = 50 ppb

Special QA/QC: As Normal

Remarks: 2 40ml HCL VOAs
Add: 2 liter glass for HCL
MW-6 2 liter glass NP
#0405-122.02

Lab number: L952521 S950700

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

Condition of sample: OK

Temperature received: Cool

	Date	Time			
Relinquished by sampler	6-5-95	1005	Received by		
Relinquished by			Received by		
Relinquished by Joanne Brown	6-6-95	1600	Received by laboratory	6-7-95	1230

CAS-S

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

CAS-S: GBTEX CAS-L: TPH-D, 418.1 DUE 6/19

APPENDIX C

OPERATION AND MAINTENANCE FIELD DATA SHEETS, SVE SYSTEM, SECOND QUARTER 1995

EMCON

Operation and Maintenance Field Report

Installed air lines for bubbling systems.
installed bubblers to 2 wells - will complete when
we put in compressor/blowers

NAME Mark Adler

DATE 5-15-95

PROJECT NAME ARCO 771

PROJECT NUMBER 0805-122.01

REMARKS: Finished tapping wells for air bubbling lines. Connected 3/4" air line to blower. Ready to bubble!
King Buck unit would not stay running, Paged D>D const. but I received no answer. also left message at home. Could get Mike Reese either.

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

KING/BUCK (model MMC-6A/E) CATALYTIC OXIDIZER

Arrival Time (24:00 hour)	
System Status (on or off)	
Shutdown Time (24:00 hour)	
Alarm Lights on ?	
Restart Time (24:00 hour)	
Reading Time (24:00 hour)	
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	
Flow (velocity: ft/min) **(pipe dia. 2½")**	
Temperature (°F)	

After Blower (system) (I2) (pipe dia. 2½")	
Pressure (In. of H2O)	
System Influent Flow (diff. pressure (in. of H2O)	
Temperature (°F)	
System (Stack dia. 4")	
Operating Temp. Set Point (°F)	
High Temp. Set Point (°F)	
Fire Box Temp (°F) (catalyst entry temp.)	
Catalyst Temp (°F)	
Stack Temp. (°F) (catalyst exit temp.)	
Total Hours	
Electric Meter (kwh)	
Total Flow (Chart Recorder) (cfm)	

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

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

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (inch. water)	Air flow (ft/min)	FID/PID Reading(ppm)	Remarks
VW-1 (SVE)	4"	18.5 - 28.5	ND	21.97	open				D.O. mg/l 1.0
MW-1 (SVE)	4"	32 - 41	ND	27.20	↓				D.O. = 1.0 mg/l
MW-2 (SVE)	4"	30 - 38	ND	23.67	↓				0.9
MW-3	4"	32 - 40							
MW-4 (SVE)	4"	26 - 42	ND	25.80	open				0.9
MW-5 (SVE)	4"	31.5 - 41	ND	26.32	↓				1.1
MW-6	4"	32.5 - 42.5							
MW-7 (SVE)	4"	30 - 40	ND	25.08	open				1.0
MW-8	4"	27.5 - 42.5							
MW-9	4"	29.5 - 39.5							
MW-10	4"	29 - 37							
MW-11	4"	29 - 39							
RW-1 (SVE)	6"	25 - 40	ND	26.76	open				0.8

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

Operator: MAdler Date: 7/10/95 **EMCON Project: 0805-122.01 94-5**

REMARKS: Called Dave Brotherton at home last night to get tips on start-up. Warmed up King Buck unit - It takes about 1 hr. to fully get to set point. Total HRS at start 270.8 Let system Run for 1 hr then sampled I-1 (2½" line after dilution = 1.4" wtr temp = 122°F

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

KING/BUCK (model MMC-6A/E) CATALYTIC OXIDIZER

Arrival Time (24:00 hour)	10:40
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	—
Alarm Lights on ?	—
Restart Time (24:00 hour)	10:57
Reading Time (24:00 hour)	11:57
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	27.7 - 29.0
Flow (velocity: ft/min) (pipe dia. 2½")	2000
Temperature (°F)	71

After Blower (system) (I2) (pipe dia. 2½")	
Pressure (In. of H2O)	8.1
System Influent Flow (diff. pressure (in. of H2O)	1.4
Temperature (°F)	122°
System (Stack dia. 4")	
Operating Temp. Set Point (°F)	700
High Temp. Set Point (°F)	975
Fire Box Temp (°F) (catalyst entry temp.)	700
Catalyst Temp (°F)	707
Stack Temp. (°F) (catalyst exit temp.)	670
Total Hours	271.8
Electric Meter (kwh)	
Total Flow (Chart Recorder) (cfm)	92

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

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

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (inch. water)	Air flow (ft/min)	FID/PID Reading(ppm)	Remarks
VW-1 (SVE)	4"	18.5 - 28.5							
MW-1 (SVE)	4"	32 - 41							
MW-2 (SVE)	4"	30 - 38							
MW-3	4"	32 - 40							
MW-4 (SVE)	4"	26 - 42							
MW-5 (SVE)	4"	31.5 - 41							
MW-6	4"	32.5 - 42.5							
MW-7 (SVE)	4"	30 - 40							
MW-8	4"	27.5 - 42.5							
MW-9	4"	29.5 - 39.5							
MW-10	4"	29 - 37							
MW-11	4"	29 - 39							
RW-1 (SVE)	6"	25 - 40							

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

Operator: MAdler Date: 7/12/95

EMCON Project: 0805-122.01 94-5

Started bubbling at 12:00 blower set at 10 psi

All the exit piping is getting hot to the touch.

Took samples I-1 (b) I-2 & E-1

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

KING/BUCK (model MMC-6A/E) CATALYTIC OXIDIZER

Arrival Time (24:00 hour)	10:40
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	—
Alarm Lights on ?	—
Restart Time (24:00 hour)	10:57
Reading Time (24:00 hour)	12:22
Well Field (I1) (before dilution)	
Vacuum (In. of H2O)	26.5 - 27.4
Flow (velocity: ft/min) (pipe dia. 2½")	2050
Temperature (°F)	72

After Blower (system) (I2) (pipe dia. 2½")	
Pressure (In. of H2O)	8.2
System Influent Flow (diff. pressure (in. of H2O)	1.4
Temperature (°F)	124
System (Stack dia. 4")	
Operating Temp. Set Point (°F)	700
High Temp. Set Point (°F)	975
Fire Box Temp (°F) (catalyst entry temp.)	700
Catalyst Temp (°F)	738
Stack Temp. (°F) (catalyst exit temp.)	677
Total Hours	272.2
Electric Meter (kwh)	03034
Total Flow (Chart Recorder) (cfm)	94

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

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

WELL FIELD (do monthly)

Well ID	Well Dia.	Screen interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (inch. water)	Air flow (ft/min)	FID/PID Reading(ppm)	Remarks
VW-1 (SVE)	4"	18.5 - 28.5							
MW-1 (SVE)	4"	32 - 41							
MW-2 (SVE)	4"	30 - 38							
MW-3	4"	32 - 40							
MW-4 (SVE)	4"	26 - 42							
MW-5 (SVE)	4"	31.5 - 41							
MW-6	4"	32.5 - 42.5							
MW-7 (SVE)	4"	30 - 40							
MW-8	4"	27.5 - 42.5							
MW-9	4"	29.5 - 39.5							
MW-10	4"	29 - 37							
MW-11	4"	29 - 39							
RW-1 (SVE)	6"	25 - 40							

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

Operator: MAdler Date: 7/12/95

EMCON Project: 0805-122.01 94-5

APPENDIX D

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, SVE SYSTEM AIR SAMPLES, SECOND QUARTER 1995

Columbia Analytical Services, Inc.

July 25, 1995

Service Request No. S950883

Ms. Valli Voruganti
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 771 / EMCON Project No. 0805-122.02**

Dear Ms. Voruganti:

Attached are the results of the vapor sample(s) submitted to our lab on July 12, 1995. For your reference, these analyses have been assigned our service request number S950883.

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

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
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
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. 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
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
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 method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950883
Project:	ARCO Facility No. 771/EMCON Project No. 0805-122.02	**Date Collected:**	7/12/95
Sample Matrix:	Vapor	**Date Received:**	7/12/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

		Sample Name:	**I-1(a)**	**I-1(b)**	**I-2**
		Lab Code:	S950883-001	S950883-002	S950883-003
		Date Analyzed:	7/13/95	7/13/95	7/13/95
Analyte	**MRL**				
Benzene	0.5		0.5	6.7	3.8
Toluene	0.5		1.7	3.7	2.2
Ethylbenzene	0.5		0.7	5.7	3.3
Total Xylenes	1		2.2	16	10
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20		ND	ND	ND
C_5 - C_8 Hydrocarbons	20		42	190	97
C_9 - C_{12} Hydrocarbons	20		23	180	99
Gasoline Fraction (C_5-C_{12})	60		65	370	200

Approved By: Steve Green Date: 7/25/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Facility No. 771/EMCON Project No. 0805-122.02
Sample Matrix: Vapor

Service Request: S950883
Date Collected: 7/12/95
Date Received: 7/12/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

		Sample Name:	**E-1**	**Method Blank**
		Lab Code:	S950883-004	S950713-VB1
		Date Analyzed:	7/13/95	7/13/95
Analyte	**MRL**			
Benzene	0.5		ND	ND
Toluene	0.5		ND	ND
Ethylbenzene	0.5		ND	ND
Total Xylenes	1		ND	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20		ND	ND
C_5 - C_8 Hydrocarbons	20		ND	ND
C_9 - C_{12} Hydrocarbons	20		ND	ND
Gasoline Fraction (C_5-C_{12})	60		ND	ND

Approved By: _____ Date: 7/25/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Facility No. 771/EMCON Project No. 0805-122.02
Sample Matrix: Vapor

Service Request: S950883
Date Collected: 7/12/95
Date Received: 7/12/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name:	**I-1(a)**	**I-1(b)**	**I-2**
Lab Code:	S950883-001	S950883-002	S950883-003
Date Analyzed:	7/13/95	7/13/95	7/13/95

Analyte	**MRL**			
Benzene	0.1	0.2	2.1	1.2
Toluene	0.1	0.4	1.0	0.6
Ethylbenzene	0.1	0.2	1.3	0.7
Total Xylenes	0.2	0.5	3.7	2.3
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	5	ND	ND	ND
C_5 - C_8 Hydrocarbons	5	10	48	24
C_9 - C_{12} Hydrocarbons	5	6	43	24
Gasoline Fraction (C_5-C_{12})	15	16	91	48

Approved By: _____ Date: 7/25/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950883
Project:	ARCO Facility No. 771/EMCON Project No. 0805-122.02	**Date Collected:**	7/12/95
Sample Matrix:	Vapor	**Date Received:**	7/12/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name:	**E-1**	**Method Blank**
Lab Code:	S950883-004	S950713-VB1
Date Analyzed:	7/13/95	7/13/95

Analyte	**MRL**		
Benzene	0.1	ND	ND
Toluene	0.1	ND	ND
Ethylbenzene	0.1	ND	ND
Total Xylenes	0.2	ND	ND
Total Volatile Hydrocarbons			
C_1 - C_4 Hydrocarbons	5	ND	ND
C_5 - C_8 Hydrocarbons	5	ND	ND
C_9 - C_{12} Hydrocarbons	5	ND	ND
Gasoline Fraction (C_5-C_{12})	15	ND	ND

Approved By: _____ Date: 7/25/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 771/EMCON Project No. 0805-122.02
Sample Matrix: Vapor

Service Request: S950883
Date Collected: 7/12/95
Date Received: 7/12/95
Date Extracted: NA
Date Analyzed: 7/13/95

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1(b)
Lab Code: S950883-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	6.66	6.68	6.67	<1
Toluene	0.5	3.72	3.69	3.70	1
Ethylbenzene	0.5	5.71	5.70	5.70	<1
Xylenes, Total	1	15.9	15.7	15.8	1
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	ND	ND	ND	<1
C_5 - C_8 Hydrocarbons	20	195	200	198	3
C_9 - C_{12} Hydrocarbons	20	178	176	177	1
Gasoline Fraction (C_5-C_{12})	60	373	374	374	<1

Approved By: _____ Date: 7/25/95

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 771/EMCON Project No. 0805-122.02
Sample Matrix: Vapor

Service Request: S950883
Date Collected: 7/12/95
Date Received: 7/12/95
Date Extracted: NA
Date Analyzed: 7/13/95

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name: I-1(b)
Lab Code: S950883-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.1	2.08	2.09	2.08	<1
Toluene	0.1	0.986	0.978	0.982	1
Ethylbenzene	0.1	1.31	1.31	1.31	<1
Xylenes, Total	0.2	3.66	3.61	3.64	1
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	5	ND	ND	ND	<1
C_5 - C_8 Hydrocarbons	5	47.6	48.8	48.2	3
C_9 - C_{12} Hydrocarbons	5	43.4	42.9	43.2	1
Gasoline Fraction (C_5-C_{12})	15	91.0	91.3	91.2	<1

Approved By: Steve Chen Date: 7/25/95

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 771/EMCON Project No. 0805-122.02

Service Request: S950883
Date Analyzed: 7/13/95

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	16	16.7	104	85-115
Toluene	16	16.5	103	85-115
Ethylbenzene	16	16.2	101	85-115
Xylenes, Total	48	48.4	101	85-115
Gasoline	200	202	101	90-110

Note: ppmV = mg/m^3 x [24.45 (gas constant) / molecular weight (MW)]
MW Benzene = 78, Toluene = 92, Ethylbenzene = 106, Total Xylenes = 106
MW Gasoline = 89

Approved By: _____ Date: 7/15/95

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 3751.00

Chain of Custody

ARCO Facility no. 771	City (Facility) Livermore	Project manager (Consultant) V. Vorugant	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408 3778697	Telephone no. (Consultant) 408 453 7300	Fax no. (Consultant) 408 453 0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood San Jose, CA.		Contract number 07077

Method of shipment: Tech

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

Special QA/QC:

Remarks: 0805-122.02

Lab number: 5950883

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Vapor)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH Gas EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
I-1(a)	1	1			X			7/12/95	1152		X									
I-1(b)	2	1			X				1212		X									
I-2	3	1			X				1214		X									
E-1	4	1			X				1220		X									

Condition of sample: Aplated

Temperature received: RT

Relinquished by sampler	Date 7/12/95	Time 17:17	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: Joanne Brown

Date: 7-12-95 Time: 17:17

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

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

APPC-3292 (2-91)

Due 7/26